

CASE 3804: Application of PAN AM.
FOR A PRESSURE MAINTENANCE PROJECT
ROOSEVELT COUNTY, NEW MEXICO.

Case Number

3804

Application
Transcripts.

Small Exhibits

ETC.

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BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 10, 1968

EXAMINER HEARING

IN THE MATTER OF:)

Application of Pan American
Petroleum Corporation for a
pressure maintenance project,
Roosevelt County, New Mexico.)

Case No. 3804

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 3804.

MR. HATCH: Case 3804: Application of Pan American Petroleum Corporation for a pressure maintenance project, Roosevelt County, New Mexico.

MR. BUELL: Guy Buell for Pan American Petroleum Corporation. We have one witness, George Ford.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1 through 6 were marked for identification.)

MR. BUELL: May it please the Examiner, this application relates to the Milnesand-San Andres Oil Pool in Roosevelt County, New Mexico. This pool is along a line of west to east trend of the San Andres Pool. It starts on the far west with Cato, then we pick up Tom-Tom, Chaveroo, Milnesand, and it ends on the east with Todd. Most all of the operators in the San Andres Pools are deeply concerned about whether or not waterflooding will be feasible and practical. Their concern is certainly justified in that unless we can successfully flood the majority of these San Andres properties, we're not going to make any money on our investment, but in some cases we probably will not get our investment back. For that reason Pan American, along with other operators, is intensely interested in whether or not these San Andres Pools

can be successfully flooded.

Insofar as I know, the first attempt to inaugurate any type of a pilot program is when Pan American, in the Milnesand Field on the Horton Federal Lease, which is the subject lease of this application, we converted a well to salt water disposal. It was salt water disposal but we were injecting it into the producing San Andres formation. This was done in June of 1966.

We have injected considerable volumes of water into this well into the producing zone, and while the results are not completely clear-cut either way as to whether or not we can successfully flood the Milnesand-San Andres, it is our intention here today that in addition to this one well in which we have been injecting, to add another injection well in order that we can further evaluate the prospects of a waterflood at least in the Milnesand-San Andres Oil Pool.

GEORGE H. FORD

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Ford, would you state your complete name, by whom you are employed and in what capacity and what location,

please?

A George H. Ford, Staff Engineer for Pan American Petroleum Corporation in Fort Worth, Texas.

Q Mr. Ford, you have testified at many previous Commission hearings, have you not, and your qualifications as a petroleum engineer are a matter of public record?

A Yes, sir.

Q With respect to the subject application, would you look first at what has been identified as Pan American's Exhibit 1? What is that exhibit?

A Exhibit 1 is a plat of the southeast portion of the Milnesand Pool. We have Pan American's three-section Horton Federal lease, stippled, small black dots, over three sections, Sections 29, 30 and 31, in Township 8 South, Range 35 East, Roosevelt County, New Mexico.

We have completed 29 wells as producers on that three-section lease from a period the first of '64 up to the early part of 1966. These wells have produced one and a half million barrels up to May 1, 1968. Our best estimate of ultimate primary recovery is two million barrels of oil from this lease. We cannot tell now how much additional recovery we might get by waterflooding. We hope that we'll have a full-scale, lease-wide waterflood program that might recover

as much as 75 percent of ultimate primary, or about one and a half million barrels.

We have shown with a red dot a proposed water injection well in this pressure maintenance project, our Horton Federal Number 30, with a blue dot our Horton Federal Number 31, that is now classified as a salt water disposal well. It is injecting into the pay formation, as Mr. Buell pointed out.

I would like to correct a date, it started in January of '66 instead of June. We would like that reclassified as a water injection well to fit in with our ultimate program for this pressure maintenance project. I have shown with a red outline the recommended project area of 14 40-acre units. Some of them may be slightly less than 40 acres, roughly 560 acres.

Q Do you have any other comments on Exhibit 1, Mr. Ford?

A No, sir.

Q Let's look now at Exhibit 2, what is that exhibit?

A Exhibit 2 is a gamma ray neutron log for Horton Federal Number 30. I'd like to make one comment, that the top of the producing zone is at about 4583, very near the bottom of the log.

Q Is that a log on the well that we're getting ready

to convert or requesting authority to convert to injection at this time?

A Yes, sir.

Q Look at Exhibit 3, what is that exhibit?

A That is a gamma ray neutron log for our Horton Federal Number 31, the well that is already on injection. The top of the producing zone there is at about 4677.

Q Let's look now at Exhibit 4, what is it?

A Exhibit 4 is a diagrammatic sketch of our proposed injection Well Number 30. I would like to point out a few items on this exhibit. Our perforations are 4696 to 4716. We will use two-inch OD plastic-coated tubing set at 4650 on a packer at that depth. The annulus between the tubing and casing will be filled with an inhibited fluid to prevent corrosion. There will be a pressure gauge on that annulus so that we can observe pressure.

Q Look now at Exhibit 5, what is that exhibit?

A That is a similar exhibit for Well Number 31, our diagrammatic sketch for Well Number 31. It's perforated from 4696 to 4700. We are using 2-7/8ths OD plastic-coated tubing set on a packer at 4670 feet. The casing tubing annulus is filled with inhibited fluid and a pressure gauge is used on that annulus.

Q Look now at our last exhibit, Exhibit 6. What is that?

A It is pertinent data for our pressure maintenance project. The one item I would like to point out is that right now, and in the immediate future, we will be using produced water from our Horton Federal lease in the Milnesand Field, with a volume range from 400 to 600 barrels of water per day.

Q What recommendations do you have to make to the Commission here today with respect to the rules and regulations that should govern this pressure maintenance program?

A I do recommend approval of our water injection pressure maintenance project for our Horton Federal lease in Milnesand and recommend an order with provisions similar to the Commission's Order R-2026. This order approved a pressure maintenance project for Pan American in the Horseshoe-Gallup Pool in San Juan County, New Mexico.

I will later furnish the Examiner by letter the factors needed to calculate the penalty removal by the water injection so that that can be incorporated into the order for this project.

MR. UTZ: That would be reservoir temperature and Z factors?

THE WITNESS: Yes, sir. Further, I recommend

approval of Pan American's Horton Federal Number 30 for water injection, redesignation of Pan American's Horton Federal Number 31 from salt water disposal to water injection.

In that connection I would like to point out that Well Number 31, in my opinion, is not entitled to an allowable assignment in the project area or the project. It was never completed as a producer.

Well Number 30 was completed as a producer but not Well Number 31. Further, I would recommend approval of a project area of the 14 40-acre units that I had outlined in red on Exhibit 1. That's all my recommendations.

MR. BUELL: May it please the Examiner, that's all we have by way of direct testimony. I would like to formally offer Exhibits 1 through 6, inclusive, for the record.

MR. UTZ: Exhibits 1 through 6 will be entered into the record of this case.

(Whereupon, Applicant's Exhibits 1 through 6 were offered and admitted in evidence.)

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Ford, I didn't reread our rule as to the project area delineation, but isn't it offsets and diagonal offsets to injection wells?

A Sir, that's the project area for the waterflood or stripper type. I believe the project area for the pressure maintenance type is set after notice and hearing, so I would assume it's whatever the evidence shows and whatever the Commission decides they will approve for a project area. I don't really have any experience on how much area the Commission has been approving for a project area for a pressure maintenance project, but what you are referring to is for the waterflood.

MR. BUELL: As I recall, Mr. Examiner, in some of our prior pressure maintenance program applications we have had more units in the project area other than the direct and diagonal offset to an injection well.

THE WITNESS: I would think that would be quite reasonable, Mr. Buell, because there's a special allowable advantage for a project area for a waterflood. I believe you can go up to top normal unit allowable times the number of wells in the project area, whereas for a project area in a pressure maintenance project, you don't have that many allowable advantages, all you can do there is to transfer the allowable from the injection well to other producers in the project area. I think they are two entirely different type project areas. If the Commission feels that this project area

I have recommended is too large, of course, it's not really too critical to our operating our project. We would certainly be agreeable to something smaller than that.

Q (By Mr. Utz) Now, these leases on these Sections 29 and 30, is the interest in both sections and in the area you outlined identical?

A Yes, sir, and also 31; 29, 30 and 31.

Q Which would be equivalent to unitization actually?

A Well, it's now in Commission records as one lease, the three sections are.

MR. BUELL: In a pressure maintenance program all the project area gives you is a more flexible operation in conducting your flood. There's no allowable advantage to it at all.

MR. UTZ: You can transfer some allowable --

A Yes.

MR. BUELL: It just gives you flexibility of where you produce your oil within the project area.

A I think the only extra allowable you might obtain would be the difference between the present allowable of an injection well and top normal unit allowable for an injection well. For example, if the well had 50 barrels limited now the top was 58, you would gain 8 barrels. Whereas on the project

area for a waterflood project it might be much more than that if you had a few high-capacity wells in the project.

MR. UTZ: Are there any other questions of the witness? When do you think we might expect this additional data?

THE WITNESS: You should receive it by Monday morning.

MR. UTZ: All right. The witness may be excused.

(Witness excused.)

MR. UTZ: Any statements in this case? The case will be taken under advisement and the hearing is adjourned.

I N D E X

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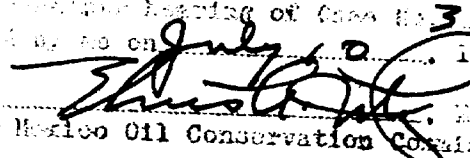
STATE OF NEW MEXICO)
COUNTY OF BERNALILLO) ss

I, ADA DEARNLEY, 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; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 18th day of July, 1968.


NOTARY PUBLIC

My Commission Expires:
June 19, 1971.

I do hereby certify that the foregoing is
a correct record of the proceedings in
the hearing of Case No. 3804
heard by me on July 2, 1968.

Ada Dearnley, Notary
New Mexico Oil Conservation Commission

L. proposed

INJECTION WELL

R.E. HORTON FEDERAL WELL NO. 30

Unit K, Sec. 29, T-8-S, R-35-E
Roosevelt Co, New Mex.
Elevation 4219-RDB

8 5/8" CSA 397'
W/ 225 SXS.
CIRCULATED
CEMENT

2" I.D. PLASTIC
COATED TUBING
SA 4650'

CSG.-TBG. ANNULUS
FILLED W/ INHIBITED
FLUID

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
PAN AM'S EXHIBIT NO. 4
CASE NO. 3804

TOP CEMENT
@ 3556' (CALC.)

PACKER SA 4650'

PERF. 4696'-4716'

T.D. 4716'

4 1/2" CSA 4716'
W/ 250 SXS.

INJECTION
WELL
R.E. HORTON FEDERAL
WELL NO. 31

Unit M, Sec. 29, T-8-S, R-35-E

Roosevelt Co, N. Mex.
Elevation 4222' RDS

SURFACE

8 5/8" CSA 412'
W/ 225 SXS.
CIRCULATED
CEMENT

2 7/8" O.D. PLASTIC
COATED TUBING
SA 4670'

CSG.- TBG. ANNULUS
FILLED W/ INHIBITED
FLUID

TOP CEMENT
@ 3575' (LOG)

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
Don Amis EXHIBIT NO. 5
CASE NO. 3804

PACKER, SA
4670'

PERF. 4696'-4700'

4 1/2" CSG. SA
4714' W/ 250 SXS.

T.D. 4714'

PAN AMERICAN PETROLEUM CORPORATION
PROPOSED PRESSURE MAINTENANCE PROJECT
R. E. HORTON FEDERAL LEASE
SECTIONS 29, 30 & 31-T8S-R35E
ROOSEVELT COUNTY, NEW MEXICO

I. Injection Interval

- A. Pool: Milnesand
- B. Formation: San Andres
- C. Depth: 4696' - 4716'

II. Fluid to be Injected

- A. Type: Produced water from the Milnesand
San Andres Pool
- B. Volume: 400-600 Barrels of Water Per Day
- C. Source: R. E. Horton Federal Lease
Producing Wells

BEFORE EXAMINER UTZ

OIL CONSERVATION COMMISSION

Pan Am's EXHIBIT NO. 6

CASE NO. 3804

GOVERNOR
DAVID F. CARGO
CHAIRMAN

State of New Mexico
Oil Conservation Commission



LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

P. O. BOX 2088
SANTA FE

July 25, 1968

Mr. Guy Buell
Pan American Petroleum Corporation
Post Office Box 1410
Fort Worth, Texas

Re: Case No. 3804
Order No. R-3456
Applicant:
Pan American Petroleum Corp.

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC X

Artesia OCC

Aztec OCC

Other State Engineer Office

Case 3802.

Heard. 7-10-68

Rec. 7-10-68.

Grant Park Am. a secondary.
recovery ~~and~~ project in.

Milner and - S.A. Pool. The Injection
well shall be:

P.A. - R.E. Horton Del-³⁰ 11-29-85-35E

✓ ✓ ✓ #31 M-2985-35E.

The Project area is:

Sec. 29- SW 1/4 NE 1/4, S 1/2 ~~SW~~ 1/4, N 2/4 SW 1/4,
SW 1/4 SW 1/4.

230 - E/2 SE/4.

cell in 85-35E.

Use the Horseshoe - Gallup Rules.

R-2026 as a guide order

Franklin D. Roosevelt

PAN AMERICAN PETROLEUM CORPORATION

OIL AND GAS BUILDING P. O. BOX 1410

FORT WORTH, TEXAS-76101

D. L. RAY
DIVISION ENGINEER

July 12, 1968

58 JUL 22

File: CHF-367-986.510.1

Subject: Case 3804
Pan American Horton Federal Lease
Pressure Maintenance Hearing
Milnesand (San Andres) Pool
Roosevelt County, New Mexico

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico 87501

Attention: Mr. Elvis Utz

Gentlemen:

As requested of Mr. George Ford by Mr. Elvis Utz on July 10, 1968, during Case No. 3804 held to consider Pan American's application for a pressure maintenance project on our Horton Federal Lease, Milnesand (San Andres) Pool, Roosevelt County, New Mexico, we are furnishing attached a tabulation of reservoir pressure versus gas compressibility factors for this San Andres reservoir. We ask that this data be used in preparing an order for this pressure maintenance project.

Yours very truly,

D. L. Ray

DCW:mp
Attachments

ATTACHMENT I
GAS COMPRESSIBILITY FACTOR
PAN AMERICAN PETROLEUM CORPORATION
MILNESAND (SAN ANDRES) POOL
ROOSEVELT COUNTY, NEW MEXICO
HORTON FEDERAL LEASE

Pressure PSIG	Z
0	.998
50	.990
100	.970
150	.950
200	.930
250	.905
300	.890
350	.875
400	.855
450	.835
500	.815
550	.795
600	.775
650	.755
700	.735
750	.720
800	.700
850	.675
900	.650
950	.630
1000	.610
1050	.590
1100	.570
1150	.555
1200	.540
1250	.525
1300	.510
1350	.500
1400	.490
1450	.482
1500	.480
1550	.482
1600	.485

Pressure Base 15.025 PSI
Reservoir Temp. 115° F or 575° R

NEW MEXICO OIL CONSERVATION COMMISSION

Examiner Hearing

Santa Fe, NEW MEXICOHearing Date JULY 10, 1968 TIME: 9 A.M.

NAME	REPRESENTING	LOCATION
Borles Kelly	White Oil Prod & Supply	S. F.
GUY T. DUELL	PAN AM	FT. WORTH
GEORGE FORD	✓ ✓	✓ ✓
E. m. Pangle	Atlantic Richfield Co.	Roswell
Jack Beards	" " "	Roswell
James H. Hinkle	" " "	Roswell
N DuHammie	RW Byram	SF
A. Lasee	H & S Oil	Artesia
P. L. Heinsch	H & S Oil	Artesia
Bill Kessler	Gulf	Roswell
Lonnie C. Smith	"	"

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. 3743
Order No. R-3401

APPLICATION OF BENSON-MONTIN-GREER
DRILLING CORPORATION FOR A PRESSURE
MAINTENANCE PROJECT, RIO ARRIBA
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 3, 1968,
at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 11th day of April, 1968, the Commission, a
quorum being present, having considered the testimony, the record,
and the recommendations of the Examiner, 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, Benson-Montin-Greer Drilling Corp-
oration, seeks authority to institute a pressure maintenance
project in its Canada Ojitos Unit Area, West Puerto Chiquito-
Mancos Oil Pool, Rio Arriba County, New Mexico, by the injection
of gas into the Niobrara member of the Mancos shale through its
Canada Ojitos Unit Well No. 2 (K-13), located in Unit K of Sec-
tion 13, Township 25 North, Range 1 West, NMPM, Rio Arriba County,
New Mexico.

(3) That initially the project area should comprise only
the following-described area in Rio Arriba County, New Mexico:

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CASE No. 3743

Order No. R-3401

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM

Sections 10 and 11: All

Section 13: W/2

Sections 14 and 15: All

Section 16: E/2

Section 23: N/2

Section 24: NW/4

(4) That a pressure maintenance project comprising the above-described area is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(5) That the applicant further seeks the promulgation of special rules and regulations governing said pressure maintenance project, and the establishment of an administrative procedure whereby said project area may be expanded for good cause shown and whereby additional wells in the project area may be converted to gas injection.

(6) That Special rules and regulations for the operation of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the Canada Ojitos Unit Area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the West Puerto Chiquito-Mancos Oil Pool until such time as the well has experienced a substantial response to gas injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the West Puerto Chiquito-Mancos Oil Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant, Benson-Montin-Greer Drilling Corporation, is hereby authorized to institute a pressure maintenance project in its Canada Ojitos Unit Area, West Puerto Chiquito-Mancos Oil Pool, Rio Arriba County, New Mexico, to be designated

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as the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, by the injection of gas into the Niobrara member of the Mancos shale through the following-described well in Rio Arriba County, New Mexico:

Canada Ojitos Unit Well No. 2 (K-13),
located in Unit K of Section 13, Township 25 North, Range 1 West, NMPM.

(2) That Special Rules and Regulations governing the operation of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, Rio Arriba County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
BMG WEST PUERTO CHIQUITO-MANCOS PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area in Rio Arriba County, New Mexico, described as follows:

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM
Sections 10 and 11: All
Section 13: W/2
Sections 14 and 15: All
Section 16: E/2
Section 23: N/2
Section 24: NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

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RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 320-acre proration unit shall be top unit allowable for the West Puerto Chiquito-Mancos Oil Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the West Puerto Chiquito-Mancos Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the West Puerto Chiquito-Mancos Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the Canada Ojitos Unit Area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until such time as the well receives a substantial response to gas injection. When such a response has occurred, the well shall be permitted to produce up to two times top unit allowable for the pool. Production of such well at a higher rate shall be authorized only after notice and hearing. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the West Puerto Chiquito-Mancos Oil Pool except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected if any, into the West Puerto Chiquito-Mancos Oil Pool

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within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to

be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

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RULE 9. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 10. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas will be confined to the Niobrara member of the Mancos shale.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

RULE 11. That the subject pressure maintenance project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations insofar as said rules are not inconsistent with the rules prescribed by this order.

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Order No. R-3401

(3) That allowables to all wells in the Canada Ojitos Unit Area but outside the limits of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project Area as defined herein shall be assigned and produced in accordance with the applicable Commission Rules and Regulations.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

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

S E A L

esr/

PAN AMERICAN PETROLEUM CORPORATION

OIL AND GAS BUILDING

P. O. BOX 1410

FORT WORTH, TEXAS-76101

D. L. RAY
DIVISION ENGINEER

June 10, 1968

File: GHF-292-986.510.1

Case 3804

Subject: Pressure Maintenance Project
R. E. Horton Federal Lease
Milnesand-San Andres Pool
Roosevelt County, New Mexico

Mr. A. L. Porter (3)
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Sir:

Pan American Petroleum Corporation respectfully requests that a hearing be scheduled to consider our application for a pressure maintenance project in the Milnesand-San Andres Pool on our R. E. Horton Federal Lease located in Sections 29, 30 and 31, T8S, R35E, Roosevelt County, New Mexico. We will request approval to initiate water injection operations into the San Andres formation in our R. E. Horton Federal Well No. 30 located in Unit K, Section 29. We will also request that R. E. Horton Federal Well No. 31 located in Unit M, Section 29, currently authorized as a salt water disposal well, be reclassified as an injection well in the proposed pressure maintenance project.

A plat of the proposed project area, schematic diagrams, well logs for each injection well, and a pertinent data sheet are attached.

Yours very truly,

D. L. Ray

DGW:mp
Attachments

DOCKET MAILED

6/27/68

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. 3555
Order No. R-3229

APPLICATION OF COASTAL STATES GAS
PRODUCING COMPANY FOR A PRESSURE
MAINTENANCE EXPANSION, LEA COUNTY,
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 26, 1967,
at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 3rd day of May, 1967, the Commission, a
quorum being present, having considered the testimony, the record,
and the recommendations of the Examiner, 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 by Order No. R-3033, entered in Case No. 3366 on
February 3, 1966, Coastal States Gas Producing Company was
authorized to institute a pilot pressure maintenance project
designated the Coastal States Flying "M" Pressure Maintenance
Project in the Flying "M" San Andres Pool, Lea County, New Mexico,
by the injection of water into the San Andres formation through
three injection wells in Sections 15, 21, and 33, Township 9
South, Range 33 East, NMPM, Lea County, New Mexico.

(3) That by Administrative Order PMX No. 23, dated
December 27, 1966, Coastal States Gas Producing Company was
authorized to expand said project by the conversion to water
injection of its FM "B" Well No. 3 located in Unit F of Section
17, Township 9 South, Range 33 East, NMPM, Lea County, New Mexico.

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(4) That Coastal States Gas Producing Company is the operator of the Flying "M" San Andres Unit approved by Order No. R-3220 on April 26, 1967.

(5) That the applicant, Coastal States Gas Producing Company, seeks authority to expand the pressure maintenance project in its Flying "M" San Andres Unit by the injection of water into the San Andres formation through four additional injection wells located in Sections 16, 20, 22, and 29, Township 9 South, Range 33 East, NMPM, Lea County, New Mexico.

(6) That a pressure maintenance project comprising the Flying "M" San Andres Unit Area is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(7) That the applicant further seeks the promulgation of special rules and regulations governing said pressure maintenance project, and the establishment of an administrative procedure whereby additional wells in the project area may be converted to water injection.

(8) That special rules and regulations for the operation of the Coastal States Gas Producing Company Flying "M" San Andres Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the Flying "M" San Andres Unit Area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Flying "M" San Andres Pool until such time as the well has experienced a substantial response to water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Flying "M" San Andres Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

(9) That Order No. R-3033 and Administrative Order PMX No. 23 should be superseded.

IT IS THEREFORE ORDERED:

(1) That Order No. R-3033 and Administrative Order PMX No. 23 are hereby superseded.

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(2) That the applicant, Coastal States Gas Producing Company, is hereby authorized to operate a pressure maintenance project in its Flying "M" San Andres Unit Area, Flying "M" San Andres Pool, Lea County, New Mexico, to be designated as the Coastal States Gas Producing Company Flying "M" San Andres Pressure Maintenance Project, by the injection of water into the San Andres formation through the following-described wells in Township 9 South, Range 33 East, NMPM, Lea County, New Mexico:

Coastal States Gas Producing Company

Flying "M" San Andres Unit Tract 11, Well No. 1,
located in Unit L of Section 15;

Flying "M" San Andres Unit Tract 5, Well No. 2,
located in Unit D of Section 16;

Flying "M" San Andres Unit Tract 3, Well No. 3,
located in Unit F of Section 17;

Flying "M" San Andres Unit Tract 12, Well No. 5,
located in Unit F of Section 20;

Flying "M" San Andres Unit Tract 17, Well No. 2,
located in Unit L of Section 22;

Flying "M" San Andres Unit Tract 1-A, Well No. 1,
located in Unit B of Section 29; and

Flying "M" San Andres Unit Tract 1-B, Well No. 4,
located in Unit D of Section 33.

(3) That Special Rules and Regulations governing the operation of the Coastal States Gas Producing Company Flying "M" San Andres Pressure Maintenance Project, Lea County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
COASTAL STATES GAS PRODUCING COMPANY
FLYING "M" SAN ANDRES PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Coastal States Gas Producing Company Flying "M" San Andres Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

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LEA COUNTY, NEW MEXICO

TOWNSHIP 9 SOUTH, RANGE 33 EAST, NMPM

Section 15: W/2 W/2

Section 16: All

Section 17: All

Section 20: E/2 and E/2 NW/4

Section 21: All

Section 22: W/2 W/2

Section 27: W/2 NW/4

Section 28: N/2, SW/4, and W/2 SE/4

Section 29: E/2 and E/2 W/2

Section 32: NE/4 and E/2 NW/4

Section 33: W/2 NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on an 80-acre proration unit shall be top unit allowable for the Flying "M" San Andres Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the

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well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of two times top unit allowable for the pool. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

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P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_{w \text{ inj}} - V_{w \text{ prod}}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^\circ}{T_r} \times \frac{1}{Z}$$

where:

- E_g = Average daily gas equivalent of net water injected, cubic feet
- $V_{w \text{ inj}}$ = Average daily volume of water injected, barrels
- $V_{w \text{ prod}}$ = Average daily volume of water produced, barrels
- 5.61 = Cubic foot equivalent of one barrel of water
- P_a = Average reservoir pressure at mid-point of the pay-zones of the pool in the project area, psig + 14.0, as determined from most recent survey
- 15.025 = Pressure base, psi
- 520° = Temperature base of 60°F expressed as absolute temperature
- T_r = Reservoir temperature of 115°F expressed as absolute temperature (575°R)

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Z = Compressibility factor from analysis of Flying "M" San Andres gas at average reservoir pressure, P_a , interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.986	500	.847	1000	.694
100	.970	600	.816	1100	.663
200	.940	700	.786	1200	.633
300	.909	800	.755		
400	.878	900	.724		

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Southeast New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

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(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the San Andres formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

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

S E A L

esr/

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. 2317
Order No. R-2026

APPLICATION OF PAN AMERICAN PETROLEUM
CORPORATION FOR A PRESSURE MAINTENANCE
PROJECT IN THE ~~HORSESHOE-GALLUP~~ OIL
POOL, ~~SAN JUAN~~ COUNTY, NEW MEXICO, AND
FOR SPECIAL RULES GOVERNING THE OPERA-
TION OF SAID PROJECT.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on ~~June 28~~, 1961, 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 13th day of July, 1961, 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, Pan American Petroleum Corporation, proposes to institute a pressure maintenance project in the ~~Horse-shoe-Gallup~~ Oil Pool in Township ~~30 North~~, Range ~~16 West~~, ~~San Juan~~ County, New Mexico, by the injection of water into the ~~Gallup~~ formation through ~~26~~ wells initially, all of which wells are within the proposed project area.

(3) That the proposed pressure maintenance project, to be known as the ~~Northeast Hogback~~ Pressure Maintenance Project, includes lands formerly designated by Order No. R-1494 as part of the Northeast Hogback Unit.

(4) That the applicant proposes that the Special Rules and Regulations to be established for the ~~Northeast Hogback~~ Pressure Maintenance Project be identical with the rules established by Order No. ~~R-1494~~ for The Atlantic Refining Company ~~Horsehoe-Gallup~~ Pressure Maintenance Project.

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(5) That such identical rules should be established in order to prevent conflict in the event the two projects eventually merge.

IT IS THEREFORE ORDERED:

(1) That the applicant, Pan American Petroleum Corporation, is hereby authorized to institute a pressure maintenance project in the ~~Horseshoe-Gallup~~ Oil Pool, ~~San Juan~~ County, New Mexico, by the injection of water into the ~~Gallup~~ formation through the following-described wells in Township ~~30-North~~, Range 16 ~~West~~:

PAN AMERICAN PETROLEUM CORPORATION

Northeast Hogback Unit Well No. 4, Unit J, Section 14
Northeast Hogback Unit Well No. 6, Unit B, Section 15
Northeast Hogback Unit Well No. 10, Unit E, Section 14
Northeast Hogback Unit Well No. 11, Unit F, Section 14
Northeast Hogback Unit Well No. 13, Unit E, Section 13
Northeast Hogback Unit Well No. 14, Unit I, Section 14
Northeast Hogback Unit Well No. 16, Unit K, Section 13
Northeast Hogback Unit Well No. 17, Unit M, Section 13
Northeast Hogback Unit Well No. 20, Unit B, Section 24
Northeast Hogback Unit Well No. 21, Unit D, Section 15
Northeast Hogback Unit Well No. 22, Unit G, Section 15
Northeast Hogback Unit Well No. 23, Unit B, Section 10
Northeast Hogback Unit Well No. 25, Unit D, Section 11
Northeast Hogback Unit Well No. 29, Unit F, Section 11
Northeast Hogback Unit Well No. 30, Unit L, Section 10
Northeast Hogback Unit Well No. 32, Unit L, Section 11
Northeast Hogback Unit Well No. 37, Unit P, Section 10

EL PASO NATURAL GAS PRODUCTS COMPANY

Williams Well No. 2, Unit P, Section 11
Williams Well No. 3, Unit J, Section 11

ABRAHAM

Federal Well No. 3, Unit B, Section 14

(2) That Special Rules and Regulations governing the operation of the ~~Northeast Hogback~~ Pressure Maintenance Project, ~~San~~ ~~Juan~~ County, New Mexico, are hereby promulgated, as follows:

SPECIAL RULES AND REGULATIONS

Milnes and Norton FOR THE
NORTHEAST HOGBACK PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the ~~Northeast Hogback~~ Pressure Maintenance Project, hereinafter referred to as the Project, shall

comprise the following-described acreage in San Juan County, New Mexico:

TOWNSHIP 30 NORTH, RANGE 16 WEST, NMPM

Section 10: E/2 and SW/4

Section 11: SW/4 NE/4, W/2 and the SE/4

Section 12: W/2 SW/4

Section 13: SW/4, W/2 NW/4 and the W/2 SE/4

Section 14: N/2, N/2 SW/4 and the SE/4

Section 15: NE/4 and the N/2 NW/4

Section 23: NE/4 NE/4

Section 24: NW/4 NE/4 and the N/2 NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Horse-shoe-Gallup Oil Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the ~~Horseshoe-Gallup~~ Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

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RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the ~~Horseshoe-Gallup~~ Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of two times top unit allowable for the pool. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the ~~Horseshoe-Gallup~~ Oil Pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the ~~Horseshoe-Gallup~~ Oil Pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

- A_{adj} = the well's daily adjusted allowable
 TUA = top unit allowable for the pool
 F_a = the well's acreage factor
 P_g = average daily volume of gas produced by the well during the preceding month, cubic feet
 I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet
 P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the ~~Horseshoe-Gallup~~ Oil Pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess

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of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_w \text{ inj} - V_w \text{ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^\circ}{T_r} \times \frac{1}{Z}$$

where:

- E_g = Average daily gas equivalent of net water injected, cubic feet
- $V_w \text{ inj}$ = Average daily volume of water injected, barrels
- $V_w \text{ prod}$ = Average daily volume of water produced, barrels
- 5.61 = Cubic foot equivalent of one barrel of water
- P_a = Average reservoir pressure at mid-point of the pay-zones of ~~Horseshoe-Gallup~~ Oil Pool in project area, psig + ~~12.01~~, as determined from most recent survey ~~13.12~~
- 15.025 = Pressure base, psi
- 520° = Temperature base of 60°F expressed as absolute temperature
- T_r = Reservoir temperature of ~~97.9~~ expressed as absolute temperature (~~547.9~~)
- Z = Compressibility factor from analysis of ~~Horseshoe-Gallup~~ gas at average reservoir pressure, P_a , interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	550	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has

been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the Pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the Project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the ~~Gallup~~ formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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CASE No. 2317
Order No. R-2026

DONE at Santa Fe, New Mexico, on the day and year herein-
above designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EDWIN L. MECHEM, Chairman

E. S. WALKER, Member

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

S E A L

esr/

DOCKET: EXAMINER HEARING - WEDNESDAY - JULY 10, 1968

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, or
A. L. Porter, Jr., Alternate Examiner:

- CASE 3800: Application of Depco, Inc. for salt water disposal, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the San Andres and possibly other formations in its State 647 Well No. 82 located in Unit F of Section 27, Township 18 South, Range 28 East, Artesia Pool, Eddy County, New Mexico, in the open-hole interval from 2421 feet to 2926 feet.
- CASE 3801: Application of H & S Oil Company for an amendment to Order No. R-3357, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-3357, which authorized a waterflood project in the West Artesia Grayburg Unit Area, Artesia Pool, Eddy County, New Mexico, to delete the water injection wells previously authorized in Units H and P of Section 7, Units D, F, H, J, and L of Section 8, and Unit D of Section 17, and to authorize for water injection certain wells in Unit I of Section 7 and Units C, E, G, K, and M, of Section 8, all in Township 18 South, Range 28 East.
- CASE 3802: Application of Atlantic Richfield Company for a unit agreement, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of the West Red Lake Unit Area comprising 1,237 acres, more or less, of Federal and Fee lands in Township 18 South, Range 27 East, Red Lake Queen-Grayburg-San Andres Pool, Eddy County, New Mexico.
- CASE 3803: Application of Gulf Oil Corporation for an amendment to Order No. R-3345, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-3345, which authorized a waterflood project in its Stuart Langlie Mattix Unit Area, Langlie-Mattix Pool, Lea County, New Mexico, to delete the water injection wells previously authorized in Unit M of Section 2, Units A, C, & I of Section 10, and Unit C of Section 11, all in Township 25 South, Range 37 East, and to authorize for water injection four wells at the following unorthodox locations in Section 10: a well 100' from the North line and 1650' from the West line; a well 100' from the North line and 660' from the East line; a well 1315' from the North line and 100' from the West line; and a well 1420' from the South line and 100' from the East line.

July 10, 1968

Docket No. 20-68 - Examiner Hearing

CASE 3804: Application of Pan American Petroleum Corporation for a pressure maintenance project, Roosevelt County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a pressure maintenance project by the injection of water into the San Andres formation through two wells located in Units K and M of Section 29, Township 8 South, Range 35 East, Milnesand-San Andres Pool, Roosevelt County, New Mexico. Applicant further seeks the designation of a project area and the promulgation of rules governing said project, and the reclassification of the well in Unit M of Section 29 from a salt water disposal well to a pressure maintenance project injection well.

CASE 3805: Application of Benson-Montin-Greer Drilling Corporation and Lloyd B. Taylor for Pressure Interference Tests and Back Allowable, San Juan County, New Mexico. Applicants, in the above-styled cause, seek authority to extend for an additional 60-day period from July 8, 1968, the shut-in test period authorized for one well in the La Plata Gallup Oil Pool, San Juan County, New Mexico, by Commission Order No. R-3399 and to also extend the back allowable make-up period for said well. Applicants further seek authority to drill three additional La Plata oil wells in Section 6 of Township 31 North, Range 13 West, and Sections 31 and 32, Township 32 North, Range 13 West, and to shut said wells in immediately after recovery of load oil and the establishment of initial potentials, for a period of up to 180 days for the purpose of conducting pressure interference tests, and to make-up the production lost during said test period at a later date. Applicants further seek a provision for administrative extension of the shut-in test period and the make-up period.

ATWOOD & MALONE
LAWYERS

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ROBERT A. JOHNSON
JOHN W. BASSETT
ROBERT E. SABIN

July 8, 1968

Mr. A. L. Porter, Jr.
Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico

RE: Examiner Hearing - July 10, 1968
Case No. 3804

Dear Mr. Porter:

In behalf of Pan American Petroleum Corporation, we enclose our Entry of Appearance in the case cited above, to be heard July 10, 1968.

With regards.

Very truly yours,

ATWOOD & MALONE


Charles F. Malone

CFM:sah

Encl.

cc: J. K. Smith, Esquire (w/encl.)
Guy Buell, Esquire (w/encl.)

MAIN OFFICE

60 JUL 9 AM 8 21

BEFORE THE OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF)
PAN AMERICAN PETROLEUM CORPORATION)
FOR A PRESSURE MAINTENANCE PROJECT) No. 3804
IN THE MILNESAND-SAN ANDRES POOL,)
ROOSEVELT COUNTY, NEW MEXICO, PRO-)
MULGATION OF RULES AND RECLASSIFICA-)
TION OF WELL.)

ENTRY OF APPEARANCE

The undersigned, Atwood & Malone, licensed to practice law in
New Mexico, hereby enter their appearance herein as co-counsel with
Guy Buell, Esquire, and Gordon Ryan, Esquire, of Fort Worth, Texas,
in behalf of Pan American Petroleum Corporation.

DATED at Roswell, New Mexico, this 8th day of July, 1968.

ATWOOD & MALONE

By 
Post Office Drawer 700
Roswell, New Mexico 88201

'68 JUL 9 AM 10 27

**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. 3804
Order No. R-3456**

**APPLICATION OF PAN AMERICAN PETROLEUM
CORPORATION FOR A PRESSURE MAINTENANCE
PROJECT, ROOSEVELT COUNTY, NEW MEXICO.**

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on July 10, 1968, at Santa Fe, New Mexico, before Examiner Elvis A. Ute.

NOW, on this 25th day of July, 1968, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, 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, Pan American Petroleum Corporation, seeks authority to institute a pressure maintenance project in the Milnesand-San Andres Pool on its R. E. Horton Federal Lease located in Sections 29, 30, and 31, Township 8 South, Range 35 East, NMPM, Roosevelt County, New Mexico, by the injection of water into the San Andres formation through its R. E. Horton Federal Well No. 30, located in Unit K, and through its R. E. Horton Federal Well No. 31, located in Unit M and currently authorized as a salt water disposal well, both in Section 29, Township 8 South, Range 35 East, NMPM, Roosevelt County, New Mexico.

(3) That the applicant further seeks the reclassification of the above-described R. E. Horton Federal Well No. 31 from a salt water disposal well to a pressure maintenance project injection well.

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(4) That the applicant further seeks the designation of the project area and the promulgation of special rules and regulations governing said project.

(5) That initially the project area should comprise only the following-described area:

ROOSEVELT COUNTY, NEW MEXICO
TOWNSHIP 8 SOUTH, RANGE 35 EAST, NMPM
Section 29: SW/4 NE/4, S/2 NW/4, E/2 SW/4,
and SW/4 SW/4
Section 30: E/2 SE/4

(6) That a pressure maintenance project, designated the Pan American Milnesand-Horton Pressure Maintenance Project, comprising the above-described area is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(7) That the aforesaid R. E. Horton Federal Well No. 31 should be reclassified as an authorized pressure maintenance project injection well.

(8) That an administrative procedure should be established whereby said project area may be expanded for good cause shown and whereby additional wells in the project area may be converted to water injection.

(9) That special rules and regulations for the operation of the Pan American Milnesand-Horton Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well on another lease producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Milnesand-San Andres Pool until such time as the well has experienced a substantial response to water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Milnesand-San Andres Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant, Pan American Petroleum Corporation, is hereby authorized to institute a pressure maintenance project

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in the Milnesand-San Andres Pool on its R. E. Horton Federal Lease, Roosevelt County, New Mexico, to be designated the Pan American Milnesand-Horton Pressure Maintenance Project, by the injection of water into the San Andres formation through the following-described wells in Section 29, Township 8 South, Range 35 East, NMPM, Roosevelt County, New Mexico:

R. E. Horton Federal Well No. 30, located in Unit K, and

R. E. Horton Federal Well No. 31, located in Unit M.

(2) That the applicant's above-described R. E. Horton Federal Well No. 31 is hereby reclassified from a salt water disposal well to a pressure maintenance project injection well.

(3) That each of the aforesaid water injection wells shall be equipped with tubing set in a packer, said packer being located within 100 feet of the uppermost perforation. Further, that the casing-tubing annulus shall be filled with an inert fluid and the annulus equipped with a pressure gauge or left open to facilitate detection of leakage in the tubing or packer.

(4) That Special Rules and Regulations governing the operation of the Pan American Milnesand-Horton Pressure Maintenance Project, Roosevelt County, New Mexico, are hereby promulgated as follows:

**SPECIAL RULES AND REGULATIONS
FOR THE
PAN AMERICAN MILNESAND-HORTON PRESSURE MAINTENANCE PROJECT**

RULE 1. The project area of the Pan American Milnesand-Horton Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

**ROOSEVELT COUNTY, NEW MEXICO
TOWNSHIP 8 SOUTH, RANGE 35 EAST, NMPM
Section 29: SW/4 NE/4, S/2 NW/4, N/2 SW/4,
and SW/4 SW/4
Section 30: E/2 SE/4**

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area,

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including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Milnesand-San Andres Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well on another lease producing from the same common source of supply shall not produce in excess of two times top unit allowable for the pool. ~~Each~~ producing well

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shall be subject to the limiting gas-oil ratio (2,000 to 1) for the pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

- A_{adj} = the well's daily adjusted allowable
- TUA = top unit allowable for the pool
- F_a = the well's acreage factor
- P_g = average daily volume of gas produced by the well during the preceding month, cubic feet
- I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet
- P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water

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injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_w \text{ inj} - V_w \text{ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^\circ}{T_r} \times \frac{1}{Z}$$

where:

- E_g = Average daily gas equivalent of net water injected, cubic feet
- $V_w \text{ inj}$ = Average daily volume of water injected, barrels
- $V_w \text{ prod}$ = Average daily volume of water produced, barrels
- 5.61 = Cubic foot equivalent of one barrel of water
- P_a = Average reservoir pressure at mid-point of the pay-zones of the pool in the project area, psig + 13.2, as determined from most recent survey
- 15.025 = Pressure base, psi
- 520° = Temperature base of 60°F expressed as absolute temperature
- T_r = Reservoir temperature of 115°F expressed as absolute temperature (575°R)
- Z = Compressibility factor from analysis of Milnesand-San Andres gas at average reservoir pressure, P_a , interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
0	.998	550	.795	1100	.570
50	.990	600	.775	1150	.555
100	.970	650	.755	1200	.540
150	.950	700	.735	1250	.525
200	.930	750	.720	1300	.510
250	.905	800	.700	1350	.500
300	.890	850	.675	1400	.490
350	.875	900	.650	1450	.482
400	.855	950	.630	1500	.480
450	.835	1000	.610	1550	.482
500	.815	1050	.590	1600	.485

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Southeast New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well on another lease producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the San Andres formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director

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may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.


(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION


DAVID F. CARGO, Chairman


GUYTON E. LARK, Member


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


esr/