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ENVIRONMENTAL ASSESSMENT



Oil and Gas Leasing
in the Big Hatchets and Alamo Hueco Mountains
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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
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LAS CRUCES, NEW MEXICO
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ENVIRONMENTAL ASSESSMENT

Oil and Gas Leasing
in the Big Hatchets and Alamo Hueco Mountains

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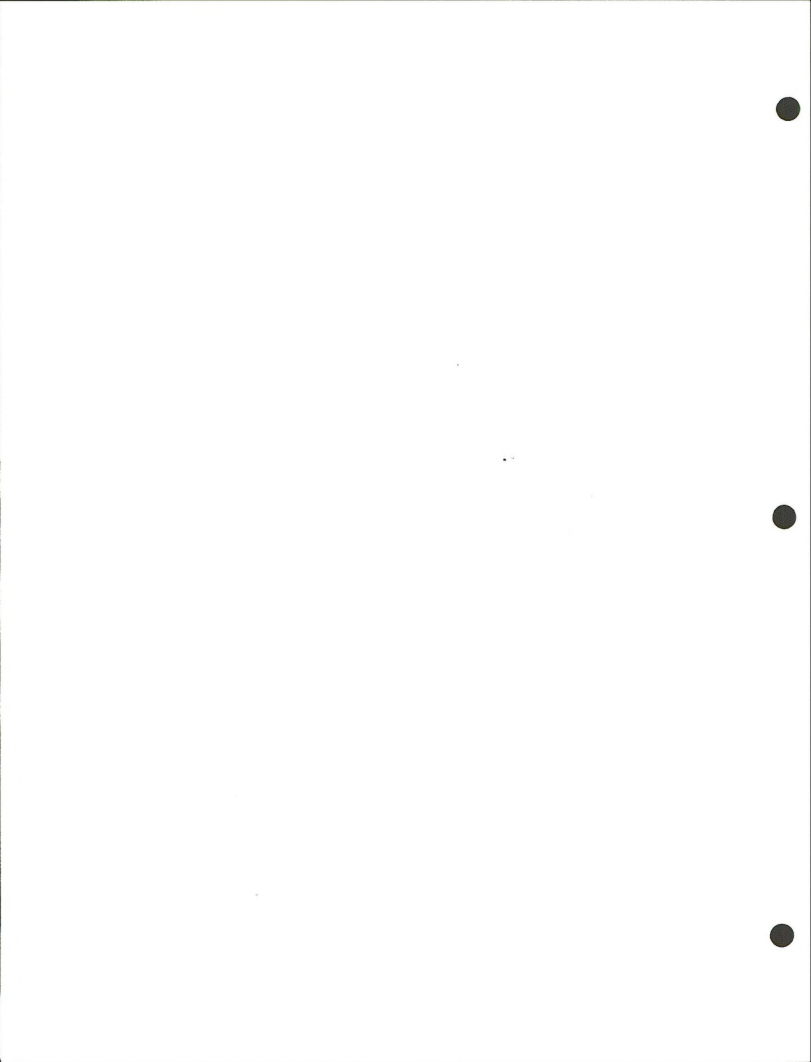


TABLE OF CONTENTS

	<u>Page</u>
Summary	
I. Introduction	2
A. Proposed Action	2
B. Scoping - Identification of Major Issues	2
C. Alternatives	4
D. Authority	7
E. Stages of Oil and Gas Development	7
F. Mitigation Measures	14
G. Interrelationships with Existing Environmental Data	15
II. Existing Environment and Impact Analysis	17
A. Air Quality	17
B. Climate	17
C. Soils and Vegetation	17
D. Water	21
E. Geology	22
F. Wildlife	28
G. Cultural Resources	42
H. Economic	46
I. Social	50
J. Human Values	51
1. Visual Resources	51
2. Wilderness	51
3. Areas of Critical Environmental Concern	52
III. Consultation and Coordination	54
Letters	57
Appendices	
Appendix A - Legal Description of Oil and Gas Lease Boundary	A-1
Appendix B - Court Decisions	A-8
Appendix C - Game Refuge Boundaries	A-9
Appendix D - Hidalgo, Luna, and Grant Counties Water Requirements	A-11
Appendix E - Species List	A-13
Appendix F - Wilderness Non-impairment Criteria	A-16

Literature Cited



LIST OF MAPS

<u>Map No.</u>		<u>Page</u>
1	Map of Environmental Assessment Study Area	
2	Map of New Mexico	1
3	Petroleum Prospects in the Southwest.	23
4	Bighorn Sheep Use Area.	33
5	Archaeological Areas.	44

LIST OF PHOTOS

<u>Photo No.</u>		
1	Big Hatchet Mountains	3
2	Big Hatchet Mountains	3
3	Big Hatchet Mountains	5
4	Alamo Hueco Mountains	6
5	Alamo Hueco Mountains	6
6	Seismic Exploration	9
7	Seismic Exploration	9
8	Drilling Operation.	11
9	Drilling Operation.	11
10	Drilling Operation.	12
11	Desert Bighorn.	35
12	Desert Bighorn.	35

LIST OF TABLES

<u>Table No.</u>		
1	Stratigraphic Nomenclature.	25
2	Median Income Deming.	46
3	Median Income Lordsburg	46
4	Economics of the Desert Bighorn Reintroduction Program.	49
5	Visual Resource Management.	53
6	Input Summary	55

LIST OF FIGURES

<u>Figure No.</u>		
1	Regional Stratigraphic Cross Section.	26
2	Stratigraphic Section - Big Hatcnets.	27

Summary

The purpose of this Environmental Assessment (EA) is to determine the oil and gas lease policy in the Big Hatchet-Alamo Hueco area of Hidalgo County, New Mexico. The present policy is to deny leases in the entire area (see map 1 for boundaries).

The major issues considered in this EA are: This nation's critical need for new energy supplies, and the Big Hatchet-Alamo Hueco area supports the only healthy, free roaming herd of desert bighorn sheep in New Mexico. The Big Hatchet-Alamo Hueco area has good oil and gas potential. Desert bighorn sheep are soon to be proposed for listing as state endangered species.

Possible oil and gas lease alternatives and the important resource tradeoffs are:

Alternative 1 - Existing Lease Boundaries Would be Maintained - No action

The amount of oil and gas which could be developed would be limited. Finding and developing new oil or gas resources, which is a national priority, would be limited to the few existing leases.

The sheep would be protected with this alternative.

Alternative 2 - Lease the Entire Area

All viable oil or gas deposits could be developed, this would contribute to the nation's energy supply.

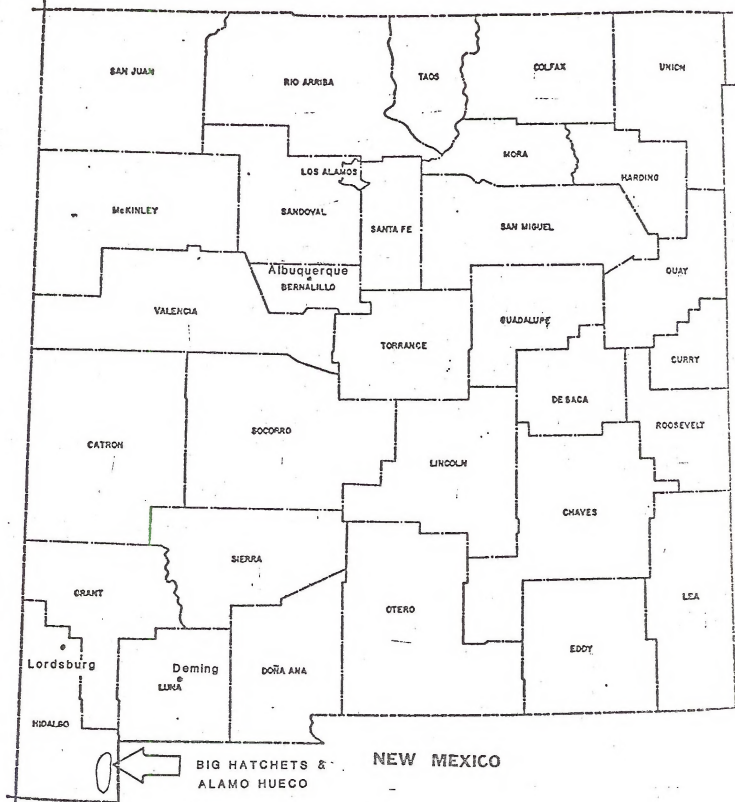
Any oil or gas development within desert bighorn critical habitat areas would likely cause the sheep to abandon the Big Hatchets, and the herd could be lost to stress or predation.

Alternative 3 - Open Part of the Area for Leasing

This alternative would increase the area available to oil and gas development (33,000 acres), however, some of the promising areas at the base of the mountain would not be developed (see map 1, the area within the oil and gas lease boundary would be no lease, except for those areas marked lease with no surface occupancy). It is unlikely that extensive development would occur in the mountains because the terrain is extremely rugged and geologically it would be less favorable. Trade-offs between protecting sheep, their potential habitat, and developing oil and gas is not as great in the mountains as the areas along the base of the mountains.

These boundaries would protect the sheep and their status would be monitored.

Map 2



This alternative attempts to maximize the area available to oil and gas leasing and protect the sheep. This is the agency preferred alternative.

Alternative 4 - Move the Sheep to Another Location

This alternative would allow oil and gas leasing in the entire area, and would, hopefully protect the sheep. This alternative is expensive, neither the Bureau of Land Management (BLM) or New Mexico Department of Game and Fish (NMG&F) has the funds to move the sheep.

Moving the sheep is also risky, mortality rates are high. Oil and gas activities would be restricted in any relocation area, however, an area with limited oil and gas potential could be chosen.

I. Introduction

A. Proposed Action

The proposed action is to update and revise the Environmental Analysis Record, Oil and Gas Leasing for Las Cruces District-West (EAR number 30-030-73-3), specifically for the Big Hatchet and Alamo Hueco Mountains. The lands involved are located in:

- T. 30 S., R. 14 W., 15 W., 16 W., NMPM
- T. 31 S., R. 14 W., 15 W., 16 W., NMPM
- T. 32 S., R. 14 W., 15 W., 16 W., NMPM
- T. 33 S., R. 14 W., 15 W., 16 W., NMPM
- T. 34 S., R. 14 W., 15 W., 16 W., NMPM (see map 1)

Purpose and Need for the Proposed Action

Revising the Environmental Assessment is necessary because Placid Oil Co. and W. E. Haley appealed rejected lease offers. Interior Board of Land Appeals decision 80-21 and 79-516 concluded "BLM has not provided the necessary background data and reasons to support in rejection of appellants offers." The purpose of this Environmental Assessment is to help determine the oil and gas lease policy in the Big Hatchets and Alamo Huecos.

B. Scoping - Identification of Major issues

Interested public contacted by letter before this Environmental Assessment was prepared to determine the major issues and possible alternatives. Meetings were held with representatives from the Bureau of Land Management (BLM), New Mexico Game and Fish (NMG&F), U.S. Geological Survey (USGS), and Placid Oil Company to discuss alternatives and issues. The following were identified as major issues:

1. There are less than 100 desert bighorn in New Mexico, 75% are in captivity and the remaining sheep are located in the Big Hatchets. Many people felt oil and gas development has the potential of further reducing the sheep population. Others felt oil and gas development can be consistent with protecting Desert Bighorn if the proper restrictions are imposed.
2. Many commentors felt locating and extracting oil and gas is very important for the local economy, and the nation's energy supply. They recognized the critical need for new energy resources. Others felt energy should not jeopardize the existence of a species and degrade wilderness qualities.

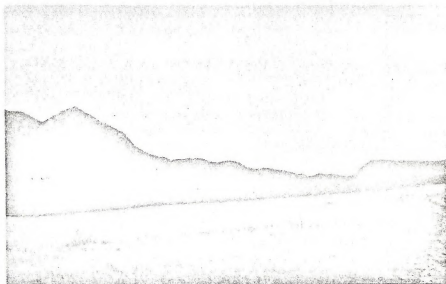
PHOTO 1

Big Hatchet Mountains



Northern Big Hatchets Looking northeast.

PHOTO 2



View of Big Hatchet, U-Bar Ridges and Hueco Mountains looking east.

3. Outstanding wilderness values and supplemental values of the area were identified as inconsistent with oil and gas leasing. Others felt wilderness tied up important resources.

Letters received during the scoping phase are in the consultation and coordination section.

C. Alternatives

This section identifies possible oil and gas lease policy alternatives. Alternatives were developed from public and government agencies' comments and suggestions by BLM specialists.

1. No action alternative: Maintain the no lease policy within the boundary identified in Environmental Analysis Record prepared in 1973 (EAR # 30-030-73-3). This is the boundary challenged in IBLA decision 80-21, 79-516 (see boundaries on map 1).

All lease offers within this boundary would be denied, however, exploration would continue on leases issued prior to the adoption of the no lease policy.

2. Open the entire area, 111,500 acres, to oil and gas leasing. Oil and gas leasing would be allowed with appropriate stipulations. Within the wilderness study area, leasing and development would be consistent with wilderness interim management policy until a final wilderness decision is made. In critical habitat areas seasonal stipulations for protecting the sheep could apply.
3. Reduce the size of the no lease area identified in the no-action alternative. There would be no leasing allowed within 1 to 1½ miles of the mountains, and a ½ mile buffer zone of leasing with no surface occupancy (see map 1). The remaining area would be leased.

Leasing with no surface occupancy would cause no increase in facilities, but exploration activities would probably increase. Slant drilling techniques would be used to remove gas or oil from the no occupancy area.

This alternative would provide a buffer zone for the sheep. The area available to oil and gas leasing would increase 33,000 acres (as compared to Alternative 1). This is the BLM preferred alternative. The legal descriptions for no-lease areas, and lease with no surface occupancy are listed in Appendix A.



Big Hatchets looking north from between the
Big Hatchets and Alamo Huecos.

Photos T. Hatfield

Alamo Hueco Mountains

PHOTO 4



Alamo Hueco Mountains
taken from Pierce Canyon.

PHOTO 5



4. The sheep would be moved to another location. This was done with the Desert Bighorn herd in the San Andres Mountains. Potential habitat areas were identified in Preliminary Survey Report Evaluation of Historic Desert Bighorn Sheep Ranges (Sandoval 1979). According to this study the best potential habitat areas are:

- a. Alamo Hueco Mountains
- b. Peloncillo Mountains
- c. Fra Cristobal Mountains
- d. Ladron Mountains
- e. San Mateo Mountains
- f. Cookes Range

The study recommended the initial release should be in the Big Hatchets. Leasing would be allowed in the entire area with appropriate wilderness stipulations.

D. Authority

BLM has the authority to issue oil and gas leases under the Mineral Leasing Act of February 25, 1920 as amended (41 Stat. 437; 30 USC 181 et seq.), and the Acquired Lands Mineral Leasing Act of August 8, 1947 (61 Stat. 913; 30 USC 351-359). The regulations implementing these acts are contained in 43 CFR, 3000 et seq., lands subject to leasing, Public Domain 43 CFR 3101. All lands subject to disposition under the Acts may be leased by the Secretary. The Secretary of the Interior, through the BLM, may refuse to lease lands for oil and gas even if the lands have not been withdrawn from mineral entry. The court cases upholding this authority are listed in Appendix B.

E. Stages of Oil and Gas Development

Leasing

Leases are offered simultaneously, applied for noncompetitively or competitively. Simultaneous offers are lands that were previously leased, but were dropped due to non-payment of rental fees or expiration, and are received through a lottery. Noncompetitive applications are filed on areas not previously leased and are applied for directly from the BLM. Competitive leases are offered in known producing areas; potential leaseholders bid on the lease, highest bidder receives the lease.

Prior to offering leases, the BLM State Office requests environmental data from the BLM District Office. The district advises the State Office of any objections to leasing, and may recommend: no lease, lease with no special stipulations, or lease with special stipulations (e.g., lease with no surface occupancy, lease with wilderness stipulations). This advice comes from existing environmental assessments or planning documents. Leasing is an administrative action, there are no impacts to the environment.

Geophysical Exploration

Recent geophysical exploration in the Big Hatchet - Alamo Hueco - Dog Mountain area consisted of geochemical and seismic operations.

a. Geochemical

A truck-mounted drill rig, and a recording truck, travel on existing roads and trails. Every 1/2 mile a 4 inch diameter 12 foot deep hole is drilled and a probe (which is connected to the recording truck) is inserted; surface disturbance is minimal. This test determines the type of gas present.

b. Seismic Surveys

Seismic surveys, such as vibroseis and dinoseis, use truck mounted equipment to pound or vibrate the earth. Detectors (geophones) are placed in the ground to pick up subsurface shock waves. The signal then travels, via cables, to a recording instrument on another truck. There are usually 4-5 vibrator or thumper trucks, 1-2 cable trucks, maintenance trucks, one recording truck, and some support pickup trucks. If trucks travel in line a trail is formed; an echelon pattern disturbs a wider area, but the disturbance is not concentrated (however, one route along the survey line may be heavily used and a trail may be formed).

Other seismic exploration activities includes the explosive and primercord methods. The explosive method involves drilling 100-200 foot deep holes, which are loaded with 5 to 50 lbs. of explosives and detonated. Primercord involves digging a narrow trench, placing a cable in the trench and detonating a primer charge at one end of the cable. Both methods are outdated and rarely used. Other geophysical methods include magnetotelluric and gravity surveys. Gravity and magnetotelluric survey instruments are carried in backpacks and set up, very minimal or no disturbance occurs. Magnetotelluric surveys may require a pickup truck, but little, if any, off-road vehicle use is necessary.

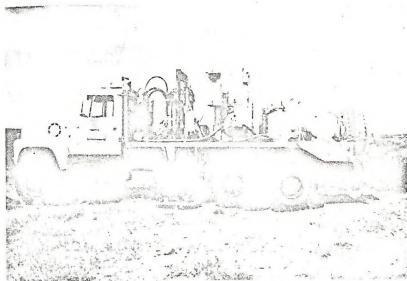
PHOTO 6

Seismic Exploration



Seismic trucks travelling off road.

PHOTO 7



Notice the vibrator plate on the ground.

Photos M. Darienzo

Drilling Exploration

The following discussion was written with help from Ray Stall and Chuck Flaherty of USGS in Artesia, NM; Tom Hewitt and Lloyd Reed of the BLM in Roswell, NM; and Russell Pigors and Marlynn Spears of BLM, Farmington, NM.

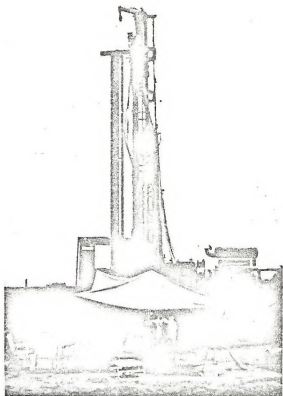
Subsequent exploration activities consist of wildcat and development wells; the two are similar. Wildcat wells are drilled in areas with no oil and gas development, and are risky because they are drilled with limited geologic information. Development wells are drilled near producing fields where there is more information and greater chances of success. The Big Hatchet - Alamo Hueco area would be a wildcat exploration area. Wildcat wells are approved by USGS only after an environmental assessment is prepared, and a determination is made that the action does not constitute a major Federal action significantly affecting the environment in the sense of the National Environmental Policy Act. The environmental assessment must have BLM concurrence. Attached to and part of the application to drill is a "Development Plan for Surface Use" which receives BLM concurrence.

After a well site is selected, an access road (usually 18 to 20 feet wide with shoulders) is constructed to accommodate a drill rig and support vehicles. During construction of the site, brush is cleared, the area is graded, and the roads and drill site may be improved with caliche. On steeper slopes, cuts and fills might be necessary, however, more level sites are preferable.

Drilling sites vary in size from about 100 feet x 100 feet to 250 feet x 350 feet. Generally, the deeper hole has the larger site, and reservoir pit for drilling fluids and cuttings. Equipment on the site includes the drill rig, with masts that are 90-120 feet high, mud pumps, generators and water and fuel storage tanks. Water is either trucked, piped in from local sources, or comes from a well. The drill hole is lined and cemented with a string of casings. These casings help to prevent contamination of ground water. Drilling equipment could be on the site from 1 week for a 2500 foot well to 4 months or more for 25,000 foot wells, if no problems are encountered. There is a crew of 4-5 men working 24 hours a day, and at night there are lights on the masts and around the drill rig.

Drilling Operations

PHOTO 8



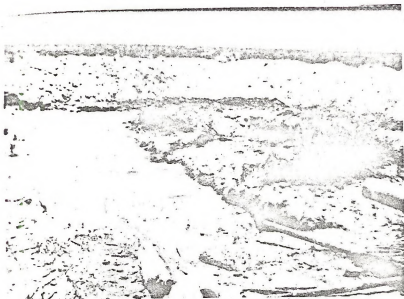
Oil and gas drilling operation. This operation was drilling about 2,600 feet deep.

PHOTO 9



Drilling Operation

PHOTO 10



Reservoir pit for drilling mud and water.
This pit will be filled in and recontoured.

If a discovery is made, much of the support equipment is moved away, but if no discovery is made, the hole is abandoned and reclaimed.

Production

The extent of oil production, if any, in the Big Hatchets and Alamo Huecos is impossible to determine without more geological data. Oil and gas activities could cease after several exploratory wells are drilled. Full scale production, if appropriate, could be a few years (2-5 years or many years away) depending on the extent of the field.

After the drill rig is removed, a surface pump (jack) for oil or valve (Christmas tree) for gas is installed. The pump may be powered electrically, via powerline or by gas generator.

Oil storage tanks would be required and other equipment such as separators, which remove excess water or gas from oil. If oil is produced from a gas drive, the gas is separated and may be flared, depending on state regulations. However, this is rarely done; usually gas is separated, conserved, and sold.

Data from the discovery well such as porosity, permeability, etc., are considered when USGS and the State Oil and Gas Commission determine well spacing. Standard well spacing for oil is 40 acres (1320 foot centers) and 160 acres (possibly 320-640 acres) for gas.

It is not unusual for four or more wells to be drilled simultaneously. Construction and drilling operations require a number of employees which live near the area.

Primary production continues as long as wells are capable of producing at a steady rate; 20-25 years is not uncommon.

The type and number of support facilities are unknown at this time. The environmental impacts of roads, pipelines, and other support facilities would be analyzed site specifically when the extent of production is known. These facilities must be authorized through rights-of-way and temporary use permits. Each of these actions requires that an Environmental Assessment or Environmental Impact Statement be completed. Therefore, this Environmental Assessment will not analyze the impacts of these facilities.

Abandonment and Reclamation

When a drill hole is abandoned or production becomes uneconomical, the operator requests permission from USGS to plug and abandon the field or well.

Abandonment is usually accomplished by removing equipment and trash, capping the hole, and reclaiming the well site, access roads and pipeline. If fresh water was found the well may be converted to a water well.

Rehabilitation could occur on both producing and abandoned wells. Waterbars and terracing may be necessary to prevent erosion of fill material. All excavation pits and drill pads would be closed by backfilling, and recontoured. Disturbed sites would be prepared to provide a suitable seedbed for re-establishing vegetation. This may include: contouring, terracing, scarifying, mulching, fertilizing, seeding and planting. Final grading of cut and fill slopes would prevent erosion and encourage establishment of vegetation.

The publication Seeding Nonirrigated Lands in New Mexico, Report #10, February 1973, discusses the procedures necessary to reestablish vegetation.

"Grasses are slow to establish in the arid southwest and new seedings should not be considered failures without allowing ample time for establishment. This is usually 2-4 years depending on the site." (New Mexico Interagency Range Committee 1973). Since water is the critical factor, irrigation would definitely reduce the time necessary for establishment (Herbel, 1980).

Vegetation could be established naturally without reseeding by mechanically manipulating the soil, thus forming a micro-environment for water to collect and seeds to germinate. (Hodder 1977) The length of time necessary for establishment is a function of the amount of moisture, the type and amount of natural seed source, and whether original vegetation was destroyed.

F. Mitigating Measures

The following measures would alleviate the adverse affects of oil and gas development.

1. For alternatives 1, 2, and 3 the area will be monitored by personnel from NMG&F and the BLM. NMG&F will submit monthly reports concerning the status of the sheep. Every year the

BLM, with the cooperation of NMG&F, will evaluate the sheep, their habitat requirements, oil and gas lease boundaries and stipulations. These reports and meetings will be consistent with Cooperative Agreement NMSO-37 Supplement 1 and contract YA-512-CT9-160. Any changes in boundaries or stipulations will receive concurrence from USGS. An Environmental Assessment or Statement will be prepared if there are boundary changes.

There will be no monitoring by NMG&F personnel with alternative 4. BLM will monitor oil and gas activities at least every 6 months and USGS will inspect activities as they deem necessary.

2. An archaeological clearance will be conducted in a 40 acre area around the drill site. This will help the company avoid disturbing any cultural resources, and alleviate the need for future surveys should the operation expand. In addition, all pipelines and access roads will be surveyed 50 feet on either side of the center line. If cultural resources are found, preferably, sites will be avoided, and if necessary, the site will be excavated. Other surface disturbing activities will be surveyed to cover all possible areas of disturbance.
3. Site specific threatened or endangered species clearances will be completed in areas that were identified by New Mexico State Heritage Program and NMG&F as having special concern plant species and listed or proposed endangered species. All activities will be site specifically analyzed for state and Federal proposed or listed threatened and endangered species (which might be identified in the future). The BLM Wildlife Biologist will determine appropriate stipulations when the clearance is completed.
4. Stipulations attached to the lease will be followed.
5. No off-road travel will be allowed on swales and drainage bottoms (tobosa draws). This includes riparian areas near stock tanks.
6. For alternatives 2 and 3, during drought periods water would be brought into the mountains for the sheep. This will alleviate the adverse effects of sheep moving to livestock troughs in the flats.

G. Interrelationships with Existing Environmental Data

This section discusses this Environmental Assessment's (EA's) relationship with other existing Environmental Assessments and

Land Use Plans. There is an existing programmatic EA concerning Oil and Gas Leasing in the Las Cruces District West. This document was the basis for rejecting oil and gas leasing in the Big Hatchets and Alamo Huecos.

The Management Framework Plan (MFP) is a BLM decision document which determines land use. The MFP for the area was prepared in 1971 and needs updating. The recreation MFP recommends the establishment of a primitive area in the Hatchet Mountain Wildlife Refuge. According to the MFP, "recreation activities will be coordinated with wildlife habitat management and with NMG&F." The minerals MFP step 2 recommends "that not anything be done to restrict oil and gas leasing, exploration, and development in the potential oil and gas resource areas. These areas are generally in basin structures." The wildlife MFP recommends "Initiate designation of this area as a primitive area. Initiate intensive study of total ecology of the bighorn sheep biological unit. Initiate cooperative efforts with the New Mexico Department of Game and Fish." These conflicts were never resolved (MFP 3).

The Big Hatchets were declared a Game Refuge by the State of New Mexico on October 25, 1926 and amended May 5, 1947 and 1978. Presently, the area is closed to all hunting except javelina and cougar. The purpose of the refuge was to protect the desert bighorn sheep. (see Appendix C for exact game refuge location).

II. Existing Environment and Impact Analysis

The existing environment will be discussed followed by an impact analysis for each stage of oil and gas development and the alternatives.

A. Air Quality

The air quality of the Big Hatchets and Alamo Huecos meets ambient air quality regulations. Sources of pollution for the area are blowing dust, vehicles, and the Phelps Dodge smelter.

There would be an increase in hydrocarbon pollution from internal combustion engines. The amount of particulate matter would increase due to an increase in vehicles; this was estimated in the Los Padres phosphate and gypsum mine EIS (BLM 1971). At average speeds of 10 mph, dust emissions from improved haul roads average .52 pounds per vehicle mile. This would not be significant because the area would still meet ambient air quality regulations.

The increase in pollution and dust would occur during all stages of oil and gas development, and would be associated with all of the alternatives.

B. Climate

Annual precipitation in the Big Hatchets and Alamo Huecos averages 9-10 inches, which falls primarily in July, August, and September. The average summer temperature is about 81°F, and the daily maximum temperature often exceeds 100° (Watts 1979). Evaporation levels are quite high, consequently there is little available moisture. The lack of water is a severe growth limiting factor which inhibits reclamation.

There would be no impacts to climate during any stage of oil and gas development or from any alternative.

C. Soils and Vegetation

The impacts to soil and vegetation would affect both, therefore, the two will be discussed together.

1. Soils

The Big Hatchets and Alamo Huecos contain three major landforms, each with different soil types. The major landforms and soil types are:

a. Mountains

Soil Texture - Over 50% of the area has exposed limestone bedrock with calcareous gravelly and cobbly loams interspersed between rock outcroppings.

Slopes - 10-75%

Erosion Hazard - moderate to high

- b. Gravelly, creosote covered piedmonts

Soil textures - gravelly loams with caliche occurring within 20 inches.

Erosion Hazard - Moderate to high. These areas are very slow to heal if disturbed.

- c. Swales and drainage bottoms (tobosa draws)

Soil texture - Silty clay loam surface to clay subsurface

Slopes - 0-5%

Erosion hazard - slight

Soils in these areas are highly compactible, especially when wet. Off-road travel can cause ruts, gullies, and a drying affect on the outer areas of the draw. (Dryer soils favor shrub growth, see mitigation measure 5).

No prime or unique farmland is located in the area.

2. Vegetation

Vegetation within the Big Hatchets consists of 5 major types, pinyon-juniper, desert shrub, mesquite sandy areas, tobosa draws and creosote gravelly areas.

Pinyon-juniper dominates the highest elevations in northern areas and shaded areas in the southern part of the range (Watts 1979).

Desert shrub dominates mountain slopes and smaller canyon (Watts, 1979). The species associated with this type are prickly pear, cholla, white-thorn, yucca, agave, ocotillo, grama grass, threeawns, muhlys, grass sagewort, dalea, and littleleaf sumac.

The mesquite sandy areas are located in areas of sandy soils along drainages. The species characterized by these areas are: mesquite, snakeweed, fourwing saltbush, and pepperweed.

Tobosa draws are located in clay or clay loam soils, which are in swales and drainage bottoms. Tobosa grass is the dominant species.

Creosote gravelly areas are located along flats around the mountains which have gravelly loams with caliche close to the surface. Species which occur in these areas are: creosote, bush muhly, tarbush, fluffgrass and mariola.

Threatened and Endangered Plant Species

A literature search for threatened, endangered, and special concern species was completed by New Mexico State Heritage Program. The following species were identified and located.

Species: Penstemon dasyphyllus

Status: Selected by the New Mexico State Heritage Program as a concern element

Species: Perityle lemmonii

Status: Previously proposed as a Federally threatened species. The State is studying the plant for some type of designation.

Species: Penstemon lanceolatus

Status: Selected by the New Mexico State Heritage Program as a special concern element.

The general location of these species is not shown because of the sensitivity of these species. An informal consultation was held with U. S. Fish and Wildlife Service on February 5, 1980. A no-affect determination to Federally listed or proposed threatened and endangered species was made. A no-affect determination was also made for State listed or proposed threatened and endangered species. (see Mitigation Measure 3)

Impacts on Soil and Vegetation

The amount of soil erosion is variable depending on soil texture, amount of rainfall, percent of slope, length of slope, and type and amount of vegetative cover. If any of these factors change, the rate of erosion is changed.

If soil and vegetation is disturbed from off-road travel or from clearing a site for roads, drill pads or other facilities, the amount of cover and, perhaps the percent and length of slope changes. The reduction in cover and changes in slope increases soil erosion.

Heavy equipment and vehicles travelling on the soil would compact the soil. In areas where soil is compacted, soil moisture is adversely affected because there is greater runoff and less infiltration. In the California Desert "as much as 90% of the soil moisture other-

wise available is lost along some vehicle trails" (Wilshire, et al. 1977). This lack of moisture makes it difficult to re-establish vegetation.

Plants can be destroyed or growth could be retarded by exposure to toxic elements (e.g., oil, gas, briny water, and drilling mud) or fire. Exposure of toxic elements for long periods could sterilize or pollute the soil. The affected areas would be localized around the drill site, usually not more than 350 feet by 350 feet. Fire could burn acres of rangeland, but the effects would be temporary, lasting only 1 or 2 growing seasons. Plant species composition could be altered by fire. Cattle would be removed from the burned area.

A blowout during the drilling operation can cause extensive damage, and last for several days. During a blowout, oil, gas and drilling mud and brine may be sprayed 100 or more feet in the air. Strong winds can blow these pollutants a mile or more from the site destroying vegetation. Blowout can contaminate subsurface formations, and depending on the porosity of the formation, these pollutants can contaminate ground water supplies. A blowout can also cause fires.

A blowout preventor is standard drilling equipment which reduces the risks of blowout. USGS periodically inspects drill sites to insure safe operations.

According to Chuck Flaherty of USGS in Artesia, NM, of the last 1500 wells drilled in his area, only 3 blowouts occurred.

The adverse impacts to soil and vegetation are temporary impacts; (in oil and gas field 20 years is not uncommon) however, the time frame is unknown. The amount of soil loss could only be computed site specifically.

The impact to soil and vegetation would intensify during each stage of oil and gas development because the amount of surface disturbance increases. The following actions increase soil erosion and decrease the amount of soil moisture and vegetative cover during each stage of development.

Geophysical Exploration

The off-road geophysical exploration trails could cause additional off-road vehicle use.

Drilling Exploration

Access roads and drill pads would be constructed. Spills of toxic materials could occur and accidental fires could be started.

Production and Development

There would be additional construction of roads, support facilities, and well sites. The increased facilities would increase the possibility of fire and spills of toxic material.

Abandonment and Reclamation

Eventually the erosion would reduce to natural levels and soil moisture and vegetative cover would be the same as undisturbed areas. In most cases, polluted and burned areas would recover, and vegetation would return. The adverse effects to soil and vegetation would be alleviated during this stage.

The differences in impacts to soil and vegetation among the alternatives are:

There would be limited increases in soil and vegetation impacts with the no action alternative (alternative 1). There would be greater increases in impacts by allowing the entire area to be oil and gas leased, (alternatives 2 and 4) then by allowing a part of the area to be leased (alternative 3).

D. Water

The Big Hatchet-Alamo Hueco area is in the Playas closed water basin. There are no perennial streams in the area, and there are no known springs in the Big Hatchets, there are several in the Alamo Huecos.

"Ground water is derived from precipitation with most of the recharge occurring along permeable streambeds and on upland alluvial fan slopes where coarse particles permit considerable infiltration." (Bureau of Reclamation 1976)

Appendix D illustrates projected water requirements for Luna, Hidalgo, and Grant Counties.

Lincoln, Hidalgo, and Grant Counties "are faced with significant water shortages if current demographic trends are maintained. As all water resources presently available and those anticipated for the future (with the unlikely exception of the near-term construction of Wheeler Dam or its equivalent in Grant County) are assigned, only transfer of existing water rights is possible to accommodate growth of population or of consumptive use in mining, manufacturing, or power generation. Mining activity demands particularly large quantities of water, and as the area's largest single sector employer, the continued economic viability is clearly tied to water supplies. The only other sector with sufficient existing water rights to meet this demand is agriculture, auguring for a steady decline in the next four decades." (Harbridge House 1978)

Water supplies can be lost or reduced during oil and gas exploration. Wildcat drilling could alter the ground water hydrology by fracturing impermeable zones below aquifers, allowing water to be lost or reduced through vertical drainage. Well drilling can also require large quantities of water, especially if porous and permeable formations are encountered. Total water needs for a 10,000 foot well is estimated to be about 800,000 to 1,200,000 gallons. Drillers prefer to use brine because it weighs more than fresh water; the extra weight is needed to prevent blowouts. Natural brine is often encountered during the drilling operation (Roswell Oil and Gas Environmental Assessment). USGS analyzes (in an Environmental Assessment) and monitors the affects of the drilling operation to ground water.

The potential for increasing water demands would be an impact only during drilling and production phases.

None of the alternatives has the potential for increasing water demands. The no-action alternative would have the least potential for increasing water demands (alternative 1). Alternatives 2 and 4 would have the greatest potential because the largest area is involved.

Geology

The Hidalgo Basin and Range area, which includes the Big Hachets and Alamo Hueco Mountains, is "considered highly favorable for exploration because of the thick sequence of marine sediments containing numerous possible source beds and potential reservoir rocks" (Foster and Grant 1974). Fifteen thousand feet of Paleozoic and Cretaceous marine beds lie between Precambrian granite and Cretaceous non-marine rocks (Zeller 1970). (see Table 1; Figures 1 and 2)

"The shales and dark limestones that are deposited in the Pennsylvanian Basin have good source rock potential. A black shale

member of the Devonian Percha shale (possibly equivalent to the rich Woodford shale in the Permian basin) also appears to have good source rock potential (J.R. Mitchell 1980).

"The best prospects are in the depressions or at least in the lower parts of the mountains uplifts where previous accumulations in the Paleozoic and lower cretaceous rocks are most likely to have remained undisturbed by later geologic activity, specifically intrusive (subsurface) igneous activity" (Zeller 1970). (see map 3)

The oil and gas is mainly trapped structurally by thrust (low angle) faulting (Hein 1980).

There have been few wells drilled in the area. The best show of gas reported was the Exxon (Humble) No. 1 State BA well drilled in 1958 (see map 3 and figure 1) in which gas flowed from a Permian (Colina) dark limestone at the rate of 10,000 cubic feet per day. The same well was worked over in 1968 the rate increased to 86,000 cubic feet of gas per day, but the flow rate was below the commercial rate.

Slight shows of oil and gas were reported in the lower Ordovician (El Paso) limestones of the Hachita Dome No. 1 Tidball and Berry Federal well which was drilled from 1954-1957 (Thompson undated).

In summary, the area is considered favorable for further oil and gas exploration because of the following:

- 1) The thick sequence of marine sediments which contain numerous possible source beds and potential reservoir rocks;
- 2) Favorable structural traps (Hein 1980);
- 3) Shows of oil and gas in the Humble and Hachita Dome wells.

Due to the scarcity of oil and gas wells drilled in the area, more exploration is needed to realize this potential.

According to James Hein of Placid Oil Company, the area should be considered for exploration of major oil and gas reserves.

There would be no impacts to geology, except the oil and gas that is removed.

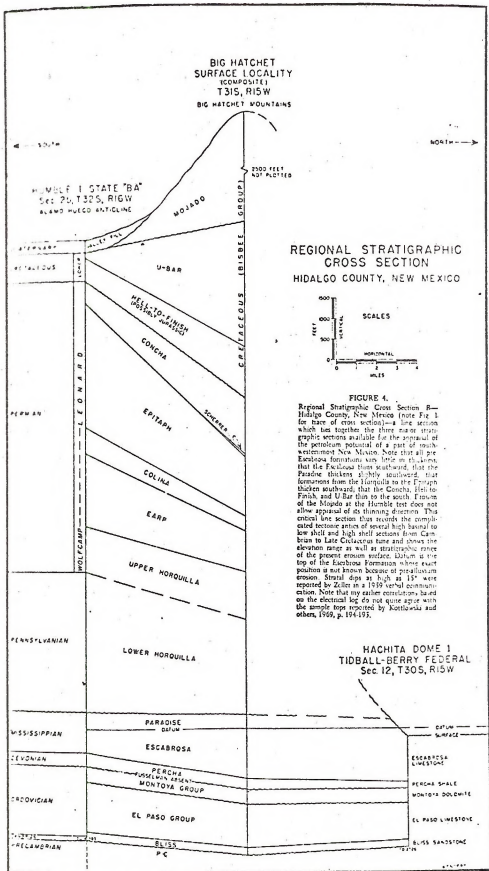
TABLE 1

-25-

		Time Scale		Formation		Northwest Chihuahua Mexico		Southeast New Mexico	
		Geologic Periods	Dates	Big Hatchet Mtns. (after Zeller)	Thickness	(after Diaz & Navarro)			
CENOZOIC	Quaternary	1 Million		Alluvium					
	Tertiary	65		Fanglomerate					
	Cretaceous	Upper							
Lower		135		Mojado Fm. 5195'					
MESOZOIC	Permian	280		U-Bar Fm. 3500'					
				Hell-to-Finish Fm. 1274'	Las Vigas				
				Concha Limestone 1376'	Concha Ls. 590' (179m)	San Andres Ls. 1360'			
				Scherrer Sandstone 20'	Scherrer Ss. 10' (3m)	Glorieta Ss. 49'			
				Epitaph Dolomite 1500'	Epitaph Dolomite 1553' (472m)	Yeso Fm. 2000'			
				Collina Limestone 440'	Collina Limestone 609' (185m)				
	Pennsylvanian	280		Earp Fm. 997'	Earp Fm. 707' (215m)	Abo Fm. 1100'			
				1500'	1030' (306m)	Wolfcamp Series 1000'			
				Horquilla Limestone 2100'	Horquilla Ls. 2515' (764m)	Virgil Series	} 2500'		
						Missouri Series			
						Des Moines Series			
						Atoka Series			
						Morrow Series			
Mississippian	350		Paradise Fm. 318'	Paradise Fm. 352' (107m)	Helms or Barnett Fm. 100'				
			Escabrosa Fm. 1261'	Hachita Fm. 296' (90m) Keating Fm. 109' (33m)	Limestone 500'				
Devonian	405		Percha Shale 280'		Woodford Shale 100'				
					Limestone 1000'				
Shurian	425				Fussellian Dolomite 600'				
Ordovician	500		Montoya Dolomite 385'		Montoya Dolomite 800'				
					Simpson Sandstone 200'				
			El Paso Limestone 1070'		Ellenburger Dolomite 450'				
Cambrian	600		Bliss Sandstone 250'		Bliss Sandstone 80'				
Precambrian			Precambrian		Precambrian				

Stratigraphic nomenclature chart showing usage in Big Hatchet Mountains area, adjacent Mexico, and southeast New Mexico. Compiled by Edward E. Kinney.

Source: Zeller, R. A., 1970, Stratigraphy of the Big Hatchet Mountains Area, New Mexico Geological Society Guidebook 21st field conference, Tyrone - Big Hatchet Mountains - Florida Mountains Region



See map 3 for cross section

FIGURE 4.
Regional Stratigraphic Cross Section B—Hidalgo County, New Mexico (note Fig. 1 for name of cross section)—a line section which ties together the three major stratigraphic sections available for the appraisal of the petroleum potential of a part of south-westernmost New Mexico. Note that all pre-Escalante formations were once in a line, that the Escalante then wedged out, that the Permian thins to the westward, that formations from the Hachita to the Ertapah thicken westward, that the Concha, Hachita, and U-Bar thin to the south. Erosion of the Mojado at the Humble test does not allow appraisal of its thinning direction. The critical line section then rounds the complicated anticline axes of several high basins to low shelf and high shelf sections from Cambrian to Late Cretaceous time and shows the elevation range as well as stratigraphic range of the present erosion surface. Datum is the top of the Escabrosa Formation whose exact position is not known because of porosity erosion. Small dips as high as 15° were reported by Zeller in a 1916 aerial reconnaissance. Note that my earlier conclusions based on the electrical log do not quite agree with the sample logs reported by Kottlawa and others, 1968, p. 194-195.

Source: Wengert, S. A., 1970, "Petroleum Prospects in Southwesternmost New Mexico", New Mexico Geological Society Guidebook 21st Field Conference, Tyrone-Big Hatchet Mountains-Florida Mountains Region,

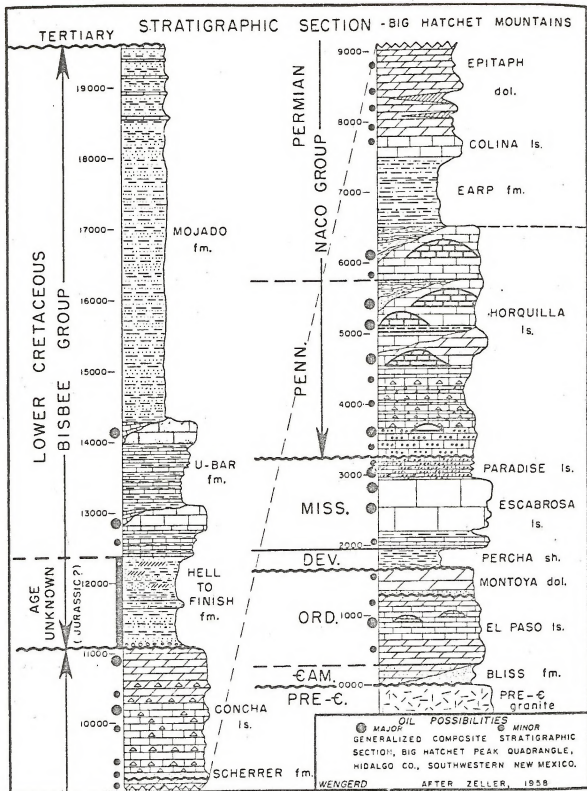


FIGURE 5.

Stratigraphic Section (composite)—Big Hatchet Mountains (after Zeller 1958, and later commercial work). This section shows those strata which may have major and minor oil possibilities in southwest-most New Mexico. The Hell-to-Finish Formation is now considered to be of Cretaceous age. The thickness of reefs in the Horquilla is vertically exaggerated.

F. Wildlife

A comprehensive resource inventory was completed covering the Alamo Hueco, Big Hatchet, and Sierra Pica Mountains. A copy is available at the Las Cruces District Office. See Appendix E for Species List)

Threatened or Endangered Species

A threatened or endangered species clearance was completed with U.S. Fish and Wildlife Service on February 5, 1980. No adverse determination was made for Federally listed and proposed species, particularly for gray wolf (listed-endangered). It is determined that oil and gas leasing would not threaten the existence of gray wolf, and the area is not presently being considered for re-establishment of the species. The species historically was extended in the Playas Valley.

An endangered species clearance for State proposed and listed species was completed April 7, 1980. State endangered categories are:

"State Endangered (Group NM I) -
Species whose prospects of survival or recruitment in the state are in jeopardy.

State Endangered (Group NM II) -
Species whose prospects of survival or recruitment within the state may become in jeopardy in the foreseeable future (Hubbard et al. 1979).

Mitigation measures 3 and 5 would generally help protect the State endangered species. The following determinations were made concerning endangered species (Olson 1980):

1. Desert bighorn (Ovis canadensis mexicana)
This species is soon to be proposed for listing. Alternatives 1, 3 and 4 would help protect the desert rangelands.
2. Coati mundi (Nava narica molaris), NM II
The habitat of this species centers on canyon bottoms.
3. Sonora Mountain Kingsnake (Lampropeltis p. pyrocephala), NM II
No specific location was given by the collector. However, the species is associated with canyon bottoms, especially wet or damp areas.

4. Giant spotted whiptail (Cnemidophorus burti stictogrammus)
NM II
This species was reported from two canyons in the Alamo- Hueco Mountains.

In addition, several other species have been reported at least casually in the Big Hatchet-Alamo Hueco area:

White-sided jackrabbit (Lepus callotis gaillardi), NM I.
Coppery-tailed trogon (Trogon elegans canescens), NM I.
Thick-billed kingbird (Tyrannus crassirostris pompalis), NM I.
Yellow-eyed Junco (Junco phaeonotus palliatus), NM II.

The jackrabbit was reported on the west side of the Alamo Hueco, and is associated with grasslands. The thick-billed kingbird would occur primarily in areas with large trees (riparian areas). The coppery-tailed trogon and yellow-eyed Junco have been reported once in the Big Hatchets.

Site specific clearances will be completed before any oil and gas activities occur. With the appropriate mitigation measures (3 and 5) a no-effect determination was made for all State listed endangered species (this does not include the desert bighorn.)

It is BLM policy to protect State threatened or endangered species, and give these species consideration equal to Federally listed species. BLM Manual 6840 outlines this policy, and the New Mexico Wildlife Conservation Act (Sections 17-2-37 through 17-2-46 NMSA) mandates protection of State listed threatened or endangered species. Public Law 93-452 (Sikes Act) requires the Secretary of Interior to cooperate with State agencies in planning, developing, and maintaining wildlife programs including providing protection for species considered threatened or endangered.

Other Wildlife Species

Wildlife species which would be adversely affected by oil and gas activities, primarily, are species which den or nest on (in) the ground, or nest in shrubs. Off-road vehicle activity and clearing areas for drill pads and roads could destroy dens or nests. The more common species which could be affected are:

Reptiles

Lizards

Texas horned lizard
Greater earless lizard
Leopard lizard
Striped plateau lizard

Snakes

Western rattlesnake
Bull snake
Western diamondback rattlesnake

Birds

Mourning dove
Horned lark
Meadow lark
Lesser nighthawk
Poor-will
Cactus wren
Roadrunner
Gambel's quail
Scaled quail
Verdin
White-crowned sparrow
Black-throated sparrow

Raptors

Marsh Hawk

Marsh hawks are primarily a wintering species, however, this species may nest in the low swales on the eastern flanks of the Big Hatchets (Hayward 1977).

Swainson's Hawk

This species occurs in grasslands and nests in yuccas and isolated trees and bushes in the low areas around the mountains (ibid.) and is sensitive to human activity. A sudden increase in human activity (e.g., heavy equipment associated with oil and gas) could cause this species to abandon its' nest.

Cooper Hawk

Cooper hawks often nests in cottonwoods around dirt tanks, and are intolerant of human activity (ibid.).

Red-tailed Hawk

This hawk is common along the western side of the mountain during the winter. A pair fledged two young in 1977 near Dog Spring (ibid.). The species nests in yuccas, and are intolerant of human activity.

Mammals

Desert cottontail
Black-tailed jackrabbit
Spotted ground squirrel
Kit fox
Badger
Striped skunk
3 species of Kangaroo rat

Mountain Lion

Mountain lion do occur in the Big Hatchet-Alamo Hueco area. The species is adaptable, according to Russel (1978) in Big Game of North America. "Not much lion habitat can be termed 'critical' because of lions' adaptability and wide distribution...Land-use planning that accounts for wildlife as well as human special needs, and corresponding mitigation policies may be the only practical means of arresting the rate at which mountain lion habitat is being lost." (Russel 1978) This could be said for many other wildlife species as well.

Javelina

Javelina is listed as a game animal in New Mexico, the species occurs primarily in southwestern portions of the state where it is probably restricted by climate. There is a good population in the Alamo Hueco-Big Hatchet Mountain area, which represents a major portion of habitat available in New Mexico. Sowls, in Big Game of North America (1978), states the greatest threat to the species is habitat loss. Information from Eddy (1961) indicates the need for movement between habitat types or to water supplies.

Desert Bighorn Sheep

There are two mountain sheep subspecies and species in New Mexico. The subspecies in the Big Hatchets is the Mexican desert bighorn sheep (Ovis canadensis mexicana). There are other herds of Rocky Mountain bighorn (Ovis canadensis) in New Mexico (Sandias, Manzano Mountain, Gila National Forest, and Pecos Wilderness).

The following sections were prepared by Bob Bavins and Andy Sandoval of New Mexico Game and Fish.

Herd Status

Reports from Mearns in 1907 indicated desert bighorn sheep were abundant in the Big Hatchets, Alamo Huecos, and Dog Mountains.

During the early 1950's, the desert bighorn sheep population in the Big Hatchet Mountains was estimated between 125 and 150 animals (Gordon 1953). At that time, bighorn sheep were known to be using the entire mountain range. Ewe groups ranged mainly throughout the southern third of the mountain, but also made some use of the northern portion of the mountain. Lambing occurred primarily in the southern third of the range. Ram distribution was generally considered to be throughout the mountain range.

Water hole counts at this time indicated that bighorn sheep not only used the steeper portions of the range, but that they also utilized the major canyon bottoms and occasionally the surrounding alluvial slopes. Sheep were observed at Chaney Well on the northwest side, Whitewater Well on the southwestern corner, and Sheridan Well near the center of the mountain range. During this period, sheep were also observed to use salt licks established for cattle in the areas of Sheridan Well and Deep Well, which is located in the bottom of Newwell Canyon (Gordon 1955).

Following several years of severe drought in the late 1950's and the resultant competition for browse with large numbers of deer, cattle, and horses, the sheep population declined to less than 25 animals by the early 1960's. The distribution of sheep was reduced to the areas around Mine Canyon, Newwell Canyon, and the northwestern fringe of the range in the vicinity of game water unit number 5 (see map 1 or 4 for locations).

Historically, desert bighorn sheep utilized the majority of the Big Hatchet Mountains and occasionally traveled well out from the mountain. Sheep use of the mountain has historically occurred from the alluvial slopes and canyon bottoms all the way to the top of the mountain.

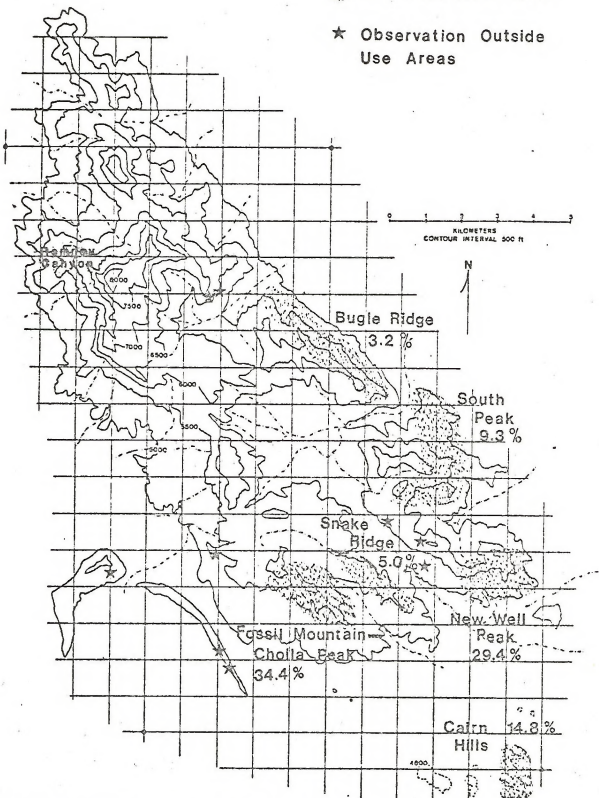
Present Sheep Distribution and Use

Lanny Wilson (the former BLM State Wildlife Biologist) reported in his letter that he followed an ewe and lamb from Sheridan Canyon, in the Big Hatchets, to the Alamo-Hueco Mountains. Shorty Lyon (a local trapper) reported (in a letter to New Mexico Game and Fish, September 10, 1978) tracking 5-6 sheep from the Big Hatchets to the Alamo Huecos, and Peterson Canyon.

In 1978, Rob Robertson (a former BLM employee) went to the Alamo-Hueco and collected fecal samples that had the typical appearance of desert bighorn sheep pellets. A sample was sent to Dr. Howard at the New Mexico State University Wildlife Department. He reported there was a 99% chance of the samples being desert bighorn pellets. There is a strong indication that some sheep do use the northern Alamo-Hueco Mountains, but not conclusively.

● Use Area (1977-1979)

★ Observation Outside
Use Areas



* This map indicates use prior to the bighorn sheep introduction program.

Watts, T. J., 1979, Detrimental Movement Patterns in a Remnant Population of Bighorn Sheep (*Ovis canadensis mexicana*) Masters Thesis, New Mexico State University

Since June 1976, intensive studies have been conducted within the Big Hatchet Mountains aimed at determining the population size, home range and distribution, and environmental factors influencing the remaining desert bighorn sheep. At the present time, the indigenous sheep population is utilizing a much restricted area of what was once their former range. Throughout the year, ewes have been located on the ridges south of Mine Canyon (Cholla Peak, Fossil Mountain, and Snake Ridge) and in the area surrounding Newell Peak. Rams are found in the same area from June through December. From January through May, the rams are generally found in the South Peak and Bugle Ridge areas, which is north of the normal ewe range. Several mineral licks have been located in the ram range near the base of Ram Butte. Principal lambing areas are the steep slopes and canyons found in the area of Fossil Mountain and Newell Peak. Lambing has been observed to occur during the months of January, March, April, May, June, August, and September. The majority of the lambing activity, however, appears to take place around March and April. (see Map 4 for locations of peaks & canyons)

Numerous movements by bighorn sheep have been documented from the mountain to a small group of hills (Cairn Hills) located approximately 4 kilometers south of the mountains. These moves are generally associated with the use of two natural mineral licks located there (Watts 1979, Lenarz 1977). Occasional observations of bighorn sheep have been made on the U-Bar Ridges and on the north side of Thompson Canyon, which represent moves to the extreme limits of the present sheep distribution. The present ewe range is reduced to less than half of what it was in the 1950's and early 1960's.

Since the early 1960's, the sheep population has fluctuated around 20 to 25 animals. In the opinion of the NMG&F, predation appears to be one of the major factors keeping the population at a low level. The loss of lambs can be directly associated with the moves back and forth to the Cairn Hills. Mountain lion predation on adult sheep has also been documented within the mountain range.

Movements have also taken place in the past month that appear to be related to the activity of seismograph crews in close proximity to the base of the mountain.

Reintroduction Efforts

In early 1979, the NMG&F, cooperating with the BLM, initiated a program to reintroduce desert bighorn sheep into areas on the Big Hatchet Mountains where records show historical use existed but which no sheep were presently utilizing. A temporary holding paddock of approximately 40 acres was constructed in Romney

Desert Bighorn Sheep

PHOTO 11



These photos were taken in the Big Hatchets after the sheep had been tranquilized and had radio collars attached.

PHOTO 12



Photos K. Holmes

Canyon on the west side of the mountain range. Eleven sheep were transplanted there from the captive population at the Red Rock Wildlife Experimental Area and held in the paddock until lambing had taken place. It was hoped that by confining the sheep in the paddock for several months, the sheep would imprint to the existing habitat, thus establishing a population in what appears to be the most suitable part of the mountain range. On May 29, 1979, a total of fourteen sheep were released. Radio tracking has continued since that time in order to determine their movements and survival. Following their release, the reintroduced sheep remained in the general area of the release site for some time, then traveled north to the vicinity of Chaney Canyon where they remained for several days. From there they moved south approximately nine airline miles to Newwell Peak and then returned back north to Thompson Canyon. They remained in Thompson Canyon for several weeks before returning to the Romney Canyon release site. There they were joined by rams from the indigenous herd and returned to the Newwell Peak and South Peak areas where they remained for two months. This was the first recorded use in recent times of the indigenous sheep on the north end of the mountain. During January, 1980, as the time approached for their lambs to be born, they again returned to the Romney Canyon area. Once more, adult rams from the indigenous herd followed them. At the time of this report, February 1980, at least three lambs have been born, two of which are still alive.

Observations of the behavior and movements of the reintroduced sheep indicate that they have expanded the total amount of habitat utilized within the Big Hatchet Mountains and have altered the traditional home range structure of the indigenous population. By following the reintroduced herd, rams from the indigenous population have been induced to travel three to four miles west and north of their previous range, an occurrence that is generally unknown among bighorn sheep.

Based on observations following the release of the reintroduced sheep, it will be extremely difficult, if not impossible, to predict what areas will be utilized by these sheep within the next few years. They have been observed to travel through the majority of the mountain range during the eight months following the release and they have spent considerable time in several different areas. Only time will provide the answers.

The Alamo Huecos were identified in Preliminary Survey Report Evaluation of Historic Desert Bighorn Sheep Ranges (Sandoval 1979) as having the best potential habitat areas. The Alamo Huecos have been identified as a herd reintroduction area. The remote character of the Alamo Huecos must be preserved for successful reintroduction efforts.

Current Status of Desert Bighorn Sheep

Due to the recent scabies infestation and corresponding loss of the San Andres bighorn population, the current situation in New Mexico is particularly precarious. Currently, less than 100 animals remain in the state, of which 75 percent are in captivity. Until recently, the San Andres population was the only indigenous population in a viable condition. The only other indigenous population in the Big Hatched Mountains was headed toward extinction until we (NMG&F) began supplementing it with additional sheep from our captive herd at Red Rock.

There are fewer than 3,200 Mexican bighorn in North America and no more than 2,100 remaining in the United States (Trefethen 1974).

Impacts of Oil and Gas Development on Wildlife

1. General Affects of Human Activity to Desert Bighorn Sheep

This section is a literature review of the affects of human activity to desert bighorn sheep. Affects to all wildlife species for each phase of oil and gas development will be discussed after this section.

The material presented is from Bob Bavin and Andy Sandoval's memo dated February 6, 1980.

At present, the data base on desert bighorn sheep is very limited when compared to species more numerous, such as mule deer.

The current status of our knowledge of desert bighorn, and bighorn sheep in general, is that it is a species that has great difficulty adjusting to encroachment of many man-related activities. We also know that behavior is extremely rigid and ritualized. Behavior patterns, such as periodic range shifts, are passed from adults to young animals and these shifts play an important role in their survival beyond the obvious advantage of distributing their impact on the vegetative portion of the habitat.

Disturbances, whether directed toward bighorn or not, have been observed to cause reactions adverse to population welfare. The point at which harm results is not clear, but bighorn have been found to abandon the use of historic ranges when human activity increased suddenly over a few years' time (Simmons 1970).

Light and Weaver (1973) studied bighorn behavior responses to man in numerous environmental situations in addressing the development of a ski resort in the San Bernadino National Forest, California. This investigation found that human visitation created a spatial displacement effect on the bighorn habitat. Bighorn and their sign were absent in a line-of-sight pattern from the center of the human influence. Bighorn adapted to this human influence by utilizing available habitat out of sight of the influence. In the vicinity of a popular clubhouse, the uppermost water source and entire basin of suitable habitat remained void of bighorn use during the summer season when human use at the cabin was intense (Light and Weaver 1973). The conclusions from this study were:

- a. Bighorn maintain their area of distribution as a living tradition and rarely depart from it.
- b. Bighorn fail to extend their range despite ample opportunity.
- c. Bighorn use of historic range begins to diminish where human use is over 500 visitor-days per year (recreational use).
- d. Between 500 and 900 visitor-days per year caused bighorn to avoid their historic range.
- e. Final results may be a reduction in numbers by crowding of the sheep population resulting in insufficient forage, increased predation, increased disease and external harassment.
- f. Any curtailment of bighorn movements will result in reduced gene flow and gene pool size, which may ultimately affect the future existence of the bighorn population.

Man's activities and presence may be harmful to both the bighorn population and the range. The direct factor or contact disturbance may reach a point where it is nothing more or less than harassment. Harassment can cause bighorn to become run down physically, perhaps from an improper diet due to nervous tension (Hansen 1970). Therefore, it is conceivable that bighorn sheep could be caused to vacate their area of preferred use due to a level of human harassment, which for other species such as mule deer would be only minor harassment.

Additional studies concerning the impact of human activity on Desert bighorn are discussed in Sandoval & Bavins' mono

and Lanny Wilson's letter in the Consultation and Coordination section.

Habitat Recommendations

The following excerpt from Lanny Wilson's letter discusses habitat management recommendations for desert bighorn sheep.

"On June 18-20, 1974, the Boone and Crockett Club, National Audubon Society, and the Wildlife Management Institute held a symposium of the most knowledgeable experts of bighorn sheep in North America. The symposium was broken into four major groups-- Desert and Mexican Bighorn, California Bighorn, Rocky Mountain Bighorn, and Dall and Stone sheep. Each group developed management recommendations for these four wild sheep categories. Pertinent to our discussion here, the following recommendations for Mexican bighorn are applicable. Keep in mind these recommendations were the collective thinking of the most knowledgeable experts on the subject in North America. The numbers and quote are from the publication, The Wild Sheep in Modern North America (Trefethen 1974).

3. When designating areas to be managed where bighorn is one of the major resources, a suitable buffer strip should be considered as part of the bighorn area (page 113).
4. New roads should not be developed in any occupied desert bighorn habitat area or areas designated for transplant, and such bighorn habitat areas should be closed to off-road vehicle use (page 113).
15. Mineral withdrawals should be implemented on all desert bighorn habitats (page 116).
16. Mineral exploration must be rigidly regulated to minimize habitat destruction and ensure adequate rehabilitation (page 116).
20. Desert bighorn travel routes should be kept free of obstructions."

Impacts on Wildlife Species for Each Stage of Development

The specific differences of the alternatives will be discussed after this section.

1. Geophysical Exploration

Wildlife species would be displaced during periods of activity. After exploration activities have ceased, the wildlife would probably reoccupy the area (e.g., some of the raptors mentioned earlier). If trucks go off-road, there might be some mortality by crushing dens or destruction of nests. Reptiles, particularly rattlesnakes, could be killed by members of the seismic crews. The seismic trails could increase the amount of roads and trails in the area and human disturbances to wildlife. However, the short duration of seismic activity (usually only a day or two) would keep wildlife disturbances to a minimum. If trucks travel on roads, the affect is the same as other vehicular travel.

NMGF mentioned earlier that present movement by the desert bighorn sheep may be associated with seismic activities. Whether this movement is detrimental is unknown, however, disturbance activities cause desert bighorn to move; without the disturbance, natural motivation would cause the movements. Any exploration activity at any time within the ewe range could result in habitat abandonment and indirect mortality. It is possible that exploration could be conducted in the ram range when rams are in the ewe area. However, presently, it is impossible to determine all ewe and ram areas because definite range has not yet been established.

2. Drilling Exploration

Drilling operations would have a more intensified affect on animal species at a specific site. Depending on depth, the drill rig could be on site from one month to several months. In the Big Hatchet-Alamo Hueco area, it would probably be 4 or more months. The associated increase in activity, noise, and vehicle traffic could cause complete displacement of animals around the site. Javelina would be adversely affected by habitat loss and by restriction of movements between habitat types. The amount of displacement for each wildlife species is unknown. The impacts to dens or nests would be more intensive at the drilling site. A road would probably be constructed to the site increasing human activity and disturbance to wildlife. Most species would reoccupy the site when exploration ceased.

Desert bighorn sheep could abandon the Big Hatchet Mountains and be lost completely due to predation, stress, nonrecruitment or other factors if any drilling occurs within the desert bighorn sheep range.

3. Production

All impacts mentioned previously would occur. In addition, wildlife habitat would be lost in areas that are committed to production. (see species listed at the beginning of the Wildlife section)

The Light and Weaver study (1973) determined 500-900 visitor days caused bighorn to avoid their historic range. If scattered oil and gas wells were visited every 2-3 days, in addition to other visits such as rancher operations, bighorn managers, student, and recreationists, the 500 visitor day level would be quickly surpassed. As stated before the Desert Bighorn Sheep could be eliminated from the Big Hatchets.

4. Abandonment and Reclamation

After the oil or gas field is depleted, service roads and well sites could be closed and rehabilitated. Wildlife populations would recover or could be reintroduced assuming other detrimental influences do not develop in the interim. Desert Bighorn reintroduction could occur if sheep from other areas are available. A restocking effort might not be successful if no indigenous herd is present.

C. Alternatives

This section will discuss the difference in impacts among the alternatives.

Alternative 1 - Existing Lease Boundaries Would be Maintained - No Action

This alternative would cause no additional impacts, however, the existing seismograph activities and associated impacts would continue on existing leases. The sheep would be protected with an ample buffer zone. Impacts to wildlife would be minimized by maintaining existing boundaries. Only the geophysical exploration would occur, except, on the few existing leases.

Alternative 2 - Lease the Entire Area

Seasonal drilling restrictions would be difficult to determine because the sheep have not developed a definite range yet. If the herd does establish definite range movements, it might be possible to determine seasonal drilling operations closer to the mountains. However, petroleum companies could be shut down midway through drilling operations when sheep return to the area. This could be an unacceptable financial risk for a deep drilling operation (15,000-20,000 feet).

It would be unlikely that drilling or production would occur in the mountains because of the unfavorable geological structure and ruggedness. However, areas along the base of the mountain could have drilling and production. Near the sensitive ram and ewe areas, the affects could be disasterous; a buffer area is necessary. Until more is known about the movements of desert bighorn sheep, this alternative could cause the sheep to abandon the Big Hatchets and cause extinction of the herd.

Alternative 3 - Open Part of the Area for Leasing

Open part of the area for leasing with no special stipulations (except wilderness stipulations). Lease other areas with no surface occupancy and the remaining area would be no lease (see map 1). This alternative would provide a buffer zone and would protect the sheep.

No surface occupancy leases would create no facilities or roads, but there would be an increase in geophysical exploration.

Alternative 4 - Move the Sheep to Another Location

Moving the sheep would mitigate the impacts from oil and gas. The recent salvage operation in the San Andreas cost about \$85,000. Presently NMG&F does not have the funds to do another salvage operation. It would be difficult to justify abandoning the large investment made in habitat improvement and evaluation. (Refer to the economic section for a detailed breakdown)

Capturing the desert bighorn sheep would cause some mortality. The stress of capturing the sheep sometimes causes death or physical injury. During the San Andres salvage operation 15 sheep died from accidents and stress, 34 survived. Captured sheep are placed in a paddock to imprint the sheep to the new surroundings. There is a potential for predation on the confined sheep, and disease could also cause mortality (Kilpatrick 1975).

Sheep released in a new area are also more susceptible to predation, perhaps because the terrain is unfamiliar.

It would be possible to transplant the Big Hatchet sheep into other habitats, but the cost involved and risk to the sheep would make it difficult to justify.

G. Cultural Resources

Most archaeological work in the survey area has been confined to random surveys that were designed to locate and excavate specific

types of sites. There have been two major surveys of the above type; both were confined primarily to the Alamo Hueco Mountains; these surveys were Cosgrove (1947) and Lambert and Ambler (1961). Both surveys were confined to locating and excavating cave sites in the Alamo Huecos, a total of 23 sites were located; however, there is considerable overlap between the sites located in the reports.

Based on surveys in the Animas Valley, various types of sites can be predicted in the study area. Paleo-Indian camps and kill sites are rare, but they do occur around the margins of Pleistocene lakes. In addition they would have used the mountain to exploit subsistence items not found in the playas. The Archaic Period, which dates from 8000 BC to 1 AD, is divided into three stages: San Pedro, Chiricahua, and Sulphur Spring. These sites are usually small campsites left by the hunting and gathering band in their seasonal movement through the area. All portions of the study area were probably used with greater emphasis on water sources.

The most numerous sites in the area can be placed within the Mogollon sequence. These sites range in size and type from small campsites to major villages. Other Mogollon sites in the area could include petroglyph sites, quarry sites, ceremonial sites, and vegetative processing areas. The probability of significant sites from this time period being present in the study area is extremely high. A number of caves in the area have been excavated, and some material may still be present in a stratified context in the caves. An intensive survey of the region around the Alamo Huecos would probably reveal a number of villages near the Talas Slope-Playa junction.

The mountains were occupied by Apachean groups from the 1600's to the late 1900's. Most Apachean camps are very difficult to locate due to sparse material remains. The first reference to European contact with the study area comes in 1774 when Hugh O'Connor led an expedition against the Gila Apache in the Alamo Hueco and Big Hatchet ranges. In the next few years, more military expeditions crossed the area.

The Mexican War of 1846 placed New Mexico in American hands. However, there was little activity in the study area for a number of years because of its remoteness. By the 1870's a number of American miners and prospectors entered the area although they left no remains. By the 1890's cattle ranching had become the primary economic pursuit in the study area. A number of ranches and line camps are located in the area, usually close to water sources.

Known archaeological areas (published sites) are located on map 5. Specific locations of sites are not given because further pot hunting could occur. There are other archaeological areas, however, they are not noted on the map because vandalism could occur.

Destruction of cultural resources would be limited by clearances (see mitigating measure 2). There could be inadvertant destruction of cultural resources during all phases of oil and gas development and with all alternatives.

H. Economic

Local Interests

The unemployment rate in Luna County is 14.4% and in Hidalgo County, 4.2% (February 1980, New Mexico Employment Office).

The following are median family income tables for Deming and Lordsburg. More current estimates are not available; there will be better estimates after the census is completed.

TABLE 2 Median Family Income: Deming

<u>1970 Census</u>	<u>1976 Estimate (1)</u>	<u>% Growth</u>
City \$6,249	\$ 9,746	56.0%
State 7,854	12,701	61.7%
U.S. 9,603	14,610	52.1%

Average Family Income

<u>1970 Census</u>	<u>1976 Estimate (1)</u>	<u>% Growth</u>
City \$ 7,455	\$11,672	56.6%
State 9,200	14,912	61.7%
U.S. 11,003	16,959	54.1%

TABLE 3 Median Family Income: Lordsburg

<u>1970 Census</u>	<u>1976 Estimate (1)</u>	<u>% Growth</u>
City \$6,596	\$11,085	68.1%
State 7,854	12,701	61.7%
U.S. 9,603	14,610	52.1%

Average Family Income

<u>1970 Census</u>	<u>1976 Estimate (1)</u>	<u>% Growth</u>
City \$ 7,276	\$12,327	69.4%
State 9,200	14,912	61.7%
U.S. 11,003	16,959	54.1%

Source: Demographic profile of Deming and Lordsburg, Southwest Council of Governments.

It is evident from the tables that Deming and Lordsburg had median family incomes below the state and national average.

There are no figures available for Hachita, but the general store owners in Hachita indicated they are in favor of oil and gas development because of the increased economic growth. The store owners also indicated they have experienced positive economic benefits from the Dawson crew working in the Big Hatchets.

According to Dawson Geophysical Company, "Our seismograph crew is based in Deming, New Mexico, and consists of thirty-three people, some of whom are local residents. The average expenditure for the crew is approximately \$70,000 per month. Almost all of this goes into the local economy with service stations, parts, houses, restaurants, motels, grocers, and landlords sharing the largest percentage."

During a telephone conversation with a Dawson representative, it was mentioned that the crew in Deming salaries' range from \$15,000 to \$30,000 per year. This could help increase the median family income, but exact figures are not available.

With 14.4% unemployment in Luna County potential employment from the oil and gas industry could be important. It is estimated that in most cases local labor is used for 10-15% of the field crew employment (road building, drilling, etc.) (Roswell District Oil & Gas EA). The greatest need for employment occurs during the discovery-development phases. Potential employment from the oil and gas industry will tend to reduce the (14.4%) unemployment in (Luna) the area.

Economic growth could increase with each stage of development. The extent of economic growth depends on the extent, if any, of the oil and gas field.

All of the alternatives would increase economic growth. Alternatives 2 and 4, which would allow leasing in the entire area, have the greatest potential for increasing economic growth. Even the no-action alternative has created economic growth as evidenced by Dawson Geophysical Company's letter.

State Interests

Fifty percent of the receipts from oil and gas leases on BLM lands goes to New Mexico. Receipts to New Mexico from mineral leases (oil & gas, potash, geothermal, etc.) last year totaled \$74.4 million; much of this was from oil and gas receipts.

New Mexico would receive the smallest share of oil and gas receipts if the entire area was closed to leasing (alternative 1). The state would receive the largest oil and gas receipt from leasing the entire area (alternative 2 and 4). Leasing a portion of the area would moderately increase receipts (alternative 3).

National Interests

The U.S. imported 44% of our oil supply or 8.2 million barrels per day in 1978. Domestic production of oil was 56% or 10.5 million barrels per day (Oil and Gas Journal 1978). The U.S. used 20 trillion cubic feet of natural gas in 1978, of that 4.5% was imported, which is 938 billion cubic feet per year (Department of Energy 1978). These figures were provided by Morris Trimmer of the New Mexico Oil and Gas Association.

Finding new energy supplies is critically important. Much has been written about the energy shortage, the President has identified it as a national priority. Any discovery which could be developed would increase the energy supply.

By limiting the area available for leasing, the amount of oil and gas which can be removed is also limited. Locating and developing new energy supplies is a national priority. The limitations for developing new oil and gas supplies are greatest with the no-action alternative. Alternative 3 would increase the present area available for leasing by 33,000 acres. Alternatives 2 and 4 would open the entire area, 111,500 acres, to oil and gas leasing and provide the greatest opportunity for developing oil and gas.

TABLE 4

Economics of the Desert Bighorn Sheep Reintroduction Program

The following table summarizes the money expended on the Desert Bighorn program in New Mexico from 1972-1980 (figures were provided by NMGF).

Expenditures (Actual & Committed) of Desert Bighorn Reintroduction Program		
Holding facilities at Red Rock ^{1/}		\$31,963.00
Trap antelope for Mexico sheep trade		13,715.00
Trap sheep in Mexico and San Andres		25,467.00
San Andres Study (Sandoval) to develop evaluation procedure		25,273.00
Big Hatchet habitat and evaluation study:	BLM	43,000.00
	NMGF	10,000.00
Historic area evaluation:	NMGF	55,000.00
	BLM	20,000.00
	U.S. Forest Service	15,000.00
Big Hatchet Transplant:	NMGF	33,070.00
	BLM	26,000.00
Big Hatchet follow-up study:	NMGF	70,000.00
	BLM	70,000.00
Maintenance cost at Red Rock:	1971-76	60,531.00
	1976-79	76,800.00
San Andres salvage operation:	NMGF	85,000.00
Rain water catchment construction - Big Hatchets		<u>1,620.00</u>
		\$662,439.00

^{1/} Includes the following donations for materials:

Central Mining District GPA	\$ 4,000.00
Shikar Safari Club International	7,000.00
Game Conservation International	<u>5,000.00</u>
	\$ 16,000.00

New Mexico Game and Fish has also solicited private donations from the general public.

Volunteer Hours

San Andres Paddock Removal	432 hrs.
Big Hatchet Paddock Removal	910 hrs.

This time was volunteered primarily by local college students.

It would be difficult to set a dollar value on the existence of desert bighorn in New Mexico. Based on the money and time committed, however, it would be difficult to justify abandoning the program.

I. Social

Letters received from the Wilderness Society, Sierra Club, Wildlife Society, Desert Bighorn Council, Wilderness Study Committee, and Foundation for North American Wild Sheep indicates the intense feelings these organizations and their members have for the wilderness character of the area and desert bighorn sheep.

Several unsolicited letters and phone calls were received requesting information concerning the content and alternatives of this Assessment. Also, advice was given concerning information that should be included in the Assessment. The letters, money, and volunteer hours donated indicates a strong support from conservation organizations for preserving the desert bighorn sheep and the wilderness character of the area.

The Big Hatchets and Alamo Hueco Mountains and the surrounding area is rural. The closest towns over 500 people are Deming and Lordsburg, about 1½-2 hours drive. If there is an oil and gas discovery which is economical to develop, the increased economic growth could alter the rural character of the area. Altering the rural character and increasing economic growth would be perceived by some residents as positive and negative to others. The degree of change which would occur is unknown.

A full analysis would be completed when the extent (if any) of production is known. Support facilities would require additional Environmental Assessments or an Environmental Impact Statement. A more accurate assessment of social impacts could be made at that time.

J. Human Values

1. Visual Resources

A visual resource inventory is lacking for this area and will not be complete until September, 1982. The inventory will be conducted under BLM Manual 8411 (Upland Visual Resource Inventory and Evaluation) as part of the Resource Management Plan.

The Wilderness Study Area would be managed as Visual Resource Management (VRM) Class I; areas outside the WSA would be managed as VRM Class II. (Table 5 defines the visual classes).

Impacts

Exploration production and reclamation activities would depend on the intensity of the surface disturbing activities. Casual exploration on existing roads and trails cause essentially no impact. Intensive exploration (i.e., construction of temporary roads, wildcat wells, drill pads) would create a greater visual intrusion. All actions would require a visual resource contrast rating site specifically.

Alternatives

The no action alternative would affect visual resources the least. The few existing leases would be developed and existing seismic activity would continue. Alternative 2 and 4 would allow leasing in the entire area, and would have the greatest effect on visual resources. Alternative 3 would increase the area available for oil and gas leasing and the affects on visual resources.

2. Wilderness

Presently, 133,000 acres in this area has been intensively inventoried for wilderness (see district files for results and public comments). Part of the area has been recommended for further study as a (WSA) Wilderness Study Area (see map 1). The boundary is subject to change until October 30, 1980 due to public review. All lands under review (inventoried lands as well as recommended WSA lands) are subject to the Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review. After October 30, 1980, until Congressional action is taken, only the Wilderness Study Area will be managed according to this policy and guidelines.

Impacts

All exploration and production activities will be assessed site specifically and will be consistent with the Interim Management Policy. Reclamation standards are outlined in the nonimpairment criteria (Appendix F). These regulations would apply to all alternatives.

3. ACEC (Area of Critical Environmental Concern)

This area has not been analyzed through the land-use planning system. There are guidelines for identifying ACECs on public lands. Portions of this area qualify because of the desert bighorn sheep herd. The herd's situation meets the four identification criteria, i.e., relevance, importance, criticalness and protectability; as outlined in the proposed guidelines (part III). The desert bighorn situation fits the example outlined in the proposed guidelines. "(ACECs) could include an important and critical habitat for a species that is endangered, threatened, sensitive, or of special importance; an important and critical area of historic range suitable for reintroduction of such a species, or an area necessary for reproduction, rearing, or seasonal use in order to maintain a viable population of such a species."

Under the guidelines, potential ACECs must be protected.

Impacts

All exploration and production activities will be assessed site specifically and will be consistent with proposed ACEC guidelines.

TABLE 5

Visual Resource Management (VRM) Classes

1. Class I. This class provides primarily for natural ecological changes; however, it does not preclude very limited management activity. Any contrast created within the characteristic environment must not attract attention. It is applied to wilderness areas, some natural areas, wild portions of the wild and scenic rivers, and other similar situations where management activities are to be restricted.

2. Areas of Critical Environmental Concern for Scenic Values (ACEC). ACEC are lands of high scenic value of relative scarcity. For this reason, priority identification must be made for presentation in the management framework process. Conformance with VRM Class II objectives constitutes interim management.

3. Class II.* Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. A contrast may be seen, but should not attract attention.

4. Class III.* Contrasts to the basic elements (form, line, color, texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.

5. Class IV.* Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, texture) inherent in the characteristic landscape.

6. Class V. Change is needed or change may add acceptable visual variety to an area. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape. This class would apply to areas identified in the scenic evaluation where the quality class has been reduced because of unacceptable cultural modification. The contrast is inharmonious with the characteristic landscape. It may also be applied to areas that have the potential for enhancement, i.e., add acceptable visual variety classification until one of the other VRM class objectives can be reached through rehabilitation or enhancement. The desired visual resource management class should be identified.

*Structures located in the foreground distance zone (0-1/2 mile) often create a contrast that exceeds the VRM class, even when designed to harmonize and blend with the characteristic landscape.

III. Consultation and Coordination

This section documents consultation and coordination which occurred prior to and during preparation of the draft Environmental Assessment.

A field examination of the Big Hatchets and Alamo Hueco was made on January 24-25, 1980. Representatives of NMGF, Placid Oil Company, USGS, and BLM assessment team members were present. The group discussed possible alternatives and mitigation measures. Placid representatives explained the geologic potential for discovery of oil and gas. The group stopped and discussed the possibility of oil and gas leasing with Mahlen Everhardt, a local rancher, Dawson Geophysical Company representatives, and Howard and Irene Fredricksen, general store owners in Hachita.

Another meeting was held with NMGF on February 4, 1980. Alternatives were discussed, and NMGF was requested to develop a preferred alternative with background data. NMGF alternative was presented in the memo from Harold Olson and was adopted with slight modification as the agency preferred alternative (alternative 3).

A letter concerning major considerations and possible alternatives regarding oil and gas leasing was sent to interested government agencies, companies, and members of the public. From comments that were received, Alternatives 1 and 2 were developed. Oil companies generally advocated leasing the entire area with special stipulations and conservation organizations advocated allowing no leasing in the area. Alternative 4 was developed from discussions among BLM assessment team members.

Numerous calls were made to USGS and BLM specialists in Roswell and Farmington concerning the stages of oil and gas development and the impacts.

Clearances for threatened and endangered species resulted from informal consultation with NMGF and U.S. Fish and Wildlife Service.

The following table summarizes the input received during development of the draft assessment.

TABLE 6

<u>Agency</u>	<u>Nature of Contact</u>	<u>Action Taken</u>
Ida Anderson	letters, BLM requested comments	information used in developing alternatives
Dave Foreman	letter, BLM requested comments	used in developing alternatives
Bob Langsenkamp	letters, phone calls BLM requested comments	used in developing alternatives
Anschutz Oil Co.	letter, BLM requested comments	used in developing alternatives
Wildlife Society	letter, BLM requested comments	used in developing alternatives
Desert Bighorn Council	letter, BLM requested comments	used in developing alternatives
Janice Cordero (Sierra Club)	letter, BLM requested comments	used in developing alternatives
Rollin Wickenden (Sierra Club)	letter, BLM requested comments	used in developing alternatives
Lang & Martin	phone call & letter, BLM requested comments	used in developing alternatives
P. H. Wach	letter, made comments	used in developing alternatives
Southwest Council Government	phone call, BLM requested demographic information	incorporated in Assessment
New Mexico Oil & Gas Association	phone call, BLM requested information concerning U.S. oil imports	incorporated in Assessment
NM Employment Office - Deming, Albuquerque	phone call, BLM requested information concerning unemployment rates, and average income	incorporated in Assessment
Arco	phone conversation, BLM requested comments, geologic information	information incorporated in the Assessment

<u>Agency</u>	<u>Nature of Contact</u>	<u>Action Taken</u>
Placid Oil Co.	meeting, phone conversation BLM requested comments and geologic information	incorporated in Assess- ment
NMG&F	meetings, phone calls, BLM requested background information, a preferred alternative and threatened & endangered species clearance.	information used in the Assessment
Lanny Wilson	phone call, letter BLM requested background information concerning sheep	information incorporated in Assessment
Dawson Geophysical	phone call, letter BLM requested economic information & comments	information incorporated in Assessment
U.S. Fish & Wildlife Service	phone calls, BLM requested threatened & endangered species clearance and comments	incorporated in Assess- ment, used in developing alternatives
U.S. Geologic Survey	meeting, phone calls, letters, BLM requested information	incorporated in Assess- ment

Newspaper Articles

An article was published in the March issue of the Advisor.

The following people or organizations were contacted but no comments were received.

El Paso Natural Gas
Chevron
Amoco
Leonard Resources
Mayor of Lordsburg
Hidalgo County Manager
New Mexico Wildlife Federation
Picacho Gun Club

Draft Copies

All agencies, organizations, and individuals who responded will receive copies of the draft assessment. The State of New Mexico clearinghouse will receive 2 copies of the Environmental Assessment. Everyone who inquired about the assessment from newspaper and the Advisor article will receive a draft copy.

Public Comments

The following letters were received concerning oil and gas leasing in the Big Hatchets and Alamo Hueco.

The Wilderness Society

1301 Pennsylvania Ave., N.W., Washington, D. C. 20006

January 23, 1980

Mr. Daniel C.E. Rathbun
District Manager
Bureau of Land Management
P.O. Box 1420
Las Cruces, NM 88001

Dear Dan

It was good to see you down in Las Cruces last week and get to discuss the wilderness review. I hope we have a chance to get out in the field together to look at some of these areas.

Thank you for the letter regarding possible oil & gas leasing in the Big Hatchet and Alamo Hueco Mountains. I can be quite clear and succinct on this issue.

The Wilderness Society is wholly and adamantly opposed to any oil & gas leasing in the Big Hatchet or Alamo Hueco roadless areas.

We feel that any oil & gas leasing in either of these areas is thoroughly inappropriate for the following reasons:

1. The Big Hatchet and Alamo Hueco Mountains are widely recognized as the outstanding potential BLM wilderness areas in New Mexico. Public interest in these areas goes back at least ten years. BLM has long recognized the superlative wilderness potential of these areas. Oil and gas leasing is all together inappropriate for this area. As has been said for the Arctic Wildlife Range in Alaska, the Big Hatchets/ Alamo Huecos are the last place in New Mexico we should look for oil and gas.
2. As you state, this area supports the only free roaming herd of desert bighorn sheep in New Mexico. The herd is not in the healthiest state possible and oil & gas leasing could be the final factor in destroying the herd. Moreover, the area has other superlative and fragile wildlife values including very strong javelina populations, Coues whitetailed deer, Sierra Madrean birds (a coppery tailed trogon was seen last spring), and other exotic species. Even if no true wilderness values were present, ecological and wildlife resources alone would demand that there be no oil & gas leasing.

The Wilderness Society
Southwest Regional Office
P. O. Box 1160
Bernalillo, NM 87004
(505) 867-3139

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JAN 25 1980	
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Not only do we feel that there should be no oil and gas leasing at all in the Big Hatchet or Alamo Hueco Wilderness Study Areas, but we further support:

1. No leases even with provision for no surface occupancy.
2. No leases outside the area with slant drilling under the Wilderness Study Areas.
3. No leases on any BLM lands east of State Highway 81 or south of BLM road 3239/38.

I can assure you that conservation groups would find any plan for oil & gas leasing in this area to be an issue of major national significance and one to which we would devote a considerable amount of effort.

Please send me copies of any regulations governing BLM's actions or options on this issue.

Thanks again, Dan, for contacting me about this. I will be very interested in seeing the EAR.

Happy Trails



Dave Foreman
Southwest Representative

cc: Lan Wood
Larry Woodward
Debbie Sease
Jean Herzegh
Brant Calkin
Bob Langsenkamp
Wes Leonard
Jim Smith
Jim Stewart
Dwight Riggs
Roger Steeb
Bob DeVelice
Roger Peterson
Henry Zeller
Dr. Bruce Hayward
Dr. John Hubbard



DESERT BIGHORN COUNCIL

Established to promote the advancement of knowledge concerning the Desert Bighorn Sheep and the long-range welfare of these animals.

Death Valley National Monument
Death Valley, California 92328

29 January 1980

Daniel C. B. Rathbun
District Manager
Bureau of Land Management
P.O. Box 1420
Las Cruces, New Mexico 88001

Dear Mr. Rathbun:

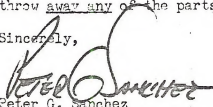
I hope your letter of 16 January 1980 is a joke or a test of our expertise that is misguided.

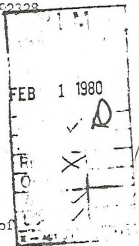
As a representative of the federal government in a responsible position, you should know that it is ecologically impossible to provide for bighorn sheep and their habitat, a wilderness area, and an oil and gas production area on the same piece of land.

The Desert Bighorn Council is opposed to oil and gas leasing in bighorn habitat because this activity is incompatible with wildlife. You must convey to others that we cannot do all things simultaneously on the land.

At this stage in your planning, Also Leopold has the best advice: "The first sign of intelligent tinkering is that you don't throw away any of the parts."

Sincerely,


Peter G. Sanchez
Secretary-Treasurer



February 11, 1980

The effect of our operations on wildlife in the area due to noise and disturbance is no more than that of any other vehicular traffic and not as great as that of road maintenance equipment commonly used in the area.

Since ours is a one time operation, we contend that it disturbs the environment to a lesser degree than the repeated use of the lands by hunters, campers, 4-Wheel drive clubs, federal agencies, farmers and ranchers, livestock or any of the many other uses or abuses to which the land is subjected.

Our seismograph crew is based in Deming, New Mexico, and consists of thirty-three people, some of whom are local residents. The average expenditure for the crew is approximately \$70,000.00 per month. Almost all of this goes into the local economy with service stations, parts houses, restaurants, motels, grocers, and landlords sharing the largest percentage. Although they help pay the bill, our people generally require little of the tax supported services of the community thereby easing the burden on the local residents.

Yours very truly,



Floyd B. Graham
Vice-President

FBG/dh



GEOPHYSICAL COMPANY

100 SOUTH MARIENFELD STREET
LAS CRUCES, TEXAS 79701
TELEPHONE 915-682-7356

FILM
SEISMOGRAPH SURVEYS

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8 450700M

February 11, 1980

Bureau of Land Management
P.O. Box 1420
Las Cruces, New Mexico 88001

Attention: Mr. Dan Rathbun

Dear Sir,

We have been asked by your staff to submit our opinions concerning the review of oil and gas leasing policies as pertain to federally owned lands, particularly those in your district, and to give you a few facts concerning the impact which seismograph crew operations have on the area and it's economy.

We are unequivocally in favor of the release of all public lands for oil and gas leasing, since it has been shown that any oil and gas exploration efforts can be made compatible with the local environment.

Dawson Geophysical Company is presently conducting an extensive seismograph survey in southern Hidalgo County, New Mexico. We are using a surface energy source, "Dinoseis," which amounts to firing propane gas in a confined chamber. The surface of the earth is not penetrated and overall operational damage to the land and vegetation is minimal. Where existing roads are available, we make every effort to utilize them for the passage of vehicles. Damage, if any, to growing vegetation generally is regenerated after a few days or weeks of normal growth.

IDA LEE ANDERSON
1437 Beneficial Life Tower
36 South State Street
Salt Lake City, Utah 84111

February 12,

FEB 19 1980

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RV	
OF	

United States Department of the Interior
Bureau of Land Management
Las Cruces District Office
P.O. Box 1420
Las Cruces, New Mexico 88001

Attention: Mr. David C.B. Rathbun
District Manager

Re: Environmental
Assessment
Oil and Gas Leasing
Big Hatchet-Alamo
Hueco Mtns. Area

Gentlemen:

I would like to offer comment regarding the effects of oil and gas leasing in the Hatchet Mountain, Alamo Hueco, Dog Mountain study area.

My geologist has made a thorough geologic study of this entire area. The study area is located in a relatively desolate, arid portion of the state. The average elevation in the valleys in this general area averages in excess of 4,500 feet. The highest point in the area is Big Hatchet Peak which is 8,366 feet high and well above the other mountains. The balance of the other mountains are of very low relief averaging about 1,000 to 2,000 feet above the valley floor. Two prominent canyons have eroded fairly deep ravines through the Hatchet Mountains and two canyons also cut through the Alamo Hueco Mountains. During inspection, no running water was observed, all runoff stream beds being exceptionally dry, leading us to believe that the stream beds have been cut primarily by flash floods. One small spring and several other dried up small springs were observed in the Alamo Hueco Mountains. We did not examine the higher elevations of Hatchet Mountain. It is possible that small streams or springs may be present at this higher elevation.

A careful study of the area revealed the usual desert wildlife; jackrabbits, rodents, snakes and scattered birds. If there are any Desert Bighorn Sheep in the area they did not reveal themselves and must spend the bulk of their time near the top of Hatchet Mountain.

Several prospective anticlines extend through the study area. If seismic studies prove the existence of these anticlines at depth we would consider this particular area to be the most prospective for oil and gas in southwest New Mexico.

Page 2
February 12, 1980

We can see no reason why well planned oil and gas exploration should have any detrimental effect on Bighorn Sheep (if any are present) or on any other wildlife in the area. Reasonable and adequate stipulations can be attached to each lease to insure protection of the environment. You may want to restrict surface occupancy for 200 or 300 feet around each spring or from any running water. You may also wish to restrict surface occupancy in the SW $\frac{1}{4}$ of Section 5, the SE $\frac{1}{4}$ of Section 6, the NE $\frac{1}{4}$ of Section 7 and the NW $\frac{1}{4}$ of Section 8, which covers Big Hatchet Peak.

Refusing to lease open Federal lands in this area would really not accomplish your objective as the entire area is shot through with State of New Mexico and privately owned lands, practically all of which are leased to oil companies. Several townships of the study area consist of far more State and privately owned lands than Federal.

At no time in America's recent history have we been as vulnerable as we are today. Our dependency on unsafe foreign sources of crude oil is a prescription for disaster. It is well known that our best prospects for new onshore reserves lie on Federal lands in the West and in Alaska, yet we are thwarted on every turn by well meaning Federal preservationists who fail to see the need for access to the Federal lands.

In parting, I would like to say that I have friends who live in the Coachella Valley, California. A large band of Desert Bighorn Sheep live in the mountains adjacent to their homes and almost nightly eat the roses and plants around their homes. They have even been observed drinking from a swimming pool during the daytime. Animals are very smart and will generally adapt well to a changed environment when they are not hunted to extinction. Witness the increased numbers of fish present in offshore waters around drilling platforms.

I trust you will decide to allow oil and gas leasing in this area.

Sincerely yours,

Ida Lee Anderson
Ida Lee Anderson

ILA:cb

New Mexico



WILDERNESS STUDY COMMITTEE



P.O. Box 801, Silver City, NM 88061 (505)388-4326

2/12/80

Mr. Dan Rathbun
District Manager
Bureau of Land Management
P.O. Box 1420
Las Cruces, NM 88001

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FEB 15 1980	
DM	<input checked="" type="checkbox"/>
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Dear Mr. Rathbun:

I would like to speak for the Study Committee in opposing any oil and gas leasing in the Big Hatchet or Alamo Hueco Roadless Areas in Hidalgo County.

We feel that these are two of the premiere potential Wilderness areas in the state under the administration of any agency.

Both areas have superb wilderness characteristics, as I can attest, having visited each area. Also, they have important supplemental values. The areas have interesting and possibly scientifically important archaeological sites. They are home for at least part of the year to thickbilled kingbirds, Harris Hawks and other Mexican species. Trogons have even been reported in the Big Hatchets (although probably not resident because of lack of riparian habitat). In fact, these areas might eventually serve as a refuge to many Mexican species, which are under increasing pressure in that country. Also, the Hatchets are home to the last native herd of Desert Bighorn Sheep in the state. The areas do indeed provide outstanding opportunities for solitude and primitive recreation, such as; hiking, backpacking, many forms of nature study, photography and birding.

We feel that oil and gas exploration and possible development may very well destroy some of these outstanding qualities. Furthermore, the BLM is not obliged to allow such activities, since they are not "grandfathered". The drilling sites may not be able to be rehabilitated within the parameters outlined in the agency's Interim Management Policy and even if it were possible, irreparable damage to the veryvulnerable wildlife populations of the area could occur.

In summation, I would like to say that we are emphatically opposed to leasing in the area. Four times more exploratoy holes have been drilled in the continental U.S. than in the rest of the non-Communist world, if I'm not mistaken. Is it necessary to offer up these outstanding areas as well for what might be an illusory gain? Thanks for the opportunity to comment.

Sincerely, Bob Langsenkamp

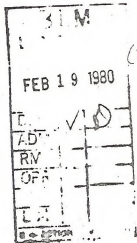
Acting Exec. Dir.

SIERRA CLUB



EL PASO REGIONAL GROUP

February 12, 1980
11113 Wharf Cove
El Paso, Texas 79936



Bureau of Land Management
Las Cruces District Office
P. O. Box 1420
Las Cruces, N. M. 88001

Dear Mr. Rathbun:

I am responding to your letter of January 16, to Tanya and Bill Hoppes. They are in the process of leaving El Paso and I have replaced Tanya as Chairman of the El Paso Sierra Club.

I have visited the Big Hachets a couple of times and have found them a very remote and beautiful range. There has been minimal development and I would like to see the area stay that way. The desert bighorn sheep is a unique and valuable resource, as are the mountain lions, and I fear that unrestricted oil and gas leasing would be disastrous for the wildlife and the landscape.

I am not opposed to oil and gas leasing as long as strict environmental safeguards are enforced. Leasing should be restricted to lands outside of wilderness study areas and outside known bighorn sheep habitat. If leasing is done on lands bordering WSA's, a performance bond should be put up by the leasee to insure reclamation of drilling sites.

The Big Hachet and Alamo Hueco Mountain Ranges are one of the last truly wild areas of the Southwest. Let's act to insure the integrity of this area as defacto wilderness and prime bighorn sheep habitat.

Please keep me informed about developments in this matter.

Sincerely,

Rollin H. Wickenden
Chairman

LANG & MARTIN

LARRY LANG
DICK MARTIN

550 PETROLEUM BUILDING, DENVER, COLORADO 80202
LAND WORK FOR ENERGY

TELEPHONE (303) 825-7117

February 13, 1980

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RM	<input type="checkbox"/>
OPR	<input type="checkbox"/>
LOG	<input type="checkbox"/>
- ACTION	

Bureau of Land Management
Las Cruces District Office
Las Cruces, New Mexico 88001
Attn: Mr. Daniel C. B. Rathbun
District Manager

RE: Oil and Gas Leasing in the Big
Hatchet and Alamo Hueco Mountains,
Hidalgo County, New Mexico

Gentlemen:

The purpose of this letter is to comment upon the captioned area in regards to your preparation of an Environmental Assessment. Please refer to the attached copy of that certain letter from Mr. Daniel C. B. Rathbun to Mr. Dick Martin dated February 5, 1980.

It is this writer's opinion that unrestricted oil and gas leasing and subsequent operations would not disturb the desert bighorn sheep in the area. The location of an oil and gas well would require approximately one acre, whereas the captioned area encompassed thousands of acres.

If the Bureau of Land Management in its Environmental Assessment decides that no oil and gas leasing be allowed in the area or decides to put no surface occupancy stipulations on leases that do issue, then an injustice would be done to the state of New Mexico, in the way of lost revenue, to the present lessees in the area, and, more importantly to the citizens of the United States in depriving them of potential oil and gas reserves, thus furthering our dependence on foreign oil.

Also, in this area, the state of New Mexico lands are often adjacent to federal lands. Leases have been issued on these state lands. For instance, in Township 32 S, R14W, Section 17, Hidalgo County, N.M., the U.S.A. owns the minerals under the S $\frac{1}{2}$. An oil and gas lease has been issued by the state of New Mexico on the S $\frac{1}{2}$ of this section. How would it benefit the sheep, the lessee, or the N $\frac{1}{2}$ of this section? Moreover, it would deprive the state of New Mexico from potential revenue.

Mr. Daniel C. B. Rathbun
District Manager

February 13, 1960
Page 2

Before the Bureau of Land Management allocates another area, where there are potential hydrocarbons, into a wilderness area or restricts an area making it virtually impossible to conduct exploratory efforts, extreme consideration should be given.

Thank you.

Sincerely,

Lang & Martin

Dick Martin

Dick Martin

DM/jm

State of New Mexico

GOVERNOR
BRUCE KING

DIRECTOR AND SECRETARY
TO THE COMMISSION
HAROLD F. OLSON

STATE GAME COMMISSION
EDWARD MUNOZ CHAMBERLAIN
GALLUP

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SILVER CITY

BILL LITHELL
SARAHON



DEPARTMENT OF GAME AND FISH

STATE DEPARTMENT OF GAME AND FISH
OFFICE OF THE STATE GAME WARDEN
SANTA FE, N.M. 87502

FEB 19 1980

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RES

February 15, 1980

Mr. Daniel C. B. Rathbun
District Manager
Bureau of Land Management
P. O. Box 1420
Las Cruces, New Mexico 88001

Dear Dan:

The Big Hatchet Mountains supports one of the State's two remaining historic desert bighorn populations and, therefore, it is extremely valuable habitat for that purpose. We are very strongly committed to manage this population to maintain it in the healthiest and most viable conditions possible.

Attached is a memorandum received from Andrew Sandoval and Bob Bavin, our bighorn biologists, which provides information on the status of desert bighorn in New Mexico and the Big Hatchet Mountains. Their recommendations reflect the Department's position concerning oil and gas leasing in that area.

We strongly oppose any leasing that may be proposed within a distance of one mile from the base of the mountains and between one and two miles that would result in the development of permanent structures or occupancy. A map is enclosed showing these areas.

Sincerely,

Harold F. Olson
Harold F. Olson
Director

Att.

MEMORANDUM
DEPARTMENT OF GAME AND FISH

February 6, 1980

TO: Bob Welch and Walt Snyder

FROM: Andrew Sandoval and Bob Bavin

SUBJECT: Oil and Gas Drilling Operations in the Big Hatchet/Alamo Hueco Mountains

Background

We recently attended a meeting with the Bureau of Land Management to discuss the proposed leasing of public lands for oil and gas drilling operations in the Big Hatchet/Alamo Hueco Mountains. Prior to the meeting, Bob participated in a field trip to the Big Hatchets with the BLM, US Geological Survey, and Placid Oil Company representatives.

Basically, the proposal would entail drilling operations, road and pipeline construction, and very likely "producing operations"; i.e., maintenance and repair work on wells. In examining the possible impacts of this proposal on wildlife, particularly desert bighorn sheep, we feel that a number of potential effects could result from this type of activity. These effects have been identified in the following pages.

In our attempt to document possible detrimental effects of increased human activity on desert bighorn sheep, it soon became apparent that quantitative data are lacking and that development of tolerance levels of desert bighorn sheep relative to human activity requires much further work for establishment of a dependable criteria.

The current world situation dictates that the United States must render itself independent from Middle East oil; therefore, the need to locate additional oil and gas fields is self-evident and hardly requires comment. However, we feel that this type of activity would not be compatible with our objectives in attempting to reestablish desert bighorn sheep in the Big Hatchet State Game Refuge and the adjoining Alamo Hueco Mountains.

Desert bighorn sheep historically occupied the arid, rugged mountain ranges of south-central and southwest New Mexico. After the advent of European man, bighorn sheep suffered drastic declines. This decline was attributed to increasing encroachment and the corresponding loss of habitat, disturbance by the human element during the settlement of these areas, diseases introduced by domestic livestock and excessive and illegal hunting. Bighorn habitat has been drastically reduced due to demands and abuses of the land by the white man. In New Mexico, desert sheep have disappeared from all but two of their historic ranges (the San Andres and Hatchets Mountains) and presently remain only as remnant herds of questionable viability.

Hatchet Mountains Desert Bighorn Sheep

History

During the early 1950's, the desert bighorn sheep population in the Big Hatchet Mountains was estimated between 125 and 150 animals (Gordon 1953). At that time, bighorn sheep were known to be using the entire mountain range. Ewe groups ranged mainly throughout the southern third of the mountain, but also made some use of the northern portion of the mountain. Lambing occurred primarily in the southern third of the range. Ram distribution was generally considered to be throughout the mountain range.

Water hole counts at this time indicated that bighorn sheep not only used the steeper portions of the range, but that they also utilized the major canyon bottoms and occasionally the surrounding alluvial slopes. Sheep were observed at Chaney Well on the northwest side, Whitewater Well on the southwestern corner, and Sheridan Well near the center of the mountain range. During this period, sheep were also observed to use salt licks established for cattle in the areas of Sheridan Well and Deep Well, which is located in the bottom of Newwell Canyon (Gordon 1955).

Following several years of severe drought in the late 1950's and the resultant competition for browse with large numbers of deer, cattle, and horses, the sheep population declined to less than 25 animals by the early 1960's. Deer numbers also declined drastically during this same period. The distribution of sheep was reduced to the areas around Mine Canyon, Newwell Canyon, and the northwestern fringe of the range in the vicinity of game water unit number 5. At this time, reports were received of a bighorn ram being removed from a metal stock tank near the southern end of the range and of two bighorn ewes being found dead near Witch Well, which is in the desert flats northeast of the mountain range (Gross 1960).

Historically then, desert bighorn sheep utilized the majority of the Big Hatchet Mountains, and occasionally traveled well out from the mountain. Sheep use of the mountain has historically occurred from the alluvial slopes and canyon bottoms all of the way to the top of the mountain.

Present Sheep Distribution and Use

Since June 1976, intensive studies have been conducted within the Big Hatchet Mountains aimed at determining the population size, home range and distribution, and environmental factors influencing the remaining desert bighorn sheep. At the present time, the indigenous sheep population is utilizing a much restricted area of what was once their former range. Throughout the year, ewes have been located on the ridges south of Mine Canyon (Cholla Peak, Fossil Mountain, and Snake Ridge) and in the area surrounding Newwell Peak. Rams are found in the same area from June through December. From January through May, the rams are generally found in the South Peak and Bugle Ridge areas which is north of the normal ewe range. Several mineral licks have been located in the ram range near the base of Ram Butte. Principal lambing areas are the steep slopes and canyons found in the area of Fossil Mountain and Newwell Peak. Lambing has been observed to occur during the months of January, March, April, May,

February 6, 1980

June, August, and September. The majority of the lambing activity, however, appears to take place around March and April.

Numerous movements by bighorn sheep have been documented from the mountain to a small group of hills (Cairn Hills) located approximately 4 km. south of the mountains. These moves are generally associated with the use of two natural mineral licks located there (Watts 1979, Lenarz 1977). Occasional observations of bighorn sheep have been made on the U-Bar Ridges and on the north side of Thompson Canyon, which represent moves to the extreme limits of the present sheep distribution. The present ewe range is reduced to less than half of what it was in the 1950's and early 1960's.

Since the early 1960's, the sheep population has fluctuated around 20 to 25 animals. Predation appears to be one of the major factors keeping the population at a low level. The loss of lambs can be directly associated with the moves back and forth to the Cairn Hills. Mountain lion predation on adult sheep has also been documented within the mountain range.

It appears the desert bighorn sheep in the Big Hatchet Mountains are intolerant of human activity. Their usual reaction to known human presence is flight to a more remote area. Movements have also taken place in the past month that appear to be related to the activity of seismograph crews in close proximity to the base of the mountain.

Reintroduction Efforts

In early 1979, the New Mexico Department of Game and Fish, cooperating with the Bureau of Land Management, initiated a program to reintroduce desert bighorn sheep into areas on the Big Hatchet Mountains where records show historical use existed but which no sheep were presently utilizing. A temporary holding paddock of approximately 40 acres was constructed in Romney Canyon on the west side of the mountain range. Seven sheep were translocated there from the captive population at the Red Rock Wildlife Experimental Area and held in the paddock until lambing had taken place. It was hoped that by confining the sheep in the paddock for several months, the sheep would imprint to the existing habitat, thus establishing a population in what appears to be the most suitable part of the mountain range. On May 29, 1979, a total of fourteen sheep were released. Radio tracking has continued since that time in order to determine their movements and survival.

Following their release, the reintroduced sheep remained in the general area of the release site for some time, then traveled north to the vicinity of Chaney Canyon where they remained for several days. From there they moved south approximately nine airline miles to Newwell Peak and then returned back north to Thompson Canyon. They remained in Thompson Canyon for several weeks before returning to the Romney Canyon release site. There they were joined by rams from the indigenous herd and returned to the Newwell Peak and South Peak areas where they remained for two months. This was the first recorded use in recent times of the indigenous sheep on the north end of the mountain. During January, 1980, as the time approached for their lambs to be born, they again returned to the Romney Canyon area. Once more, adult rams from the indigenous herd followed

them. At the time of this report, February, 1980, at least three lambs have been born, two of which are still alive.

Observations of the behavior and movements of the reintroduced sheep indicate that they have expanded the total amount of habitat utilized within the Big Hatchet Mountains and have altered the traditional home range structure of the indigenous population. By following the reintroduced herd, rams from the indigenous population have been induced to travel three to four miles west and north of their previous range, an occurrence that is generally unknown among bighorn sheep. It is still too early in the reintroduction program to conclusively state what portion of the mountain range these sheep will finally settle into.

Based on observations following the release of the reintroduced sheep, it will be extremely difficult, if not impossible, to predict what areas will be utilized by these sheep within the next few years. They have been observed to travel through the majority of the mountain range during the eight months following the release and they have spent considerable time in several different areas. Only time will provide the answers.

Current Status of Desert Bighorn Sheep in New Mexico

Due to the recent scabies epizootic and corresponding loss of the San Andres bighorn population, the current situation in New Mexico is particularly precarious. Currently, less than 100 animals remain in the state, of which 75 percent are in captivity. Until recently, the San Andres population was the only indigenous population in a viable condition. The only other indigenous population in the Big Hatchet Mountains was headed toward extinction until we began supplementing it with additional sheep from our captive herd at Red Rock.

The loss of the San Andres bighorn herd as a viable population dictates that greater emphasis will be placed on the potential of the Big Hatchet Mountains. During the past three years, the Department of Game and Fish and the Bureau of Land Management have invested over \$200,000 on research studies to identify factors responsible for the apparent inability of this population to increase, habitat evaluation studies to identify critical use areas and, more recently, to transplant desert bighorn into the Big Hatchet Refuge to alleviate this population's inability to overcome the threshold between survival and extinction. We must strive to protect this investment and exert every effort to insure the survival of this bighorn population if we are to fulfill our principle obligation to New Mexico's wildlife resources.

Bighorn Sheep Behavioral Considerations

At present, the data base on desert bighorn sheep is very limited when compared to species more numerous, such as mule deer. Research studies of desert bighorn were initiated within the past 10-15 years, with most of the effort taking place in the past five years. Due to their low numbers, the rate of data collection has been slow. We have yet to reach the point of sufficient knowledge about desert bighorn to proceed with comprehensive, long-term studies of population dynamics, food habits, nutrition, behavior, and competition with other species, including man.

February 6, 1980

The current status of our knowledge of desert bighorn, and bighorn sheep in general, is that it is a species that has great difficulty adjusting to encroachment of many man-related activities. We also know that behavior is extremely rigid and ritualized. Behavior patterns, such as periodic range shifts, are passed from adults to young animals and these shifts play an important role in their survival beyond the obvious advantage of distributing their impact on the vegetative portion of the habitat. Past experience has taught us that the animals do not adjust well to disruptions of these patterns.

Disturbances, whether directed toward bighorn or not, have been observed to cause reactions adverse to population welfare. The point at which harm results is not clear, but bighorn have been found to abandon the use of historic ranges when human activity increased suddenly over a few years' time (Simmons 1970).

Light and Weaver (1973) studied bighorn behavior responses to man in numerous environmental situations in addressing the development of a ski resort in the San Bernardino National Forest, California. This investigation found that human visitation created a spatial displacement effect on the bighorn habitat. Bighorn and their sign were absent in a line-of-sight pattern from the center of the human influence. Bighorn adapted to this human influence by utilizing available habitat out of sight of the influence. In the vicinity of a popular clubhouse, the uppermost water source and entire basin of suitable habitat remained void of bighorn use during the summer season when human use at the cabin was intense (Light and Weaver 1973). The conclusions from this study were:

1. Bighorn maintain their area of distribution as a living tradition and rarely depart from it.
2. Bighorn fail to extend their range despite ample opportunity.
3. Bighorn use of historic range begins to diminish where human use is over 500 visitor-days per year (recreational use).
4. Between 500 and 900 visitor-days per year caused bighorn to avoid their historic range.
5. Final results may be a reduction in numbers by crowding of the sheep population resulting in insufficient forage, increased predation, increased disease and external harassment.
6. Any curtailment of bighorn movements will result in reduced gene flow and gene pool size, which may ultimately affect the future existence of the bighorn population.

Highways, water canals and Impoundments, high voltage lines, fences and residential communities are known to be deleterious to desert bighorn in several ways -- they directly or indirectly increase mortality, they act to prevent use of water sources and habitat, they erect barriers to local travel and movement routes, and increase human activities beyond innate tolerance levels (Graf 1970).

Man's activities and presence may be harmful to both the bighorn population and the range. The direct factor or contact disturbance may reach a point

where it is nothing more or less than harassment. Harassment can cause bighorn to become run down physically, perhaps from an improper diet due to nervous tension (Hansen 1970). Therefore, it is conceivable that bighorn sheep could be caused to vacate their area of preferred use due to a level of human harassment, which for other species such as mule deer would be only minor harassment.

Decline of bighorn populations due solely to increases in human activity would be difficult to demonstrate. Nevertheless, the bighorn decline in the Sandia Mountains roughly coincided with the period of tramway construction activities and accelerated people pressure, though we cannot demonstrate that this was a direct cause and effect relationship. The population size in the Big Hatchet Mountains declined by 50 percent during the two-year study, possibly due to the increase in human activity in the area, again suggesting a cause and effect relationship (Watts 1979).

Conclusions

We do not oppose the objectives of the proposal itself; we oppose the risk associated with intensified human disturbance and possible disruption of behavior patterns, which has the potential of further reducing the sheep population. This could also be the difference between success or failure of the reintroduction efforts.

Competition for forage, water, and space, is a major factor in the survival of a species living precariously under marginal conditions. Under natural conditions, there appears to be a balance between the animals and the environment. We must recognize that the environment in which desert bighorn live today is one grossly unbalanced as a result of man's activities. We, the causative factor in this unbalanced environment, must try to understand our role and to correct at least some of the imbalance. By controlling the competitive factors such as man's activities, we are adding a little more to the side of the scales on which bighorn sheep are so precariously balanced.

Any land use which restricts the opportunities of desert sheep for water, food, and travel will result in less optimum population numbers on any given range. Effects of permitting conflicting land use activities here and there over a period of years reduces the available habitat and population size. Disturbances by man, once having only temporary effect, today acts to constrict range and reduce population numbers permanently. Our concern stems from a responsibility to prevent the extinction of this bighorn sheep population. The cost necessary to insure the survival of this population seems to us a small price to pay for the long-term potential advantage.

Recommendations

For the continued protection of this valuable and critical desert bighorn sheep population, it is recommended that no intrusions or surface disturbances be allowed within two miles of the mountain range proper so as to reduce the possibility of harassment to the sheep population. With a few exceptions, this would generally conform with the boundaries of the existing wilderness study area (Figure 1). The two most noticeable exceptions would be the area near the Hatchet Ranch headquarters which is well beyond the two-mile limit, and the area

February 6, 1980

near the mouth of Sheridan Canyon, which is closer than the recommended two-mile limit.

It is specifically recommended that no leases be allowed within one mile of the mountain and that any leases one to two miles from the mountain be prevented from having any type of surface occupancy.

Especially important are any areas that are of a critical nature such as existing or potential lambing grounds, areas of known mineral licks, and areas near known water sources.

cc: Harold Olson
Wain Evans
Ralph Little
Byron Donaldson

Mason

Literature Cited

1. P. 1973. Big Hatchet bighorn studies. P-R Job Prog. Rep., W-62-R-1. New Mexico Dept. of Game and Fish, Santa Fe.
2. S. Big Hatchet bighorn studies. P-R Job Prog. Rep., Proj. W-62-R-2. New Mexico Dept. of Game and Fish, Santa Fe.
3. 1970. Habitat protection and improvement. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Sumner and G. Monson (eds.). In press.
4. E. 1960. Mexican Bighorn studies. P-R Job Prog. Rep., Proj. W-62-R-1. New Mexico Dept. of Game and Fish, Santa Fe.
5. G. 1970. The impact of modern man. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Sumner and G. Monson (eds.). In press.
6. S. 1977. Desert bighorn sheep investigations. P-R Job Prog. Rep., Proj. W-122-R. New Mexico Dept. of Game and Fish, Santa Fe.
7. 1978. Intra-specific variation in the social structure of Ovis canadensis. M.S. Thesis. New Mexico State University, Las Cruces, 36 pages.
8. J. T., Jr. and R. Weaver. 1973. Bighorn sheep habitat study. San Bernadino National Forest. Cajon Ranger District, California.
9. N. M. 1970. Adaptive behavior. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Sumner and G. Monson (eds.). In press.
10. T. J. 1979. Detrimental movement patterns in a remnant population of bighorn sheep (Ovis canadensis mexicana). M.S. Thesis. New Mexico State University, Las Cruces, 185 pages.

SIERRA CLUB



EL PASO REGIONAL GROUP

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February 18

Bureau of Land Management
Las Cruces District Office
P. O. Box 1420
Las Cruces, New Mexico 88001

Re: Your Environmental Assessment concerning oil and gas
leasing in the Big Hatchet and Alamo Hueco Mountains
in Hidalgo County, New Mexico

Dear Mr. Rathbun:

The above EA is of critical importance to our Group because it contains an area that supports the only free roaming native herd of desert bighorn sheep in New Mexico and because it will be recommended as a wilderness study area.

We have spent a great deal of time and effort following the work of New Mexico Game and Fish concerning their desert bighorn sheep reintroduction program and we think this operation should have every chance to succeed. It is unlikely that oil and gas leasing in the area would be conducive to such an operations success.

We are also concerned with the wilderness study area designation and want these mountain ranges to be included in the wilderness system. Oil and gas leasing would not be beneficial to their inclusion.

Because of the naturalness of this area and lack of man-made disturbances, we believe it has great potential for plant and animal studies and relatively little seems to have been done. Oil and gas leasing would hinder such scientific studies.

In summation, the El Paso Group of the Sierra Club does not endorse oil and gas leasing in the Big Hatchet and Alamo Hueco Mountains for the above stated reasons.

Sincerely yours,

Janice Cordero

Janice Cordero
El Paso Executive Committee

Memorandum

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Idaho State Office

IN REPLY REFER TO:

3100(931)

TO : District Manager, Las Cruces, New Mexico

FROM : Wildlife Management Biologist, Idaho State Office

SUBJECT: Oil and Gas Boundaries

Date: February 19, 1980

As you are aware, I was the wildlife management biologist in the New Mexico BLM State Office from October 1971 to December 1973. During that time, I was able to visit the Big Hatched Mountains and the Alamo Hueco Mountains on several occasions. During this time I walked the Big Hatched Mountain Range twice and did some bighorn spot checking in the Alamo Hueco Mountains once. Based on these visits and undertaking literature reviews, New Mexico Game and Fish reports, etc., I co-authored a paper with Robert Jacobsen entitled, "Habitat of the Mexican Bighorn Sheep in the Big Hatched Mountains of New Mexico." This paper was published in the 1972 Desert Bighorn Council Transactions. The point I am making is, with my past and present bighorn work (over 15 years now) as well as familiarity with the Big Hatched-Alamo Hueco Mountains, I believe I am qualified to discuss the issue of oil and gas leasing in these areas.

To my knowledge, nowhere in North America has there been any data developed as to the impacts of oil and gas exploration and/or development in areas occupied by bighorn sheep, and more importantly, desert bighorn. This complicates the problem as there is no specific data or research from which to make some reasonable predictions for this case.

The reason I emphasize desert bighorn compared to other mountain sheep subspecies or species, is that their behavior in reacting to intrusions into their habitat is usually predictable and dramatic. For example, it is not uncommon to read accounts of Rocky Mountain bighorn standing next to highways or feeding on lawns next to towns in Jasper, Baniff, Yellowstone National Park, or in other areas (Geist, 1971) of North America. To my knowledge, there are only two such sightings for desert bighorn in the history of all bighorn sheep research, both of which were Nelson's bighorn (*Ovis canadensis nelsoni*) and not Mexican bighorn (*Ovis canadensis mexicana*). In one case, a band of bighorn ewes and lambs were observed feeding along a highway in Death Valley National Monument (Wells and Wells 1961) and in another case, Nelson's bighorn have been observed feeding adjacent to ranch houses in the Palm Springs area during the winter when the houses were not occupied and the area was not disturbed by people, automobiles, dogs, noise, etc. (Tevis, 1959). What must be understood is that desert bighorn appear to have not developed the capability to withstand a large number of humans or human intrusions into their habitat to the same degree that some northern sheep populations have.

June 1980

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Some bighorn researchers have theories as to why this phenomenon occurs, but no one really knows. Here, again, one must be careful with generalizations, as there is one documented case of Stone Sheep (*Ovis stoni*) in northern British Columbia, Canada, abandoning an entire mountain range resulting from mineral exploration by two men and a bull dozer for a very short period of time (DeMarchi, personal communication). In my opinion, a similar response can be expected for the New Mexico sheep if extensive seismographic, test drilling, and/or development were undertaken.

It now you have probably deducted that I am opposed to any oil and gas exploration within the Big Hatchet Mountain or Alamo Hueco Mountain Ranges. Following are some of the reasons that I believe such an action could be devastating to the Mexican bighorn and American bighorn habitat in these areas.

1. Oil and gas exploration and/or development could result in abandonment of the remaining Mexican bighorn for behavioral reasons which cannot be wholly explained as previously discussed above. Impacts from development, should a discovery be made, could seriously preclude any future Mexican bighorn enhancement or reestablishment programs which are currently underway in the area.

It would appear to me that oil and gas exploration could be undertaken adjacent to the mountain ranges and slant drilling utilized to tap any discoveries. My recommendations on this subject will be discussed later.

Currently there are no viable Mexican bighorn populations remaining in New Mexico with the recent crash of the San Andres population. The Big Hatchet-Alamo Hueco area bighorn reestablishment program may be the last hope to maintain a viable desert bighorn population in the state. There are fewer than 3200 Mexican bighorn in North America and no more than 2100 remaining in the United States (Trefethen, 1974). As you can see, the Big Hatchet-Alamo Hueco population and enhancement program is critical to maintaining this limited North American wildlife resource.

2. Oil and gas exploration and/or development could result in increased public access to the areas. Pendergast (1977) correlated a decrease in mountain goat (*Oreamnos americanus*) numbers with coal exploration. DeForge (1972) found desert bighorn in the San Gabriel Mountains of California abandoned historic use areas when utilized by trail bikes. Jorgensen (1977) reported the adverse impacts to desert bighorn in Coyote Canyon in Anza-Borrego State Park. The road has subsequently been closed. Dunaway (1971) reported on habitat abandonment resulting from human disturbances in California.

3. On June 18-20, 1974, the Boone and Crockett Club, National Audubon Society, and the Wildlife Management Institute held a symposium of the most knowledgeable experts of bighorn sheep in North America. The symposium was broken into four major groups--Desert and Mexican Bighorn, California Bighorn, Rocky Mountain Bighorn, and Dall and Stone sheep. Each group developed management recommendations for these four wild sheep categories. Pertinent to our discussion here, the following recommendations for Mexican bighorn are applicable. Keep in mind these recommendations were the collective thinking of the most knowledgeable experts on the subject in North America. The numbers and quote are from the publication, "The Wild Sheep in Modern North America" (Trefethen, 1974).
 3. When designating areas to be managed where bighorn is one of the major resources, a suitable buffer strip should be considered as part of the bighorn area (page 113).
 4. New roads should not be developed in any occupied desert bighorn habitat area or areas designated for transplant, and such bighorn habitat areas should be closed to off-road vehicle use (page 113).
 15. Mineral withdrawals should be implemented on all desert bighorn habitats (page 116).
 16. Mineral exploration must be rigidly regulated to minimize habitat destruction and ensure adequate rehabilitation (page 116).
 20. Desert bighorn travel routes should be kept free of obstructions.

(Note) I tracked a ewe and lamb from upper Sheridan Canyon to the little knobs immediately north of the Alamo Hueco Mountains and then to the Alamo Hueco's one afternoon. From following the ewe, it was obvious to me she had travelled this route before. Therefore, it is my opinion this is an important travel route for the bighorn and will be in the future.

I have reviewed the maps and proposals as to oil and gas leasing and areas of no oil and gas leasing. In reviewing my recommendations as to this matter, three conditions must be understood.

1. I believe the Big Hatchet Mountains are primarily used as a bighorn fall-winter-spring range. The Alamo Hueco Mountains and possibly the Dog Mountains or some of the mountain ranges in Mexico (prior to fencing of the boundary between the U. S. and Mexico) were used as migrating areas or summer range. I reached this conclusion based on the data available at the time I was in New Mexico. However, at that time no one really knew. Since then, more research of the Big Hatchet sheep has been undertaken. My point being, better data is probably now available which could affect my recommendations should I have had this data available to me now.
2. Because of the energy crisis and BLM policies that you must consider in this issue, my recommendations are a little more liberal than they would normally be. Some risks are involved.
3. My recommendations are based solely on my knowledge of bighorn, bighorn habitat, and how the bighorn used the habitat when I was there. They do not include other resource values which also must be considered (frail soil areas, wilderness, aesthetics, livestock grazing, etc.)

Recommendations different from those proposed are shown in red on the enclosed maps. The letters (a, b, c, etc.) correspond to proposed stipulations within the areas outlined in red.

- a. Oil and gas seismographic exploration permitted from June 1 to September 15. No road or trail construction by earth moving equipment permitted. Minimum soil and vegetation disturbance will be tolerated. In the event a discovery is made, no drilling or development will be allowed within this area until the impacts to bighorn sheep can be adequately determined.

b. Use correct. (next page)

Areas not shown within "a" or "b" or the yellow lines within the Big Hatchet Mountains, Alamo Hueco or Dog Mountains should not be leased for oil and gas to ensure habitat and animal protection for bighorn sheep.

I hope that this memo will be of some help in resolving this issue. If I can be of further assistance, please let me know.

Enclosures
Maps

Lanny O. Wilson
jic

ERRATA

The following correction was phoned in by Lanny Wilson:

- b. Oil and gas seismographic exploration permitted from November 1 to April 1. No road or trail construction by earth moving equipment will be permitted. Minimum soil and vegetative disturbance will be tolerated. If a discovery is made, no drilling or development will be allowed within this area until impacts to desert bighorn can be determined.

Literature Cited:

- DeForge, James R., 1972. Man's Invasion Into the Bighorn's Habitat. Trans. Desert Bighorn Council. p. 112-115
- DeMarchi, R. A., Personal Communication. Wildlife Biologist. Branch of Wildlife Services. Cranbrook, British Columbia, Canada.
- Dunaway, David J., 1971. Human Disturbance as a Limiting Factor of Sierra Nevada Bighorn Sheep. In first Trans. of the North American Wild Sheep Conf., edited by Eugene Decker. p. 165-173. Dept. of Fish and Wildlife Biol., Colorado State Univ., Ft. Collins.
- Geist, Valerius. 1971. Mountain Sheep - A Study in Behavior and Evolution. University of Chicago Press. 383 pp.
- Jacobsen, Robert D. and Lanny O. Wilson, 1972. Habitat of the Mexican Bighorn Sheep in the Big Hatchet Mountains of New Mexico. Trans. Desert Bighorn Council. p. 36-46.
- Jorgensen, Mark C. and Robert E. Turner, Jr. 1973. The Desert Bighorn Sheep of Anza-Borrego Desert State Park, Trans. Desert Bighorn Council. p. 81-88.
- Pendergast, B. A. 1977. Mountain Goats and Coal Extraction in Northeastern British Columbia. In abstracts of the first Intermountain Goat Symp. edited
- Tevis, L. Jr. 1959. Man's Effect on Bighorn in the San Jacinto-Santa Rosa Mountains. Desert Bighorn Council Trans. p. 69-74
- Trefethen, James B. (Editor) 1975. The Wild Sheep in Modern North America. The Winchester Press. New York. 302 p.

THE WILDLIFE SOCIETY

NEW MEXICO CHAPTER



February 19, 1980

BLM LAS CRUCES	
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12 - APPROVED 6-670



Ms. Mary Zuschlag
Bureau of Land Management
Las Cruces District Office
P. O. Box 1420
Las Cruces, NM 88001

Dear Ms. Zuschlag:

The New Mexico Chapter of The Wildlife Society realizes that the United States must strive to produce enough oil and gas to reduce its dependency on Middle East supplies. To do this, new areas with oil and gas potential must be investigated. However, we do not feel that oil and gas exploration activities in the Big Hatchet and Alamo Huco Mountains would be compatible with desert bighorn sheep survival.

Historically, desert bighorn sheep occupied the arid mountain ranges in southcentral and southern New Mexico. After a scabies epizootic this winter the only indigenous population of desert bighorn sheep in New Mexico survived in the Big Hatchet Mountains. The population of this herd has dropped to less than 25 animals and is precariously balanced on the edge of extinction. The Game and Fish Department is currently supplementing this indigenous herd in an effort to build its numbers to that of a viable population.

Little hard data is available on the effects of oil and gas exploration on desert bighorn sheep survival. However, many studies have shown that the species has great difficulty adjusting to encroachment of man-related activities. Bighorns have abandoned the use of historic ranges when human activity suddenly increased in the area. In addition researchers have found that highways, water canals and impoundments, high voltage lines, fences, and residential communities have directly or indirectly increased mortality. These encroachments by man prevent the use of water sources and habitat, erect barriers to local travel and movement routes and increase human activities beyond the innate tolerance level of desert bighorn sheep.

The New Mexico Chapter of The Wildlife Society are in agreement with the New Mexico Game and Fish Department, in that we oppose oil and gas exploration in the Big Hatchet and Alamo Huco Mountains because of the risk of a further reduction of the bighorn's chances for survival.

Page 2
February 19, 1980
Ms. Mary Zuschlag

We are in further agreement with their recommendations which follow:

(1) No intrusions or surface disturbance should be allowed within two miles of the mountain range proper so as to reduce the possibility of harassment to the sheep population. This boundary generally conforms with the boundaries of the existing Wilderness Study Area. Two notable exceptions are in the area near the Hatchet ranch headquarters which is well beyond the two mile limit and the area near the mouth of Sheridan Canyon which is closer than the recommended two mile limit.

(2) It is recommended that no leases be allowed within one mile of the mountain and that any leases one or two miles from the mountain be prevented from having any type of surface occupancy.

(3) It is especially important that no exploration be conducted on any areas that are of critical nature to the desert bighorn population such as existing or potential lambing grounds, areas of known mineral licks and areas near known water sources.

Sincerely,

Phillip J. Zwank
Phillip J. Zwank, President
Extension Wildlife Specialist

PJZ:gw



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555 SEVENTEENTH STREET
DENVER, COLORADO 80202
TELEPHONE 303-825-6100
TWX 910-931-2620

February 21, 1980

Bureau of Land Management
District Office
P. O. Box 1420
Las Cruces, New Mexico 88001

RE: Environmental Assessment
Big Hatchet & Alamo
Hueco Mountains

Gentlemen:

Not being intimately familiar with the above-captioned area, I cannot adequately address specific areas of environmental concern. However, I do believe that oil and gas leasing should take place. The basis of this belief is in the ability of your staff to mitigate environmental problems on the ground after leasing has occurred. Your administrative authority allows you to make recommendations on where drill sites would be located, what types of geophysical exploration would be allowed, and where the alignment of roads and/or pipelines would run. All of these activities are covered by your administrative discretion.

In summary I suggest that the entire area be leased with a minimum amount of restrictive stipulations attached so that you and the oil and gas operators can use your best judgment when applications come into your office. This will allow all parties the greatest freedom and will most certainly expedite the leasing process.

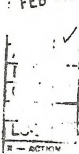
Very truly yours,

P. B. Doty
Pete B. Doty
Operations Coordinator

PBD:sh

RLM

FEB 25 1980



PLCS
mm

PLACID OIL COMPANY
410 SEVENTEENTH STREET, SUITE 2000
DENVER, COLORADO 80202

February 21, 1980

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Mr. Daniel C. B. Rathbun
District Manager
Bureau of Land Management
Las Cruces, New Mexico 88001

Re: Big Hatchet Mountains
Hidalgo County, New Mexico
Area: NM-030-035

Dear Mr. Rathbun:

The field investigation of the above referenced area was held on January 24, 1980 and was attended not only by your BLM people but also a representative of the USGS and state fish and game.

The meeting and review of the area was rewarding in that it allowed us to see, first hand, the topography and ground cover in the areas of our lease applications.

Our primary concern is to be allowed to explore these areas in more detail by soil sampling and geophysical work and possible drilling to attempt to determine the oil and gas potential of the area.

We recognize that some portions of our lease applications are, to some extent, inaccessible for drilling or exploration activity. These areas where there are high degree slopes and unstable soils could be set up as no occupancy and protected from surface disturbance.

We would utilize a plan of exploration and evaluation that would minimize surface disturbance and, thus make any necessary restoration (reseeding and grading) an easy task.

The limited number of desert bighorn sheep that inhabit portions of the Big Hatchet Mountains would be exposed to no more noise and activity than is currently in progress on the county road on the southwestern side of the mountains.

We could probably coordinate our exploration with the breeding and lambing seasons to further minimize disturbance to the bighorn sheep.

Mr. Daniel C. B. Rathbun
February 21, 1980

Page 2.

To further aid your department in preparing its final assessment of this area, we are enclosing a brief geological report and maps which indicate our areas of interest, as well as our existing State of New Mexico leases within the area.

If we can be of further assistance, or you desire additional input, please advise.

Very truly yours,

PLACID OIL COMPANY



Norman Haltiner
District Landman

NH/lb

Enclosures


GEOLOGICAL SUMMARY

The Big Hatchet Mountains area has a marine sedimentary section of over 15,000' including Paleozoic and Cretaceous rocks. The section includes Lower and Upper Paleozoic as well as Lower Cretaceous reservoir objectives. Most of the objectives outcrop in the Big Hatchet Mountains (which have been formed by Basin and Range style normal faulting) but remain buried in the valleys.

Lower Paleozoic objectives include porous Ordovician dolomites and Mississippian patch reefs, bioherms, and bioclastic banks. The area is on trend with the shelf margin of the Alamo-Hueco Basin which formed during Pennsylvanian time giving it excellent Upper Paleozoic potential. Over 1200' of porous Pennsylvanian patch reefs are present in the mountains as are Permian reefs with porous dolomites. Lower Cretaceous objectives include porous sands and reefs. Therefore, the area has an excellent stratigraphic sequence for oil and gas exploration.

The trapping mechanism for oil and gas accumulations is mainly structural and of Laramide age. Thrust faults and associated anticlinal trends which have been exposed in the mountain range can be projected into the valleys where they could trap oil or gas at depth. Such possibilities would have to be detailed with seismic before they could be drilled.

Shows of oil and gas have been reported in wells in the area and because of the favorable structural and stratigraphic setting, the area should be considered for exploration of major oil and gas reservoirs.

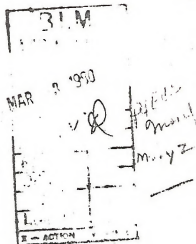

James Hein



P. H. WACH
Consulting Geologist
1437 BENEFICIAL LIFE TOWER
SALT LAKE CITY, UTAH 84111
Ph. (801) 532-3938 Home (801) 277-8191

February 28, 1980

Mr. Daniel C. B. Rathbun, District Manager
Bureau of Land Management
District Office
P. O. Box 1420
Las Cruces, New Mexico 88001



Dear Mr. Rathbun:

I would like to make a few comments pertinent to oil and gas leasing in the Big Hatchet and Alamo Hueco Mountains of southern New Mexico. I'm a Consulting Geologist for May Petroleum, Inc., of Dallas, Texas. We have, through various lease brokers, filed on leases in both the Big Hatchet and Alamo Hueco Mountains. I know it is customary for the Bureau of Land Management to assume the very worst conditions that can happen will occur in oil and gas exploration. In fact, it is highly probable and very likely that oil and gas exploration can be conducted in the subject area with little or no damage to desert wildlife. In other areas where desert bighorns are known to exist, such as west of Palm Springs, California, they are little affected by dense population of homosapiens. It is doubtful that the few people involved in oil and gas exploration in an area as remote as southern New Mexico will have large effects on the desert bighorn population. It is also highly improbable that deep drilling for oil and gas will affect the surface water in the Big Hatchet and Alamo Hueco Mountains.

It is noted that Indian artifacts are present in the area as well as other historical sites. I have driven through much of the area and am convinced its very remoteness and lack of enforcement makes the area more susceptible to vandalism than oil and gas operations would. The U-Bar Ranch personnel indicated to me that much vandalism already occurs in the area because of its remoteness. The presence of responsible oil and gas people may, in fact, discourage the pottery and bottle hunters that have had free run over the area.

In addition, it should be noted that, at present, herds of cattle roam freely over much of the area and the area is used for ranching and grazing. It would seem these uses are at least as damaging to the bighorn sheep as any oil and gas operations might prove to be. It is highly unlikely that a gas discovery (more probable than oil) after the drilling phase is complete would have any lasting effect on the desert

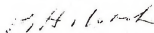
Mr. Daniel C. B. K. Anbun
February 28, 1980
Page 2

ecology. Gas wells drilled on 320-acre spacing require little care and would result in little or no lasting surface damage.

The Big Hatchet-Alamo Hueco region represents a very high potential area for the discovery of natural gas. The United States is at the mercy of Canada and Mexico for this very important resource. Our balance of payments is adversely affected by the import of large quantities of fuel oil and natural gas (over \$4/MCF for gas). The Phelps-Dodge smelter at nearby Playas is importing fuel oil at high prices to refine and smelt valuable metals. A local source of natural gas would alleviate this problem. The production of domestic fuels is the most important problem facing our nation. The Bureau of Land Management ought to be helping in this effort by allowing these lands to be leased with proper environmental safeguards.

In conclusion, I'm of the opinion that oil and gas exploration can be conducted in this area and that no lasting damage will be caused to the desert ecological system. It is unlikely the sheep will flee across the (fenced) border into Mexico as a result of properly supervised (by the BLM) oil and gas operations.

Sincerely,



P. H. Wach, Consulting Geologist
May Petroleum, Inc.
Salt Lake City, Utah 84111

PHW/ks



MAR 20 1980

Approved
**UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Field Supervisor
Ecological Services
U.S. Fish and Wildlife Service
Suite C
3530 Pan American Highway, NE
Albuquerque, New Mexico 87107**



Handwritten routing slip with a grid and checkmarks. At the bottom, it says 'ACTION'.

March 17, 1980

Memorandum

To: District Manager, Bureau of Land Management,
Las Cruces, New Mexico

From: Acting Field Supervisor, FWS, Ecological Services,
Albuquerque, New Mexico

Subject: Environmental Assessment concerning oil and gas leasing
in the Big Hatchet Mountains, Hidalgo County New Mexico
(response to your letter of February 22, 1980) (BLM)

Upon review of specific information and available literature concerning the issue of the effect of oil and gas resource development on desert bighorn sheep we concur with the recommendations of the New Mexico Department of Game and Fish (NMDGF). The Big Hatchet Mountains should be considered unique because they support one of the two remaining desert bighorn sheep populations in New Mexico and should receive special protection because of this.

We recommend that oil and gas leasing not be allowed within the boundaries recommended by the NMDGF and that leasing outside of this area be allowed with appropriate wilderness and wildlife restrictions. When oil and gas leasing activities are initiated they should be coordinated with the NMDGF and the U.S. Fish and Wildlife Service.

Thank you for the opportunity to comment on these proposed oil and gas leases. We look forward to continued involvement in your land management planning activities.

Joel A. Medlin

Joel A. Medlin

cc: Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
State Director, Bureau of Land Management, Santa Fe, New Mexico
Area Manager, Phoenix, U.S. Fish and Wildlife Service, Phoenix, Arizona



Save Energy and You Serve America!

Atlantic Richfield Company 555 Seventeenth Street
Denver, Colorado 80217
Telephone 303 575 7577

J. R. Mitchell
Public Lands Coordinator

March 19, 1980

Mr. Daniel C. B. Rathbun
Bureau of Land Management
Post Office Box 1420
Las Cruces, NM 88001

RE: The Big Hatchet Mountain Area, New Mexico

Dear Mr. Rathbun:

Atlantic Richfield Company appreciates the opportunity to offer comments to the Bureau of Land Management with regard to the Big Hatchet Mountain Area in New Mexico.

We strongly support the multiple-use management concept for our nation's public lands. The exploration for and development of energy and mineral resources will expand our domestic energy supply, thereby improving local and national economies, increasing employment, and helping to reduce U.S. dependence on foreign oil. The public interest is best served when ecologically sound and economically prudent exploration and production activities are allowed to coexist with other land uses.

The Pedregosa Basin, located in the Big Hatchet Mountain Area, has significant potential for the discovery of hydrocarbons. Stratigraphically, the Paleozoic section found here resembles a section found in the prolific Permian Basin 200 miles east of this area. Also located in this area are Pennsylvanian reefs which border the Pennsylvanian Basin which lies to the southwest.

The shales and dark limestones that are deposited in the Pennsylvanian Basin have good source rock potential. A black shale member of the Devonian Percha Shale (possibly equivalent to the rich Woodford Shale in the Permian Basin) also appears to have good source rock potential. Additional potential reservoir rocks found in this area include Permian shelf carbonates and Lower Cretaceous limestones and sandstones. Even the Tertiary volcanics may serve as reservoir rocks in some cases.

The geology of this province is quite complex, in particular the Pedregosa Basin has undergone at least three major periods of structural disturbance which make prediction of structures in the subsurface extremely difficult. Only a few wells have been drilled in the

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Mr. Daniel C. B. Rathbun
Page 2
March 19, 1980

Pedregosa Basin, but several of those have encountered shows of oil and gas. Tertiary volcanics cover approximately two-thirds of the mountain range in the area and obscure the stratigraphic and structural geological information of the area.

Our initial seismic program has revealed that good seismic data can be acquired and is essential to further exploration in the area. Gravity surveys, in conjunction with the seismic, reveal that there is structural as well as stratigraphic potential for the area. This gravity/seismic approach has been found to be useful in other parts of the basin. Because this province covers such a large part of the western United States, and because some portions have proved to be productive, certain areas within the province deserve further critical exploration for oil and gas. This includes the Pedregosa Basin.

The impact of past exploration in the area is not readily discernable. Wells recently drilled, and those drilled in the past, have had little permanent effect. Atlantic Richfield Company's seismic program has been underway for the past six months. During this time, a State Fish and Game field man has been present observing the impacts of our operations. He has indicated that our exploration program has not created any problems and in particular the sheep in the Sheep Study Area have not been bothered by our seismic work.

It has been shown in the past that energy and mineral exploration and development are compatible with other uses of the land, including wilderness and wildlife refuges. The Kenai Moose Range in Alaska and the various wildlife refuges along the coast of the Gulf of Mexico are prime examples. The development of the North Slope of Alaska and the construction of the 800 mile trans-Alaska pipeline also have shown that energy development and nature are truly compatible. Petroleum activity should be viewed as temporary in that exploration activities, including such operations as seismic surveys and drill stem testing, involve minimal disturbance of the land over a fairly short period of time. Further, even if a commercial discovery is made, the normal producing life of a field, 25 to 30 years, is also a temporary intrusion on the land involving small scale disturbances which can be substantially or entirely reclaimed upon termination of producing operations.

Mr. Donald C. B. Rathbun

Page 1

March 14, 1980

Atlantic Richfield Company has offered, and continues to offer to go over the area with any interested party to evaluate the impact of its exploration to date. From our studies, the impact is practically unnoticeable, even in the roadless areas. Thus, we feel that a past history of environmentally sound exploration programs in this area is a factor that should have a direct bearing on any future decisions the Bureau of Land Management might make relative to land use in the area. We strongly recommend that these activities be allowed to continue.

If you have any questions, or need further information, please let us know.

Sincerely,

Jay P. Mitchell

J. R. Mitchell

JRM:sjs

Foundation for North American Wild Sheep

55 WEST IVY STREET □ ST. PAUL, MINNESOTA 55117 □ PHONE: (612) 489-7683

APR 4 '80

April 1, 1980

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Dan Rathbun, District Manager
Bureau of Land Management
1705 North Valley Drive
P.O. Box 1420
Las Cruces, New Mexico 88001

Dear Mr. Rathbun:

The Foundation for North American Wild Sheep recently learned that the oil and gas leasing in extreme southwestern New Mexico is being considered. We are opposed to any oil and gas leasing in the Mexican bighorn habitats within the Big Hatchet, Alamo Hueco and Dog Mountain ranges.

The Foundation was one of the principle donors of funds to the New Mexico Department of Fish and Game to save what could be salvaged of the San Andre herd. As you are aware, the outcome of this population is still questionable. Therefore, the present hope for the desert bighorn in New Mexico is the current program in the Big Hatchet Mountains of which the B.L.M. should be justly proud. Therefore, to undertake any programs that could result in habitat alteration and/or abandonment by Mexican bighorn in either area could be severe at this time.

Please contact me in the event I could assist you in the future.

Sincerely,



Lloyd Zeman

LX/jb

DM - 031	<input checked="" type="checkbox"/>
ASST DM	<input checked="" type="checkbox"/>
PRECIS	<input checked="" type="checkbox"/>
PUBLIC INFO SR	<input checked="" type="checkbox"/>
ADMIN - 002	<input checked="" type="checkbox"/>
ADMIN ASST	<input checked="" type="checkbox"/>
SPW CLK ASST	<input checked="" type="checkbox"/>
OPER - 033	<input checked="" type="checkbox"/>
RM - 024	<input checked="" type="checkbox"/>
IC/L - 036	<input checked="" type="checkbox"/>
WSRA - 037	<input checked="" type="checkbox"/>
FILE	<input checked="" type="checkbox"/>
X = ACRON = INFO	

Appendix A - Legal Description of Oil & Gas Lease Boundary - Alternative 3

Legal Description of Oil and Gas Leasing with No Surface Occupancy Area

T. 30 S., R. 15 W., NMPM

Sec. 17:	NE $\frac{1}{4}$	160.00
21:	NE $\frac{1}{4}$	160.00
22:	W $\frac{1}{2}$	320.00
26:	SW $\frac{1}{4}$	160.00
27:	E $\frac{1}{2}$, NW $\frac{1}{4}$	480.00
35:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
	Subtotal	<u>1,760.00</u>

T. 30 S., R. 16 W., NMPM

Sec. 14:	NW $\frac{1}{4}$ SE $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	120.00
23:	S $\frac{1}{2}$ NE $\frac{1}{4}$, S $\frac{1}{2}$	400.00
26:	All	640.00
35:	All	640.00
	Subtotal	<u>1,800.00</u>

T. 31 S., R. 14 W., NMPM

Sec. 7:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
17:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
21:	N $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
22:	S $\frac{1}{2}$	320.00
27:	E $\frac{1}{2}$	320.00
34:	E $\frac{1}{2}$	320.00
	Subtotal	<u>2,400.00</u>

T. 31 S., R. 15 W., NMPM

Sec. 1:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
2:	Lots 1 & 2, S $\frac{1}{2}$ NE $\frac{1}{4}$	185.00
12:	NE $\frac{1}{4}$	160.00
	Subtotal	<u>825.00</u>

T. 31 S., R. 16 W., NMPM

Sec. 11:	E $\frac{1}{2}$, E $\frac{1}{2}$ NW $\frac{1}{4}$	400.00
14:	E $\frac{1}{2}$	320.00
24:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
25:	E $\frac{1}{2}$	320.00
	Subtotal	<u>1,520.00</u>

Oil and Gas Leasing with No Surface Occupancy (con't)

T. 32 S., R. 14 W., NMPM

Sec. 3:	Lots 1 and 2, S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$	317.76
11:	W $\frac{1}{2}$	320.00
14:	W $\frac{3}{4}$	320.00
23:	NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$	280.00
	Subtotal	<u>1,237.76</u>
	Total	9,542.76

Legal Description of No Oil and Gas Leasing Area

T. 30 S., R. 15 W., NMPM

Sec. 7:	Lots 3 & 4, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	321.81
17:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
18:	A11	643.72
19:	A11	644.10
20:	A11	640.00
21:	NW $\frac{1}{4}$, S $\frac{1}{2}$	480.00
27:	SW $\frac{1}{4}$	160.00
28:	A11	640.00
29:	A11	640.00
30:	A11	640.16
31:	A11	635.16
33:	A11	640.00
34:	A11	640.00
	Subtotal	<u>7,204.95</u>

T. 30 S., R. 16 W., NMPM

Sec. 13:	NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, S $\frac{1}{2}$	480.00
24:	A11	640.00
25:	A11	640.00
	Subtotal	<u>1,760.00</u>

T. 31 S., R. 14 W., NMPM

Sec. 17:	SW $\frac{1}{4}$	160.00
18:	A11	640.00
19:	A11	640.00
20:	A11	640.00
21:	SW $\frac{1}{4}$	160.00
27:	W $\frac{1}{2}$	320.00
28:	A11	640.00
29:	A11	640.00
30:	A11	640.00
31:	A11	640.00
33:	A11	640.00
34:	W $\frac{1}{2}$	320.00
	Subtotal	<u>6,080.00</u>

T. 31 S., R. 15 W., NMPM

Sec. 2:	Lots 3 & 4, S $\frac{1}{2}$ NW $\frac{1}{4}$, S $\frac{1}{2}$	505.39
3:	Lots 1, 2, 3 & 4, S $\frac{1}{2}$ N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, SW $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	612.56
4:	A11	696.16
5:	A11	695.60
6:	A11	725.98
7:	A11	672.06
8:	A11	640.00
9:	A11	640.00
10:	NE $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ N $\frac{1}{2}$, S $\frac{1}{2}$	560.00

No Oil and Gas Leasing (con't)

T. 31 S., R. 15 W., NMPM

Sec. 11:	A11	640.00
12:	W $\frac{1}{2}$, SE $\frac{1}{4}$	480.00
13:	N $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$	560.00
14:	A11	640.00
15:	Lot 1, N $\frac{1}{2}$, SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	632.90
17:	A11	640.00
18:	A11	672.84
19:	A11	670.48
20:	N $\frac{1}{2}$	320.00
21:	A11	640.00
22:	Lots 1, 2, 3 & 4, NW $\frac{1}{2}$, S $\frac{1}{2}$	606.32
23:	Lots 1, N $\frac{1}{2}$ N $\frac{1}{2}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	280.50
24:	A11	640.00
25:	A11	640.00
26:	W $\frac{1}{2}$	320.00
27:	A11	640.00
28:	A11	640.00
29:	A11	640.00
30:	Lots 1, 2, NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	413.86
31:	Lots 1, 2, 3 & 4, E $\frac{1}{2}$ N $\frac{1}{2}$, W $\frac{1}{2}$ E $\frac{1}{2}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$	626.71
33:	A11	640.00
34:	A11	640.00
35:	A11	640.00
	Subtotal	<u>19,651.36</u>

T. 31 S., R. 16 W., NMPM

Sec. 1:	A11	640.92
12:	A11	640.00
13:	A11	640.00
24:	NE $\frac{1}{4}$	160.00
	Subtotal	<u>2,080.92</u>

T. 32 S., R. 14 W., NMPM

Sec. 3:	Lots 3 & 4, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$	317.84
4:	A11	636.08
5:	Lots 1, 2, 3 & 4, S $\frac{1}{2}$ N $\frac{1}{2}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	597.60
6:	A11	639.40
7:	A11	640.00
8:	NE $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	440.00
9:	A11	640.00
10:	A11	640.00
15:	A11	640.00
17:	N $\frac{1}{2}$	320.00
18:	S $\frac{1}{2}$	320.00
19:	A11	640.00

No Oil and Gas Leasing (con't)

T. 32 S., R. 14 W., NMPM

Sec. 20:	E $\frac{1}{2}$, W $\frac{1}{2}$ W $\frac{1}{2}$	480.00
21:	W $\frac{1}{2}$, W $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
22:	N $\frac{1}{2}$, N $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
30:	W $\frac{1}{2}$	320.00
31:	All	640.00
	Subtotal	<u>8,710.92</u>

T. 32 S., R. 15 W., NMPM

Sec. 1:	All	640.00
3:	NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$	600.00
4:	S $\frac{1}{2}$ N $\frac{1}{2}$, S $\frac{1}{2}$	480.00
5:	S $\frac{1}{2}$ NE $\frac{1}{4}$, W $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$	440.00
6:	Lots 2, 3 & 4, NE $\frac{1}{4}$, SE $\frac{1}{2}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	580.73
7:	All	667.20
8:	NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$	160.00
9:	E $\frac{1}{2}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SW $\frac{1}{4}$	480.00
10:	All	640.00
11:	S $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, S $\frac{1}{2}$	520.00
12:	E $\frac{1}{2}$, N $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{2}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	520.00
13:	W $\frac{1}{2}$ W $\frac{1}{2}$, SE $\frac{1}{2}$ SW $\frac{1}{4}$	200.00
14:	N $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	480.00
15:	NE $\frac{1}{4}$, NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{2}$ SE $\frac{1}{4}$	480.00
17:	NE $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, NE $\frac{1}{2}$ SE $\frac{1}{4}$	320.00
18:	Lots 1, 3 & 4, N $\frac{1}{2}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	416.11
19:	All	657.79
20:	All	640.00
21:	NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$	280.00
22:	SE $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	80.00
23:	N $\frac{1}{2}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$	240.00
25:	W $\frac{1}{2}$ NE $\frac{1}{4}$	80.00
26:	N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$	480.00
27:	NE $\frac{1}{2}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, S $\frac{1}{2}$	520.00
28:	W $\frac{1}{2}$	320.00
29:	N $\frac{1}{2}$, SE $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	520.00
30:	Lots 1 & 4, NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$	370.00
31:	Lots 1, 2, 3, 4, 5, 6 & 7, W $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$	573.55
33:	Lots 1, 2, 3 & 4, NW $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, N $\frac{1}{2}$ S $\frac{1}{2}$	602.26
	Subtotal	<u>12,987.64</u>

T. 33 S., R. 14 W., NMPM

Sec. 17:	*S $\frac{1}{2}$ N $\frac{1}{2}$, *N $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	280.00
18:	Lots 2, 3 & 4, *S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$	320.50
19:	Lots 1, 2, 3 & 4, NW $\frac{1}{4}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	522.50

No Oil and Gas Leasing (con't)

T. 33 S., R. 14 W., NMPM

Sec. 20:	E $\frac{1}{2}$ E $\frac{1}{2}$, NW $\frac{1}{2}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$	280.00
28:	SW $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	280.00
29:	N $\frac{1}{2}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	560.00
30:	All	640.00
31:	N $\frac{1}{2}$, E $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
	Subtotal	<u>3,283.06</u>

T. 33 S., R. 15 W., NMPM

Sec. 1:	Lot 3, SE $\frac{1}{4}$ NE $\frac{1}{4}$	80.29
4:	S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	360.00
5:	Lots 2, 3 & 4, SW $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, NW $\frac{1}{2}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	363.15
6:	All	642.32
7:	NW $\frac{1}{4}$ NE $\frac{1}{4}$	40.00
8:	NE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	200.00
9:	All	640.00
10:	All	640.00
11:	S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$	240.00
12:	SW $\frac{1}{4}$ NW $\frac{1}{4}$, NE $\frac{1}{2}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$	240.00
13:	W $\frac{1}{2}$ NE $\frac{1}{4}$, W $\frac{1}{2}$, SE $\frac{1}{4}$	560.00
14:	E $\frac{1}{2}$, E $\frac{1}{2}$ W $\frac{1}{2}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$	520.00
15:	N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$	600.00
17:	NE $\frac{1}{2}$ NE $\frac{1}{4}$, W $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
18:	SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$	80.00
20:	E $\frac{1}{2}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ SW $\frac{1}{4}$	480.00
21:	N $\frac{1}{2}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ S $\frac{1}{2}$	520.00
22:	NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	360.00
23:	N $\frac{1}{2}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	320.00
24:	E $\frac{1}{2}$, E $\frac{1}{2}$ W $\frac{1}{2}$, NW $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$	560.00
25:	All	640.00
26:	NW $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ W $\frac{1}{2}$	280.00
27:	W $\frac{1}{2}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$	200.00
28:	N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	600.00
29:	NE $\frac{1}{4}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$	320.00
30:	Lots 3 & 4, N $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	358.17
31:	W $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	120.00
34:	SE $\frac{1}{4}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$	320.00
35:	W $\frac{1}{2}$ E $\frac{1}{2}$, W $\frac{1}{2}$	480.00
	Subtotal	<u>11,163.93</u>

T. 33 S., R. 16 W., NMPM

Sec. 1:	Lots 1, 2, 3 & 4, S $\frac{1}{2}$ N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$	481.72
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No Oil and Gas Leasing (con't)

T. 34 S., R. 14 W., NMPM

Sec. 5:	N $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$	120.00
6:	N $\frac{1}{2}$	320.00
	Subtotal	<u>440.00</u>

T. 34 S., R. 15 W., NMPM

Sec. 3:	NE $\frac{1}{4}$, W $\frac{1}{2}$ W $\frac{1}{2}$, SE $\frac{1}{2}$ SW $\frac{1}{4}$	360.00
5:	W $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{2}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$	160.00
6:	NE $\frac{1}{4}$ NE $\frac{1}{4}$	40.00
8:	N $\frac{1}{2}$, NW $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
9:	N $\frac{1}{2}$ N $\frac{1}{2}$, SE $\frac{1}{2}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$	440.00
10:	NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$	240.00
11:	NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	280.00
12:	N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, SW $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{2}$ SE $\frac{1}{4}$	560.00
14:	SW $\frac{1}{4}$ NE $\frac{1}{4}$, W $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$	400.00
15:	NE $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, NE $\frac{1}{2}$ SE $\frac{1}{4}$, SW $\frac{1}{2}$ SE $\frac{1}{4}$	320.00
21:	Lots 1, 2, 3 & 4, NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$	369.40
22:	Lots 1, 2, 3 & 4, N $\frac{1}{2}$	411.60
23:	Lots 2, 3 & 4, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$	268.55
**24:	Lots 1, 2, 3 & 4, N $\frac{1}{2}$	410.00
	Subtotal	<u>4,659.55</u>

Grand Total 78,504.05

* All minerals Federal

** Oil and Gas Federal

Appendix B

The following court cases upholds BLM authority to refuse oil and gas leases even if the area has not been withdrawn from mineral entry:

Udall v. Tallman, 380 U.S. 1, 4 (1963); James O. Breene, Jr., 38 IBLA 281 (1978); Dell K. Hatch, 34 IBLA 247 (1978); L. A. Idler (Supp.), 28 IBLA 8 (1976); Cartridge Syndicate, 25 IBLA 57, 58 (1976); Rosita Trujillo, 21 IBLA 289 (1975); Richard K. Todd, 68 I.D. 291, 295-96 (1961), aff'd sub nom. Duessing v. Udall, 350 F. 2nd 748 (D.C. Cir. 1965), cert. denied, 383 U.S. 912 (1966).

Appendix C

ORDER AMENDING BIG HATCHET REFUGE

IT IS HEREBY ORDERED by the State Game Commission that the Big Hatchet Game Refuge created October 25, 1926, be amended to include the following described lands:

Beginning at the Hatchet headquarter ranch about 15 miles south of Hachita and following road southeast 10 miles to Cabin Ranch; thence south eight miles, along the International boundary road and fence, to fence running southwest, thence southwest along this fence and road 3 miles to Mangus Well; thence west along road, partly new, ten miles to Whitewater Well; thence northwest along road four miles to SW corner of Section 35 S., R. 16 W; thence along fence lines as follows: North 2 miles to SE corner, Section 22; west one mile to SW corner, Section 22; north $4\frac{1}{2}$ miles to Quarter corner between Sections 33 and 34; thence east $\frac{1}{4}$ miles; north $\frac{1}{2}$ mile; east $\frac{1}{4}$ mile; north one mile; east $\frac{1}{4}$ mile to SW corner, Section 23 T. 30 S., R. 16 W; thence north one mile; thence east $\frac{1}{2}$ mile; thence north one mile; thence east $\frac{1}{2}$ mile to NW corner, Section 13 near South Well; thence eastward along road (no fence) $4\frac{1}{2}$ miles to the Hatchet Ranch and point of beginning, containing approximately 105,000 acres located in Hidalgo County.

IT IS FURTHER ORDERED that the foregoing order shall be published once in accordance with law, in the Lordsburg Liberal, a newspaper of general circulation in Hidalgo County.

Dated at Santa Fe, New Mexico, this 5th day of May, 1947.

STATE GAME COMMISSION

By: _____
Angus L. Evans, Chairman

ATTEST:

Elliott S. Barker, Secretary

STATE GAME COMMISSION'S

ORDER NO. 4-79

Pursuant to the authority vested in the State Game Commission by provisions of Sections 17-1-14 and 17-1-26, New Mexico Statutes Annotated, 1978 Compilation, the following order is hereby made and adopted concerning:

AMENDING BIG HATCHET GAME REFUGE NO. 10

The boundary description of the Big Hatchet Game Refuge No. 10, heretofore created by order of the State Game Commission on October 25, 1926 and subsequently amended on May 5, 1947, is hereby amended as follows:

"That area bounded by a line starting at the Hatchet Ranch headquarters and following a road in a southeast direction through Sections 14, 13, and 24 of T. 30 S., R. 15 W., and Sections 19, 30, 29, 32, 33, and 34 of T. 30 S., R. 14 W., and Sections 3, 2, 1, 12, and 13 of T. 31 S., R. 14 W.; thence south through Sections 13, 24, 25, 36, and 35 of T. 31 S., R. 14 W., and Sections 2, 11, 14, 23, and 26 of T. 32 S., R. 14 W.; thence west through Sections 27, 28, 29, 30, and 19 of T. 32 S., R. 14 W., and Sections 24, 23, 22, 21, 20, 17 and 18 of T. 32 S., R. 15 W., and Section 13 of T. 32 S., R. 16 W.; thence south along the section line between Sections 13 and 14, and Sections 23, and 24, of T. 32 S., R. 16 W. to the intersection of the road to the Humble Oil and Refining Company test well No. 1; thence northwest along the road through Sections 23 and 14; thence west along the section line between Sections 10 and 15; thence north along the fence line and section line between Sections 9 and 10 and Sections 3 and 4 of T. 32 S., R. 16 W.; thence east approximately one-half mile along the section line of Section 3, T. 32 S., R. 16 W., and Section 34 of T. 31 S., R. 16 W.; thence north along a road and fence line through Sections 34, 27, 22, and 15 to the intersection of the road to Romney Well; thence west along the Romney Well road through Sections 10 and 9 to State Road 81; thence north along State Road 81 through Sections 9 and 4 of T. 31 S., R. 16 W., and Sections 33, 34, 27, and 22; thence west along the section line between Sections 22 and 15; thence west approximately one-half mile between the section line between Sections 23 and 14; thence north one-half mile to the northwest corner of the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 14; thence northeast along the fence to the section line between Sections 14 and 13; thence north along the fence and section line between Sections 14 and 13, 11 and 12; thence east along the fence line through Section 12 to the intersection of the road to the Hatchet farm; thence southeast along the road through Section 12 of T. 30 S., R. 16 W., and Sections 7, 8, 17, 16, 15, 22, 23, and thence north through Sections 23 and 14 of T. 30 S., R. 15 W. to the Hatchet Ranch headquarters and the point of beginning."

Appendix 3
Water Requirements
HIDALGO COUNTY

	1971 Census		1980	2001	2020
	Urban	Rural			
<u>Total County Population</u>	4,734		6,200	6,200	7,100
Urban	3,429		3,200	4,200	4,175
Rural	1,305		1,200	1,200	1,300

Present and projected amount of water withdrawn (w) and on-site water table depletions (d) in 1971 acre-feet

	1971		1980		2000		2020	
	w	d	w	d	w	d	w	d
<u>Irrigation</u>								
Lower Colo. R. Basin								
San Simon	5.3	3.7	3.2	4.8	7.3	1.8	4.3	4.9
Vinden Valley	10.7	5.4	11.1	5.8	11.5	8.1	11.1	11.5
Animas Valley	34.3	22.2	31.3	21.8	20.3	21.4	26.3	21.4
Lordsburg Valley	19.3	11.7	34.6	30.3	43.3	28.2	39.6	33.1
Rio Grande Basin								
Playas Valley	3.2	3.0	14.1	8.3	18.2	11.4	20.3	18.6
	73.5	42.3	111.2	84.0	100.5	70.9	100.1	79.2
Urban, Lordsburg	1.3	2.6	0.9	0.1	1.2	0.7	1.5	1.1
Rural	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manufacturing	0	0	0	0	0	0	0	0
<u>Minerals</u>								
Lower Colo. R. Basin	0.1	0.1	0.9	0.7	1.8	1.3	7.4	5.2
Rio Grande Basin	0	0	6.0	4.2	6.5	4.6	7.0	4.9
<u>Power</u>	0.9	0.7	1.2	0.9	20.0	15.1	20.0	15.1
Livestock	7.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Recreation, land based	0	0	0	0	0	0	0	0
	76.4	44.3	121.0	70.3	150.3	94.9	156.7	104.2

1/ It is estimated the Lordsburg plant will be expanded by 1980 and a nuclear plant is projected in the Animas Valley by the year 2000. Both sites are located in the Lower Colorado River Basin.

Source: N.M. Interstate Stream Commission & N.M. State Engineer Office., Hidalgo County: Water Resources Assessment for Planning Purposes, Santa Fe, 1974.

Water Requirements
LUNA COUNTY

	1970 Census		1980	2000	2020
	Urban	Rural			
<u>Total County Population</u>	11,705		13,200	15,400	18,100
Urban	8,343		9,300	12,200	15,200
Rural	3,362		3,100	3,100	3,100

Present and projected amount of water withdrawn (w) and on-site water table depletions (d) in 1971 acre-feet

	1971		1980		2000		2020	
	w	d	w	d	w	d	w	d
<u>Irrigation</u>	134.9	98.3	155.8	110.0	150.8	108.3	149.3	103.3
Urban	2.1	1.0	2.7	1.6	3.4	3.2	4.3	3.0
Rural	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.2
Manufacturing	0.1	0	0.1	0.1	0.1	0.1	0.2	0.1
Minerals	0.7	0.4	1.4	0.2	2.2	1.6	3.4	3.9
Power	0	0	0	0	0	0	56.0	39.2
Livestock	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Recreation, land based	0	0	0	0	0	0	0	0
	138.5	100.3	159.7	112.6	159.3	113.0	215.1	152.3

Source: N. M. Interstate Stream Commission and N. M. State Engineer Office, Luna County: Water Resources Assessment for Planning Purposes, Santa Fe, 1974.

Water Requirements

GRANT COUNTY

	1970 Census	1980	2000	2020
<u>Total County Population</u>	22,030	24,300	29,000	34,500
Urban				
Lower Colo. R. Basin, Cliff-Gila	0	0	0	2,500
Rio Grande Basin, Silver City	10,659	12,900	17,500	22,500
Rural				
Lower Colo. R. Basin	2,750	2,800	3,000	1,000
Rio Grande Basin	8,621	8,600	8,500	8,500

Present and projected amount of water withdrawn (w/d) and on-site water table depletions (depl) in 1,000 acre-feet

	1970		1980		2000		2020	
	Wd	Depl	Wd	Depl	Wd	Depl	Wd	Depl
Lower Colo. R. Basin								
Irrigation								
Upper Gila, Cliff-Gila, Buckhorn-Duck Cr. and Red Rock areas	9.1	4.7	8.9	4.5	8.6	4.5	8.5	4.5
Lordsburg Valley	4.7	2.7	8.5	5.0	9.3	5.7	9.7	6.3
Urban, Cliff-Gila	0	0	0	0	0	0	0.5	0.3
Rural	0.3	0.1	0.2	0.1	0.2	0.1	0.1	0.1
Manufacturing	7.6	3.5	11.3	7.3	13.1	8.5	14.1	9.3
Minerals	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Livestock	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2
Stock pond evap.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Fish and Wildlife	0	0	0	0	0	0	0	0
Recreation, land based	0	0	0	0	0	0	0	0
Sub-total	23.4	12.7	30.7	18.7	35.1	20.7	34.8	22.4
Rio Grande Basin								
Irrigation								
Mimbres Basin	4.2	2.4	5.8	3.2	5.5	3.2	5.2	3.0
Urban, Silver City & vicinity	1.8	0.9	2.2	1.1	3.1	1.9	4.8	3.2
Rural	0.8	0.4	0.6	0.4	0.7	0.5	0.8	0.5
Manufacturing	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1
Minerals	15.1	9.6	21.8	15.4	27.6	19.9	35.9	27.8
Livestock	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Stock pond evap.	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Fish and Wildlife	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Recreation, land based	0	0	0	0	0.2	0.1	0.2	0.1
Sub-total	22.8	14.2	31.4	21.1	38.8	27.0	48.4	36.0
Total	46.2	26.9	62.1	39.8	71.7	47.7	83.2	58.4

Source: N. M. Interstate Stream Commission & N. M. State Engineer Office, Grant County Water Resources Assessment for Planning Purposes, Santa Fe, 1975.

Appendix E

Species List
Big Hatchet-Alamo Hueco
(Hayward 1977)

Amphibians

Plains Spadefoot
Couch Spadefoot
Western Spadefoot
Great Plains Toad
Green Toad
Desert Toad

Reptiles

Western Box Turtle
Lesser Earless Lizard
Greater Earless Lizard
Collared Lizard
Leopard Lizard
Yarrow Spiny Lizard
Desert Spiny Swift
Striped Plateau Lizard
Side-blotched Lizard
Tree Lizard
Texas Horned Lizard
Round-tailed Lizard
Giant Spotted Whiptail
Chihuahua Whiptail
Little Striped Whiptail
New Mexico Whiptail
Western Whiptail

Snakes

Texas Worm Snake
Western Hog-nosed Snake
Common King Snake
Sonora Whipsnake
Striped Whipsnake
Western Patch-nosed Snake
Bull Snake
Black-necked Garter Snake
Western Diamond-backed Rattlesnake
Rock Rattler
Black-tailed Rattlesnake
Western Rattlesnake

Birds

Pied-billed Grebe
Great Blue Heron
Green Heron
Mallard
Shoveler
Green-winged Teal
Ring-necked Duck
Bufflehead
Ruddy Duck
Turkey Vulture
Golden Eagle
Marsh Hawk
Swainson's Hawk
Harris Hawk
Cooper Hawk
Red-tailed Hawk
Rough-legged Hawk
Ferruginous Hawk
Kestral
Prairie Falcon
Gambel's Quail
Scaled Quail
Killdeer
Lesser Yellow-legs
Spotted Sandpiper
Mourning Dove
White-winged Dove
Roadrunner
Yellow-billed Cuckoo
Burrowing Owl
Screech Owl
Barn Owl
Great-horned Owl
Poor-will
Lesser Nighthawk
Common Nighthawk

White-throated Swift
Black-chinned Hummingbird
Broad-tailed Hummingbird
Costa's Hummingbird
Rufous Hummingbird
Belted Kingfisher
Common Flicker
Yellow-bellied Sapsucker
Acorn Woodpecker
Ladder-backed Woodpecker
Thick-billed Kingbird
Cassin Kingbird
Western Kingbird
Western Wood Pewee
Ash-throated Flycatcher
Empidonax sp.
Olive-sided Flycatcher
Say Phoebe
Vermillion Flycatcher
Cedar Waxwing
Horned Lark
Rough-winged Swallow
Violet-green Swallow
Barn Swallow
Cliff Swallow
Steller Jay
Scrub Jay
Common Raven
White-necked Raven
Verdin
Bush-tit
Conyern Wren
House Wren
Rock Wren
Bewick Wren
Cactus Wren
Mockingbird
Crissal Thrasher
Curve-billed Thrasher
Bendirex Thrasher
Robin
Hermit Thrush
Swainson's Thrush
Western Bluebird
Mountain Bluebird
Townsend Solitaire
Ruby-crowned Kinglet
Golden-crowned Kinglet
Phainopepla

Loggerhead Shrike
Starling
Solitary Vireo
Bell Vireo
Yellow-rumped Warbler
McGillivory Warbler
Lucy Warbler
Yellor Warbler
Wilson Warbler
American Redstart
Yellow-breasted Chat
House Sparrow
Eastern Meadowlark
Western Meadowlark
Great-tailed Grackle
Brewer Blackbird
Yellow-headed Blackbird
Northern (Bullock) Oriole
Scott Oriole
Hooded Oriole
Brown-headed Cowbird
Bronzed Cowbird
Western Tanager
Summer Tanager
Pyrrhuloxia
Rose-breasted Grosbeak
Black-headed Grosbeak
Blue Grosbeak
Lark Bunting
Painted Bunting
Pine Siskin
House Finch
Lesser Goldfinch
American Goldfinch
Green-tailed Towhee
Brown Towhee
Rufous-sided Towhee
Chipping Sparrow
White-crowned Sparrow
Lark Sparrow
Rufous-crowned Sparrow
Black-throated Sparrow
Dark-eyed Junco
Gray-headed Junco
Brewer Sparrow
Blocked-chinned Sparrow
Vesper Sparrow
Savannah Sparrow
Song Sparrow
Chestnut-collared Longspur

Mammals

Pallid Bat
Silver-haired Bat
Hoary Bat
Southwestern Bat
California Bat
Small-footed Bat
Fringe-tailed Bat
Cave Bat
Western Pipistrelle
Lumped-nosed Bat
Mexican Free-tailed Bat
Desert Cottontail
Black-tailed Jackrabbit
White-sided Jackrabbit
Spotted Ground Squirrel
Rock Squirrel
Black-tailed Prairie Dog
Spotted Skunk
Striped Skunk
Hooded Skunk
Hog-nosed Skunk
Cougar
Bobcat
Feral Hog
Javelina
Mule Deer
White-tailed Deer
Pronghorn
Bison
Desert Bighorn
Desert Shrew
Cliff Chipmunk
Pinyon Mouse
Raccoon

Appendix F
Wilderness Protection Stipulation

By accepting this lease, the lessee acknowledges that the lands contained in this lease are being inventoried or evaluated for their wilderness potential by the Bureau of Land Management (BLM) under Section 603 of the Federal Policy and Management Act of 1976, 90 Stat. 2743 (43 USC Sec. 1782), and that exploration or production activities which are not in conformity with section 603 may never be permitted. Expenditures in leases on which exploration drilling or production are not allowed will create no additional rights in the lease, and such leases will expire in accordance with law.

Activities will be permitted under the lease so long as BLM determines they will not impair wilderness suitability. This will be the case either until the BLM wilderness inventory process has resulted in a final wilderness inventory decision that an area lacks wilderness characteristics, or in the case of a wilderness study area until Congress has decided not to designate the lands included within this lease as wilderness. Activities will be considered nonimpairing if the BLM determines that they meet each of the following three criteria:

- (a) It is temporary. This means that the use or activity may continue until the time when it must be terminated in order to meet the reclamation requirement of paragraphs (b) and (c) below. A temporary use that creates no new surface disturbance may continue unless Congress designates the area as wilderness, so long as it can easily and immediately be terminated at that time, if necessary to management of the area as wilderness.
- (b) Any temporary impacts caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the wilderness study area (or inventory unit) as a whole by the time the Secretary of the Interior is scheduled to send his recommendations on that area to the President, and the operator will be required to reclaim the impacts to that standard by that date. If the wilderness study is postponed, the reclamation deadline will be extended accordingly. If the wilderness study is accelerated, the reclamation deadline will not be changed. A full schedule of wilderness studies will be developed by the Department upon completion of the intensive wilderness inventory. In the meantime, in areas not yet scheduled for wilderness study, the reclamation will be scheduled for completion within 4 years after approval of the activity. (Obviously, if and when the Interim Management Policy ceases to apply to an inventory unit dropped from wilderness review following a final wilderness inventory decision of the BLM State Director, the reclamation deadline previously specified will cease to apply). The Secretary's schedule for transmitting his recommendations to the President will not be changed as a result of any unexpected inability to complete the reclamation by the specified date, and such inability will not constrain the Secretary's recommendation with respect to the area's

The reclamation will, to the extent practicable, be done while the activity is in progress. Reclamation will include the complete recontouring of all cuts and fills to blend with the natural topography, the replacement of topsoil, and the restoration of plant cover at least to the point where natural succession is occurring. Plant cover will be restored by means of reseeding or replanting, using species previously occurring in the area. If necessary, irrigation will be required. The reclamation schedule will be based on conservative assumptions with regard to growing conditions, so as to ensure that the reclamation will be complete, and the impacts will be substantially unnoticeable in the area as a whole, by the time the Secretary is scheduled to send his recommendations to the President. ("Substantially unnoticeable" is defined in Appendix F of the Interim Management Policy and Guidelines for Lands Under Wilderness Review).

(c) When the activity is terminated, and after any needed reclamation is complete, the area's wilderness values must not have been degraded so far, compared with the area's values for other purposes, as to significantly constrain the Secretary's recommendation with respect to the area's suitability or unsuitability for preservation as wilderness. The wilderness values to be considered are those mentioned in Section 2(c) of the Wilderness Act, including naturalness, outstanding opportunities for solitude or for primitive and unconfined recreation, and ecological, geological or other features of scientific, educational, scenic, or historical value. If all or any part of the area included within the leasehold estate is formally designated by Congress as wilderness, exploration and development operations taking place or to take place on that part of the lease will remain subject to the requirements of this stipulation, except as modified by the Act of Congress designating the land as wilderness. If Congress does not specify in such act how existing leases like this one will be managed, then the provisions of the Wilderness Act of 1964 will apply, as implemented by rules and regulations promulgated by the Department of the Interior.

Literature Cited:

- Cosgrove, C. B., 1947. Caves of the Upper Gila and Hueco areas in New Mexico and Texas, Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University Vol. XXIV - No. 2.
- DeForge, R., 1972. Man's Invasion Into the Bighorn's Habitat. Trans. Desert Bighorn Council. p. 112-115
- DeMarchi, R. A., Personal Communication. Wildlife Biologist. Branch of Wildlife Services. Cranbrook, British Columbia, Canada.
- Dunaway, J., 1971. Human Disturbance as a Limiting Factor of Sierra Nevada Bighorn Sheep. In first Trans. of the North American Wild Sheep Conf., edited by Eugene Decker. p. 165-173. Dept. of Fish and Wildlife Biol., Colorado State University, Ft. Collins.
- Eddy, T. A., 1961. Foods and Feeding Patterns of the Collared Peccary in Southern Arizona, Journal of Wildlife Management, 25:3.
- Foster, R. W., Grant P. R., 1974. The Future of New Mexico Oil and Gas Resources, Resource Map 3, New Mexico Bureau of Mines and Mineral Resources
- Gordon, S. P., 1953. Big Hatchet bighorn studies. P-R Job Prog. Rep., Proj. W-68-R-1. New Mexico Dept. of Game and Fish, Santa Fe.
- Ibid, 1955. Big Hatchet bighorn studies. P-R Job Prog. Rep., Proj. W-68-R-2. New Mexico Dept. of Game and Fish, Santa Fe.
- Geist, Valerius. 1971. Mountain Sheep - A Study in Behavior and Evolution. University of Chicago Press. 383 pp.
- Graf, W. 1970. Habitat protection and improvement. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Summer and G. Monson (eds.). In press.
- Graham, F. B., 1980. Oil and gas leasing (letter), Las Cruces District BLM
- Greenwood, E., et al September 1977. Petroleum Potential and Stratigraphy of Pedrogosa Basin: Comparison with Permian and Orogrande Basins. The American Association of Petroleum Geologists, Bulletin Vol. 61, No. 9
- Gross, J. E., 1960. Mexican Bighorn studies. P-R Job Prog. Rep., Proj. W-100-R-1. New Mexico Dept. of Game and Fish, Santa Fe.

- Hansen, C. G., 1970. The impact of modern man. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Sumner and G. Monson (eds.). In press.
- Harbridge House Inc., 1976. Southwestern New Mexico Social-Economic Profile
- Hayward, B. J., Heiner C. T., Miller R. F., 1977. Resource Inventory of the Alamo Hueco-Big Hatchet-Sierra Rica Mountain Complex. BLM contract No. YA-512-CT6-201
- Hein, J., 1980. Geological Summary (letter) Las Cruces District BLM
- Herbel, C., 1980, Reclamation Techniques (phone call)
- Hodder, R. L., 1977. Dry Land Techniques in the Semi-arid West, from Reclamation and Use of Disturbed Land in the Southwest, University of Arizona Press.
- Hubbard, J. P., et al, 1979. Handbook of Species Endangered in New Mexico, New Mexico Department of Game and Fish.
- Jacobsen, Robert D. and Lanny O. Wilson, 1972. Habitat of the Mexican Bighorn Sheep in the Big Hatchet Mountains of New Mexico. Trans. Desert Bighorn Council. p. 36-46.
- Jorgensen, C. and E. Turner, Jr., 1973. The Desert Bighorn Sheep of Anza-Borrego Desert State Park, Trans. Desert Bighorn Council. p. 81-88.
- Kilpatrick, J., 1975. Bighorn Transplant in Texas in 1975 Desert Bighorn Council Transactions, Desert Bighorn Council.
- Lambert, M. F., and Ambler, R. J., 1961. A Survey and Excavation of Caves in Hidalgo County, New Mexico. The School of American Research, Monograph 25
- Lenarz, M. S., 1977. Desert bighorn sheep investigations. P-R Job Prog. Rep., W-122-R. New Mexico Dept. of Game and Fish, Santa Fe.
- Ibid, 1978. Intra-specific variation in the social structure of Ovis canadensis. M. S. Thesis. New Mexico State University, Las Cruces, 34 pages.
- Light, J. T., Jr. and R. Weaver. 1973. Bighorn sheep habitat study. San Bernadino National Forest. Cajon Ranger District, California.
- Lyon, S., 1978, Desert bighorn sheep (letter) Ralph Little, Southwest Supervisor, New Mexico Game and Fish.

- Mearns, E. A., 1907. Mammals of the Mexican Boundary of the United States. Smithsonian Institution United States National Museum, Bulletin 56, GPO.
- Mitchell, J. R., 1980. Oil and gas leasing (letter) Las Cruces District BLM
- New Mexico Interagency Range Committee, 1973. Seeding Nonirrigated Lands in New Mexico, Agricultural Research Service.
- Olson, H., 1980. Endangered Species (memo), Las Cruces District BLM.
- Pendergast, B. A., 1977. Mountains Goats and Coal Extraction in Northeastern British Columbia. In abstracts of the first Intermountain Goat Symp. edited.
- Rue, L. L. III, 1968. Bighorn Sheep in Sportsman Guide to Game Animals, Harper and Row, New York.
- Russel, 1978. Mountain Lion Chapter in Big Game of North America, edited by Schmidt, J. L. and Gilbert, D. L., Stockpole Books.
- Sandoval, A. V., 1979. Preliminary Survey Report Evaluation of Historic Desert Bighorn Sheep Ranges, New Mexico Department of Game and Fish.
- Sandoval A., and Bavin, B., 1980. Desert bighorn sheep (memo to Bob Welsh and Walt Snyder), Las Cruces District BLM
- Simmons, N. M., 1970. Adaptive behavior. In the desert bighorn: Its life history, ecology and management. Desert Bighorn Council, L. Summer and G. Monson (eds.). In Press.
- Southwest Council of Governments, Demographic Profile of Deming and Lordsburg.
- Sowls, L. K., 1978. Collared Peccary a chapter in Big Game of North America, edited by Schmidt, J. L., and Gilbert, D. L., Stockpole Books.
- Travis, L. Jr., 1959. Man's Effect on Bighorn in the San Jacinto-Santa Rosa Mountains. Desert Bighorn Council Trans. p. 69-74.
- Thompson, S., n.d. Tectonic and Igneous Effects on Petroleum Accumulations in Southwestern New Mexico, New Mexico Geological Society.
- Trefethen, James B. (Editor) 1975. The Wild Sheep in Modern North America. The Winchester Press. New York. 302 p.

- Trimmer, M., 1980. Personal communications- New Mexico Oil and Gas Association.
- U. S. Bureau of Land Management, 1974. Environmental Analysis Record Oil and Gas Leasing, NM-6 Roswell District.
- Ibid, 1971. Final Environmental Impact Statement for the Proposed Preference Right Phosphate Lease, Los Padres National Forest.
- U. S. Bureau of Reclamation, 1976. New Mexico Water Resources Assessment for Planning Purposes.
- Watts, T., 1979. Detrimental Movement Patterns in a Remnant Population of Bighorn Sheep (Ovis canadensis mexicana) Master Thesis, New Mexico State University.
- Wengerd, S. A., 1970. Petroleum Prospects in Southwesternmost New Mexico. New Mexico Geological Society Guidebook. 21st Field Conference, Tyrone-Big Hatchet Mountains-Florida Mountains.
- Wilshire, H. G., Bodman, G. B., Broberg, D., Kochelman, W. J., Major J., Malde, H. E., Snyder, C. T., Stebbins, R. C., 1977. Impacts and Management of Off-Road Vehicles, Report of the Committee on Environment and Public Policy, The Geological Society of America.
- Wilson, L., 1980. Desert bighorn sheep (letter), Las Cruces District BLM
- Zeller, R. A., 1970. Petroleum Geology of Southwestern New Mexico, Abstract in New Mexico Geological Society Guidebook 21st Field Conference, Tyrone-Big Hatchet Mountains-Florida Mountains Region.
- Ibid, Stratigraphy of the Big Hatchet Mountains Area, New Mexico, condensed by Kinney, E. E., abstract in New Mexico, Geological Society Guidebook 21st Field Conference, Tyrone-Big Hatchet Mountains-Florida Mountains Region.

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