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FINAL
ENVIRONMENTAL
ASSESSMENT

OIL AND GAS LEASING

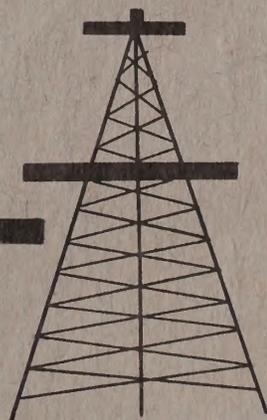
BIG HATCHETS

ALAMO HUECO MOUNTAINS



LAS CRUCES DISTRICT OFFICE

SEPTEMBER, 1980



TD
195
.P4
B36
1980b



United States Department of the Interior

IN REPLY REFER TO

1791

BUREAU OF LAND MANAGEMENT
District Office
P. O. Box 1420
Las Cruces, New Mexico
88001

September 25, 1980

Dear Reader:

The Final Environmental Assessment for Oil and Gas Leasing Big Hatchets-Alamo Hueco Mountains has been completed. The assessment focuses the effects of oil and gas leasing on desert bighorn sheep.

The final assessment was prepared using the comments received through the public review process. The final environmental assessment is a departure from the usual procedure of completely reprinting the draft environmental assessment with changes based on public input. The changes suggested from the public review process did not require a major rewrite, and substantial cost saving could be realized by printing only the responses to comments and the modifications and corrections. This document should be used with the draft assessment.

The Finding of No Significant Impact is the decision document, and is located at the beginning of the assessment.

ERRATA

The following corrections to Map 1 and Appendix A should be made.

Map 1:

T. 31 S., R. 15 W., NMPM
Sec. 2 - this is a State section

Appendix A:

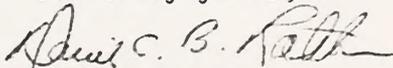
Page 65 - T. 31 S., R. 15 W., NMPM
Sec. 2: Lots 1 and 2, $S\frac{1}{2}NE\frac{1}{4}$ is deleted

Page 67 - T. 31 S., R. 15 W., NMPM
Sec. 2: Lots 3 and 4, $S\frac{1}{2}NW\frac{1}{4}$, $S\frac{1}{2}$ is deleted

Page 67 - T. 30 S., R. 16 W., NMPM
Sec. 12: $S\frac{1}{2}SE\frac{1}{4}$ is added as a no lease area

Many thanks to all those individuals and organizations who provided suggestions and comments on the draft.

Sincerely yours,


Daniel C. B. Rathbun
District Manager

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FINAL

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
P. O. BOX 1420
LAS CRUCES, NEW MEXICO
88001

ENVIRONMENTAL ASSESSMENT

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

Prepared by: Mary Zuschlag, Team Leader
Kenneth Holmes, Wildlife Biologist
Mark Darienzo, Geologist and Surface Protection
Specialist
Gary Marsh, Outdoor Recreation Planner
Peter Laudeman, Archaeologist
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Andy Sandoval, Wildlife Biologist, New Mexico
Game & Fish
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Table of Contents

	<u>Page</u>
Finding of No Significant Impact	
Summary	
Part I Consultation and Coordination	1
Working Records of Comments	4
1-1 to 3-1.	4
4-1 to 4.	7
5-1 to 2.	10
6-1 to 2.	14
7-1	19
8-1	24
9-1 to 4.	28
10-1 to 3.	33
11-1 to 8.	39
12-1 to 3.	42
13-1 to 3.	49
14-1 to 2.	54
Part 2 Modifications and Corrections	59
Significant Changes	62
Appendix G Cooperative Agreement BLM-NMDG&F.	A-1
Appendix H Geology	A-4
Literature Cited	

Finding of No Significant Impact

Based on the Environmental Assessment, alternative three as amended is adopted as the Oil and Gas Lease Policy.

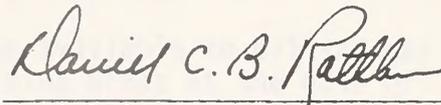
Desert bighorn sheep were listed as a state endangered species. The Sikes Act (88 STAT 1369, 16 USC) and Endangered Species Act (87 STAT 384) requires BLM to protect State listed endangered species. Alternative three was developed in cooperation with New Mexico Game & Fish in order to protect desert bighorn sheep.

Continuing desert bighorn sheep studies will provide more information concerning the species movements and habits. Also the oil and gas potential will be better evaluated after opening part of the area for leasing. As more information becomes available appropriate boundary adjustments can be made (mitigation measure 1 provides for monitoring the sheep and reviewing boundaries annually).

If oil or gas is present it could be extracted in the future. However, if desert bighorn sheep are lost, due to oil and gas activities, the species may be difficult or impossible to restore.

Based on the reasons stated above, leasing should be consistent with our present knowledge of protecting desert bighorn sheep.

Based on discussions of the impacts in the Environmental Assessment, alternative three is not a major Federal action significantly affecting the environment because the sheep will be protected. Therefore, preparation of an Environmental Impact Statement is not necessary.



Daniel C. B. Rathbun
District Manager

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 old policy was 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 one of the few free roaming herds of desert bighorn sheep in New Mexico. The Big Hatchet-Alamo Hueco area has good oil and gas potential. Desert bighorn sheep are listed as state endangered species.

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

Alternative 1 - Maintain Old No Lease Boundaries - 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, 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.

The boundaries are modified in the Final Environmental Assessment. More area is available for leasing south of U-Bar ridge, and a no surface occupancy area has been added (T. 31 S., R. 14 W., W $\frac{1}{2}$ Section 26 and 35 NMPM).

This alternative attempts to maximize the area available to oil and gas leasing and protect the sheep. Alternative 3 was chosen as the new oil and gas lease policy in the Big Hatchets - Alamo Huecos.

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.

CONSULTATION AND COORDINATION

CONSULTATION AND COORDINATION

This section documents public comments concerning the draft and updates the consultation and coordination section.

The public was notified of the draft assessment through news articles in the following papers: Deming Headlight, Lordsburg Liberal, Las Cruces Sun News, Silver City Press, El Paso Times, Albuquerque Journal. News items were also submitted to the following radio stations: KOBE Las Cruces, KGRT Las Cruces, KRWG Las Cruces, KASK Las Cruces, KSIL Silver City, KNFT Silver City, KOTS Deming.

Copies of the draft were available at Wilderness Meetings June 3, 4, and 5 in Las Cruces, Lordsburg, and Deming. Comments were received at those meetings concerning Oil and Gas Leasing in Big Hatchets-Alamo Hueco. Transcripts are available at the Las Cruces District Office.

Copies of the draft were distributed to 145 members of the public and government agencies. Everyone with lease applications within the old no lease boundary (alternative 1) was sent a copy of the draft.

Comments on the draft environmental assessment were requested from the following agencies, interest groups, and individuals.

Elected Officials

U. S. Senator Pete Domenici
U. S. Senator Harrison Schmitt
Bruce King, Governor of New Mexico

Federal Agencies

U. S. Geological Survey
U. S. Fish and Wildlife Service

New Mexico State Agencies

New Mexico Clearing House Bureau
New Mexico State Planning Division
New Mexico Department of Game and Fish
New Mexico State University
New Mexico State Land Office

Regional and Local Agencies

Southwest Council of Governments
Southern Rio Grande Council of Governments
Hidalgo County Planning Office
Mayor of Lordsburg
Mayor of Deming
Luna County Planning Office
Chamber of Commerce, Las Cruces

Conservation Organizations

Sierra Club
New Mexico Wildlife Federation
Wilderness Society
Friends of the Earth
Desert Bighorn Sheep Council
Foundation for North American Wild Sheep
New Mexico Natural History Institute
Wilderness Study Committee

Other Groups or Companies

New Mexico Oil and Gas Association
Human Systems Research Inc.
Amerind Foundation
Land & Martin
Pacific Western Land Company
Leonard Resources
Center for Urban Affairs

Petroleum or Geophysical Exploration Companies

P. H. Wach
Exxon Company USA
Placid Oil Company
ARCO
Gulf Oil Company
Argonaut Enterprises
May Petroleum
Dawson Geophysical Company
Anschutz

Individuals

Mahlon Everhart
Zay Clopton
Dick Hodges
Scott Merville
Lanny Wilson
Bob Bavin
Andy Sandoval

Lease Applicants

Elaine Wolf
Flossie Speed
W. E. Haley
Joe B. Schutz
Ida Lee Anderson

WORKING RECORD OF COMMENTS

Letters received during the final assessment are printed with responses. In some cases comments were similar, so the responses were combined below. The three responses below also caused the most confusion.

- 1-1 We received verbal questions concerning the leasing status within Alternative 1 boundary and the relationship of leasing and geophysical exploration.

Alternative 1 was the old, no-lease boundary challenged in IBLA decision 80-21 and 79-516.

Geophysical exploration is independent of lease issuance, i.e., geophysical exploration can occur without a lease. However, geophysical exploration in an unexplored area is associated with leasing. If there is no lease, it is unlikely that geophysical exploration would occur. After receiving a lease in the Big Hatchets Alamo Huecos, the next logical step would be geophysical exploration. Stipulations concerning geophysical exploration will be developed on a case-by-case basis after Notice of Intent is filed.

- 2-1 In accordance with the Sikes Act and Endangered Species Act, a Memorandum of Understanding was signed between NMG&F and BLM. BLM agreed "to cooperatively develop conservation programs for state listed endangered or sensitive animals that would prevent the destruction or adverse modification of their habitats as appropriate to State laws." In addition, a supplement agreement was signed concerning desert bighorn sheep (Appendix G). An evaluation of Bighorn habitat was made in accordance with the Cooperative Agreement. In this study, the Alamo Huecos was "recommended for intensive study to determine (its) full potential for perpetuating viable populations of desert bighorn sheep" (Sandoval 1979). Because the Alamo Hueco Mountains are identified as a reintroduction area, BLM must cooperate with NMG&F in protecting the area.

- 3-1 There is some confusion over the relationship between the desert bighorn sheep vs. the oil and gas leasing issue and the proposed Wilderness Study Areas in the Big Hatchets and Alamo Huecos. The Wilderness Study Area (WSA) proposals in these areas are based solely on the presence of wilderness characteristics. Required wilderness characteristics are: size (greater than 5,000 acres), naturalness, and outstanding opportunities for solitude or primitive and unconfined recreation.

The presence of desert bighorn sheep in these areas is considered a supplemental feature of scientific and educational value. The Wilderness Act states that a wilderness "may also contain" supplemental values. That is, supplemental values are not required, but

it is important that their presence be noted and considered. Such values may enhance an area's wilderness quality.

WSA designation does not prohibit oil and gas leasing. However, exploration within areas under wilderness review must be consistent with the non-impairment criteria as stated in the "Interim Management Policy and Guidelines for Lands Under Wilderness Review," December 12, 1979 (Appendix F).

Impairment or nonimpairment of wilderness characteristics by oil and gas activities is determined on a case-by-case basis.

The no lease and lease with no surface occupancy recommendation is based primarily on the desert bighorn sheep situation. The Wilderness Study Area proposals are coincidental.



United States Department of the Interior

GEOLOGICAL SURVEY

P. O. Drawer 1857
Roswell, New Mexico 88201

May 12, 1980

Memorandum

To: Mary Zuschlog, Bureau of Land Management
Las Cruces District Office

Through: Area Geologist, Roswell, New Mexico *JWS 5-12-80*

From: Geologist, Roswell, NM

Subject: Review of Big Hatchet's Oil and Gas EA

The following are review comments regarding the subject matter which may be of interest to you:

P. 8, Geophysical Exploration:

4-1

Clarify tense. Introductory sentence is the past tense - description of methods is written in present tense. Do you mean that these methods can be used, should be used, or have been used in this area?

Pgs. 22-24, Geology:

4-2

Entire section is simply a collection of quotations. There is no continuity and little meaning to the entire section. What would be appropriate and useful would be a concise discussion of the sedimentary section in the area, with brief descriptions of the rocks and their depositional histories, pointing out probable source and reservoir rocks, and stratigraphic traps, structural history of the area and how this structure may have created additional potential hydrocarbon traps. Cretaceous should always be capitalized and spelled correctly and all oil and gas tests or wells should be located by section, township, and range.

4-3

4-4

The expression "impacts to geology" as used, fails to convey any useful message.

N. E. WINGARD
Geologist

Working Record of Comments

- 4-1 The first sentence after Geophysical Exploration was written in the past tense to indicate geophysical exploration has occurred.

The description of methods was written in the present tense because not all methods have been used. We tried to discuss the common exploration methods. To simplify the narrative all methods were discussed in the present tense.

- 4-2 The geology section is not a detailed analysis because it must be understandable to the average reader. Discussing depositional and structural history in non-technical language would make the section overly long. There is additional geological information in Appendix H, letters in the consultation and coordination section, and the corrections in Part 2. The important point the section should convey is that the oil and gas potential is very good.

- 4-3 The errors were corrected, refer to the errata section. The location of the test well is on page 26 of the draft.

- 4-4 The sentence has been omitted, refer to errata section.

Ida Lee Anderson
1437 Beneficial Life Tower
36 South State Street
Salt Lake City, Utah 84111

May 30, 1980

Mr. David C. B. Rathbun
District Manager, B.L.M.
Las Cruces District
P. O. Box 1420
Las Cruces, New Mexico 88001

Dear Mr. Rathbun:

I am in receipt of a draft copy of your Environmental Assessment concerning oil and gas leasing in the Big Hatchet-Alamo Hueco area of southwestern Hidalgo County, New Mexico.

I am the owner of certain Offers to Lease for Oil and Gas filed in Townships 30 through 34 South, Ranges 14 to 16 West. I have previously furnished written comment to your office regarding leasing in this area after your office advised the Santa Fe office to reject one of my Offers to Lease in this area.

I would like to comment on the draft copy of your Environmental Assessment. It is very evident that the main concern of your office is to protect the small band of desert bighorn sheep which you state make their habitation in this area. I am also very concerned about protecting all endangered species, because I love the outdoors, but I also realize that we must find more domestic oil and gas reserves or our country is in real trouble. Oil and gas is seldom found in readily accessible places. It is often found in places where weather and terrain are extremely harsh for man. Nevertheless, if we are to find more domestic reserves we must drill in places where oil and gas is likely to be found. The subject area is very promising for natural gas production, which is the reason that my geologist recommended leasing this area.

5-1 I would like to comment on the habits of desert bighorn sheep. I owned a home in Rancho Mirage, California, in the Coachella Valley, about ten miles south of Palm Springs. My home was located down near the east base of the San Jacinto Mountains. Hundreds of other homes have been built in this area. Many are occupied all year around. A band of desert bighorns lives in these mountains. They love to come down into the yards in the evening or early morning and eat the flowers. They have been doing this for years. Many of my former neighbors and I have taken hundreds of pictures of them at very close range. Just before we sold our home, my husband and I were taking a swim in our outdoor pool (early April, 1976) in mid morning, when we looked up and 27 sheep were standing about 100 feet away watching us. We both went in the house to get our cameras.

Before we could take pictures a large truck carrying construction materials to a higher elevation came by and frightened them off. I know it to be a fact that desert bighorns will live in perfect harmony with man, as long as man does not hunt them. The only restriction that I know of as regards sheep in this area, is that heavy construction activity is prohibited during the sheep's mating season.

You have proposed the following alternatives:

1. Refuse to lease within the area.
2. Lease the entire area.
3. Open part of the area for leasing.
4. Move the sheep to another location.

5-2 I believe that alternative number 2 should be selected. I can see no good reason why leases should not be issued over the entire area. Adequate stipulations can be attached to each lease to insure that no seismic or drilling activity (except maintenance of producing wells, if any) will take place during the sheep mating season; limited areas around known springs can be designated as "no surface occupancy" and other fair and reasonable stipulations can be included to adequately protect any cultural resources in the area and to make sure that any drilling sites are properly rehabilitated.

In summary, oil and gas explorationists have often conducted seismic, drilling and producing activities in areas much more environmentally sensitive than the subject area (for example, within the City limits of Los Angeles and Long Beach, California) with no adverse results to the environment. Refusal to lease this entire area would be taking a very narrow and prejudiced view. Ranchers living on the fee lands scattered through this area pose much more danger to the sheep than oil and gas exploration ever would.

I am personally unable to attend any of the four public meetings to be held June 2 through June 5, but I have asked Mr. O. Clair Adams to present my comments and read this letter if possible.

Respectfully yours,



Ida Lee Anderson

ILA:cb

cc: BLM, Santa Fe, New Mexico
Senator Harrison Schmitt
Senator Pete V. Domenici

Working Record of Comments

5-1 On June 17, Bonner Bolong, California Game and Fish wildlife biologist was contacted concerning the desert bighorn sheep near Rancho Mirage, California. Mr. Bolong has worked with the sheep in this area for many years. According to Mr. Bolong, the sheep in Rancho Mirage are not Mexican Desert Bighorn (*Ovis Canadensis mexicana*) but Nelson Desert Bighorn (*Ovis canadensis nelson*).

The original watering area for the sheep was in a nearby canyon. The herd abandoned the area because people used the area for swimming and harassed the sheep. The sheep were attracted to Rancho Mirage by lush vegetation and water (swimming pools). Sheep move into the area primarily during the hot, dry months when little water is available elsewhere, and the area is relatively quiet.

Rancho Mirage is an affluent community where many residents have two homes, and therefore, houses are often vacant during the summer. The area has been occupied 30-40 years and the sheep have gradually adapted to humans.

5-2 Refer to Comment 2-1.

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

June 9, 1980

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

Re: Draft Environmental Assessment
Big Hatchet and Alamo Hueco
Mountains

Gentlemen:

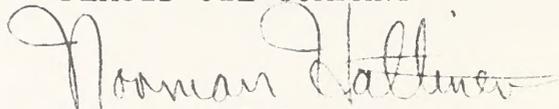
Enclosed is a letter response on behalf of Mr. James C. Hoskins, III, stating Placid Oil Company's basic position and feelings on the Draft Environmental Assessment regarding the work completed to date on the Big Hatchet and Alamo Hueco Mountains in Hidalgo County, New Mexico.

If you need further information, please advise.

Also, we are interested in attending any upcoming meetings on the subject matter and therefore, would be appreciative of notification of same.

Sincerely yours,

PLACID OIL COMPANY


Norman Haltiner
District Landman

NH/mtr

Enclosure

PLACID OIL COMPANY
1600 FIRST NATIONAL BANK BUILDING
DALLAS, TEXAS 75202

June 6, 1980

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

RE: Draft Environmental Assessment
Big Hatchet and
Alamo Hueco Mountains

Gentlemen:

We have reviewed your Draft Environmental Assessment dated May, 1980 re the Big Hatchet and Alamo Hueco Mountains, and we are pleased that the possibility of oil and gas exploration in this area is being given detailed consideration.

While we are very conservation-minded, we are also working to solve the problem of dependence upon foreign supply of energy.

Therefore, we support the strong debate of these issues in an effort to solve the problem of being able to fully utilize our energy resources while we protect and appreciate our natural resources.

Your third alternative for use of the subject area is encouraging in that it provides for some hydrocarbon exploration activity.

However, we feel very strongly that this situation should be viewed in light of the fact that two very different types of activity are to be considered relative to use of leases by oil and gas exploration companies.

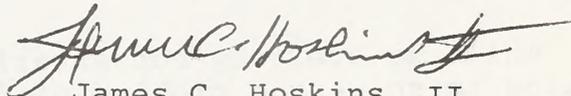
6-1 | First, seismic work must be done over a large area. This work would be required to determine whether there are any areas that would be so prospective as to justify the great expense of actually drilling an exploratory well. Of course, during this phase there would be no drilling rigs, well sites or reserve pits similar to those illustrated on pages 11 and 12 of your Draft Environmental Assessment. Also, there would be, during this stage, no danger of blowouts or contamination.

Second, because of the seismic work certain small areas could be determined to be prospective of oil and/or gas. An exploratory well might then be drilled with, perhaps, a ten percent chance of finding hydrocarbons and a much smaller chance of finding a commercially recoverable deposit of hydrocarbons.

6-2 | The point is that the more severe use (i.e., that that is least compatible with wildlife habitation) would come much later, if it all, and would be restricted to very small areas. This being the case, as we sincerely believe the evidence to indicate, we truly believe that your third listed alternative should apply to a much larger geographic area than is illustrated on your Map No. 1 as being allocated to it. In all likelihood the exploratory activities of this Company and others would condemn as not prospective for oil and gas recovery a large part of the applicable Wilderness Study Areas.

We hope that our comments have been helpful, and we look forward to cooperating with you in seeking to protect and utilize the resources of this nation in ways beneficial to all of us.

Very truly yours,



James C. Hoskins, II
Attorney

JCH:sm

Working Record of Comments

6-1 Refer to Comment 1-1.

6-2 Refer to Finding of No Significant Impact.

State of New Mexico

GOVERNOR
BRUCE KING

DIRECTOR AND SECRETARY
TO THE COMMISSION
HAROLD F. OLSON



STATE GAME COMMISSION
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CIMARRON

DEPARTMENT OF GAME AND FISH

STATE CAPITOL
SANTA FE
87503

June 11, 1980

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

Dear Mr. Rathbun:

I have reviewed the Draft Environmental Assessment, Oil and Gas Leasing, Big Hatchets and Alamo Hueco Mountains, and wish to make the following comments.

At the Game Commission meeting held on May 24, 1980, the Commission placed Desert Bighorn Sheep on the State endangered list. I wish to reaffirm the position of this Department concerning the proposed oil and gas leasing as stated in our letter dated February 15, 1980, and memorandum dated February 6, 1980, both of which are included in the Assessment Appendix. It is essential that the Bighorn Sheep receive priority consideration for their protection and enhancement. This consideration must be incorporated into any course of action pursued by your agency.

Thank you for the opportunity to review and comment upon the draft assessment.

Sincerely,

A handwritten signature in cursive script that reads "Harold Olson nywe".

Harold F. Olson
Director

Foundation for North American Wild Sheep

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

June 12, 1980

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

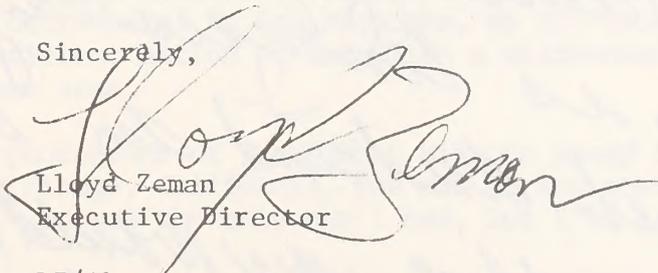
Dear Mr. Rathbun:

Recently we heard about the proposal for oil and gas exploration in the Big Hatchet and Alamo Hueco Mountains. As you may or may not be aware, The Foundation for North American Wild Sheep was the first major conservation organization in North America to raise funds to support saving the gene pool of the Mexican bighorn in the San Andres Mountains this past year. Many thousands of dollars were provided by our organization in this effort. The San Andres situation was an effort to salvage what was left of one of the two remaining desert bighorn populations in New Mexico. The impacting agent in this instance was a parasite. To consider a proposal by man which could result in loss of the other Mexican bighorn population at this time is out of the question. We strongly urge you to select alternative one (1).

We are well aware of the Nation's dilemma to develop self sufficient oil and gas deposits. We may well have to do so in the Big Hatchet and Alamo Hueco Mountains at some time in the future, after existing viable Mexican bighorn have been reintroduced in historic habitats in the State. We do not believe it is in the best interest of the United States to further jeopardize the continued existence of an endangered species on federal lands at this time. The Mexican bighorn was classified by the New Mexico Department of Game and Fish as a State "endangered species". We are also in full concurrence with this classification at this time.

Would you please advise us of your decision. We believe we have a considerable investment in this issue based upon our previous commitment with the San Andres situation.

Sincerely,


Lloyd Zeman
Executive Director

LZ/jb

529 West Lane
12 June 1980

BLM
P.O. Box 1420
Las Lunas NM 88001

Dear Sue,

It sounds incredible to me that a government agency, such as you, who has been assured by our government many times that we our share of oil and gas, would consider big-horn sheep more valuable than oil or gas for our survival as a nation!!!

Maybe you are right. Maybe we have plenty of gas already found and exploration is unnecessary - I don't believe it and am offended and insulted that you would suggest a restricted survey - If we need oil and gas lets find it.

Sincerely
Ruth Harley

GEOLOGICAL CONSULTANT

1450 Beneficial Life Tower
36 South State Street
Salt Lake City, Utah 84111

Business: (801) 532-3838
532-3846
Home: (801) 295-6752

June 12, 1980

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

Dear Mr. Rathbun:

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

A copy of the map you submitted with your Draft Environmental Assessment on Oil and Gas Leasing in the Big Hatchets and Alamo Hueco Mountains is attached to this letter. As agreed in the Deming, New Mexico, meeting on June 5, 1980, we have outlined that part of the subject area (area outlined in red) within which we feel it would be reasonable that oil and gas leases carry the stipulation "no surface occupancy." That area is essentially all of the Big Hatchet Mountain range. The restrictive stipulations on the leases should prevent any encroachment on the mountainous area occupied by Desert Bighorn sheep, therefore, their requirement for solitude will not be jeopardized.

7-1 | Should a commercially significant hydrocarbon accumulation be discovered adjacent to the area outlines, some oil or gas reserves could be produced from beneath the restricted area by locating the drilling rig outside the boundary and drilling at an angle beneath the boundary. For that reason it is important that the leases be issued even though the restrictive stipulations are attached. The Alamo-Hueco Mountains area is mostly private and State owned, there are numerous existing roadways (see attached map) and sheep have not been seen there for over 20 years. For these reasons and because the oil and gas potential is very good in that area it is recommended that all Federal oil and gas leases be issued without restrictive stipulations. Again, I feel it would be detrimental to the Bighorns, to the local interests and to the energy-deficient nation to establish a wilderness area in the Big Hatchet-Alamo Hueco area.

The photograph of the Desert Bighorn sheep feeding among the houses at Rancho Mirage, California, you saw at the meeting in Deming is also enclosed. It was the only one I had, but I've since had a copy made.

Very truly yours,

O. Clair Adams

O. Clair Adams

Enclosures



Working Record of Comments

Mr. Adams recommended lease with no surface occupancy in the Big Hatchets and lease in the Alamo Huecos. The no surface occupancy area he recommended covered only the mountainous areas. U-Bar ridge was excluded.

The map was not published to reduce printing costs, but it is available at the Las Cruces District Office.

7-1 Refer to Comment 2-1.



This photo accompanied Mr. Adams Comments. Refer to comment 5-1 concerning the sheep at Rancho Mirage, California.



DESERT BIGHORN COUNCIL

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

P.O. Box 1383
Loomis, California 95650

June 15, 1980

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

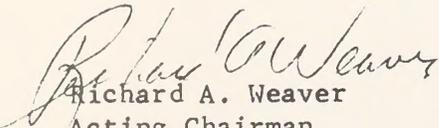
Dear Mr. Rathbun:

We have reviewed the Draft Environment Assessment relative to Oil and Gas Leasing in the Big Hatchet and Alamo Hueco Mountains. We wish to compliment you on the discussions of possible impacts to the Mexican bighorns (Ovis canadensis mexicana) inhabiting the area. We concur with your findings. In our opinion, this desert bighorn population would be in jeopardy if oil and gas exploration were permitted. Should oil and/or gas deposits be located and developed, there is little doubt the sheep population could co-exist with the developments. To our knowledge, there are no viable bighorn sheep populations anywhere in North America co-existing with intensive oil and gas developments. Therefore we support alternative 1.

At the Desert Bighorn Council meeting held this past April, the Council passed a resolution supporting the New Mexico Game and Fish Department's position of classifying the Mexican bighorn in New Mexico as an endangered species under the State's, not Federal, Rare and Endangered Species Act. During the discussion of the resolution it was pointed out that it is the Bureau of Land Management's policy to honor State endangered species lists the same as Federal lists. Our reason for pointing this policy out is not to remind you of your regulations but to stress that in our opinion, oil and gas exploration and possible development could jeopardize the continued existence of an endangered species inhabiting public land.

We appreciate the opportunity to comment on the Draft Environmental Assessment. Should we be of any further assistance to you, please call on us.

Sincerely,


Richard A. Weaver
Acting Chairman
Technical Staff

State of New Mexico

GOVERNOR

BRUCE KING

DIRECTOR AND SECRETARY
TO THE COMMISSION

HAROLD F. OLSON



STATE GAME COMMISSION

EDWARD MUNOZ, CHAIRMAN
GALLUP

J.W. JONES
ALBUQUERQUE

ROBERT H. FORREST
CARLSBAD

ROBERT P. GRIFFIN
SILVER CITY

BILL LITTELL
CIMARRON

DEPARTMENT OF GAME AND FISH

STATE CAPITOL
SANTA FE
87503

June 16, 1980

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

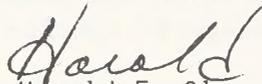
Dear Mr. Rathbun:

This is an addendum to my letter dated June 11, 1980 in regards to the Draft Environmental Assessment, Oil and Gas Leasing, Big Hatchets and Alamo Hueco Mountains.

The attached letter dated March 17, 1980 which is addressed to you is to be included in our response to the draft statement. I suggest that the attached letter be included in the appendix of the final statement along with my letter dated February 15, 1980 and memorandum dated February 6, 1980 that are in the appendix of the draft statement.

Thank you for including this addendum in our response to the draft statement.

Sincerely,


Harold F. Olson
Director

Enc.

State of New Mexico

GOVERNOR
BRUCE KING

DIRECTOR AND SECRETARY
TO THE COMMISSION
HAROLD F. OLSON



STATE GAME COMMISSION
EDWARD MUNOZ, CHAIRMAN
GALLUP
JW JONES
ALBUQUERQUE
ROBERT H. FORREST
CARLSBAD
ROBERT P. GRIFFIN
SILVER CITY
BILL LITTELL
CIMARRON

DEPARTMENT OF GAME AND FISH

STATE CAPITOL
SANTAFE
87503

March 17, 1980

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

Dear Dan:

In preparing our response regarding mineral leasing in the vicinity of the Big Hatchet Mountains, we did not designate the Cairn Hills on the southeast side of the mountain as critical habitat. Our reason for not doing so was because the map furnished to us indicated that mineral leases had already been awarded in that area. Current use by the indigenous sheep population in the Hatchets demonstrates that Cairn Hills should be classed as critical sheep habitat and we request that our previous proposal be amended to reflect this.

In the event that leasing is allowed in the area, we feel that mitigation would be necessary. To determine the impact of mineral extraction on sheep populations in the area, it will require monitoring of the population during the extraction phase of exploration. We estimate the Department could conduct this activity at a cost of approximately \$45,000 a year. This would allow for actual assessment of the effect of mineral exploration and extraction on desert bighorn sheep populations and legitimate mitigation measures could then be recommended for future consideration.

Your serious consideration of these proposals is requested.

Sincerely,

Harold F. Olson
Harold F. Olson
Director

New Mexico



WILDERNESS STUDY COMMITTEE

P.O. Box 801 Silver City, NM 88061

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

6/18/80

Dear Mr. Rathbun:

In speaking for the Study Committee, I would like to say that ~~the~~ BLM study team seems to have made a sincere attempt to balance the nation's need for petroleum products and the equally valid need to preserve rare and valuable wildlife and its habitat, in the Big Hatchet-Alamo Hueco Oil and Gas Leasing Environmental Assessment (Draft)

We guardedly endorse the BLM's preferred alternative (#B), with the proviso that clearly outlined mitigating measures be adopted and enforced, if monitoring by the New Mexico Department of Game and Fish and the BLM reveals that O & G exploration and/or development activities are causing an adverse impact on the desert bighorn population or other rare or endangered species. The authority for such measures should be spelled out clearly. This should be done to protect all parties concerned. Such measures may include temporary or permanent cessation of O & G activities in certain cases. The area in which such measures might apply should extend to the boundary of the old no-lease area, at least.

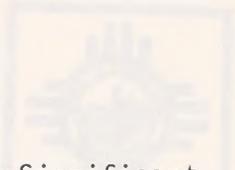
8-1

Such measures, as outlined above, are necessary to protect the increasingly rare Desert Bighorn, whose population dynamics have entered a downward spiral, and, as such, are very sensitive to any additional stress. Also, these mitigating measures would serve to protect other species with overlapping habitat requirements, and would enhance and protect the wilderness quality of the areas. It is especially important to assure protection of the bighorn and its habitat, along with the habitats of other species, in the Hatchet/Hueco complex. This is because of the increasing development that seems likely in the "Boot Heel" area and in Mexico.

Although it is impossible to say with complete certainty, the trade-offs for such protection seem to be relatively small. The bulk of the area is not suitable for oil and gas development due to its rugged topography, and the few thousand additional acres on the flats that would be withdrawn or regulated seem to be a small price to help assure the survival of this herd of Desert Bighorn and its magnificent habitat.

Thank you for the opportunity to offer these comments

For the Study Committee, Bob Langsenkamp



Working Record of Comments

8-1 Refer to mitigation measure 1, 3 and the Finding of No Significant Impact. In addition, an environmental assessment will be completed by USGS before drilling occurs. Geophysical exploration is independent of leasing; stipulations will be determined on a case-by-case basis.



NEW MEXICO OIL & GAS ASSOCIATION

512 Webber • P.O. Box 1864 • Santa Fe, N.M. 87501
Telephone (505) 982-2568

JUNE 20, 1980

DRAFT ENVIRONMENTAL ASSESSMENT OIL AND GAS LEASING IN THE BIG HATCHETS AND ALAMO HUECO MOUNTAINS

MR. DANIEL C. B. RATHBUN
DISTRICT MANAGER
BUREAU OF LAND MANAGEMENT
P.O. Box 1420
LAS CRUCES, NEW MEXICO 88001

DEAR MR. RATHBUN:

THE NEW MEXICO OIL & GAS ASSOCIATION (NMOGA) HAS RECEIVED THE LAS CRUCES DISTRICT'S MAY 1980 DRAFT ENVIRONMENTAL ASSESSMENT (DEA) WHICH ADDRESSES OIL AND GAS LEASE POLICY IN THE BIG HATCHET - ALAMO HUECO AREA OF HIDALGO COUNTY, NEW MEXICO. WE THANK YOU FOR THE OPPORTUNITY TO SUBMIT COMMENTS.

THE CHIEF CONCERN OF BLM IS TO PROTECT A HERD OF FREE ROAMING DESERT BIGHORN SHEEP. TO DO SO BLM WOULD DENY OIL AND GAS LEASES IN 78,500 ACRES COVERING BOTH THE BIG HATCHETS AND THE ALAMO HUECOS, AND EXTENDING ONE TO ONE AND-A-HALF MILES BEYOND THESE MOUNTAINS. IN ADDITION, THERE WOULD BE A ONE-HALF MILE BUFFER ZONE IN WHICH LEASING WOULD BE ALLOWED, BUT LESSEES WOULD NOT BE PERMITTED ACCESS TO THE SURFACE TO CONDUCT OPERATIONS. ALL OF THIS IS ALTERNATIVE NUMBER 3 IN THE DEA, WHICH IS BLM'S PREFERRED ALTERNATIVE. AT THE PRESENT TIME LEASING IS DENIED IN 111,500 ACRES, AND THIS IS DEFINED AS ALTERNATIVE NUMBER 1. BLM'S PREFERRED ALTERNATIVE (NUMBER 3) WOULD REDUCE THE PROHIBITED LEASE AREA BY 33,000 ACRES. ANOTHER ALTERNATIVE, NUMBER 2, WOULD OPEN THE ENTIRE 111,500 ACRES TO OIL AND GAS LEASING WITH APPROPRIATE PROTECTIVE STIPULATIONS.

NMOGA STRONGLY OPPOSES ALTERNATIVES 1 AND 3 FOR THE FOLLOWING REASONS:

- 9-1 | 1. NO SHOWING HAS BEEN MADE THAT THE SPECIES IS THREATENED BY OIL AND GAS OPERATIONS

OF APPROXIMATELY 100 DESERT BIGHORN IN NEW MEXICO, SOME 75% ARE IN CAPTIVITY AND ARE NOT ENDANGERED IN ANY WAY. THE REMAINING 25 SHEEP ROAM FREELY IN THE BIG HATCHETS. SINCE THE EARLY 60'S THE SHEEP POPULATION IN THE BIG HATCHETS HAS REMAINED FAIRLY CONSTANT -- FLUCTUATING BETWEEN 20 TO 25 ANIMALS. SEVERE DROUGHT IN THE LATE 1950'S SEEMS TO BE THE REASON THE NUMBERS WERE REDUCED TO THIS LOW LEVEL.

THE NEW MEXICO DEPARTMENT OF GAME AND FISH (NMG&F) BELIEVES PREDATION (E. G. MOUNTAIN LIONS) IS ONE OF THE MAJOR FACTORS KEEPING THE POPULATION AT A LOW LEVEL. NMG&F ALSO REPORTS:

"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."

MR. LANNY O. WILSON, BLM'S WILDLIFE BIOLOGIST IN NEW MEXICO IN THE EARLY 70'S, SAYS:

"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."

9-2 | WE CALL YOUR ATTENTION TO THE FACT THAT OIL AND GAS EXPLORATION AND DRILLING HAVE BEEN CONDUCTED IN THE AREA DURING THE TIME THAT THE SHEEP POPULATION HAS REMAINED CONSTANT. ONE WELL, A 14,585' DRY HOLE INSIDE THE ALTERNATIVE 3 OUTLINE, WAS DRILLED IN 1958 AND REWORKED IN 1968. IT WAS EXTENSIVELY TESTED, AND IN FACT FLOWED 10,000 CUBIC FEET OF GAS PER DAY. AT LEAST FOUR WELLS HAVE BEEN DRILLED IMMEDIATELY TO THE NORTH OF THE BIG HATCHET HABITAT. THE SHEEP DO NOT SEEM TO HAVE BEEN AFFECTED.

2. THE HERD REMAINS LOCATED IN THE BIG HATCHETS - NOT IN THE ALAMO HUECOS

9-3 | AFTER YEARS OF MONITORING BY STATE AND FEDERAL WILDLIFE PEOPLE, THERE IS NO CONCLUSIVE EVIDENCE THAT THE HERD SOUGHT TO BE PROTECTED HAS EVER RANGED INTO THE ALAMO HUECO MOUNTAINS. WITHOUT SUCH EVIDENCE THERE IS NO REASON WHATSOEVER TO APPLY AN OIL AND GAS LEASING BAN TO THE ALAMO HUECOS.

3. EXISTING CONTROLS ADEQUATELY PROTECT THE HERD

9-4 | THE AREA HAS BEEN MONITORED FOR YEARS BY NMG&F AS A PART OF THE BIG HATCHET GAME REFUGE. IT WILL CONTINUE TO BE DILIGENTLY MONITORED BY NMG&F. IF BY ANY CHANCE NMG&F CONCLUDES THAT OIL AND GAS EXPLORATION OR DEVELOPMENT DOES THREATEN THESE 25 SHEEP, THEY CAN BE REINTRODUCED INTO OTHER SUITABLE HABITATS, A PROCESS ALREADY SUCCESSFULLY DEMONSTRATED BY NMG&F IN THE SAN ANDRES MOUNTAINS. THE ESTIMATED COST -- LESS THAN \$100,000 -- IS NEGLIGIBLE COMPARED TO THE NATION'S NEED TO DEVELOP MORE ENERGY SUPPLIES.

THE USGS SURFACE USE PLAN REQUIREMENTS ALSO OFFER PROTECTION. LEASE STIPULATIONS SPECIFICALLY DESIGNED TO PROTECT THE DESERT BIGHORN, CAN ALSO BE APPLIED TO OIL AND GAS LEASES ISSUED IN THE AREA.

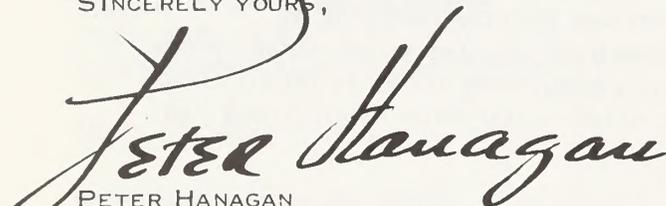
CONCLUSION

THE BIG HATCHET - ALAMO HUECO AREA IS HIGHLY FAVORABLE FOR OIL AND GAS PRODUCTION. THE ENTIRE AREA SHOULD BE OPENED TO OIL AND GAS LEASING WITH APPROPRIATE PROTECTIVE STIPULATIONS AS PROVIDED IN ALTERNATIVE 2. ALTERNATIVES 1 AND 3 ARE BASED PURELY ON SPECULATION THAT OIL AND GAS OPERATIONS THREATEN THE DESERT BIGHORN HERD IN THE BIG HATCHETS. WE REMIND YOU OF A STATEMENT MADE BY MR. JAMES A. JOSEPH, UNDER SECRETARY OF THE INTERIOR, ON MAY 21, 1980, ON THE SUBJECT OF DISCHARGE PERMITS IN THE OUTER CONTINENTAL SHELF. MR. JOSEPH SAID:

"REGULATORY POLICY SHOULD BE BASED ON WHAT NEEDS TO BE REGULATED AND NOT ON HYPOTHESES."

THANKS AGAIN FOR THE OPPORTUNITY TO COMMENT.

SINCERELY YOURS,


PETER HANAGAN
EXECUTIVE VICE PRESIDENT

PH:RA

CC: ARTHUR W. ZIMMERMAN, STATE DIRECTOR

Working Record of Comments

9-1 We were unable to locate any area where desert bighorn co-exist with oil and gas activities.

The sheep will be monitored. Therefore, boundary adjustments can be made as more information is known.

9-2 The boundary has been adjusted. It no longer includes the well (Refer to Modifications/Corrections Section).

9-3 Refer to Comment 2-1.

9-4 Refer to the Finding of No Significant Impact and page 42 of the draft.

NEW MEXICO WILDLIFE FEDERATION

300 VAL VERDE, S.E.
ALBUQUERQUE, NEW MEXICO 87108
TELEPHONE: (505) 265-7372

TOM THORNTON
PRESIDENT

6-20-80

Daniel Rathbun
District Manager, BLM
PO Box 1420
Las Cruces, NM 88001

Dear Mr. Rathbun:

We have read the DEA on Oil and Gas Leasing in the Big Hatchets and Alamo Hueco Mtns and believe the document presents the pros and cons in good perspective. Our concern is the welfare and perpetuation of the desert bighorns in these areas. This key remnant herd demands our best efforts if they are to survive. Numerous in depth research studies in the West have repeatedly shown that the desert bighorn is a species that does not adapt to nor tolerate disturbances by man.

It is, therefore, essential that key habitats on the mountain remain secure from oil and gas exploration.

Since your Big Hatchet Mountain Wildlife Habitat Area brochure features the desert bighorn on the cover, it is apparent that the BLM is dedicated to managing the area to benefit the bighorns.

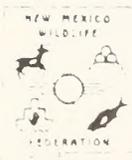
We recognize the energy shortage and the need for mineral exploration, we therefore endorse Alternative Number 3 (exploration near the base of the mountain with a buffer zone). This allows mineral exploration and yet protects the bighorns - a good compromise we believe.

This viewpoint represents the New Mexico Wildlife Federation which is composed of 20 affiliate and 19 associate chapters throughout the state with well over 2,000 members.

Sincerely



Tom Thornton



*Dedicated to the Wise Use and Management of Our Wildlife Resources
and the Natural Environment Upon Which All Life Depends*

THE NEW MEXICO NATURAL HISTORY INSTITUTE

A Nonprofit Corporation

Box 369, St. Johns College
Santa Fe, New Mexico 87501

NEW MEXICO NATURAL HISTORY INSTITUTE
Henry M. Zeller, Secretary
Post Office Box 870
Silver City, New Mexico 88061

JUN 20 1980

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

Subject: Draft EAR, "Oil and Gas Leasing, Big Hatchets, Alamo Hueco Mountains."

Dear Mr Rathbun:

Our primary comment with regard to the subject EAR is to emphasize our full concurrence with your choice of Alternative 3 as the preferred alternative. In selecting Alternative 3 with the new boundaries for oil and gas leasing you have followed the recommendations of the New Mexico Department of Game and Fish for protection of the Mexican bighorn sheep population, the Department being the leading authority on the ground concerning this particular population and its habitat. At the same time, you are able to contract the former no-lease boundaries, thus opening up 33,000 acres to possible oil and gas production. Your solution appears to represent the optimum answer to the two opposing aspects of your problem. See below for additional points which may strengthen your choice.

We concur with the mitigating measures outlined on Pages 14 and 15 of the EAR. Number 1 of these measures is especially important, providing as it does for monitoring of the sheep and for enforcement of lease stipulations.

10-1 | Although not having any direct bearing on the actual purpose of the EAR, the description of the vegetation on Pages 18 and 19 is deficient. No apparent mention is made of the vegetation of the Alamo Huecos, only that of the Big Hatchets being described, and for the latter, mountain shrubland is overlooked. Referring to the contract study done by Hayward et al (see second page of "Literature Cited"), and while allowing for the fact that any two observers often classify plant communities somewhat differently, I believe the types prevailing in the EAR area should be pinyon-juniper, mountain shrub, grassland, desert shrub (including mesquite and creosotebush dominated communities and tobosa swales), and the riparian communities along washes. The pinyon-juniper and mountain shrub types are found only at the higher elevations of the Big Hatchets, while grassland is extensive in the Alamo Huecos. The Hayward study states: "The most distinctive feature of the Alamo Huecos is the extensive area covered by the perennial grassland vegetative type; this type is dominated by the grama grasses and is common in the central higher elevations of the range." It is recommended that the discussion of the vegetation be revised.

Mr Daniel C B Rathbun

JUN 20 1961

The water situation is discussed on Pages 21 and 22 of the EAR. The water supply in the entire general area is precarious, all possible sources being already appropriated. In fact, this point could be enlarged upon as being an important factor arguing against the inception of any new large-scale activity demanding commensurate water supply.

Although we believe the EAR is correct in choosing the precarious status of the Mexican bighorn sheep population as the most cogent consideration in a decision on oil and gas leasing, the bighorn is certainly not the only wild-life species inhabiting the EAR area. There is abundant wildlife, living in a variety of habitats and microhabitats, and the biotic communities are of great interest. Like all the country along the Mexican border of New Mexico, the EAR area is a biological ecotone exhibiting transition between the species of Mexico with those originating to the north. This transition is not uniform all along the border, there being deeper penetrations northward in some places than others, depending on the terrain. In addition, the topographical nature of corridors offering ease of ingress, in terms of the habitat they offer, may bring qualitative differences in the species found. In consequence, no area along the border is necessarily like another, nor is there any area that does not offer significant opportunities for study from a biogeographic point of view. Emphasizing this situation is the fact that a great deal of the border area has not been carefully explored, nor has the available biological information been fully analysed.

The Big Hatchet - Alamo Hueco area is no exception here. Differences between its biota and that of the Animas Mountains and that of the Peloncillos further westward, together with the biota of the intervening basins, are very worthy of deeper study than they have yet received. Judging from the Hayward study, I believe the low saddle between the Big Hatchets and the Alamo Huecos deserves special attention, as does the grassland at the upper elevations of the latter. The EAR area could be an excellent natural area for research.

To preserve opportunities for study, the biota of the EAR area should be kept as immune as possible from the existing human interference. Although the bighorn has received a great deal of attention because of its highly visible, "big game" status, it is most certainly not the only species that could be harmed by extensive and/or intensive oil and gas activity. Further field work in the area might well disclose other species, plant or animal, that are in just as precarious a situation as the bighorn population. This is not to say that this possibility, or even the obvious opportunities for biological study, can provide as effective an argument for protection of the EAR area as the bighorn situation, still here is something that should not be overlooked.

The biological/ecological characteristics of the EAR area as part of the border ecotone supply "supplemental values" which should weigh heavily in determining its wilderness potential. In other correspondence we plan to recommend confirmation of the Big Hatchets (NM-030-035) and the Alamo Huecos (NM-030-038) as Wilderness Study Areas. But wilderness status for the moun-

Mr Daniel C B Rathbun

JUN 20 1980

tain areas, proper, is not enough. When opportunity presents itself we plan to recommend establishment of an ACEC to include the mountains, the saddle between them, and a band of the basin country surrounding the mountains.

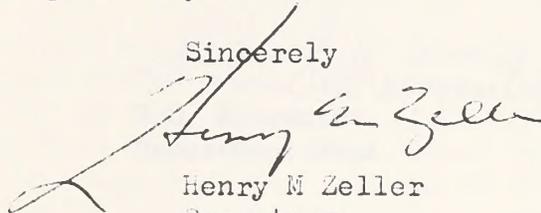
Needless to say, we are very pleased that the Alternative 3 no-lease boundaries include the Alamo Huecos as well as the Big Hatchets, this being in extension of the Game and Fish Department recommendations. As brought out at the bottom of Page 36 of the EAR, the Alamo Huecos should be preserved for possible future bighorn reintroduction. A healthy Big Hatchets herd might extend its range to the Alamo Huecos on its own initiative. These points have been touched on in the EAR, but in addition you might add our discussion of the biological/ecological values of the combined EAR area as a means of strengthening your inclusion of the Alamo Huecos with the Big Hatchets in the no-lease area.

10-3 | In the discussion of alternatives on Pages 41 and 42, your choice of Alternative 3 could be strengthened generally if you would add points concerning conservation of the precarious water supply in the general area, already threatened by massive withdrawals by agriculture and mining, and protection of the scientific (biological/ecological) values of the EAR area.

We would like to add one concluding point with respect to the private land and the privately owned mineral rights under Federal surface ownership in the EAR area. Particularly in the Alamo Huecos and in the saddle between the ranges, activities on these lands and access to them could cause destructive impacts which could virtually nullify BLM policy under Alternative 3. Specifically, we are concerned about the Cairn Hills, where numerous movements by the sheep to mineral licks there have been documented. (See top of Page 3 of Sandoval/Bavin memorandum attached to the EAR.) The Cairn Hills are surrounded by non-Federal lands.

We urge the BLM to make a strong effort to control access to these lands as well as surface damage and wildlife harassment affecting Federal surface where mineral rights are privately owned.

Sincerely



Henry M Zeller
Secretary

Working Record of Comments

- 10-1 The vegetative section of the environmental assessment has been revised.
- 10-2 Other threatened or endangered species are protected by prohibiting off-road vehicle activities in riparian and psuedo-riparian areas (mitigation measure 3 and 5). It is difficult to deny oil & gas leases on the basis of unknown resources.
- 10-3 The exact effects of drilling and production on the water supply is unknown at this time. USGS prepares an environmental assessment when an application to drill is made. At that time, the impacts to water will be better known.

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

DEPARTMENT OF FISHERY AND WILDLIFE SCIENCES
Box 4901/Las Cruces, New Mexico 88003
Telephone (505) 646-1544



June 20, 1980

Mr. Dan Rathbun, District Manager
Bureau of Land Management
1705 North Valley Drive
Las Cruces, NM 88001

Dear Mr. Rathbun:

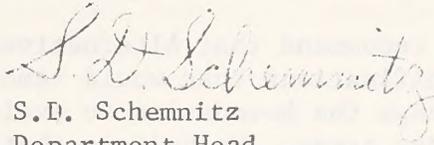
I have read your Draft Environmental Assessment on Oil and Gas Leasing Big Hatchets with interest. Overall, the report seems to be thorough and comprehensive.

My comments are based on 4 years of intensive desert bighorn research in the Big Hatchet Mountains from 1976-1979 by two graduate students under my direction. It was apparent that the native sheep population was extremely wary and difficult to observe. Our sheep observations were expedited by the use of radio telemetry. Our studies substantiated literature cited on p. 37-38. The sheep occupy a very isolated portion of the mountain away from man's impact.

Any oil exploration and drilling directly on the mountain would adversely impact the bighorns. A buffer strip of 1-2 miles from the base of the mountain would allow oil and gas activity and not disturb the bighorns. Of the alternatives listed, Alternative 3 most closely approximates this situation.

Desert bighorns have declined to a precariously low level in New Mexico. Every effort should be made to safeguard our two remnant populations while allowing energy exploration and development.

Sincerely yours,


S.D. Schemnitz
Department Head

SDS/nj

555 17th Street
Denver, Colorado 80202
Telephone 303 575 7577

J. R. Mitchell
Public Lands Coordinator



June 20, 1980

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

RE: Environmental Assessment Pertaining to Oil and Gas
Leasing Policy in the Big Hatchet-Alamo Hueco Mountain Area

Dear Mr. Rathbun:

Atlantic Richfield Company appreciates the opportunity to comment on the Bureau of Land Management (BLM) Draft Environmental Assessment pertaining to development of an oil and gas leasing policy in the Big Hatchet - Alamo Hueco Mountain Area. These comments supplement our oral testimony presented at the Alamogordo and Las Cruces, New Mexico meetings and our pre-environmental assessment letter dated March 19, 1980. Our general comments are presented in the following paragraphs and our specific comments are attached.

Atlantic Richfield supports reasonable measures that are required to protect the environment and wildlife. Additionally, we agree with the BLM's concept that the Desert Big Horn sheep herd should have a refuge and be protected to help encourage expansion of the herd. However, we do not believe that the large amount of wilderness proposed in the Draft Assessment is needed for such a small herd of sheep. The Alamo Hueco and the U-Bar Ridge areas are not ordinarily used by the herd. Since these areas have significant hydrocarbon potential, we strongly urge that they be excluded from the wilderness area.

We recommend that Alternative 3 be adopted by the BLM, with modifications that would remove the buffer zone requirement and change the boundaries to exclude the Alamo Hueco and the U-Bar Ridge areas. We believe that this modified area would provide ample refuge for the sheep herd. Alternative 3 would also provide an acceptable balance between the oil and gas potential of the area and the area's wildlife needs.

In summary, Atlantic Richfield believes that oil and gas activities can be, and have been, conducted in harmony with the environment. Further, we support wildlife protection programs that are in reasonable balance with other activities such as oil and gas operations. Moreover, we believe that this balance can be achieved in the Big Hatchet - Alamo Hueco Mountain Area

Mr. Daniel C. B. Rathbun

RE: Environmental Assessment Pertaining to Oil and Gas
Leasing Policy in the Big Hatchet-Alamo Hueco Mountain Area

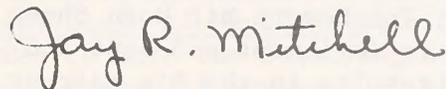
June 20, 1980

Page 2

by adopting Alternative 3 together with our recommended modifications.

Again, we appreciate the opportunity to provide our comments to the BLM on this issue.

Sincerely,



J. R. Mitchell

JRM/bbf

Attachment

ATLANTIC RICHFIELD COMPANY SPECIFIC COMMENTS CONCERNING THE
BUREAU OF LAND MANAGEMENT - DRAFT ENVIRONMENTAL ASSESSMENT
OIL AND GAS LEASING IN THE BIG HATCHET AND ALAMO HUECO MOUNTAINS

We recommend that Alternative 3 as described on Page 42 of the assessment, with certain modifications, be selected as the preferred plan for the area and be implemented by the BLM. The modifications we recommend include changing the outline of the wilderness area (see recommended boundaries on attached map) to exclude the Alamo Hueco Mountain and the U-Bar Ridge and removing the buffer zone requirement to allow leasing and other oil and gas activities.

Our justification for this recommendation is based on the following:

- a) This area has the potential to provide additional domestic hydrocarbon supplies which will serve to displace imports.
- b) As described in the draft report, The Desert Big Horn Sheep Reintroduction Program took eight years to implement and cost \$662,000 plus extensive volunteer effort. The results in the Big Hatchet area were unfavorable since the herd experienced a decline to fourteen sheep from twenty-five initially present. Their numbers were supplemented by additional foreign sheep, making a net zero increase for the entire effort. These efforts have further disturbed the natural process of the herd by disrupting the unique gene pool that the Big Hatchet herd represented. This experience leads us to believe that the chance for a significant increase in the herd size is remote. Therefore, it appears unnecessary to provide an avenue for the overflow of sheep in the Alamo Huecos. The Alamo Huecos area appears to have been rarely, if ever, used by the sheep and certainly is not a prime requirement for the remaining twenty-five sheep. Even in the Big Hatchet Mountain area the sheep generally occupy only a few square miles at the southern end of the mountain. At a time when their numbers were much larger, they apparently only occupied the southern one-third of the mountain.

Further, the occasional sightings of sheep on the U-Bar Ridge does not justify its inclusion in the wilderness area. The herd's movements to the extreme limits of its range, including the Cairn Hills, has exposed them to predation by mountain lions and has resulted in the loss of lambs. If the State Game and Fish Department is successful in its efforts to protect mountain lions and increase their numbers, this will become an increasing problem for the sheep. These two conflicting programs are significant, with respect to the sheep, since one mountain lion can consume sixty sheep in the course of a year. These conflicting programs also point out the serious challenges facing effort to reach a reasonable, balanced land management program.

- c) We wish to make the following comments on the section entitled, "Impacts of Oil and Gas Development on Wildlife", starting on Page 38. As stated in Part (a), the Big Horn sheep rarely depart from their traditional area.
- d) Further, Part (b) on Page 38 indicates that the sheep have failed in the past to extend their range. Since this is the case, there

11-6 | does not appear to be any reason for them to be expected to take up residence in the Alamo Huecos and U-Bar Ridge areas. Therefore, the Alamo Huecos and U-Bar Ridge should be excluded from wilderness consideration.

Part (c) on Page 38 pertains to the sheep's use of their historic range and man's impact on their activities. Under normal circumstances drilling crews operate in a very limited area and they would be very unlikely to impact the sheep's activities. As stated on Page 32, the sheep are only rarely seen on the slopes of the mountain and would have no difficulty in maintaining a position out of the line of sight of oil and gas activities.

11-7 | d) | Regarding the section entitled, "Impacts on Wildlife Species for Each Stage of Development - Geophysical Exploration", Page 40, we wish to make the following observations. The New Mexico Game and Fish report of movement of sheep in response to geophysical activity is a recent and highly questionable development. Mr. Bavin, of the New Mexico Department of Game and Fish, reported to ARCO representatives in March, 1980, that his observations spanning six months of seismic activity in the area revealed that the sheep had no concern for such activities. Further, during a recent meeting with New Mexico Game and Fish personnel and an ARCO representative at Santa Fe, New Mexico, in which seismic activity was discussed, it was recognized that there had been no adverse effects from seismic activity.

11-8 | e) | The extensive road system in the valley between the Alamo Huecos and the Big Hatchet Mountains is inconsistent with the wilderness classification of this area.

Working Record of Comments

11-1 The \$662,000 was expanded for the desert bighorn reintroduction program. This is a state-wide program to reintroduce desert bighorn in historic use areas. The Big Hatchets are only part of the program. The Alamo Hueco was an important historical use area for the sheep, and will probably be the next reintroduction area, not an overflow area (comment 2).

Historic records indicate desert bighorn sheep occupied the entire Big Hatchet, Alamo Hueco, Dog Mountain area.

11-2 The number of sheep in the Big Hatchets has increased to 29 (see the desert bighorn update). One important reason for introducing sheep in the Big Hatchets was to increase the gene pool, to strengthen the herd. Introduced sheep have altered the traditional home range of the indigenous herd (page 36 of the draft).

11-3 Refer to 11-1

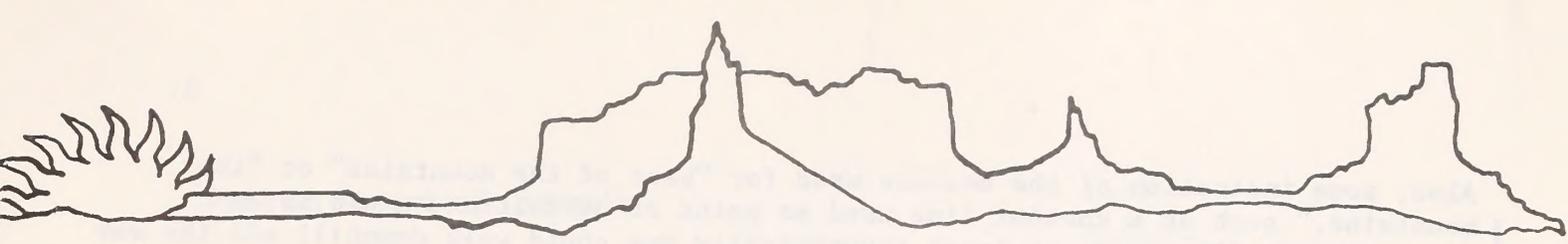
11-4 To our knowledge, NMG&F has never expressed interest in increasing mountain lion numbers in the Big Hatchets or Alamo Huecos. This was confirmed in a telephone conversation with NMG&F. The only big game hunting allowed in the Big Hatchets is mountain lion and javelina.

11-5 Refer to 11-1

11-6 Refer to Comment 3-1. The area between the Alamo Hueco and the Big Hatchets is not now proposed as a Wilderness Study Area.

11-7 We have no response from NMG&F concerning this comment.

11-8 Refer to 11-6.



THE RIO GRANDE CHAPTER OF THE SIERRA CLUB

338 East De Vargas, Santa Fe, NM 87501

June 23, 1980

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

Dear Dan:

We appreciate the opportunity to comment on the draft Environmental Assessment report prepared by your office May 1980 regarding proposed oil and gas leasing in the Big Hatchets and Alamo Hueco Mountains.

Commendations on the thoroughness of the EAR and the unusually extensive documentation.

The relatively uniform and consistent recommendations as quoted in the report from the various governmental agencies and other organizations which could be expected to voice concern for protection of critical habitat for the desert bighorn and for other important resources of the area was impressive. Also impressive was the uniform disregard for these wildlife resources as expressed by those whose interest is clearly vested. But at least one could enjoy a chuckle or two at the attempted analogy by lease-holder Ida Lee Anderson between the fish allegedly swarming around drilling platforms in offshore waters and the implication that desert bighorn will nuzzle up to drilling rigs in the Big Hatchets. Perhaps you should give some consideration to enhancing their feeding grounds by planting roses and installing swimming pools . . .

On a more serious note: The BLM's preferred alternative #3, while addressing the need for protection of bighorn habitat and other special resource values, falls short of the recommendations of reputable professionals. While the Department of Game and Fish (Memo to Welch & Snyder, 2/6/80) suggests no intrusions or surface disturbances allowed within two miles of the mountain range proper and no leases at all within one mile of the mountain, the BLM proposal specifies "no leasing allowed within one to one-and-one-half miles of the mountains, and a one-half mile buffer zone with no surface occupancy." Thus surface disturbance could be expected at some points one-half mile closer to critical habitat areas than recommended by professionals quoted in the study.

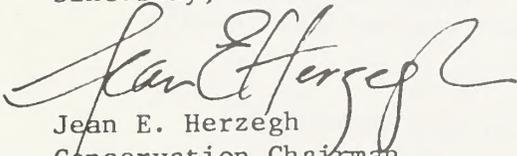
Further, examination of the map and proposed boundaries reveals discrepancies with even the BLM's stated boundary limitations: see the northwestern Big Hatchets boundary and surface occupancy area, which would permit disturbance as close as one-half mile from the mountain.

12-2 | Also, some indication of the measure used for "base of the mountains" or "the mountains," such as a contour line used as point of definition, would be an important clarification; at least theoretically one could walk downhill all the way from the Big Hatchets to Corpus Christi, Texas!

12-3 | A basic concern of ours is, of course, the Wilderness Study Area designation proposed for these two areas. Since these boundary lines were drawn up by the BLM with regard not only to the bighorn habitat but also to the outstanding wilderness and other wildlife resource characteristics of the areas, we strongly believe that in no case should leasing (even without surface occupancy) be allowed at any point within the proposed WSA boundaries. Corrections should be made, for instance, in the boundary lines in the northeastern Big Hatchets and also in the area due west of Fossil Mountain leading to the Robertson Ranch area.

We hope the problems addressed herein will be resolved satisfactorily in your final decision.

Sincerely,



Jean E. Herzegh
Conservation Chairman
Rio Grande Chapter Executive Committee

Working Record of Comments

- 12-1 The boundary was expanded on the eastern side (T. 31 S., R. 14 W., W $\frac{1}{2}$ Section 26, 36 NMPM) of the Big Hatchets (refer to Modifications/Corrections section).
- 12-2 No contour line will be used as a point of definition, because a legal description must be written for the boundary. Basing a legal description on a contour line is complex and impractical to manage.
- 12-3 Refer to Comment 3-1.

Route 3, Box 115-D
Las Cruces, NM 88001
23 June 1980

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

Dear Mr. Rathbun:

Now come the energy companies to the Big Hatchet-Alamo Hueco area. We are running out of oil, their experts say, so we must cut the earth in half like an orange to squeeze out every last drop. According to their peculiar philosophy we must use up all of our energy resources before they run dry.

A four-legged expert. There is a dispute among the doctors. Another expert has testified. The Big Hatchet-Alamo Hueco area offers outstanding opportunities for solitude and ought not to be disturbed. I know because a bighorn sheep told me so — and he is one of the world's foremost authorities on opportunities for solitude. He did not communicate this information to me in so many words, for he has little truck with us flatlanders. His mere presence in these mountains is his irrefutable testimony; the most austere anchorite should feel at home in bighorn country.

A nervous tenant. The Mexican bighorn sheep has a delicate psyche. Only with great difficulty does he adapt himself to a new environment. Even so, study has shown that he will leave his traditional home when there is a relatively small intrusion of the two-legged mammals who inhabit so much of our planet. When he does leave his historic residence, his chances for survival diminish drastically.

A fragile habitat. The ecological balance of the Big Hatchet-Alamo Hueco range is almost as delicate as the psyche of its edgy tenant. There are no perennial streams in the area and in the Big Hatchets there are no springs. The annual rainfall is nine inches; the annual rate of evaporation is about ten times that much. Any activity which would induce erosion or would damage or pollute the aquifers would destroy the area and the bighorn with it.

Co-tenants. The bighorns, of course, are not the only wildlife in Big Hatchet-Alamo Hueco. More than 200 species of birds, reptiles, mammals and amphibians have been observed. Some of them are on Federal and State endangered species lists, as is some of the plantlife in the area. Cattle graze the mountains too. I emphasize the Mexican bighorn because so much time, talent and money have been spent to preserve the herd.

The investment. At the turn of the century Mexican bighorns were numerous in these mountains. Now there are only 2000 in all of the United States, and of the 100 in New Mexico 75% are captives held in paddocks. From 1972 to 1980 the New Mexico Department of Game and Fish and the Federal Government have spent \$662,000 on the desert bighorn reintroduction program. Three private organizations donated a total of \$16,000 and other groups have contributed. College students volunteered 1350 hours of their time. In the effort to control the bighorn scabies epidemic Tim Wallace, a dedicated New Zealander — at his own expense — came to New Mexico with helicopters, pilots, special knowledge, unique equipment and hair-raising flying skills. Army personnel at White Sands helped. There has been a tremendous outpouring of time, money and love in behalf of the bighorn. This investment cannot be risked on the grand promises of profit seekers.

Trickled to death. If the entire history of oil exploration and production had taken place in southwestern New Mexico, the whaling fleet would be in business still. Holes in the ground abound, but little petroleum comes out of them. Why perforate and scar our lovely desert country when all experience warns us that we may not find enough oil to fuel and lubricate the exploration equipment?

A forgotten multiple use. There are valuable resources under the surface of public lands in the United States. Maybe there is oil under the Big Hatchets. Oil is a finite resource whose finitude has become painfully apparent. When such a condition arises, we ought to be creating a reserve. Moreover, where petroleum is found, there usually is helium, another finite resource. Today oil producers blow off helium much as they once flared off natural gas. Twenty-five years hence our energy program may need helium worse than it ever needed more petroleum. Current research indicates that helium will be the critical ingredient in no-loss electrical transmission, super-efficient electrical generation, storage of electrical energy and fusion power. All of which brings to mind a forgotten facet of the multiple use concept: a storage place for conserving subsurface resources.

Public lands as resource stockpiles. We are talking about oil and gas leases, so let us put our minds to petroleum reserves. First of all there is no oil crisis; there is only a failure of supply to meet demand. If truly there were a crisis, we should be aping our Brazilian neighbors; Brazil imports only alcohol burning automobiles from the United States and is growing thousands of acres of sugar cane to provide fuel. What we should be doing now is curbing demand and accumulating a reserve to get us by until technology finds a substitute for the dwindling resource. There is no better place to store the reserve than under the public lands where they now lie.

Life on top of a stockpile. The nice part about using public lands as a stockpile for resources is that other uses of public lands may continue simultaneously and without impairment. No storage facilities need be built. There is no problem or expense in moving resources to the stockpile. No pollution is generated. Even radioactive minerals locked in the earth keep their lethal fists in their pockets. Water resources remain intact and undepleted by the stockpile. On the roof of a natural underground warehouse dumb cows can pause in their grazing to ruminate upon dumber hikers carrying

fifty-pound packs up a steep trail. There will be no noisy oil production equipment or roughnecks to disturb the nervous bighorns. Sleeping resources will not leave tire tracks, will not cause erosion and will not require reclamation programs.

Who's in charge? Buried resources are no comfort to anyone until they have been located and identified. Oil men will be unwilling to explore unless they can get dibs on the resources. Where circumstances are such that resources can be extracted or harvested without destroying some greater public benefit, exploration and exploitation can be carried through leasing and commercial development as in the past. In a case such as the Big Hatchet-Alamo Hueco lands — where a fragile ecosystem and a costly wildlife asset are in jeopardy — probing for resources should be accomplished by the custodial agency itself; by a cooperating agency such as the U.S. Geological Survey; or by a private exploration contractor using environmentally safe techniques under the strictest supervision of the custodial agency. Those who might call this Big Government interference in the free enterprise system should keep in mind that public land assets belong not to a company of stockholders but to the citizens for whom the Government acts.

Local economics. If new leases are not granted in Big Hatchet-Alamo Hueco, residents of Hachita will lose the few dollars they might have gathered over the next few years from exploration and production. On the other hand, they will be spared the boom and bust economy that has given us Madrid, Chloride and Mosollon. Who wants to be mayor of a ghost town?

Alamo Hueco (030-038). A peek at the many-fingered pattern of the Alamo-Hueco public lands does not suggest that they would make a good wilderness area. However, there are 12,500 acres here. These lands possess all the characteristics of the Big Hatchets including bighorn habitat. The mountains are beautiful and their geological formations are unique. There are extraordinary petroglyphs, among them the only known depiction of a buffalo in southern New Mexico. The imprint of man is minor and easily corrected.

Maintained roads. M. T. Everhart, grazing permittee and owner of the Hatchet Ranch, says he needs and has maintained several primitive ways in the Big Hatchets. The route through Sheridan Canyon has a special significance because its designation as a permanent road would divide NM 030-035 into two WSA's. I have traveled over this route in a BLM vehicle. My eye and my posterior tell me that it has not been maintained in a sense that would make a road. Some of it is no more than tracks in an arroyo bottom. Mr. Everhart, the BLM and environmentalists will have no problem if access to wilderness areas by permittees is defined in the language of BLM's December 1979 IMP or that of House Report 96-617, 11-14-79 (on Colorado RARE-II lands).

The northeast corner of NM 030-035. In my original Big Hatchet wilderness recommendations I included some more-or-less flat country in the northeast corner of NM 030-035. BLM eliminated this from the WSA. I think it should be restored because it is part of the whole Big Hatchet system. It has esthetic and scientific values of its own. Vehicle routes show some signs

of regular maintenance, but if the access language suggested in the preceding paragraph is used, the roads could be shut off to the public with no hardship to the permittee.

Restricted recreational use. Because bighorn sheep will tolerate only a limited number of visitor days (500-900 annually), I suggest that use of the Big Hatchet-Alamo Hueco area by hikers and backpackers be more severely restricted than is required by wilderness designation alone. This can be accomplished by a monitoring system similar to that used by the Forest Service: a birdhouse-like box on a post at each entrance point with pads for recreational users to register the fact of their entrance and the duration of their stay. When the visitor-day count approaches a threatening number, recreational use should be suspended for an appropriate period.

The leasing alternatives. Of the four leasing alternatives listed in the May 1980 Draft Environmental Assessment of oil and gas leasing in the Big Hachets and Alamo Hueco Mountains, I feel that No. 1 — the "no action" alternative — is the only one which these mountains, their flora and their fauna can live with. It is frightening enough to think what will happen as the holders of existing leases pursue their business. It is impossible to imagine that bighorns will co-exist with a multiplication of exploratory disturbances, thumping drills, clanking pipes, day and night operations, bright lights, road construction, vehicular traffic, off-road vehicle use, on-site crews, rigs, tanks and other structures even if the water supply and forage survive the onslaught. Even the most conscientious operator would have a difficult time running an environmentally compatible show. By now many residents of New Mexico's uranium belt are aware that conscientious operators are rare birds among the big energy companies.

Sincerely



Edward B. Burns

New Mexico Wilderness Study Committee

PACIFIC WESTERN
U-
LAND COMPANY

P.O. BOX 188 - GILA, NEW MEXICO 88038 - (505) 535-2811

June 23, 1980

District Manager
Bureau of Land Management
District Office
P. O. Box 420
Las Cruces, New Mexico 88001

Dear Sir:

This responds to your invitation for comments on the environmental assessment concerning oil and gas leasing in the Big Hatchets-Alamo Hueco area of Southwestern Hidalgo County, New Mexico. Pacific Western Land and Cattle Company is in the agriculture and livestock business. We own and lease substantial areas of land in the region covered by this environmental assessment. Therefore, our interest in the assessment arises both from our concern about the natural environment of the area and our concern with having sufficient quantities of fuel at reasonable prices in the United States to allow our business and other businesses to operate.

We have reviewed the comments on the proposed oil and gas leasing program and find many of those comments to be typical of those consistently received from environmental advocacy groups and wildlife professionals. It is somewhat understandable that these environmental groups and professionals espouse their narrow perspectives because their function is seen to be as advocates of wildlife protection with little or no regard to the resource production needs of the United States. The serious responsibility held by your office is to weigh the merits of their positions with the critical need for domestic oil development and to reach an objective decision which is in the best overall interest of the United States.

13-1 | We are impressed by the speculative nature of the comments and the discussion in the environmental analysis on the effects of oil and gas exploration and development in this area. The statements are to the effect that these activities "may", or "might" be detrimental to the bighorn sheep at uncertain distances from the activity. In contrast to these uncertainties is the certainty that our nation needs additional oil and gas production. In weighing the merit of comments

13-2

and recommendations made by persons concerned predominately with protecting the bighorn sheep, it should be considered that those recommendations are based upon the views of the commentators of what would be the ideal, approaching a no-risk or the least possible risk alternative, with respect to protection of the sheep.

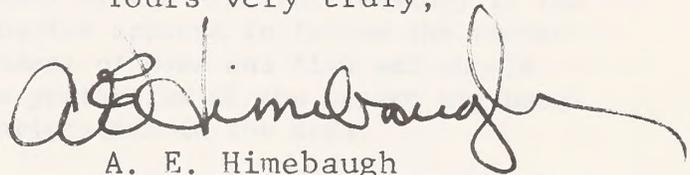
13-3

A serious defect we see in the draft analysis is the failure to consider the cumulative impact on our nation's oil and gas producing capability caused by the many withdrawals of public land from leasing of which this action being considered is only one. The Council on Environmental Quality's regulations require these cumulative impacts to be considered. (40 C.F.R. 1508.7).

We favor alternative 2, allowing the entire area to be leased. We believe that sufficient safeguards can be provided for the sheep by proper scheduling of the operations in certain areas and for certain times of the year. This would reduce the impact on wildlife while still allowing the entire area to realize its full productive potential.

We appreciate the opportunity to make these comments and urge your serious consideration of them.

Yours very truly,



A. E. Himebaugh
Vice President

AEH:ajs

cc: BHO
KCB
JTT

Working Record of Comments

13-1 Refer to Finding of No Significant Impact

13-2 Refer to Comment 2-1

13-3 Examining the cumulative impact on our nation's oil and gas producing capability is beyond the scope of this environmental assessment. There is no guarantee oil or gas will be found. It would be nearly impossible to analyze an unknown oil and gas reserve's cumulative impact on the nation's energy supply.



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.

June 24, 1980

Memorandum

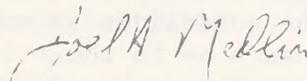
To: District Manager, Bureau of Land Management,
Las Cruces, New Mexico

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

Subject: Environmental Assessment concerning oil and gas leasing
in the Big Hatchet and Alamo Hueco Mountains, Hidalgo
County, New Mexico (response to your letter of May 20,
1980) (BLM)

Upon review of the subject Environmental Assessment, we concur with your findings that Alternative 3, Open Part of the Area for Leasing, is the preferred alternative. This Alternative appears to follow the recommendations of the New Mexico Department of Game and Fish and should provide adequate safeguards for the protection of the desert big horn sheep while allowing oil and gas exploration in the area.

Thank you for the opportunity to comment on this oil and gas leasing activity. We look forward to continued involvement in your land management planning activities.


Joel A. Medlin

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





STATE OF NEW MEXICO
DEPARTMENT OF
FINANCE AND ADMINISTRATION
PLANNING DIVISION

BRUCE KING
GOVERNOR

DAVID W. KING
SECRETARY

ANITA HISENBERG
DIRECTOR

505 DDN GASPAR AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-2073
(505) 827-5191

June 25, 1980

Mr. Daniel C.B. Rathbun, District Manager
BLM, District Office
P.O. Box 1420
Las Cruces, New Mexico 88001

Dear Mr. Rathbun:

This is in response to your invitation for comments on the draft copy of the Environmental Assessment for Oil and Gas leasing in the Big Hatchet - Alamo Hueco Mountains.

At this stage, it appears that there is sufficient data to claim that any development or human activity in this area is going to have a negative impact on the Desert Bighorn. This, in addition to the present condition of the herd and to the status of the Desert Bighorn on the North American Continent, makes for a strong argument in support of the sheep in the Big Hatchet-Alamo Hueco Region.

If any oil and gas leasing is to occur, I believe that it should follow the guidelines as suggested by the Game and Fish Department such as in their recommendations as to boundaries.

I would also suggest that you contact the State Historic Preservation Bureau so as to determine more definitely the cultural resources of the area.

Please keep us informed on all updates of this proposal.

Sincerely,

Betsy Reed

Betsy Reed
Planner

BR:bc



STATE OF NEW MEXICO

OFFICE OF THE GOVERNOR

SANTA FE

87503

BRUCE KING
GOVERNOR

June 27, 1980

Mr. Daniel B. Rathbun, District Manager
United States Department of the Interior
Bureau of Land Management
P.O. Box 1420
Las Cruces, NM 88001

Dear Mr. Rathbun:

After reviewing your environmental assessment concerning oil and gas leasing in the Big Hachet-Alamo Hueco-Sierra Rica Mountain complex in Hidalgo County, I am convinced that there is a fundamental disagreement as to the impact of energy exploration on the continued existence of the Desert Bighorn sheep in New Mexico. Several facts stand out in relation to this disagreement. One is that this sheep is clearly in great jeopardy in our state and that preservation and protection of this animal is in order. Another fact is that we have a serious national crisis in supplying adequate energy for our country. Continued development of New Mexico's energy supplies is necessary if we are to assist in meeting our nation's requirements. As Governor, it is my responsibility to be sure that we are doing all we can to succeed in this goal. It is also a fact that extensive oil and gas leases already exist on state lands within the region for which this environmental assessment is being made. To date it appears that no actual development of oil or gas wells has been initiated.

14-1 | The wildlife values of the Big Hachet-Alamo Hueco-Sierra Rica Mountains complex appear to hinge principally on the remoteness of the region from human habitation and wilderness designation would seem to principally be of assistance in management of the Desert Bighorn sheep herd. I am not convinced that such a designation is the appropriate one for this particular area.

However, in considering all of these various factors and especially in view of the precarious status of the Desert Bighorn sheep in New Mexico, we feel that priority consideration must be given to them.

Mr. Daniel B. Rathbun
June 27, 1980
Page 2

14-2

I would suggest that a careful review of this situation be made on an annual basis. I expect that a thorough evaluation procedure and specific time frame will be developed by your agency to consider the merits and demerits of mineral development activities in this area. It is most important that a realistic plan be initiated so that it is clear to the public that you are considering a full range of factors in managing this important area.

It is important that management objectives are being met in regard to preservation of the Desert Bighorn sheep, and at the same time, that unrealistic obstacles are not being placed in the way of those who are engaged in furthering our energy supplies.

It is regrettable that such conflicts as this one have to arise, but I believe we can meet this challenge. We must, if we are to succeed in being wise stewards of New Mexico's lands. If you have further questions in regard to my views on this sensitive subject, please contact this office.

Sincerely,



BRUCE KING
Governor

Working Record of Comments

14-1 Refer to comment 3-1.

14-2 Refer to mitigation measure 1 and the Finding of No Significant Impact.

Howard E. Rothrock
Consultant

June 30, 1980

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

Dear Mr. Rathbun:

I appreciate the opportunity of commenting on the question of oil and gas leasing in the Big Hatchet - Alamo Hueco area of southwestern Hidalgo County, New Mexico, as suggested in your letter of May 20, 1980, and graciously extended by phone June 27, 1980.

I object to the proposal to forbid leasing public lands in Hidalgo County, New Mexico, because:

- A) Such a proposal is inimical to the best interests of the majority of United States citizens for the following reasons:
1. it would prevent exploration for petroleum -- a vital source of energy;
 2. it could delay the reduction of our dependence on foreign sources of petroleum;
 3. it could stimulate the rising cost of petroleum products -- synthetics as well as fuels;
 4. it could contribute to our unfavorable balance of trade.

I contend that these considerations are overwhelmingly paramount as compared with encroachment of roads or possible detriment to wildlife, both of which are temporary and can be corrected after development has taken place.

I will be glad to elaborate on this conclusion if necessary.

Yours truly,


Howard E. Rothrock
Consulting Geologist

HER:bhc

xc: Messrs. K. C. Bennett
Fred Peel



June 30, 1980

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

Dear Mr. Rathbun:

Lloyd Zeman, Executive Director of the Foundation for North American Wild Sheep, was kind enough to send us a copy of his June 12, 1980, letter to you concerning the proposal for oil and gas exploration in the Big Hatchet and Alamo Hueco Mountains.

I wanted to write to you, on behalf of our 52,000 members throughout the United States, to request that you give every consideration to the recommendation set forth in Lloyd's above letter and his urging that you folks select alternative one (1).

While we here at NAHC Headquarters are certainly concerned about the nation's aims at developing a lesser reliance on the vagaries of OPEC, we certainly do agree with the Foundation for North American Wild Sheep that nothing be done to jeopardize the continued existence of an endangered species such as the Mexican bighorn.

May we hear from you as to your decision so that we might inform our membership?

Thank you in advance for your consideration, Mr. Rathbun.

Sincerely,

Paul S. Burke, Jr.
President

PSB/dkp

Rodney D. Jones
BMEWS Box 1226
APO, New York, 09023

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

Gentlemen,

I am writing this letter, mainly out of concern for the safety and good management of the Big Hatchet-Alamo Huecho Desert Bighorn herd.

I do not pretend to be an environmentalist, or a conservationist for that matter, and where petroleum resources are involved, I would rather see the oil companies have all that they want, this would in effect solve the basic problems.

But today, the problem is how to let the major oil companies have the oil without raping the wilderness areas of the land. These wild places must be preserved. There can be no moving of the herd, there can be no interference with their habitat. I honestly believe that whatever small amount of oil that can be produced in the area in question will have no bearing whatsoever on the energy problems of the nation today.

The oil companies are becoming more environment minded, this is true, but they are still business people, and they have not PROVEN that they are genuinely dedicated to the protection of the safety of the wildlife in the areas that they develop.

What I say, I say because of big business' attitudes towards the legalities of the land, law is enforced, by and large, when it is economically worthwhile. The government might detail five good lawyers to a case, prosecuting an offending business or corporation, that corporation, in turn, will hire fifty lawyers to prove their good intentions and stall the legal gears until the case is dismissed.

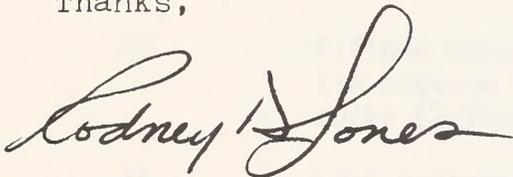
The other suggested alternative, moving the herd. Forget it, it will not work without fatalities, there has never been any sort of a capture-transfer scheme that did not involve loss of life on the part of the animals involved. Not one un-natural loss can be considered acceptable.

The people of the nation own the land, the Bureau of Land Management is RESPONSIBLE for seeing that it is maintained for it's intended purpose.

The Hatchet Mountains were set aside mainly as a wildlife refuge and to me a wildlife refuge is a sanctuary, a church if you will, let us leave God's home for His creations, as they are, wild and free.

We really do not need the oil that is not even known to exist there, why ruin a good thing looking for it?

Thanks,



Rodney Jones
citizen, Lordsburg, N.M.
landowner, Hidalgo & Luna counties.

Thule, Greenland
June 27, 1980

Part 2 of the final Environmental Assessment contains revisions made to the draft. Minor changes are incorporated into an Errata section below. Following that errata sheet are significant changes which should be added to the appropriate sections.

ERRATA

The following corrections should be made in the draft assessment.

<u>Page</u>	<u>Correction</u>
2	Interested public <u>were</u> contacted by letter before this Environmental Assessment was prepared to determine the major issues and possible alternatives.
4	Maintain the no lease policy within the boundary identified in the <u>Environmental Analysis Record</u> prepared in 1973 (EAR# 30-030-73-3).
16	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. (extra were declared should be omitted).
22	Wildcat drilling <u>could</u> alter the ground water hydrology by fracturing impermeable zones below aquifers, allowing water to be lost or reduced through vertical drainage. (can should be omitted)
22	Fifteen thousand feet of Paleozoic and <u>Cretaceous</u> marine beds lie between Precambrian granite and <u>Cretaceous non-marine</u> rocks (Zeller 1970).
24	Last sentence on the page should be removed.
28	2. Coatimundi (<u>Nasua narica molaris</u>), NMII
31	There are two mountain sheep subspecies in New Mexico (<u>and species is omitted</u>). The subspecies in the Big Hatchets is the Mexican desert bighorn sheep (<u>Ovis canadensis mexicana</u>). There are other herds of Rocky Mountain Bighorn (<u>Ovis canadensis canadensis</u>) in New Mexico (Sandias, Manzano Mountain, Gila National Forest and Pecos Wilderness).
32	Lanny Wilson (the former BLM State Wildlife Biologist) reported in his letter that he followed <u>a</u> ewe and lamb from Sheridan Canyon, in the Big Hatchets, to <u>the</u> Alamo-Hueco Mountains.
42	The recent salvage operation in the San <u>Andres</u> cost about \$85,000.

- 51 The Wilderness Study Area would be managed as Visual Resource Management (VRM) Class I, areas outside the WSA would be managed as a VRM Class II (Table 5 defines visual classes), is amended to read: The entire area, 111,500 acres, will be managed as a VRM Class II area.
- A-4 T. 31 S., R. 15 W., NMPM, Subtotal 19,651.36 is amended to 19,011.36.
- A-7 T. 34 S., R. 14 W., NMPM, Subtotal 440.00 is amended to 921.72
- A-7 Grand Total 78,504.05 is amended to 77,864.05
- A-16 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 suitability for preservation as wilderness.
- third Dawson Geophysical Company letter to BLM, page two is printed letter before page one.

SIGNIFICANT CHANGES

I. Introduction

C. Alternatives, page 4 - Revised Boundaries for Alternative 3

Revised boundaries for Alternative 3 are shown on map 1 (located in the rear pocket). Boundary adjustments were made as a result of public input. The area deleted from the no lease boundary has significant oil and gas potential. This is evidenced by Humble Well No. 1 state BA, which had a show of gas. The well was located within the no lease area outlined in the draft assessment (refer to New Mexico Oil and Gas Association page 25). The deleted area is not intensively used by the sheep and has existing roads, stock tanks, and wells. The area has potential as a Big Hatchets-Alamo Hueco migration route, but this would be after sheep are introduced in the Alamo Hueco's. Present migration routes appear to be further east near Cairn Hills (page 32 of the draft and Lanny Wilson's letter). The boundary change is consistent with NMG&F recommendations.

An area on the eastern side (T. 31 S., R. 14 W., W $\frac{1}{2}$ section 26 and 35 NMPM) of the Big Hatchets was included as a no surface occupancy area to keep the map boundary consistent with the boundary description in the narrative (no leasing allowed within 1 to 1 $\frac{1}{2}$ miles of the mountain). The no lease boundary in the north and eastern part of the Big Hatchets was not enlarged, because lands outside the alternative one boundary are primarily private or state land (refer to Rio Grande Chapter of the Sierra Club comments page 40).

II. Existing Environment and Impact Analysis

C. Soils and Vegetation - page 17

The Alamo Huecos have an extensive area of perennial grassland which is dominated by grama grasses in the central and higher portions of the range. There are also desert shrub areas in which Arizona oak is the most common with some mountain mahogany, shrub oak, little leaf sumac, spicebush, Morman tea, and turpentine bush; grasses include grama, three awn, squirrel tail, and dropseed. (Sandoval, 1979)

Areas at the base of the Alamo Huecos are similar to creosote and mesquite areas in the Big Hatchets (Hayward et al, 1977).

E. Geology - page 22

The Hidalgo Basin and range area which includes the Big Hatchets is part of the overthrust belt of western United States and Canada. Recent discoveries of hydrocarbons in northern Utah and western Wyoming within the belt has created interest in other portions of the belt. However, volcanics complicate the structure of the area and make it difficult to project thrusts from one area to another.

Also in southwestern New Mexico "there is a large time gap between the age of the trap and the age of the reservoir and source rocks, but in Wyoming and Utah the structural traps of the overthrust belt and the reservoir and source rocks are closer in age".

The structural complexities of the southwestern New Mexico will make oil and gas exploration more difficult than other parts of the overthrust belt. (Woodward 1980)

F. Wildlife - page 28

Three lambs were born to the indigenous herd this spring and five lambs to the introduced sheep. Presently (July, 1980) there are 29 desert bighorn sheep in the Big Hatchets. The introduced herd appears to be using the area within 3 and 4 miles of Romney Canyon. A few of the rams from the indigenous herd are now living with the introduced herd. The introduced herd is using water facilities and salt blocks, in contrast the native herd is not.

Recently (May, 1980) a remnant herd of desert bighorn has been confirmed (photos) in the Guadalupe Mountains. The exact number of the herd is not known. New Mexico Game and Fish has also received reliable reports of a desert bighorn sheep herd in the Organ Mountains (no numbers are available).

Three sheep have died at Red Rocks from a virus, and three others are missing and presumed dead. The virus hampers future reintroduction efforts.

The remaining San Andres sheep which were not captured for scabies treatment were shot with a two-piece bullet developed by 3-M Corporation. One part contained paint to mark the sheep and the other was a cellulose bullet that penetrates the skin and dissolves releasing a drug developed by Merck Pharmaceuticals. 3-M and Merck donated their equipment, materials, services, and sent representatives to help in the treatment. The treatment appears to be successful; the sheep are recovering.

Assisting in the operation were U. S. Fish and Wildlife Service, U. S. Department of Agriculture, New Mexico State University, Colorado State University, Merck Pharmaceuticals and 3-M Corporation. Game Conservation International and the Foundation for North American Sheep made donations of \$10,000 for the rescue and research effort (Crenshaw 1980).

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
26:	W $\frac{1}{2}$	320.00
27:	E $\frac{1}{2}$	320.00
34:	E $\frac{1}{2}$	320.00
35:	W $\frac{1}{2}$	320.00
	Subtotal	<u>3,040.00</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 $\frac{1}{2}$	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	10,182.76

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:	All	643.72
19:	All	644.10
20:	All	640.00
21:	NW $\frac{1}{4}$, S $\frac{1}{2}$	480.00
27:	SW $\frac{1}{4}$	160.00
28:	All	640.00
29:	All	640.00
30:	All	640.16
31:	All	635.16
33:	All	640.00
34:	All	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:	All	640.00
25:	All	640.00
	Subtotal	<u>1,760.00</u>

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

Sec. 17:	SW $\frac{1}{4}$	160.00
18:	All	640.00
19:	All	640.00
20:	All	640.00
21:	SW $\frac{1}{4}$	160.00
27:	W $\frac{1}{2}$	320.00
28:	All	640.00
29:	All	640.00
30:	All	640.00
31:	All	640.00
33:	All	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 $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	612.56
4:	All	696.16
5:	All	695.60
6:	All	725.98
7:	All	672.06
8:	All	640.00
9:	All	640.00
10:	NE $\frac{1}{4}$ 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:	All	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:	All	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:	All	640.00
18:	All	672.84
19:	All	670.48
20:	N $\frac{1}{2}$	320.00
21:	All	640.00
22:	Lots 1, 2, 3 & 4, NW $\frac{1}{4}$, 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:	All	640.00
25:	All	640.00
26:	W $\frac{1}{2}$	320.00
27:	All	640.00
28:	All	640.00
29:	All	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 $\frac{1}{2}$ W $\frac{1}{2}$, 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:	All	640.00
34:	All	640.00
35:	All	640.00
	Subtotal	<u>19,011.36</u>

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

Sec. 1:	All	640.92
12:	All	640.00
13:	All	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:	All	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:	All	639.40
7:	All	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:	All	640.00
10:	All	640.00
15:	All	640.00
17:	N $\frac{1}{2}$	320.00
18:	S $\frac{1}{2}$	320.00
19:	All	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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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 $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$	480.00
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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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>10,113.74</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 $\frac{1}{4}$ 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 $\frac{1}{4}$	320.56
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
20:	E $\frac{1}{2}$ E $\frac{1}{2}$, NW $\frac{1}{4}$ 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>

No Oil and Gas Leasing (con't)

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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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 $\frac{1}{4}$ 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 $\frac{1}{2}$ NW $\frac{1}{4}$, 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. 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 $\frac{1}{4}$ SW $\frac{1}{4}$	360.00
5:	W $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ 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 $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	400.00
9:	N $\frac{1}{2}$ N $\frac{1}{2}$, SE $\frac{1}{4}$ 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

No Oil and Gas Leasing (con't)

T. 24 S., R. 15 W., NMPM

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 $\frac{1}{4}$ SE $\frac{1}{4}$	280.00
12:	N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$	560.00
14:	SW $\frac{1}{4}$ NE $\frac{1}{4}$, W $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ 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 $\frac{1}{4}$ SE $\frac{1}{4}$, SW $\frac{1}{4}$ 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	4,659.55

Grand Total 74,508.43

* All minerals Federal

** Oil and Gas Federal

SUPPLEMENTAL COOPERATIVE AGREEMENT

BETWEEN

THE NEW MEXICO DEPARTMENT OF GAME AND FISH

AND

THE BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

I. Purpose

This is a supplement to the master cooperative agreement dated January 30, 1976 concerning implementation of the Sikes Act (88 Stat. 1369, 16 U.S.C., Sec. 670a (1976)). Established herein is the working relationship for implementation of the Desert Bighorn Sheep Restoration and Habitat Management Program on public lands in New Mexico. This supplement supersedes supplement dated April 8, 1976.

II. Authority

The Sikes Act. Public 93-452

Federal Land Policy Management Act of October 21, 1976
(90 Stat. 2744, 43 U.S.C.A. Sec. 1701 et seq. (1978 supp.)).

III. Operations

WHEREAS, the New Mexico Department of Game and Fish, hereinafter referred to as the Department, is responsible for the preservation and management of wildlife and is currently involved in a desert bighorn sheep propagation, study and restoration program,

WHEREAS, the Bureau of Land Management, hereinafter referred to as the Bureau, administers habitat in several mountain ranges with potential for reestablishment of desert bighorn sheep and/or public lands in the Big Hatchet-Alamo Hueco Mountains, which are now inhabited by desert bighorn sheep,

WHEREAS, desert bighorn sheep have been eliminated from most of their former range and there is a need for cooperative efforts to benefit and ensure the survival of this game animal on public lands in New Mexico;

NOW THEREFORE, the Department and Bureau hereby mutually agree to the following:

- A. To jointly conduct a cooperative desert bighorn sheep restoration and habitat management program on public lands in southern New Mexico.

- B. To cooperatively work to evaluate mountain ranges with potential for reestablishment of desert bighorn sheep and make associated studies of habitat conditions. Most of this work will be done by the Department under contract with funds furnished by the Bureau. The following mountain ranges will be studied to determine habitat condition and suitability. Caballos, Alamo Huecos, West Potrillos, Ladrons, Floridas, Big Hatchet and Little Hatchets.
- C. The mountain ranges specified in Item B will be considered for future release of desert bighorn sheep as the animals become available. The location for the future releases will be dependent on the habitat suitability evaluations described in Item B and the comparative value of the area for successful establishment and production of bighorns. The Department will inform the Bureau of the areas selected for reestablishment of bighorns as far ahead of the release date as possible.
- D. The Department has the approval to release 22 desert bighorn sheep in the Big Hatchet Mountains in accordance with the environmental analysis prepared by the Las Cruces District with the special mitigating measures: no mechanical road maintenance to the release site, removal of the paddock fence and water catchment and pipeline, and obtaining access from the private landowner.
- E. This supplemental release in Item D does not affect the potential releases as determined through the habitat suitability evaluation study described in Items B & C.
- F. Funding provisions for the desert bighorn sheep restoration programs will be by the Bureau through Sikes Act funding and by the Department. Current expenditures include paddock fence materials for the release and maintenance of existing watering units and a follow-up study of the bighorn sheep now existing in the Big Hatchet Mountains and those scheduled for release in October 1978.
- G. The Bureau will manage public lands in the mountain ranges selected for bighorn release through the current habitat evaluation contract (B) and the Bureau's management framework planning decision.
- H. The two agencies will work together in preparing and distributing news releases and other publicity concerning this program.
- I. To jointly prepare a comprehensive long-range plan for the desert bighorn sheep restoration and habitat management program in FY 1981.

IV. Other Provisions

A. Nothing in this agreement shall be construed as obligating either party hereto in the expenditure of funds, or for the future payment of money, in excess of appropriations authorized by law.

B. Each party agrees to meet at least once annually to review program accomplishments and develop plans for the coming year.

C. This supplemental cooperative agreement replaces the supplemental cooperative agreement signed April 8, 1976, and shall become effective when signed by the designated representatives of the parties hereto and shall remain in force until terminated by mutual agreement, or by either party upon thirty days notice in writing to the other of its intention to terminate upon a date indicated. Amendments to this memorandum may be proposed by either party and shall become effective upon approval of both parties.

NEW MEXICO DEPARTMENT OF GAME AND FISH

By *Hugh F. Olson* Date 10-30-78
Director

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

By *Arthur W. Zimmerman* Date 10/20/78
State Director

Appendix H

Geology

Meaningful and productive exploration will be very difficult because of the geological complexities related to petroleum. There are several difficulties, with related problems, that explorationists will have to face. The major ones, as seen from limited study and synthesis, are as follows:

1. The Pre-Laramide fold structures and flexes are truncated and may be overridden by Laramide thrusts, particularly along the northwestward trending Alamo Hueco shelf area. These structures, some of which may contain petroleum, are hidden under thrust plates.

2. The Early Cretaceous fold structures and flexes are mostly obliterated and hidden by the existing Basin and Range structures, as are the older Pre-Cretaceous fold structures and flexes. These structures are buried under Quaternary valley fill and Tertiary volcanic rocks. Possibly thick sections of volcanic rocks overlie important petroleum accumulations.

3. Basin and Range deformation does not appear to reflect the older structures, therefore, may not be useful as a guide to petroleum accumulations.

4. Deleterious effect of igneous intrusive rocks and volcanic vents on petroleum accumulations must be considered. These areas are: the Animas Mountains, Alamo Hueco Mountains, Little Hatchet Mountains, (just outside the area), and the Peloncillo Mountains.

5. Paleo-erosional surfaces and ground water action on petroleum accumulations and on potential traps from Cambrian time, (Bliss Sandstone), up through Pennsylvanian time. There were episodes of erosion and groundwater action which were destructive features that may have affected petroleum accumulations.

6. Laramide thrusting and intrusion, Mid-Tertiary Basin and Range normal faulting, and intense Tertiary and Quaternary volcanism undoubtedly created some disarrangement of ground fluid systems.

The indicated destructive features combined with formational cover, alluvial cover, and volcanic rock cover make petroleum finding here arduous indeed.

Significant petroleum accumulations are more likely in the Pedragosa Basin, and at considerable depth. Petroleum possibly exists and may be found in the Early Cretaceous U-Bar formation down to about 3,500 (+), the Permian Epitaph dolomite, colina limestone, and the Earp formation, down to about 14,000 feet; the Pennsylvanian, Horquilla limestone, down to about 17,000 feet; the Mississippian limestone, down to about 19,000 feet; the Ordovician limestone, down to 20,000 feet, and the Bliss formation, down to about 21,000 feet.

The better oil potential is most likely in the Permo-Pennsylvanian formation and downward. The best potential may be in the Permo-Pennsylvanian interval. The better gas potential is most likely in the Early Cretaceous formations down to and perhaps including the Permian strata. The Cretaceous strata is more likely to yield gas than oil. The strata is at less depth and it is biogenetically the more favorable for gas.

The potential oil and gas accumulations are likely to be in the following stratigraphic disconformities: Lower Cretaceous carbonate reefs, biostromes, and quaternose sandstones; Permian carbonate reefs, biostromes, and dolomites; Mississippian down to Ordovician limestones and dolomite disconformities, stray sandstones, and reefs; and, lowermost, the Bliss sandstone.

Utilization of all available geologic information, including applicable geophysics, and bold drill site selections for deep tests can result in oil and gas discoveries.

Literature Cited:

Crenshaw, John. 1980. Desert Bighorns -- A New Hope. New Mexico Wildlife Magazine, May - June, 1980. P. 28-29.

Woodward, Lee. 1980. A Hard Look at Overthrust Belt Prospects in Southwest New Mexico. Oil and Gas Journal April 21, 1980. P. 114-116.

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