

**CASE 1456: Chaco Oil Co. application for
exception to Rule 104, drill 4 additional oil
wells in Red Mountain-Mesaverde Oil Pool.**

Case No.

1556

Application, Transcript,
Small Exhibits, Etc.

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

November 28, 1958

Mr. Henry S. Birdseye
Box 8294
Albuquerque, New Mexico

Dear Mr. Birdseye:

We enclose two copies of Order R-1296 issued November 26, 1958, by the Oil Conservation Commission in Case 1556.

Very truly yours,

A. L. Porter, Jr.
Secretary - Director

bp
Encls.

C
O
P
Y

**BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO**

**IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:**

**CASE NO. 1556
Order No. R-1296**

**APPLICATION OF CHACO OIL COMPANY
FOR AN EXCEPTION TO RULE 104 OF
THE COMMISSION RULES AND REGULATIONS
TO PERMIT THE DRILLING OF FOUR
ADDITIONAL OIL WELLS ON TWO EXISTING
40-ACRE UNITS IN THE RED MOUNTAIN-
MESAVERDE OIL POOL, MCKINLEY COUNTY,
NEW MEXICO.**

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on November 19, 1958, at Santa Fe, New Mexico, before Elvis A. Utz, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 26th day of November, 1958, the Commission, a quorum being present, having considered the application, the evidence adduced and the recommendations of the Examiner, Elvis A. Utz, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Chaco Oil Company, is the owner of two 40-acre units in the Red Mountain-Mesaverde Oil Pool consisting of the SW/4 SE/4, Section 20 and the NW/4 NE/4, Section 29, both in Township 20 North, Range 9 West, NMPM, McKinley County, New Mexico, with four producing oil wells on said units.

(3) That applicant seeks permission to drill four additional wells on said 40-acre units with no increase in allowables with the proposed locations as follows:

Well No. 20-9, located 110 feet from the South line
and 1910 feet from the East line of Section 20

-2-

Case No. 1556
Order No. R-1296

Well No. 29-18, located 100 feet from the North line and 1380 feet from the East line of Section 29

Well No. 29-19, located 100 feet from the North line and 1800 feet from the East line of Section 29

Well No. 29-20, located 300 feet from the North line and 1800 feet from the East line of Section 29

all in Township 20 North, Range 9 West, NMPM, McKinley County, New Mexico.

(4) That the preponderance of the evidence indicates that the drilling of the proposed wells within the two 40-acre units now producing will result in greater ultimate recovery of oil from said Red Mountain-Mesaverde Oil Pool.

(5) That the subject application should be approved.

IT IS THEREFORE ORDERED:

That the application of Chaco Oil Company for permission to drill the four following-described wells on the two presently existing 40-acre units in the Red Mountain-Mesaverde Oil Pool be and the same is hereby approved:

Well No. 20-9, located 110 feet from the South line and 1910 feet from the East line of Section 20

Well No. 29-18, located 100 feet from the North line and 1380 feet from the East line of Section 29


Well No. 29-19, located 100 feet from the North line and 1800 feet from the East line of Section 29


Well No. 29-20, located 300 feet from the North line and 1800 feet from the East line of Section 29

all in Township 20 North, Range 9 West, NMPM, McKinley County, New Mexico.

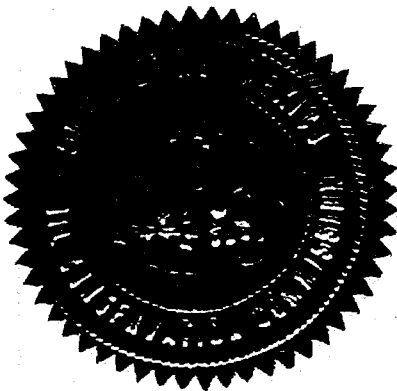
DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION


Edwin L. Machem, Chairman


Murray E. Morgan, Member


A. L. Porter, Jr., Member & Secretary



BEFORE THE
OIL CONSERVATION COMMISSION
NOVEMBER 19, 1958

IN THE MATTER OF:

APPLICATION OF CHACO OIL COMPANY, CASE 1556

TRANSCRIPT OF HEARING

DEARNLEY - MEIER & ASSOCIATES
GENERAL LAW REPORTERS
ALBUQUERQUE NEW MEXICO
Phone CHapel 3-6691

BEFORE THE
OIL CONSERVATION COMMISSION
NOVEMBER 19, 1958

IN THE MATTER OF:

Application of Chaco Oil Company for an exception)
to Rule 104 of the Commission Rules and Regulations.)
Applicant, in the above-styled cause, seeks an)
order authorizing it to drill four additional)
oil wells in the Red Mountain-Mesaverde Oil Pool) Case
in the SW/4 SE/4 of Section 20 and the NW/4 NE/4) 1556
of Section 29, Township 20, Range 9 West, McKinley)
County, New Mexico.)

BEFORE:

Elvis Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Next case on the Docket is 1556.

MR. PAYNE: Application of Chaco Oil Company for an
exception to Rule 104 of the Commission Rules and Regulations.

MR. BIRDSEYE: My name is Henry S. Birdseye. I am a
consulting geologist and a co-partner in Chaco Oil Company, the
Applicant, and authorized representative of Chaco Oil Company
at this hearing. (WITNESS SWORN.)

DIRECT EXAMINATION

MR. PAYNE: State your name and position for the record.

A My name is Henry S. Birdseye. I'm a co-partner in
Chaco Oil Company and the authorized representative of Chaco Oil
Company in this case.

MR. PAYNE: have you previously testified before this
Commission as an expert, Mr. Birdseye?

A Yes, I have.

MR. PAYNE: Are the witness' qualifications accepted?

MR. UTZ: Yes, they are.

MR. PAYNE: Please proceed.

A The Red Mountain Oil Field was discovered in 1934, which, I believe, was prior to the establishment of the Commission. Virtually all of the early development was done in absence of regulations, so that there is no pattern of producing wells which conforms to present day regulations. There is also a virtually complete absence of technical data regarding the field both geological and engineering.

These reports may summarize some of the things which I'm about to tell.

MR. UTZ: Is this an exhibit?

A Well, I've not labeled it as an exhibit; however, we can call it Exhibit E, and it will be submitted as Exhibit E for the Commission.

I refer you to Exhibit A, which is a regional map, the only purpose of which is to show the location of the Red Mountain Field with respect to Hospah and Seven Lakes Field and show the original structure, which here consists of two converging faults between which there is a nosing or a small anticline enclosure on which the production in the Red Mountain Field occurs.

Exhibit B shows proration units O in Section 20 and B in Township 20 North, Range 9 West. All of the present production

is within those two proration units, and this application is concerned with the request to drill additional wells within the two producing units with no increase in the allowable.

The wells which are now producing, and have been since Chaco Oil Company acquired this lease in November of 1957, are Wells Number 1, 2, 3 and 4, with a total daily productive capacity at the present time of about 9 barrels.

These wells were all drilled many years ago, and we have some information, certainly not enough to draw an isopach map or recommend any remedial treatment.

Applicant's Exhibit C is a structural contour map drawn on the producing sand referred to here as the 450-foot sand. This map was drawn in 1945 by a geologist, Vernon King. It shows only Sections 20 and 29 in their entirety, but the two adjoining sections to the east -- I might interject here in the south half of Section 20 and the north half of Section 29 are covered by one Santa Fe Railway Company lease -- Sections Number 9, 4, 26, which was assigned in 1955 to Ben and Celia Sapir, which was subsequently assigned to the Chaco Oil Company, a partnership of four individuals.

Applicant's Exhibit D is a rather detailed structural map of a producing area and its vicinity, based primarily on stratigraphic testing program undertaken by Chaco Oil Company in the spring of 1958, correlated by electrical and gamma ray logs; and it probably is the most reliable structural information which is

available. In fact, it is almost the only reliable technical information available on the field.

Units O and B are encircled by the orange line. The inner irregular dashed line outlined in green is what I consider to be the apparent depleted portion of the reservoir, which you can see lies northwest and in a down dip from the crest of the structure. And there is a fault which transverses the reservoir in the middle of the east-west fault some 40 or 50 feet through. There is production on both sides of the fault.

Shown on Exhibit D within units O and B are proposed well locations which are colored in red. As you can see, these all lie within presently producing 40-acre units, due to the irregularity of the spacing of the original, currently producing wells.

We are at somewhat of a disadvantage to follow any standard spacing, whether it be two and a half, five or ten acres within those units; so these proposed locations are rather arbitrarily chosen to drain portions of the reservoir, which, as shown in the well data or Exhibit B, and I believe D, shows some of the now abandoned wells which we think by modern drilling and completion methods could be put on production.

We are applying not for an additional allowable over the unit allowable for units O and B, but simply for an unorthodox location on the wells shown. I have not indicated the footages. I have them here, and if you wish, I will give you the footages of these proposed wells shown in red on the map.

The field is currently producing from 6 to 9 barrels a day, depending more on mechanical difficulties which have arisen with the pumping equipment than anything else.

The well shown as number two on the north side of the fault in Section 20, Unit 0, is capable of producing about 5 barrels a day of oil with no water. The remaining wells, 1, 3 and 4, are productive of slightly more than a barrel a day, with considerable quantities of water, which I think is attributable to the original completion.

There is no measurable gas produced with the oil. Apparently it is not a solution gas drive to any extent at all that is measurable. The only drive mechanism which we can extrapolate from the productive history of the field around these wells is due to a low pressure water drive which seems to be doing a pretty fair job of flushing the immediate vicinity of the well bore, but probably it doesn't cause a migration from any considerable radius; and that is, in my opinion, a justification for proposing these additional wells on such close spacing outside of apparently depleted portions of the reservoir.

Now, this apparently depleted portion of the reservoir was sketched by me on the basis of production from the wells which appear within the green line, based on the volume of production which accumulatively through October, 1958, amounts to 25,290 barrels.

Previous engineering data, such as it is, and it is extremely

sketchy, indicates that the data supplied by Vernon King in 1945 states that the net pay thickness of this pool in the Menefee formation of the Mesaverde group has an average of 8 feet pay thickness.

In trying to determine what area of the reservoir would have to be voided in the production of 25,290 barrels, I have taken an assumed pay thickness of 8 feet average pay porosity of 20 percent average connate water saturation of 50 percent original reservoir pressure 195 pounds per square inch, etcetera, as shown on page A-2 of Exhibit E of the bound report.

Assuming that these reservoir factors are correct, the average recoverable oil per acre foot would originally have been 180 barrels, the average recoverable oil per acre, or 1440.7 barrels. I have estimated a recovery factor of 25 barrels. By simple arithmetic, it would indicate to produce 25,290 barrels of oil.

Given these reservoir conditions, approximately 17.55 acres would have been voided, and this is the approximate area within the green line.

The bases for our application are in keeping with the objectives of the Oil Conservation Commission. First, the prevention of waste, and, too, waste certainly would be prevented by the completion of additional wells, which would permit the more efficient drainage of the remaining reserve. Second, there is no question of correlative rights here, as you can see. The two

40-acre producing units lie separated from the adjoining leases to the east by an additional non-productive 40-acre unit; and there seems to be very little likelihood that production will extend on those units to the east, which then would offset other lease holders. And, third, our final consideration in making this application is based on simple economics. Since Chaco Oil Company took over the ownership and operation of this property in November of 1957, approximately a year ago, our overhead and capital expenditure is \$19,855.16. The total income of Chaco Oil Company from production on this lease has amounted to \$5,189.39, leaving a deficit for one year's operation of \$14,666.77. It is obvious that we can't operate at this rate of profit for very many years.

We believe on the basis of inherited old well information that the locations which are shown as proposed and colored in red on Exhibit D, all or some of them should be productive and should lie outside of the drained area at the present time. It may be that after drilling one or two of these wells we will have sufficient success in completing new wells we will want to step out further. At the present time, it would appear to be quite a gamble to move out on any regular spacing of five acres or even two and a half acres. We are certainly hindered in any such plan by the spacing of the original wells which were drilled prior to the establishment of the Oil Commission.

That is, gentlemen, the gist of the direct testimony. I would

be happy to entertain questions and try to answer them as best I can.

MR. UTZ: Who owns the leases in Units A and B to the east of this area?

A They are part of the Santa Fe Lease to Chaco Oil Company. The entire area shown on the map, the south half-north half of 20 and 29 are covered by one lease from the Santa Fe Railroad to Chaco.

Q You are applying for non-standard locations?

A That is correct, within Units O and B, present producing units.

Q You have those footages on those locations?

A Yes, I have. I should have noted them on the map. I neglected to do so. Maybe you can read my scribbling here.

MR. UTZ: Any other questions of the witness? If there are no questions of the witness, you may be excused.

(Witness excused.)

MR. UTZ: Any other statement to be made in this case? If there is none, the case will be taken under advisement, and the hearing is adjourned.

(Whereupon the hearing adjourned at 7:10 p.m.)

STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, John Calvin Bevell, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached transcript of hearing before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript by me; that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 25th day of November, 1958, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

John Calvin Bevell
 NOTARY PUBLIC

My Commission Expires:

January 24, 1962

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1556... heard by me on *Nov. 19*, 1958.

[Signature], Examiner
 New Mexico Oil Conservation Commission

MAIN OFFICE OCC

Exam hearing
Case 1556

10:00 OCT 27 PM 1:37

Albuquerque, New Mexico
October 27, 1958

Oil Conservation Commission
P.O. Box 871
Santa Fe, New Mexico

Gentlemen:

The Chaco Oil Company hereby requests a hearing before the Oil Conservation Commission for an exception to Rule 104 B (1) for the Red Mountain Oil Field in Sections 20 and 29, Township 20 North, Range 9 West, McKinley County, New Mexico.

Chaco Oil Company requests this exception in order that four additional wells may be drilled to the shallow oil pay in the Red Mountain Field. At the present time the four wells which are producing lie within two 40-acre units, Unit O in Section 20 and Unit B in Section 29. The four wells currently producing have a total capacity of about 10 barrels per day. We desire to drill additional wells within the same 40-acre units now producing, and we do not request additional allowables beyond those presently assigned to the two 40-acre units. Gas-oil ratios are negligible and reservoir pressure is so low that one well can be expected to drain no more than a few acres.

We should prefer to have this case heard at the earliest possible date, preferably on November 19th, 1958, and will appreciate hearing from you if this date will be convenient.

Cordially,

CHACO OIL COMPANY

Henry S. Birdseye

Henry S. Birdseye
P.O. Box 8294
Albuquerque, New Mexico

HSB:bp

Red Mountain Mesaville Oil Pool.

Compliments Harper Realty Co.

20-9: 110/S 1910/E Sec 20

29-18: 100/N, 1380/E }
29-19: 100/N, 1380/E } Sec.
29-20: 200/N, 1380/E } 29.

DOCKET: EXAMINER HEARING NOVEMBER 19, 1958

Oil Conservation Commission 9 a.m., Mabry Hall, State Capitol, Santa Fe, New Mexico

The following cases will be heard before Elvis A. Utz, Examiner:

- CASE 1337: Application of Gulf Oil Corporation for permission to commingle the production from two separate oil pools. Applicant, in the above-styled cause, seeks an order amending Order R-1093 and Order R-1093-A to authorize it to commingle the production from the Montoya formation with the production from the Ellenburger, Fusselman, and McKee formations on its Learcy Mc-Buffington Lease consisting of the S/2 of Section 13, Township 25 South, Range 37 East, Lea County, New Mexico.
- CASE 1548: Application of Shell Oil Company for an automatic custody transfer system and for permission to commingle the production from four separate leases. Applicant, in the above-styled cause, seeks an order authorizing it to install an automatic custody transfer system and to commingle the production from the Vacuum Pool on four State Leases located in Sections 29, 30, and 31, Township 17 South, Range 35 East, Lea County, New Mexico.
- CASE 1549: Application of Tidewater Oil Company for two non-standard gas proration units. Applicant, in the above-styled cause, seeks an order establishing a 120-acre non-standard gas proration unit, in both the Tubb Gas Pool and the Blinbry Gas Pool, each to comprise the S/2 SE/4 and SE/4 SW/4 of Section 36, Township 21 South, Range 37 East, Lea County, New Mexico, and to be dedicated to applicant's State "Q" Well No. 1, located in the SE/4 SW/4 of said Section 36, which well is dually completed in the aforesaid pools.
- CASE 1550: Application of Tidewater Oil Company to commingle the production from several separate oil pools. Applicant, in the above-styled cause, seeks an order authorizing it to commingle the production from the Ellenburger, McKee, Fusselman, Montoya and any other pool or pools encountered which produces oil of similar qualities on its Coates "C" Lease comprising the E/2 and SE/4 NW/4 and NE/4 SW/4 of Section 24, Township 25 South, Range 37 East, Lea County, New Mexico. Applicant further requests permission to commingle production from the Drinkard formation on said lease with any other pool or pools encountered which produce sour crudes. Applicant proposes to separately meter production from each pool prior to being commingled. Applicant further seeks permission to produce more than sixteen wells into said common facilities.
- CASE 1551: Application of Pan American Petroleum Corporation for permission to commingle the production from three separate leases and for permission to produce more than sixteen wells into a common tank battery. Applicant, in the above-styled cause, seeks an order authorizing it to commingle the production from the Empire-Abc Pool from the three separate Federal leases hereinafter described:

LC-065478-B N/2 NW/4, NE/4, N/2 SE/4, and E/2 SW/4
Section 3; E/2 Section 10

NM-025604 S/2 SE/4 Section 3; W/2 Section 10

LC-067858 N/2 and SW/4 Section 11

all in Township 18 South, Range 27 East, Eddy County, New Mexico. Applicant further requests authority to produce more than sixteen wells into the common tank battery for said leases. Applicant proposes to separately meter production from each of the above-described leases prior to being commingled.

CASE 1552:

Application of Pan American Petroleum Corporation for permission to commingle the production from four separate leases. Applicant, in the above-styled cause, seeks an order authorizing it to commingle the production from the Abo formation adjacent to the Empire-Abo Pool from the four separate State leases hereinafter described:

E-5461 NW/4 NW/4 Section 2

B-7244-30 S/2 NW/4, NW/4 SW/4, and SE/4 SW/4 Section 2

B-8814-12 NE/4 SW/4 Section 2

E-7833 SW/4 SE/4 Section 2

all in Township 18 South, Range 27 East, Eddy County, New Mexico. Applicant proposes to separately meter the production from each of said leases prior to being commingled.

CASE 1553:

Application of The Texas Company for a dual completion and for permission to commingle the liquids produced from two separate pools. Applicant, in the above-styled cause, seeks an order authorizing it to dually complete its Peery-Federal (NCT-1) Well No. 1 located 1980 feet from the North and East lines of Section 29, Township 15 South, Range 30 East, Chaves County, New Mexico, in such a manner as to permit the production of oil from an undesignated Devonian oil pool and gas from an undesignated Ellenburger Gas Pool through parallel strings of tubing. Applicant further requests permission to commingle the liquids and low pressure gas produced from the Devonian and Ellenburger formations from all existing and future wells on its Peery-Federal Lease which comprises all of said Section 29.

CASE 1554:

Application of The Texas Company for an automatic custody transfer system and for permission to commingle the production from five separate leases. Applicant, in the above-styled cause, seeks an order authorizing it to install an automatic custody transfer system and to commingle the production from the Bisti-Lower Gallup Oil Pool on five Navajo Allottee Leases located in Sections 14, 15, and 23, Township 25 North, Range 11 West, San Juan County, New Mexico. Applicant proposes to separately meter the production from each lease prior to being commingled.

CASE 1555:

Application of H. K. Riddle for two non-standard oil proration units and two unorthodox oil well locations. Applicant, in the above-styled cause, seeks an order establishing a 61-acre non-standard oil proration unit consisting of Lots 1, 2, 3, and 4 of Section 18, said unit to be dedicated to a well to be drilled on an unorthodox location 1980 feet from the South line and 252 feet from the West line of said Section 18; applicant further seeks

the establishment of a 63-acre non-standard oil proration unit consisting of Lots 1, 2, 3, and 4 of Section 19, said unit to be dedicated to a well to be drilled on an unorthodox location 660 feet from the North line and 256 feet from the West line of said Section 19, all in the Bisti-Lower Gallup Oil Pool, Township 26 North, Range 13 West, San Juan County, New Mexico.

CASE 1556:

Application of Chaco Oil Company for an exception to Rule 104 of the Commission Rules and Regulations. Applicant, in the above-styled cause, seeks an order authorizing it to drill four additional oil wells in the Red Mountain-Mesaverde Oil Pool in the SW/4 SE/4 of Section 20 and the NW/4 NE/4 of Section 29, Township 20 North, Range 9 West, McKinley County, New Mexico.

CASE 1557:

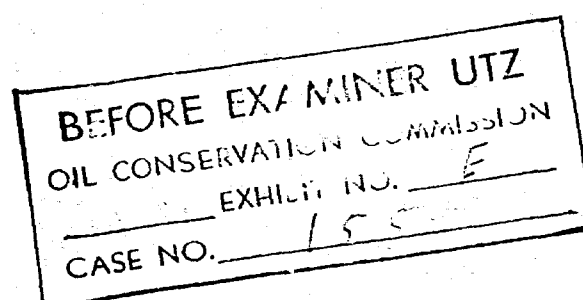
Application of Cities Service Oil Company for a dual completion. Applicant, in the above-styled cause, seeks an order authorizing it to dually complete its State "P" No. 3 Well located 990 feet from the South and West lines of Section 32, Township 22 South, Range 38 East, Lea County, New Mexico, in such a manner as to permit the production of oil from the Blinebry Oil Pool and from an undesignated Glorieta oil pool through parallel strings of tubing.

NEW MEXICO OIL CONSERVATION COMMISSION

CASE NUMBER 1556:

CHACO OIL COMPANY'S APPLICATION FOR AN
EXCEPTION TO RULE 104 in RED MOUNTAIN FIELD

November 19, 1958



Henry S. Birdseye
CONSULTING GEOLOGIST
P. O. BOX 9244
ALBUQUERQUE, NEW MEXICO
PHONE 5-1011

NEW MEXICO OIL CONSERVATION COMMISSION CASE 1556: CHACO OIL COMPANY'S
APPLICATION FOR AN EXCEPTION TO RULE 104. GEOLOGY, PRODUCTION, OIL
RESERVES, AND ECONOMICS OF RED MOUNTAIN FIELD, MCKINLEY COUNTY, N. M.

INTRODUCTION

Location

The Red Mountain Field is located in sections 20 and 29, Township 20 North, Range 9 West, in northern McKinley County, New Mexico. The field is 55 air miles north of Grants, 50 air miles west of Cuba, 57 air miles south-southeast of Farmington and 93 air miles northwest of Albuquerque.

Access

The field is reached via 59 miles of dirt road from U. S. Highway 66 at Prewitt, New Mexico, or by 40 miles of dirt road from a point on State Road 44 which is 34 miles west of Cuba. The road is subject to occasional washouts from summer thunderstorms.

HISTORY

Production was discovered on the Red Mountain structure by the Stacey, Webber et. al. No. 1 Santa Fe in Section 29, Township 20 North, Range 9 West, in June of 1934. The discovery well was completed for a reported daily potential of 5 barrels of oil from a Mesaverde sand at 475 to 498 feet. During the next three years approximately 25 wells were drilled,

of which 7 were reported productive. State records indicate cumulative production in excess of 23,000 barrels through 1957. However, since the field was discovered prior to the establishment of the Oil Conservation Commission, production and technical data now available are incomplete and unreliable. The productive area of the field, now covered by a lease from the Santa Fe Pacific Railroad Company on the South $\frac{1}{2}$ of Section 20 and the North $\frac{1}{2}$ of Section 29, has changed hands intermittently since the field discovery. In 1955 this lease was assigned to Ben and Celia Sapir. In November of 1957, operation of this lease was assumed by Chaco Oil Company, a joint venture of Ben Sapir and Henry S. Birdseye.

In July, 1958, Chaco Oil Company drilled a Morrison test in the southeast quarter of Section 20. Bottomed at a total depth of 3936 feet, this well was plugged and abandoned after encountering gas-cut salt water in the Dakota formation.

A series of ten stratigraphic holes 200 to 300 feet in depth was drilled in the early part of 1958, and served to establish subsurface control for the delineation of the structure, as shown in Exhibit D.

GEOLOGIC SETTING

Physiography

The Red Mountain structure is situated in a broad strike valley in shale members of the Mesaverde formation some two miles south of the escarpment known as Chacra Mesa, which is capped by the uppermost member of the Mesaverde Group, the

Cliff House sandstone. Topographic relief in this portion of the San Juan Basin is generally slight, interrupted by occasional buttes capped by erosion-resistant sandstone beds.

Structure

In a regional sense, the Red Mountain field is on the Chaco slope between the Zuni Uplift to the south and the San Juan Basin to the north. Regional dip is to the northeast at an average of about 100 feet per mile. On the south flank of the San Juan Basin, local structural reversal has played an important role in the accumulation of oil at the Hospah field, which has produced more than 3½ million barrels from an area of about 400 acres on a small north-trending, faulted anticline. Various other small structures in this area have been drilled with negative results, probably in large part because of unfavorable stratigraphic and hydrodynamic conditions. The Red Mountain structure has been mapped by personnel of the U. S. Geological Survey as an anticline within a wedge-shaped, down-dropped fault block. Outcrops do not provide clear surface expression of the fold. However, it is apparent that structural reversal is present aside from fault closure, possibly accenting a fault trap.

Stratigraphy

Surface exposures on the Red Mountain structure are of the Menefee formation of the Mesaverde Group. The uppermost beds of the Menefee Formation and the entire Cliff House Formation have been removed by erosion. The approximate strat-

igraphic section (through the Triassic only) at this locality is as follows:

<u>PERIOD</u>	<u>FORMATION</u>	<u>DEPTH</u>
Upper Cretaceous	Menefee Fm.	Surface
	Point Lookout ss.	1650'
	Crevasse Canyon Fm.	1760'
	Hospah ss.	2690'
	Gallup ss.	2750'
	Lower Mancos	2860'
	Dakota ss.	3710'
Jurassic	Morrison Fm.	3920'
	Todilto gypsum	4900'
	Entrada ss.	4975'
Triassic	Chinle sh.	5300'
	Shinarump(Agua Zarca)ss.	5965'
	Moenkopi Fm.	6080'

FACTORS AFFECTING HYDROCARBON ACCUMULATION

While the majority of oil and gas fields in the San Juan Basin to the north are controlled almost entirely by variations in porosity and permeability, production on the south flank of the Basin, as at Stoney Butte, Red Mountain and Hospah, is dominantly controlled by structural features, with minor control by lenticularity of producing sands. Extensive wildcat drilling by various operators to the north, east, south and west of Red Mountain has failed to establish production where structure is

absent, even though lenticularity of porosity and permeability may be present. This is probably the result of excessive water saturations due to the proximity of recharging outcrops to the south. The only examples of stratigraphic entrapment in this area are found at Seven Lakes 14 miles southwest of Red Mountain and in the Torreon area some 20 miles east of Red Mountain, where lenticularity has permitted the segregation of minor quantities of oil independent of structure. Thus exploration has rather clearly established that structural closure, either by faulting or folding or both, is important to commercial oil accumulations within a few tens of miles of the outcrops on the south flank of the San Juan Basin.

Vertical closure in the important Hospah field is at least 100 feet. The amount of closure on the Red Mountain structure has not yet been established; however, it is considered possible that at least 100 feet of closure may be established as a result of future development. Rather sparse subsurface control has shown considerable lenticularity in the Menefee producing zone at Red Mountain. An attempt has been made to estimate the area which has been drained during the production of some 25,000 barrels of oil to date. As shown on Exhibit D, the depleted area of about 17 acres lies northwest (down-dip) from the axis of the nose or dome. This is probably the result of a tilted water table, due to the hydrodynamic potential of the recharging outcrops to the south. However, data from the wells drilled years ago to the

"450-foot" sand are so inconclusive that it cannot be definitely stated that this is so; therefore, at least one well is projected to test the structurally-high area southeast of present production.

NEED FOR ADDITIONAL DEVELOPMENT

Production of oil from the "450-foot" zone of the Menefee Formation at Red Mountain has totalled about 25,290 barrels to date. Four wells are now productive, with a daily capacity of about eight barrels, which is barely sufficient to pay the costs of operating the property. It is the contention of Chaco Oil Company that additional wells, drilled within the two 40-acre proration units now producing, and completed by modern techniques, should substantially raise the productive capacity of the shallow pay without necessitating an increase in the allowables for the two proration units, for the following reasons:

(1) Reservoir Drive: the quantity of gas produced with oil is so slight as to be unmeasurable. It is evident from the amount of water produced with oil in the various wells, and from the rather slight fluid fill-up in the wells (averaging less than 50 feet), that the only drive mechanism in the reservoir is a very low-pressure water drive. This apparently accounts for the comparatively good recovery factor experienced in the field to date, but also precludes the drainage by any one well of more than a small radius from the well bore.

(2) Area Drained: on Appendix page A-2, an attempt has been made to estimate the area of the "450-foot" pay zone which has been

drained in the production of some 25,000 barrels of oil to date. If the assumed reservoir factors are approximately correct, a total of about 17½ acres has been more or less voided of oil. Based on known production data, an area of this size has been plotted on Exhibit D, to represent the apparently depleted portion of the reservoir. If the drained area is correctly plotted, it is apparent that structurally favorable areas are present outside the periphery of this area. Chaco Oil Company desires to drill four additional wells to the "450-foot" pay to tap the hitherto undrained portion of the reservoir.

(3) Projected Development: the locations of the four wells projected by Chaco Oil Company to more efficiently drain the reservoir are shown on Exhibit D. The tentative locations are based on two criteria: reported gauges of oil production in older wells which were never produced, and the assumed position of the depleted part of the reservoir in respect to known structure. Exhibit B shows reported amounts of oil gauged from older wells not now producing.

(4) Economic Need for Increased Production: since Chaco Oil Company was formed in November, 1957, its total income from sales of oil and gas from the Red Mountain field has been \$5,189.39. In the same period, Chaco Oil Company's overhead and capital expenditures at Red Mountain have amounted to \$19,855.16, leaving a deficit for approximately one year's operation of \$14,665.77. Obviously, it will be necessary to increase production substantially if the deficit is to cease. From the Company's experience with the older,

depleted wells now on production, it is clear that production can only be increased by completing new wells outside the depleted portion of the field.

(5) No Increased Allowable Requested: as Exhibits B and D show, all of the past production has been from two forty-acre units, Number O in Section 20 and Number B in Section 29. Further, it appears that future production from any new wells will probably be confined to these same units. If Chaco Oil Company's application in this case is granted, the unit allowables set by the Oil Conservation Commission be almost certainly adequate for the productive capacity of the field, and at the same time permit the Company a reasonable return on its investment. Therefore, this application does not include a request for any increase over the standard two unit allowables.

SUMMARY

Chaco Oil Company is the assignee and operator of the Red Mountain oil field in McKinley County, New Mexico, and there is no production in the pool outside of the lease operated by Chaco Oil Company. Numerous wells have been drilled to the "450-foot" Mesaverde oil pay since the field discovery in 1934. Possibly eight wells have produced intermittently since 1934, and cumulative production is approximately 25,000 barrels to this date (November, 1958). At the present time, four wells have a total daily productive capacity of about nine barrels, from two forty-acre production units.

The reservoir sand is a lentil or lenticular interval in the Menefee formation. In addition to an unknown amount of control by sand lenticularity, the pool is predominantly controlled by structure, viz., a dome or anticlinal nosing within a down-dropped fault block. Fairly good structural control obtained through a stratigraphic testing program, supplemented by previous subsurface mapping from sample logs, indicates that production to date has been largely from an area of about 17½ acres which lies somewhat down the flank of the structure northwest of the crest.

The reservoir drive mechanism apparently is a very low-pressure water drive. Solution-Gas is so slight as to be negligible. From observations of the producing wells, it seems likely that each well has a very modest drainage area, and that structurally-favorable portions of the reservoir can only be drained by drilling new wells.

Four new wells are projected in the Red Mountain pool, as shown on Exhibit D. All will fall within presently-productive production units, and no increase in allowable is requested from the Commission.

The need for additional wells within the Red Mountain pool is sound from the point of view of engineering and conservation, and is an economic necessity, since present production is not sufficient to meet the expenses of operation.

Respectfully submitted,

Henry S. Birdseye
Co-Owner and Authorized Agent

19 November, 1958

PRODUCTION SUMMARY, RED MOUNTAIN FIELD

McKINLEY COUNTY, NEW MEXICO

Barrels of Oil Produced

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
January	unk.	215	119	210	60	0	0	175
February	"	77	0	80	175	0	0	200
March	"	308	494	162	135	0	0	250
April	"	297	0	140	195	0	0	225
May	"	306	180	115	195	0	0	125
June	"	251	156	180	165	0	0	125
July	"	153	200	225	0	0	0	100
August	"	231	0	195	0	0	314	50
September	"	0	222	75	0	0	376	95
October	"	201	128	75	0	0	287	170
November	"	0	180	0	0	0	300	
December	<u>517</u>	<u>0</u>	<u>71</u>	<u>120</u>	<u>0</u>	<u>0</u>	<u>284</u>	
TOTALS	5177	2017	1750	1577	885	0	1561	1515
SUMULATIVE	15985	18002	19752	21239	22214	22214	23775	25290

ASSUMED RESERVOIR DATA SHEET

RED MOUNTAIN OIL FIELD

McKinley County, New Mexico

"450-foot" Producing Sand (Menefee formation)

* * * * *

Average Porosity	20 %
Average Connate Water Saturation	50 %
Original Reservoir Pressure	195 psi
Reservoir Temperature	70°F
Average Net Pay Thickness	8 feet
Average Recoverable Oil per Acre-foot	180 barrels
Average Recoverable Oil per Acre	1,440.7 "
Reservoir Volume Factor	1.05
Estimated Recovery Factor	25 %
Oil Produced to 11-1-58	25,290 barrels
Number of Reservoir Acres Voided	17.55 acres