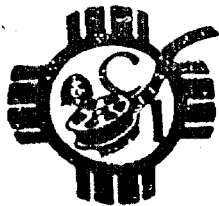


CASE 7400: TEXACO INC. FOR A PRESSURE  
MAINTENANCE PROJECT, LEA COUNTY, NEW  
MEXICO

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DOCKET MAILED

Date 10/23/81

in Cs 6248  
from pres  
by PPLE-mail  
3500 psi

will keep  
whi from  
Double Eagle

want to see  
2500 pump to start  
set @ 3000 psi would  
go to 4500 psi later

Case No.

7400

Application

Transcripts.

Small Exhibits

ETC



POST OFFICE BOX 2033  
STATE LAND OFFICE BUILDING  
SANTA FE, NEW MEXICO 87501  
(505) 827-2434

December 29, 1981

Mr. Ken Bateman  
White, Koch, Kelly & McCarthy  
Attorneys at Law  
Post Office Box 787  
Santa Fe, New Mexico

Re: CASE NO. 7400  
ORDER NO. R-6857-A

Applicant:

Texaco Inc.

Dear Sir:

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

Yours very truly,

JOE D. RAMEY  
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD	X
Artesia OCD	X
Aztec OCD	

Other

W.N.M.C.F.



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STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
DIVISION FOR THE PURPOSE OF  
CONSIDERING:

CASE NO. 7400  
Order No. R-6857-A

APPLICATION OF TEXACO INC. FOR  
A PRESSURE MAINTENANCE PROJECT,  
LEA COUNTY, NEW MEXICO.

NUNC PRO TUNC ORDER

BY THE DIVISION:

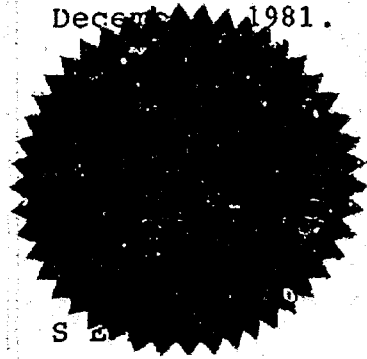
It appearing to the Division that Order No. R-6857 dated December 18, 1981, does not correctly state the intended order of the Division,

IT IS THEREFORE ORDERED:

(1) That Finding No. (2) on Page 2 of Order No. R-6857 and Ordering Paragraph No. (1) on Page 3 of said Order each be and the same is hereby corrected to describe certain wells as being in Township 17 South, Range 34 East, NMPM, Lea County, New Mexico.

(2) That the corrections set forth in this order be entered nunc pro tunc as of December 18, 1981.

DONE at Santa Fe, New Mexico on this 29th day of December, 1981.



STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

*Joe D. Ramey*  
JOE D. RAMEY,  
Director

W.N.M.C.F.



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BRUCE KING  
GOVERNOR

LARRY KEHOE  
SECRETARY

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

December 18, 1981

POST OFFICE BOX 2088  
STATE LAND OFFICE BUILDING  
SANTA FE, NEW MEXICO 87501  
(505) 827-2434

Mr. Ken Bateman  
White, Koch, Kelly, & McCarthy  
Attorneys at Law  
Post Office Box 787  
Santa Fe, New Mexico

Re: CASE NO. 7400  
ORDER NO. R-6857

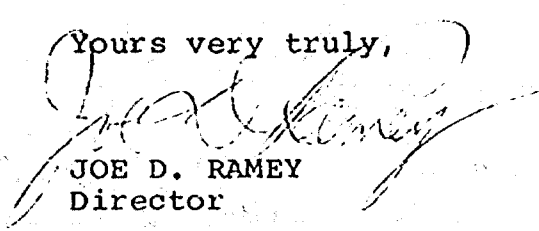
Applicant:

Texaco Inc.

Dear Sir:

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

Yours very truly,

  
JOE D. RAMEY  
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD ☒  
Artesia OCD ☒  
Aztec OCD ☐

Other ☐

W.N.M.C.F.



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STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
DIVISION FOR THE PURPOSE OF  
CONSIDERING:

CASE NO. 7400  
Order No. R-6857

APPLICATION OF TEXACO INC. FOR  
A PRESSURE MAINTENANCE PROJECT,  
LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 4, 1981, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 18th day of December, 1981, the Division Director, 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 Division has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Texaco, Inc., seeks authority to institute a pressure maintenance project in its North Vacuum Abo West Unit Area, North Vacuum-Abo Pool, Lea County, New Mexico, by the injection of water into the Abo formation through the following wells:

W.N.M.C.F.



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-2-

Case No. 7400

Order No. R-6857

TOWNSHIP 15 SOUTH, RANGE 34 EAST, NMPM

<u>North Vacuum Abo West Unit Well Number</u>	<u>Unit Letter</u>	<u>Section</u>
2	F	15
4	N	15
6	H	21
7	F	22
10	N	21
11	P	21
12	N	22
16	F	28
17	H	28
18	F	27
21	P	28
22	N	27
25	L	34

(3) That there are 25 wells completed in the North Vacuum-Abo Pool in the unit area, and these wells are currently producing a total of approximately 296 barrels of oil per day, for an average daily rate of production of 11.8 barrels of oil per well.

(4) That considering the depth of the Abo reservoir in the unit area, from approximately 8700 feet to approximately 8900 feet, 11.8 barrels per day should be considered "stripper" production, and the subject project, under the provisions of Rule 701 F of the Division Rules and Regulations, should be classified as a waterflood project rather than a pressure maintenance project.

(5) That the proposed project should result in the recovery of otherwise unrecoverable oil, thereby preventing waste.

(6) That the operator should take all necessary steps to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface from injection, production, or plugged and abandoned wells.

(7) That based on the data submitted in Case No. 6248 relating to injection pressures in the North Vacuum Abo Pool, which was incorporated by reference into the record of the



W.N.M.C.F.



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-3-

Case No. 7400  
Order No. R-6857

instant case, the injection wells or injection pressurization system for the subject project should be so equipped as to limit injection pressure at the wellhead to no more than 3500 psi, but the Division Director should have authority to increase such pressure limitation, should conditions warrant.

(8) That the subject application should be approved and the project should be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations.

IT IS THEREFORE ORDERED:

(1) That the applicant, Texaco Inc., is hereby authorized to institute a waterflood project on its North Vacuum Abo West Unit Area, North Vacuum-Abo Pool, by the injection of water into the Abo formation through the following described wells in Township 15 South, Range 34 East, NMPM, Lea County, New Mexico:

<u>North Vacuum Abo West</u> <u>Unit Well Number</u>	<u>Unit</u> <u>Letter</u>	<u>Section</u>
2	F	15
4	N	15
6	H	21
7	F	22
10	N	21
11	P	21
12	N	22
16	F	28
17	H	28
18	F	27
21	P	28
22	N	27
25	L	34

(2) That injection into each of said wells shall be through internally coated tubing, set in a packer which shall be located as near as practicable to the uppermost perforation; that the casing-tubing annulus of each injection well shall be loaded with an inert fluid and equipped with an approved pressure gauge or attention-attracting leak detection device.

(3) That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing or packer in any of said injection wells, the leakage of water or oil from or around any producing well,

W.N.M.C.F.



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-4-

Case No. 7400

Order No. R-6857

or the leakage of water or oil from any plugged and abandoned well within the project area and shall take such timely steps as may be necessary or required to correct such failure or leakage.

(4) That the injection wells herein authorized and/or the injection pressurization system shall be so equipped as to limit injection pressure at the wellhead to no more than 3500 psi, provided however, the Division Director may authorize a higher surface injection pressure upon satisfactory showing that such pressure will not result in fracturing of the confining strata.

(5) That the subject waterflood project is hereby designated the North Vacuum Abo West Waterflood Project and shall be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations.

(6) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Division in accordance with Rules 706 and 1115 of the Division Rules and Regulations.

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

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



S E

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

*Joe D. Ramey*  
JOE D. RAMEY,  
Director

W.N.M.C.F.



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STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION  
STATE LAND OFFICE BLDG.  
SANTA FE, NEW MEXICO  
4 November 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Texaco, Inc., for a  
Unit Agreement, Lea County, New  
Mexico.  
and  
Application of Texaco, Inc., for a  
pressure maintenance project, Lea  
County, New Mexico.

CASE  
7399  
and  
7400

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation  
Division:

Mr. Perry Pearce, Esq.  
Legal Counsel to the Division  
State Land Office Bldg.  
Santa Fe, New Mexico 87501

For the Applicant:

Ken Bateman, Esq.  
WHITE, KOCH, KELLY, & MCCARTHY  
220 Otero Street  
Santa Fe, New Mexico 87501

W.N.M.C.F.



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2		
3	I N D E X	
4		
5	ROBERT J. ANTHONY	
6	Direct Examination by Mr. Bateman	6
7	Cross Examination by Mr. Nutter	8
8	Redirect Examination by Mr. Bateman	8
9	Recross Examination by Mr. Nutter	24
10		
11		
12		
13	E X H I B I T S	
14	<u>7399</u>	
15	Applicant Exhibit One, Unit Agreement	7
16	Applicant Exhibit Two, Letter	7
17	Applicant Exhibit Three, Letter	8
18		
19	<u>7400</u>	
20	Applicant Exhibit One, Map	9
21	Applicant Exhibit Two, Listing	10
22	Applicant Exhibit Three, Map	12
23	Applicant Exhibit Four, Log	12
24	Applicant Exhibit Five, Graph	13
25	Applicant Exhibit Six, Plat	14

W.N.M.C.F.



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E X H I B I T S

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Applicant Exhibit Seven, Map

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Applicant Exhibit Eight, Map

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Applicant Exhibit Nine, Schematic

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Applicant Exhibit Ten, Schematic

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Applicant Exhibit Eleven, Schematic

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Applicant Exhibit Twelve, Graph

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Applicant Exhibit Thirteen, Water Analysis

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Applicant Exhibit Fourteen, Water Analysis

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MR. NUTTER: Call Case Number 7399.

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MR. PEARCE: Application of Texaco, Incorporated, for a unit agreement, Lea County, New Mexico.

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MR. BATEMAN: Mr. Examiner, I'm Ken Bateman of White, Koch, Kelly, and McCarthy, appearing for the applicant, and if I might, I'd like to suggest that we hear Case 7400 combined with 7399.

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MR. NUTTER: We'll now call Case 7400.

MR. PEARCE: Application of Texaco, Incorporated for a pressure maintenance project, Lea County, New Mexico.

13

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15

MR. NUTTER: Cases Numbers 7399 and 7400 will be consolidated for purpose of testimony. Please proceed.

16

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MR. BATEMAN: Thank you. I have one witness.

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(Witness sworn.)

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MR. BATEMAN: Mr. Examiner, before we proceed, I've noticed a minor error in the publication of Case 7400. I believe there's a 40-acre tract, if I'm not mistaken in Section 33.

MR. ANTHONY: 80 acres.

W.N.M.C.F.



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MR. BATEMAN: 80 acres, excuse me, an 80-acre tract in Section 33 of Township 17 South, Range 34 East, included both in the unit and in the pressure maintenance project application.

MR. NUTTER: Well now, the 30-acre tract in Section 33 does have an injection well on it, is that correct?

MR. ANTHONY: No, sir. That injection well is in the San Andres pay.

MR. NUTTER: Well, where is the error the then, Mr. Bateman? We didn't describe the project. We described the location of the wells, the thirteen wells are located in these sections.

MR. BATEMAN: I stand corrected. I'm sorry.

MR. NUTTER: So, that are all the wells in the named sections?

MR. ANTHONY: Yes.

MR. BATEMAN: Apparently they are.

MR. NUTTER: Okay, we don't have an error, then.

MR. BATEMAN: All right, thank you.

W.N.M.C.F.



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ROBERT J. ANTHONY

being called as a witness and being duly sworn upon his oath,  
testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. BATEMAN:

Q Would you state your full name and  
place of employment for the record, please?

A My name is Robert J. Anthony. I'm  
employed by Texaco, Incorporated.

Q And in what capacity are you employed?

A I am District Reservoir Engineer,  
located in Hobbs, New Mexico.

Q And in that capacity are you familiar  
with the two applications that we have before us today?

A Yes, in my capacity I chaired the En-  
gineering Committee that developed the studies for the unit  
in question today.

Q Have you previously testified before  
the Division?

A Yes, I have.

Q And made your qualifications a matter  
of record?

A Yes, I have.



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MR. BATEMAN: I offer Mr. Anthony as an expert.

MR. NUTTER: Mr. Anthony is qualified.

Q Would you proceed, then, with what's been marked Exhibit Number One in Case Number 7399, the proposed unit agreement.

A. Exhibit Number One is the unit agreement. We have 100 percent working interest approval of this agreement. The royalty interest is owned 100 percent by the State of New Mexico.

Exhibit Number Two is a letter from the Commissioner of Public Lands approving this unit agreement as to form and content. You will note in the middle of the page there he indicated some advised changes. These changes were made, are incorporated in this unit exhibit -- unit agreement, Exhibit One, and were approved by the working interest owners.

Q Mr. Anthony, the ipso facto termination date as initially expressed has been reached, is that correct?

A. Yes. I'd like to bring your attention to Article 26, page ten, which is the ipso facto termination date; was to have expired on September 1st, 1981.

In August of 1981 Texaco approved 100

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percent working interest owner approval to extend that termination date to September 1, 1932.

Now, Exhibit Number Three, then, is a letter to the Commissioner of Public Lands apprising him of the fact that the working interest owners had extended the ipso facto termination date of this unit agreement.

Q Were Exhibit One through Three prepared by you or under your direction?

A That's correct.

MR. BATTEMAN: I offer at this time Exhibits One through Three in Case Number 7399.

MR. NUTTER: Exhibits One through Three will be admitted in evidence.

CROSS EXAMINATION

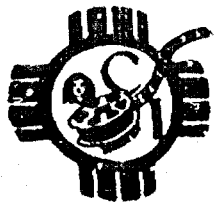
BY MR. NUTTER:

Q Mr. Anthony, now what was that last statement you said, that the Texaco and the working interests extended that termination date, and you advised the Land Office.

Has the Land Office approved that extension?

A We have not received a letter from the Land Office approving the extension of the date, nor have

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1  
2 we received a letter disapproving. We have assumed approval  
3 since they did not advise us otherwise.

4 Q But that would have to be more or less  
5 an amendment to this unit agreement, then, wouldn't it, be-  
6 cause the unit agreement states that the thing is terminated,  
7 in effect.

8 A Yes, I believe that would be the legal  
9 procedure, yes, sir.

10 Q Since you haven't received any communica-  
11 tion from the Land Commissioner as yet.

12 A No, sir, we have not.

13 MR. NUTTER: Are there any other ques-  
14 tions of Mr. Anthony? He may be excused.

15 MR. BATEMAN: Mr. Anthony is going to  
16 proceed with testimony in Case 7400.

17 MR. NUTTER: Oh, okay.

18 Q Mr. Anthony, would you then proceed with  
19 what's been marked Exhibit Number One in Cause No. -- Case  
20 Number 7400?

21 A Exhibit Number One is a map of a portion  
22 of the Vacuum Field in Lea County, New Mexico, indicating  
23 all the completions within a two-mile area of the proposed  
24 unit boundary. It also indicates the completions within a  
25 half mile radius, as indicated by the circles, around each

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proposed injection well.

You'll note at the bottom of the page an index of abbreviations indicating the zone that each of the wells is completed in.

Q There are quite a number of productive horizons in this area, then.

A. That is true.

Q Would you proceed then with Exhibit Number Two?

A. Exhibit Number Two is a listing of all of the wells within the half mile radius of the injection wells in the proposed unit. This listing gives the well name and number; the casing sizes and setting depths; and the cement program; and the top of the cement behind each string of casing. It also gives the total depth, completion interval, the location of the well, the completion date, and the initial stimulation treatment.

I'd like to call attention to the center of the page under production casing cement top. You will note some numbers there with "see remarks" beside each. These refer to some remarks on the second page of this exhibit wherein the original cement top behind the production string was not sufficiently high to protect the salt section and isolate it from the Ogallala formation near the surface here,

W.N.M.C.F.



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1 and in each of these cases a remedial procedure was performed  
2 on these wells to perforate the production casing at the in-  
3 dicated depth and bring cement from that point up to the sur-  
4 face behind the production pipe.  
5

6 This effectively isolates the salt sec-  
7 tion from the Ogallala formation at the surface.

8 MR. NUTTER: And this was done as the  
9 result of surveys --

10 A. That's right.

11 MR. NUTTER: --, or possible problems re-  
12 sulting from the other waterflood in the area, is that correct?

13 A. That's right. The bradenhead surveys  
14 indicated pressure or fluid flow from the bradenhead on these  
15 wells and they were subsequently re-cemented.

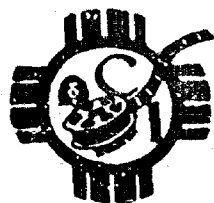
16 MR. NUTTER: Didn't have anything to do  
17 with this flood; it was a previous flood.

18 A. That's true. That's true.

19 Q. Mr. Anthony, for the record, there are  
20 other pressure maintenance projects in the immediate area,  
21 is that correct?

22 A. Yes. Almost all the San Andres in the  
23 Vacuum Field is under waterflood or pressure maintenance  
24 operations and the remainder of the Abo North Field is under  
25 pressure maintenance operations at this time.

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Q Would you proceed then with Exhibit Number Three?

A Exhibit Number Three is a structure map underlying the proposed unit area of the Upper Abo zone, indicating a structural dip to the west of approximately 100 feet per mile. The productive limits in this area have been defined by a permeability pinchout to the west. This was determined by a couple of noncommercial wells drilled just to the west of the proposed unit area.

Q Would you give the Examiner a brief development history of the proposed unit area?

A Drilling in the unit area began in late 1971 with Southland Royalty's "NV" State No. 2, which is located in the southeast quarter of the northeast quarter of Section 28. Development continued, then, through 1972 and into early 1973 throughout the area.

Q Let's proceed, then, with Exhibit Number Four.

A Exhibit Number Four is a porosity log, Sidewall Neutron Porosity Log on Texaco's New Mexico "T" State Noncontiguous Tract No. 4 Well No. 3.

This indicates the proposed unitized interval from a subsea depth of -4500 feet to -4850 feet. The completions in the proposed unit area are in the porous

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interval indicated on this log from 8800 to 8900 feet. This porosity interval does correlate with the interval being injected into the Mobil's offsetting North Vacuum Abo Unit.

Q What is the production history of the wells in the proposed unit?

A Exhibit Number Five indicates the primary production of the proposed unit area, which encompasses 2000 acres, 25 active producing wells.

As of August 1st, 1981, the cumulative primary production from this area was 1,666,000 barrels.

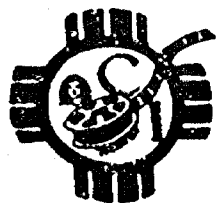
The ultimate primary for the area, as determined by the Engineering Committee from decline curve extrapolation was 2,449,000 barrels. Therefor, the remaining primary as of August 1st, 1981, is 783,000 barrels.

Our prediction of pressure maintenance recovery from this recommended unit is 1,837,000 barrels.

Q What is the present production from the wells in the area?

A July being the last date complete records were available, the producing rate was 296 barrels of oil per day. This breaks down to 12 barrels of oil per day per well, which is more than what is classified stripper; therefor, this unit area will be necessarily defined as a pressure maintenance project, also.

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Q And would you describe to the Examiner what the proposed plan of operation would be?

A The plan of operation will be to inject fresh water into the Abo North zone into 13 wells, which are presently producing wells but will be converted to injection wells, on 160-acre 5-spot pattern. This pattern is a continuation of Mobil's North Vacuum Abo Unit pattern and it is compatible with that -- with that pattern.

Q Is that shown on Exhibit Number Six?

A Yes, that is Exhibit Number Six. Now, the -- on the east -- east side of the field, or the right side of this map, Mobil has the North Vacuum Abo East Unit, which is currently injecting water.

The center portion of the map, the larger portion of the field, is Mobil's North Vacuum Abo Unit, and the proposed unit, then, is on the left side of the map, or the west side of the field, and encompasses -- then this will encompass almost all the remaining Vacuum Abo North wells; therefor the entire field will be under pressure maintenance operations if this application is approved.

MR. NUTTER: Are those other projects also classified as pressure maintenance?

A That's true.

Q Will you proceed, then, with Exhibits



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Seven and Eight?

A Exhibit Seven is a map of the proposed unit area indicating the original well numbers, or the present well numbers within the unit area.

Exhibit Eight, then, is the same map with new well numbers indicated. These numbers will become effective upon the date of unitization of this unit.

Q Would you continue then with Exhibits Nine, Ten, and Eleven, and describe the proposed completion of the injection wells?

A In this unit area we have three different types of completions, therefore we've presented three schematics here indicating those three different types.

Exhibit Number Nine being a completion wherein a 5-1/2 inch liner was hung in the 8-5/8ths inch pipe. This indicates then that we will run our 2-3/8ths plastic-coated tubing on a packer approximately 15 -- 50 feet above the perforations and the annulus then will be loaded with an inhibited fluid.

Number Ten is the same type completion; however the 5-1/2 goes all the way back to the surface.

There is one well, Gulf's Ritz State Well No. 1, which is a dual completion, is presently downhole commingled. Gulf, as operator of this well, wishes to con-

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tinue producing the San Andres completion here so that the proposed injection will be down a string of 2-1/16th tubing set in a packer 50 feet above the perforations with Gulf's San Andres production string, 2-1/16th tubing also, hung a tubing anchor at approximately 4650 feet.

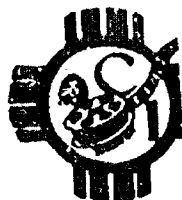
Now, since we cannot load the annulus with an inhibited fluid here, we will continuously inject corrosion inhibitor down the annulus of this well to prevent corrosion of our injection string.

Q Mr. Anthony, what injection pressures do you expect to encounter?

A In the other two active units in the area the initial pressures required to inject into this formation were about 3000 psi. Now, in Case Number 6248, which was the hearing for pressure maintenance in Mobil's North Vacuum Abo East Unit, they developed a fracture pressure for the Vacuum Abo North Field, and we would like to use those data to justify a higher than the current standard .2 psi per foot maximum injection pressure in our unit. I believe in the North Vacuum Abo East Unit they were afforded a maximum injection pressure of 3500 psi, and we would ask for that same pressure based on the information that they developed as frac pressure for this reservoir.

MR. NUTTER: What case number was that?

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6248.

MR. NUTTER: And they were authorized

3500 psi, then?

A

That is correct.

MR. NUTTER: And the rule of thumb, .2

of a pound, would give you probably about 1700 psia.

A

That is correct. That is correct. And

we feel that we could not inject more than say three to four

weeks at that -- at that pressure, and probably less. We

might not be able to inject for any length of time at all

at 1700.

MR. NUTTER: What volume of water do

you anticipate injecting into these wells?

A

We expect to average approximately 2500

barrels of water per day and our pressures will probably

start out, as I indicated, at 3000 psi, and before the flood

is depleted, it will probably reach 4500 psi. That's been

the experience of Mobil in their floods.

MR. NUTTER: That's surface pressure

you're talking about.

A

That's surface pressures I'm talking

about at all times.

Now, I will state that Texaco, as oper-

ator of the unit, will as soon as possible after injection

W.N.M.C.F.



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1  
2 is started in this unit, determine the fractpressure within  
3 the unit area and we will inject below that determined frac  
4 pressure or the maximum pressure afforded us by the Oil Con-  
5 servation Division.

6 MR. NUTTER: Now, this -- in this Case  
7 Number 6248, you say Phillips obtained that 3500 pound limit  
8 and that was in what project?

9 A In the North Vacuum Abo East Unit.

10 MR. NUTTER: Well, isn't that a Mobil  
11 project?

12 A Mobil. Did I say Phillips?

13 MR. NUTTER: Yeah, you said Phillips.

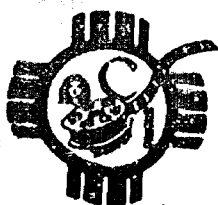
14 A I'm sorry. I'm sorry. It was -- it  
15 was Mobil. I don't know why I said Phillips.

16 MR. NUTTER: Okay. How about the central  
17 project there, the big one that they operate, what pressure  
18 are they using there?

19 A Their maximum pressure currently is  
20 4800, I understand.

21 They have, I believe, or I have heard  
22 that they have asked for permission to operate at this higher  
23 range and have shown by step rate testing that they are not  
24 fracturing the reservoir at this pressure at this late stage in  
25 life of the flood. They've been injecting since August of

W.N.M.C.F.



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19

1973.

MR. NUTTER: So they probably got in before the door was shut on injection pressures, didn't they?

A That is correct. That is correct.

MR. NUTTER: They started out with high pressures --

A Yes.

Q -- from the beginning.

A Uh-huh.

MR. NUTTER: Maybe that's why they had that survey in that other one.

A Yes.

Q Mr. Anthony, to go back a little bit, the data introduced in Case Number 6248 by Mobil, I believe, was by data obtained from the North Vacuum Abo Unit, is that correct?

A Yes, I believe they used a total of 62 step rate tests on various wells within the North Vacuum Abo -- North Vacuum Abo Unit. Some of those wells being very near the proposed unit. Well No. 220 in the North Vacuum Abo Unit was one of those wells which directly offsets our unit boundary, one 80-acre location there in --

Q That's shown on Exhibit Six, I believe, is it not?

W.N.M.C.F.



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20

1  
2 A Yes, Exhibit Six indicated that. That's  
3 in the southeast quarter of the southeast quarter of Section  
4 22. And we feel that the pressure data that they arrived  
5 at would be extrapable to our unit area, since the reservoir  
6 is quite similar.

7 Q Will you proceed then with Exhibit Num-  
8 ber Twelve?

9 A Exhibit Number Twelve is the one we were  
10 just talking about, Ken, in the -- where this --

11 Q All right, but I don't believe we've  
12 described it for the record yet.

13 A Exhibit Number Twelve is the frac pressure  
14 determination from these 62 step rate tests that Mobil ran in  
15 the North Vacuum Abo Unit. They were taken over a 3-year  
16 period starting immediately after injection was commenced in  
17 their unit.

18 Therefor the initial pressure of 3150  
19 psi would probably be the minimum pressure that we would en-  
20 counter in our unit since it is similar to the North Vacuum  
21 Abo Unit and it's about the same stage of depletion, I assume  
22 that their unit was when they started the flood.

23 Q Do you happen to have any data on what  
24 the frac pressure step test indicated on Well No. 220?

25 A Well No. 220 was tested in December of

W.N.M.C.F.



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1974. It had been injecting -- on injection for approximately 18 months. The cumulative injection was approximately 100,000 barrels.

The step rate test on that well indicated a parting pressure of 4150 psi. I don't know what the bottom hole pressure was, which certainly affects the fracture pressure of the reservoir; however, it was probably increased above the initial bottom hole pressure at the commencement of injection, but it was at 4150 psi after 18 months of injection.

MR. NUTTER: Is that all part of the record there in --

A In Case 6248.

MR. NUTTER: -- Case Number 6248?

A That is correct. That's part of the record.

MR. NUTTER: If you don't mind, Mr. Bateman, we'd like to make reference to that case in making an analysis of this case.

MR. BATEMAN: Certainly.

Q Just one further question on Exhibit Twelve. It indicates that the fracture pressure increases over time. Would you expect that to occur also in this project?

W.N.M.C.F.



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1  
2 A Yes. As we -- as we inject water into  
3 this reservoir and raise the average reservoir pressure in the  
4 area, we expect the fracture pressure of the formation to in-  
5 crease at a corresponding rate.

6 Q And what maximum pressure are you re-  
7 questing at this time?

8 A 3500 psi, as was afforded the North  
9 Vacuum Abo East Unit.

10 Q Have you obtained a water analysis of  
11 fresh water in the area?

12 A Yes. Exhibit Thirteen is a water ana-  
13 lysis of two fresh water supply wells immediately adjacent  
14 to the proposed unit area, these being Duval water supply  
15 well and the Kerr-McGee water supply well. The locations of  
16 these wells are indicated on the analysis.

17 This analysis indicates that the chloride  
18 content of the Ogallala water at date of this analysis was  
19 82 parts per million and 67 parts per million, respectively;  
20 therefor, there is no salt contamination in this area at this  
21 time.

22 Q Have you obtained a water supply for the  
23 proposed pressure maintenance project?

24 A Texaco is currently negotiating with the  
25 City of Carlsbad, the owner of the Double Eagle Water Company



W.N.M.C.F.



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1  
2 for a fresh water supply in the area. Upon completion of this  
3 contract we will purchase water from Double Eagle. This water  
4 will be from the Ogallala aquifer from Double Eagle water  
5 rights in Lea and Eddy County.

6 Exhibit Number Fourteen is a water ana-  
7 lysis of the supply water from Double Eagle's system, and an  
8 analysis of the formation water from the Vacuum Abo North  
9 Field. Under our direction Martin Water Labs of Midland,  
10 Texas, performed a compatibility test of these two waters and  
11 it indicates at the bottom of this analysis that there are  
12 no incompatibilities between these two waters that would  
13 pose any problems to our injection system.

14 Q Mr. Anthony, do you believe that the  
15 approval of this application will be in the best interests  
16 of conservation, and will protect correlative rights and  
17 prevent waste?

18 A I do.

19 Q Were Exhibits One through Fourteen pre-  
20 pared by you or under your direction?

21 A They were.

22 MR. BATEMAN: Mr. Examiner, I offer  
23 Exhibits One through Fourteen at this time and we have no  
24 further direct testimony.

25 MR. NUTTER: Exhibits One through Four-

W.N.M.C.F.



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24

teen will be admitted in evidence.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Brooks, I notice down here at the bottom of this last exhibit that the Martin Laboratories indicate that if you combine produced water with this fresh water and allow oxygen into the water that you're going to have an iron oxide precipitate unless you treat the water.

Do you intend to recycle your produced water?

A. That's true.

Q And you will treat it to avoid that?

A. We will treat the fresh water to --

Q Remove the oxygen.

A -- remove any oxygen from the fresh water. That's standard --

Q To avoid the precipitate.

A. That's right. That's standard operating procedure.

Q But you will be recycling your produced water.

A. That's true.

Q Now are the injection wells also shown

W.N.M.C.F.



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25

on Exhibit Number Two?

A. Yes, sir, I believe every completion within that circle around each injection well, including the proposed injection wells, is included.

Q Okay.

A. Yes, they are.

Q Now on those figures you gave for production figures, those were through August of '81 or beginning of August of '81?

A. Up to August 1st; through July.

Q Okay. That's at 8-1, then.

A. Yes.

Q Now what was the cum at that time?

A. 1,666,000 barrels.

Q And you estimated your total ultimate cum would be two four forty nine?

A. Yes.

Q So you predict you have remaining primary reserves of 783,000.

A. That is correct.

Q Now did you give us an estimate of what you expect on pressure maintenance to increase those?

A. That's right, we expect to recover an additional 1,837,000 barrels.

W.N.M.C.F.



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26

Q That's additional on top of the remaining primary of 783?

A That is correct.

Q All right, now you say you're producing at about 296 barrels per day. You have, what is it, 25 wells in there?

A Yes.

Q What is the range of production on the individual wells in this area?

A they run from 3 barrels a day up to maximum of 25, I believe.

The majority of the wells produce in excess of 10 barrels a day, which is normally classified as a stripper well.

Q Well, it would be at a shallow depth.

A Right.

Q I don't think I'd say 10 barrels at this depth would be stripper wells. I think you could say 12 at this depth would be considered a stripper.

A We would certainly accept that.

Q You wouldn't have an objection to this being classified as a waterflood rather than a pressure maintenance?

A No, sir, we would not. We would have

W.N.M.C.F.



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27

no objection whatsoever.

Q It's simpler to administer.

A Yes, sir, certainly is. Takes a lot less paper work.

MR. NUTTER: Are there any further questions of Mr. Anthony? He may be excused.

Do you have anything further, Mr. Bateman?

MR. BATEMAN: Nothing further, thank you.

MR. NUTTER: Does anyone have anything they wish to offer in Case 7399 and 7400, consolidated?

We'll take the cases under advisement.

(Hearing concluded.)



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SALLY W. BOYD, C.S.R.

Rt. 1 Box 193-11  
Santa Fe, New Mexico 87501  
Phone (505) 455-7409

CERTIFICATION

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

11/4 7399-7400 81  
[Signature], Examiner  
Oil Conservation Division

**INITIAL**  
**TRIAL**

[illegible]

TEXACO  
CASE NO. 7400

2

**INITIAL.**  
**THEATRE**

[illegible]

James H. Brown, Esq.

1. Original cement top 3 5'60", cement behind 5-1/2 casing from 5'60" to surface
2. Original cement top 3 2'600", cement behind 5-1/2 casing from 1'650" to surface
3. Original cement top 4 2'346", cement behind 5-1/2 casing from 2'300" to surface
4. Original cement top 3 2'6-0", cement behind 5-1/2 casing from 2'330" to surface
5. Original cement top 3 2'550", cement behind 5-1/2 casing from 1'675" to surface
6. Original cement top 3 3'400", cement behind 5-1/2 casing from 1'675" to surface
7. Original cement top 3 2'700", cement behind 5-1/2 casing from 1'775" to surface
8. Original cement top 3 3'650", cement behind 4-1/2 casing from 3'550" to surface
9. Original cement top 3 2'635", cement behind 5-1/2 casing from 2'000" to surface

**W.M.M.E.T.**



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17 16 15

20 21 22

29 28 27

32 33 34

Mobil  
-4641 "Conoco"  
Cosaka Resources  
-4608  
-4673 "Conoco"  
Southland Royalty  
-4627  
"NV"  
Exxon  
-4617  
"CO"  
-4653  
-4600  
-4627  
"AZ" Com  
Southland Royalty  
-4579  
"Conoco"  
State  
-4593  
"D"  
NCT-1  
-4558  
-4591  
-4565  
-4601 "V"  
-4633

State Gulf  
"Rills"  
Phillips  
25  
-4687  
26  
-4688 "Leo"  
State  
Texaco  
3  
-4677 "T"  
NCT-4  
2  
-4665  
Marathon  
1  
"B"  
-4662 8097  
Southland Royalty  
2  
"NV"  
-4615  
3  
-4636  
Texaco  
1  
"T"  
NCT-3  
-4614  
State  
Texaco  
20  
-4676  
NCT-2

164  
103  
139  
-4492  
144  
-4592  
5-J  
7-J  
143  
-4544  
149  
145  
-4495

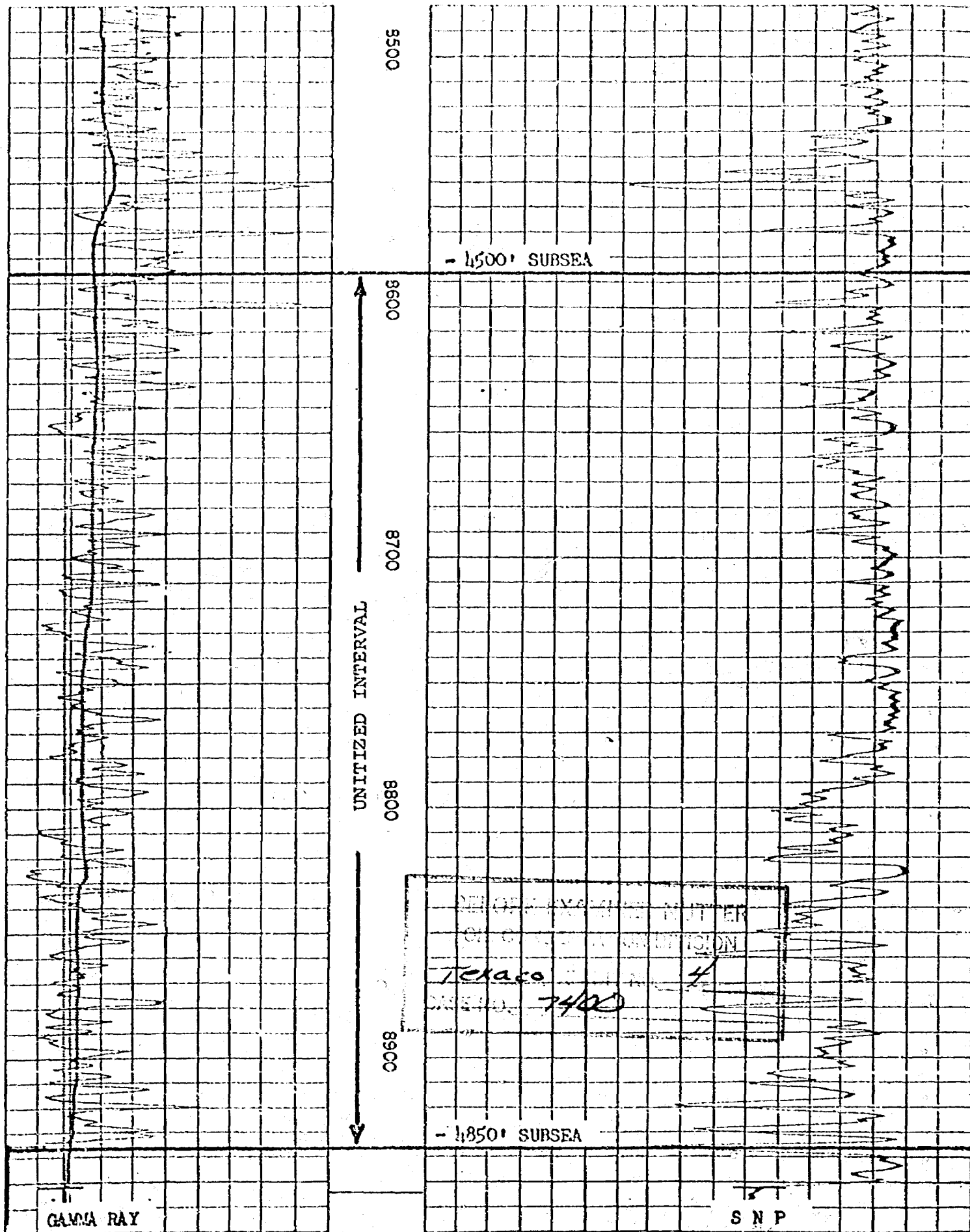
NORTH VACUUM ABO UNIT (Mobil)

-4600  
-4550  
-4500

STRUCTURE MAP DIVISION  
JAN 1960  
TEXACO  
CASE NO. 7400  
3

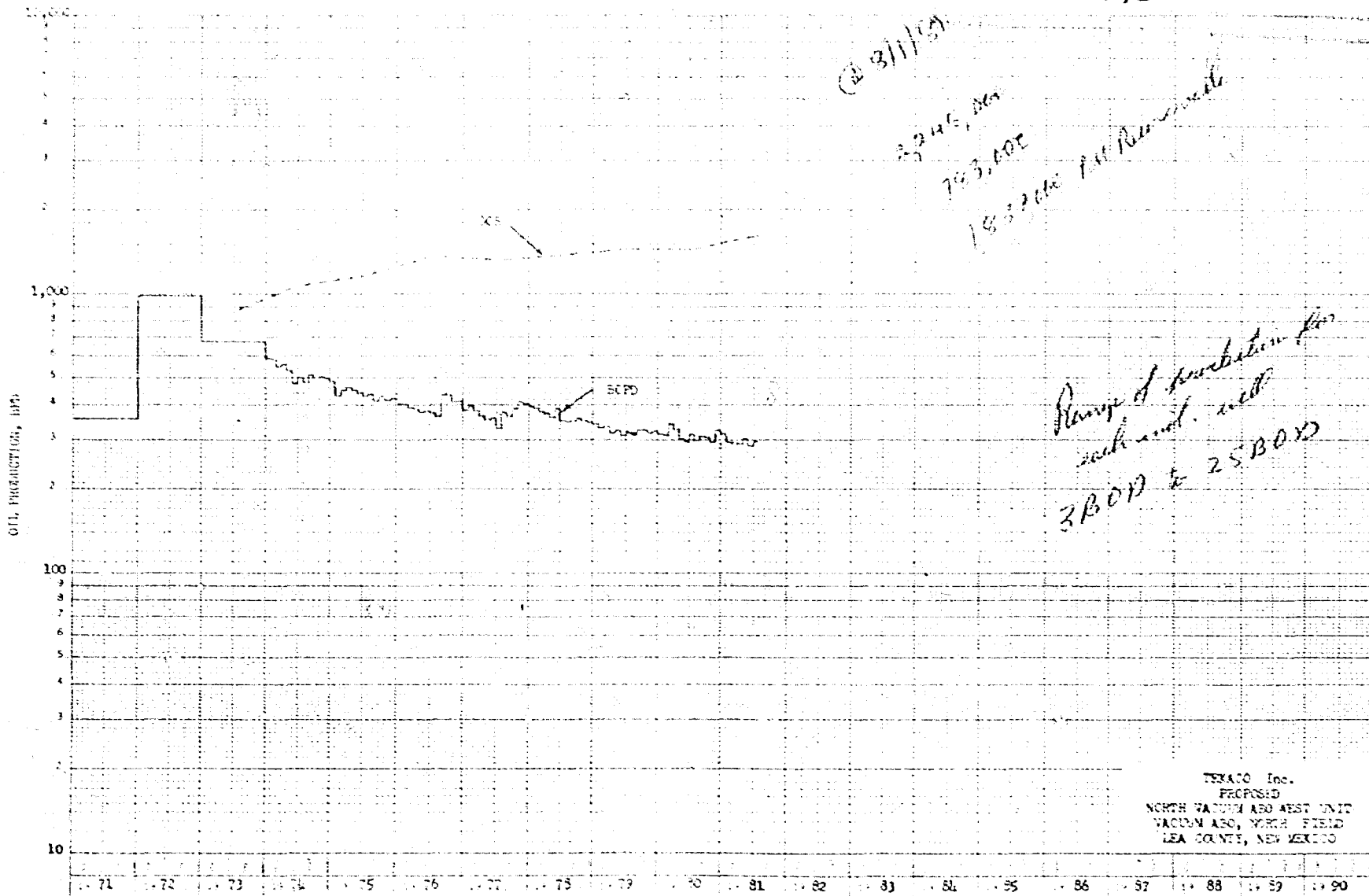
TEXACO INC.  
STRUCTURE MAP  
UPPER ABO ZONE  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO  
SCALE 1" = 2000' C.I. = 50'  
CRC  
FIGURE 8

NORTH VACUUM ABO WEST UNIT  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO  
SCALE 1" = 2000' C.I. = 50'  
CRC FIGURE 8

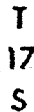


47 6850

K-E 10" STAMP BY MORGAN & LLOYD, L.L.C.



R-35-E



- TEXACO INC  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO  
Texaco  
7400  
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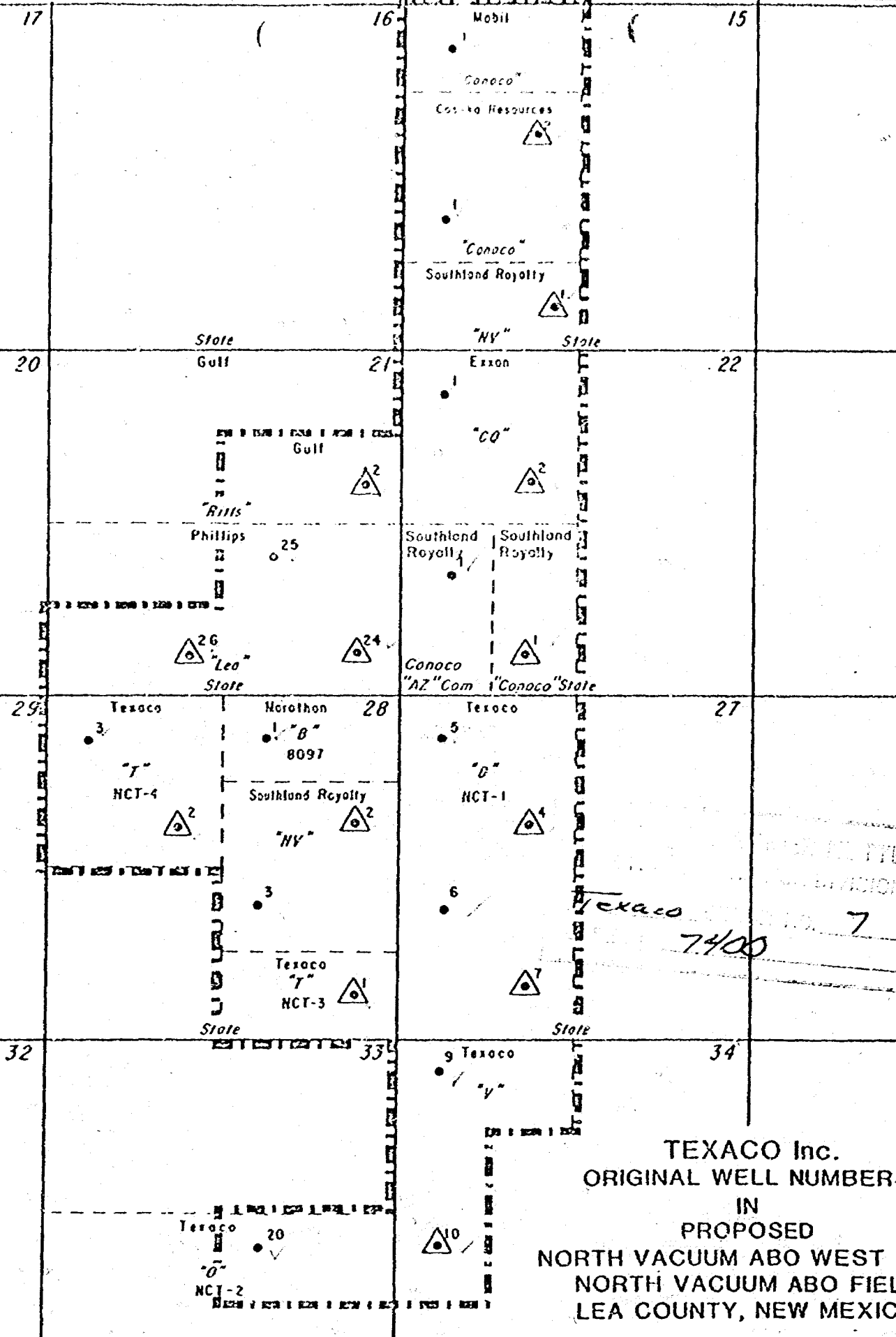
△ INJECTION WELL

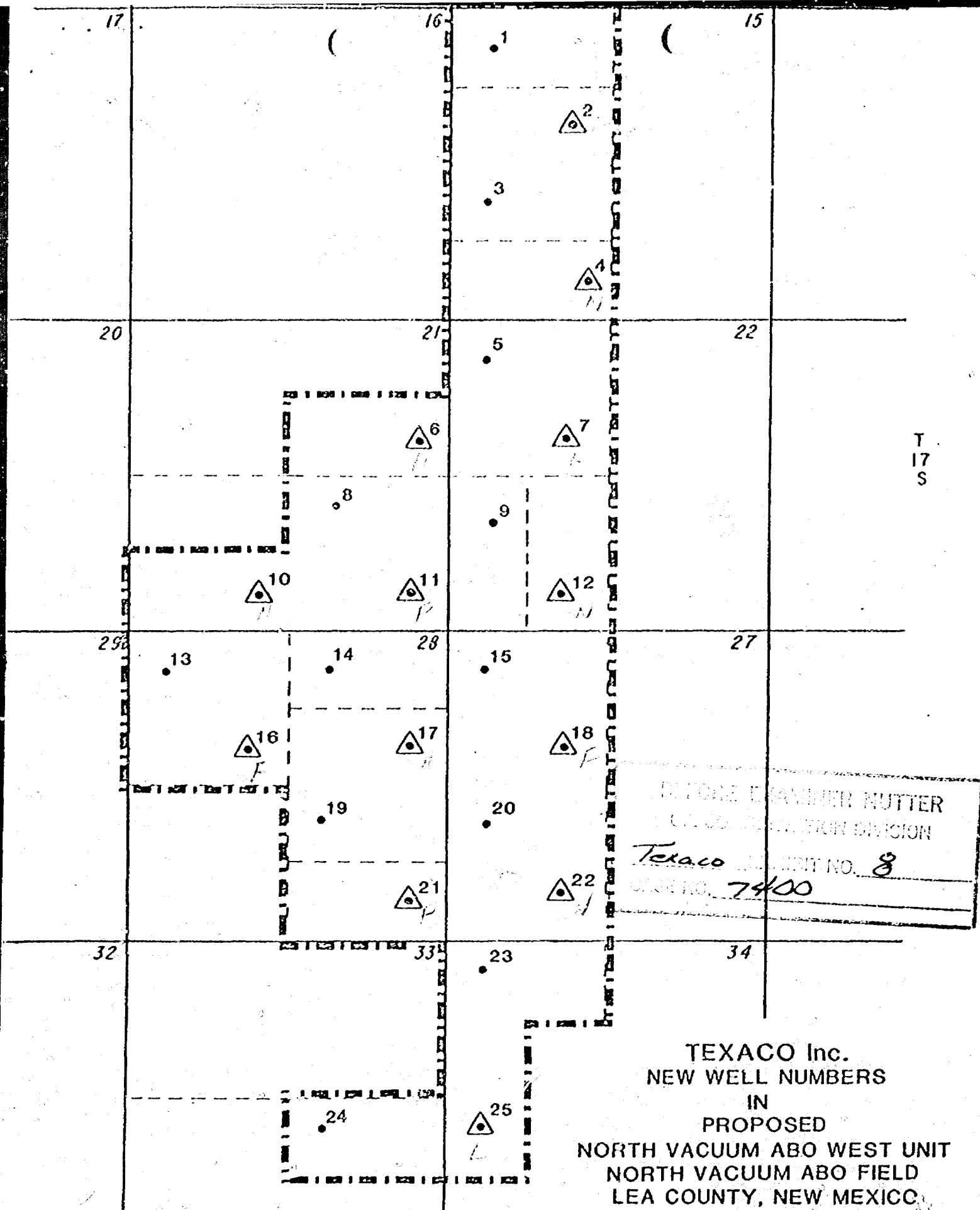
R-34-E

TEXACO Inc.  
ORIGINAL WELL NUMBERS  
IN  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO

SCALE:

0 1000 2000 3000 4000 5000





T  
17  
S

DETONE E. HAMMER NUTTER  
U.S. GEOLOGICAL SURVEY DIVISION  
Texaco UNIT NO. 8  
CASE NO. 7400

TEXACO Inc.  
NEW WELL NUMBERS  
IN  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO

△ INJECTION WELL

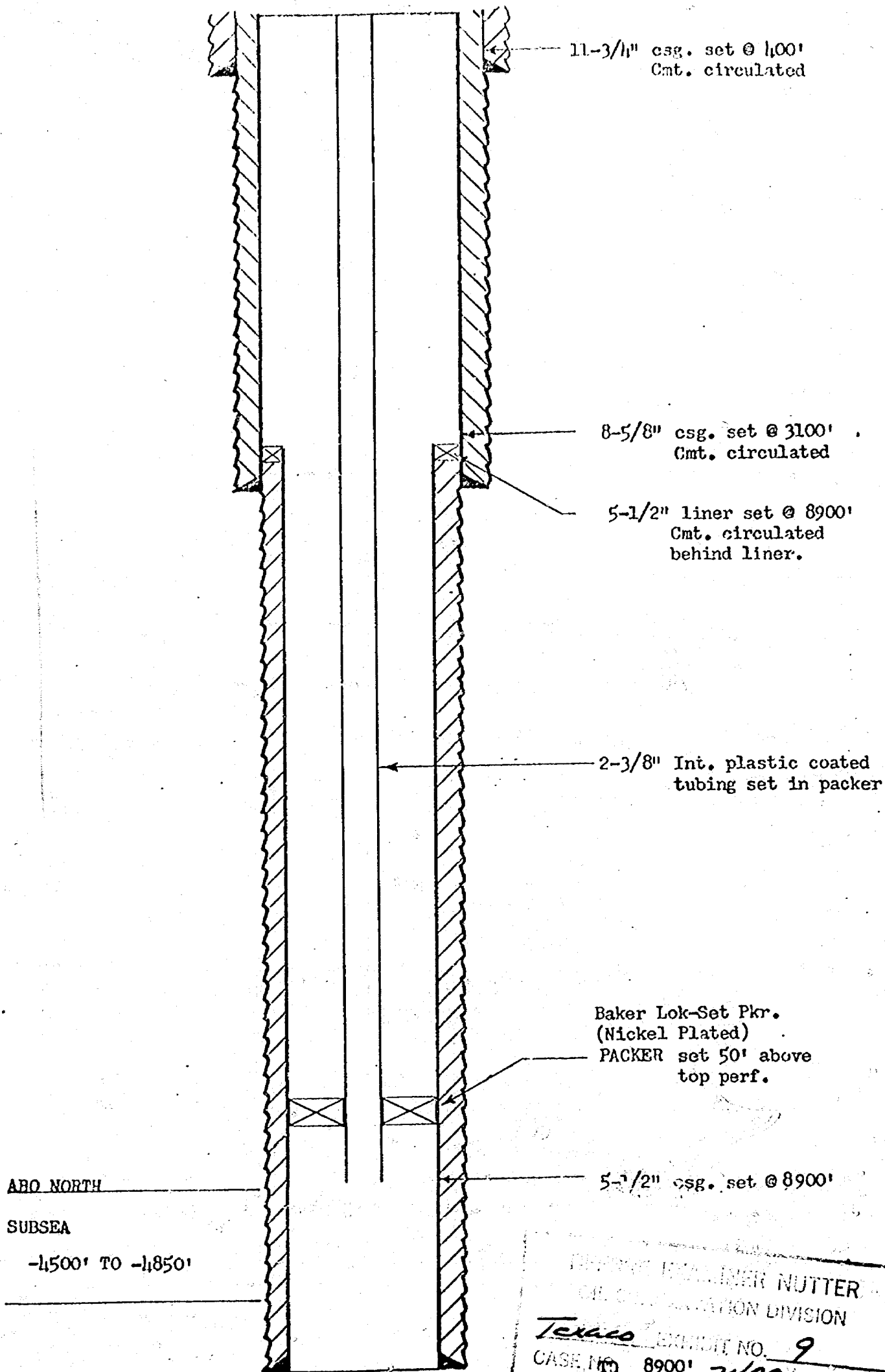
R-34-E

SCALE:  
0 1000 2000 3000 4000 5000

W.N.M.C.F.



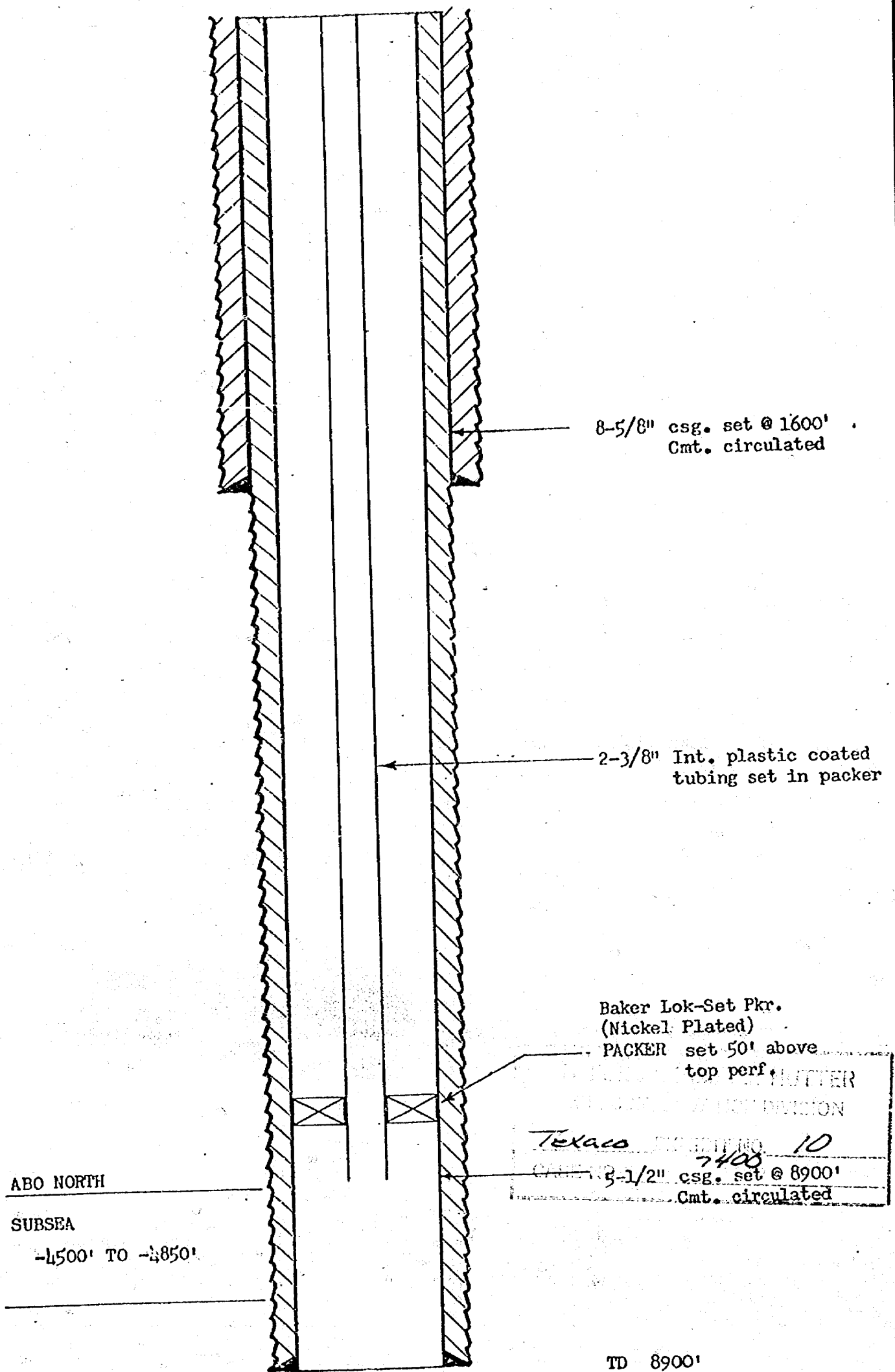
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TYPICAL INJECTION WELL

TEXACO Inc.  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
VACUUM ABO, NORTH FIELD  
LEA COUNTY, NEW MEXICO

TEXACO FIELD ENGINEER NUTTER  
CAL. DIVISION  
EXHIBIT NO. 9  
CASE NO. 8900' 7400

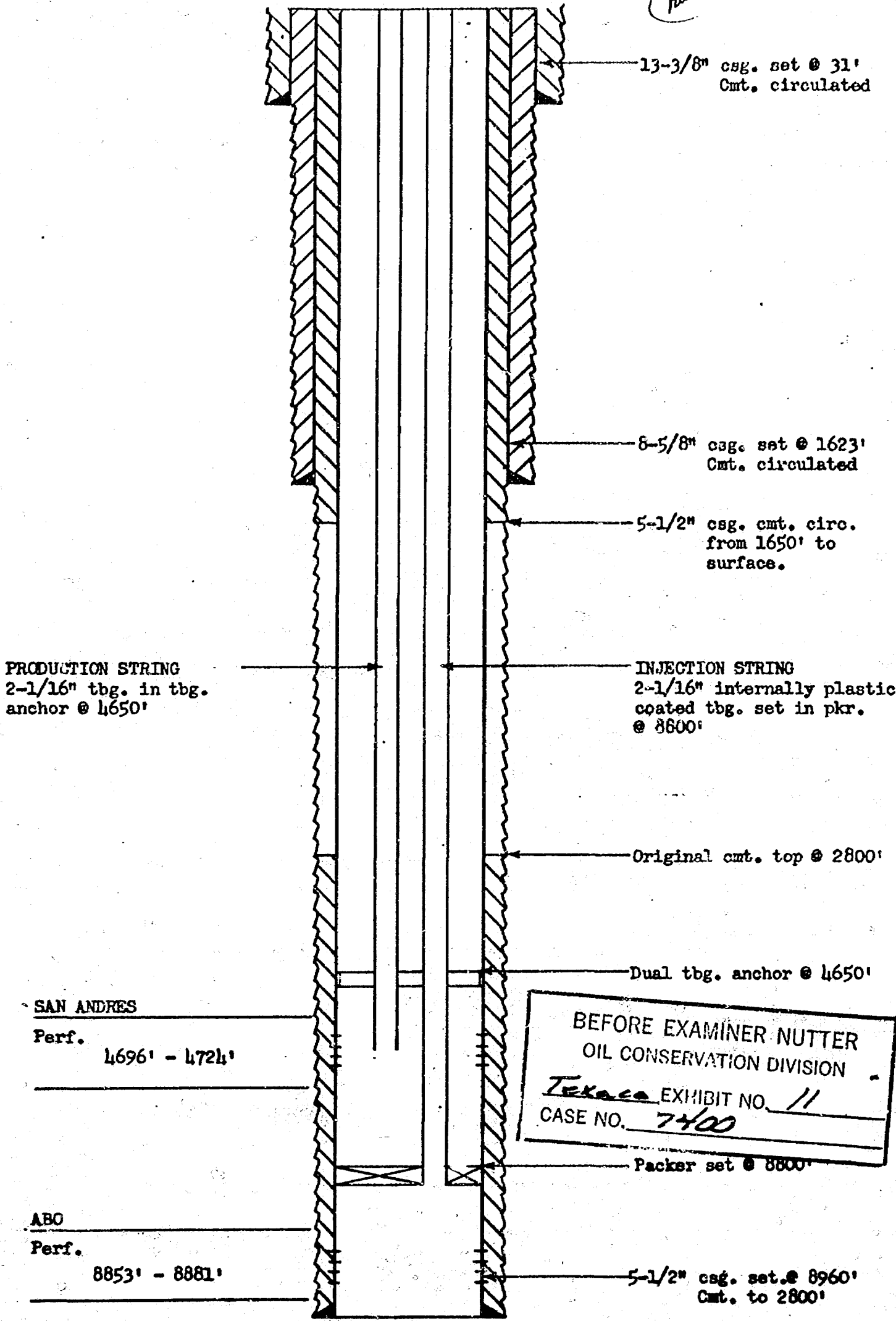


TYPICAL INJECTION WELL

TEXACO Inc.  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
VACUUM ABO, NORTH FIELD  
LEA COUNTY, NEW MEXICO



*(Ritter Gulf #1)*



BEFORE EXAMINER NUTTER  
OIL CONSERVATION DIVISION  
*Texaco* EXHIBIT NO. 11  
CASE NO. 7400

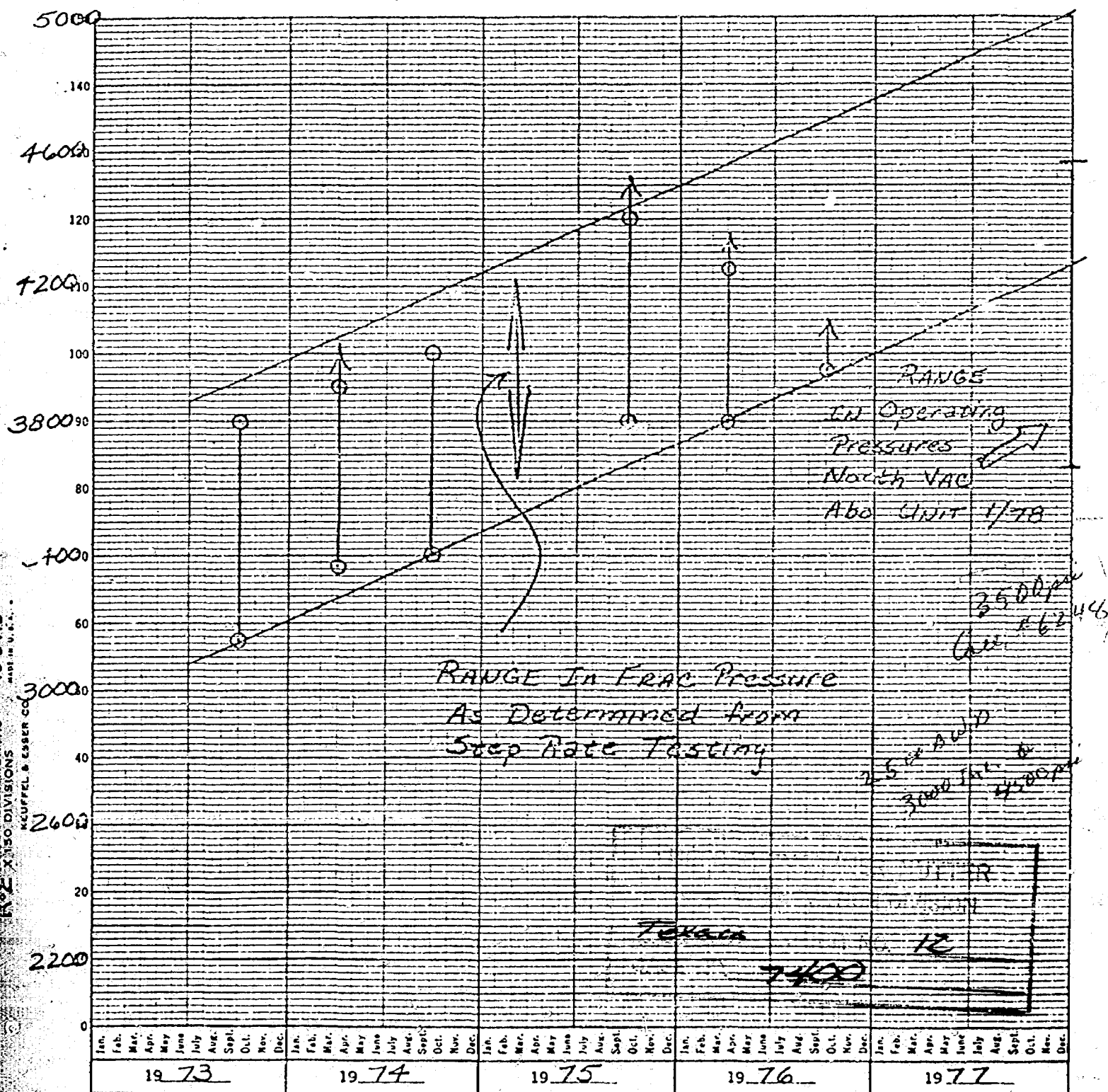
DUALLY COMPLETED INJECTOR

TEXACO Inc.  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
VACUUM ABO, NORTH FIELD  
LEA COUNTY, NEW MEXICO

RJA/CRC 10-30-81

Mobil Oil Corporation  
North Vac Abo Unit  
Frac Pressure Determination  
By Step Rate Tests

FRAC.  
Pressure



709 W. INDIANA  
MIDLAND, TEXAS 79701  
PHONE 682-4521

P. O. BOX 1468  
MONAHAN, TEXAS 79758  
PHONE 943-3234 OR 863-1040

Martin Water Laboratories, Inc

709 W. INDIANA  
MIDLAND, TEXAS 79701  
PHONE 683-4921

RESULT OF WATER ANALYSES

TO: Area Engineer  
P.O. Box 727, Lovington, NM  
LABORATORY NO. 781135  
SAMPLE RECEIVED 7-21-81  
RESULTS REPORTED 7-22-81

COMPANY Texaco, Inc. LEASE As listed

FIELD OR POOL \_\_\_\_\_

SECTION \_\_\_\_\_ BLOCK \_\_\_\_\_ SURVEY \_\_\_\_\_ COUNTY Lea STATE New Mexico

SOURCE OF SAMPLE AND DATE TAKEN:

NO. 1 Rx water - taken from Double Eagle water supply. 7-17-81

NO. 2 Produced water - taken from Texaco NM State "V" (tank battery). 7-17-81

NO. 3 Vacuum Abo, N. Field

NO. 4 \_\_\_\_\_

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES				
	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0017	1.1150		
pH When Sampled				
pH When Received	7.80	6.74		
Bicarbonate as HCO <sub>3</sub>	194	95		
Supersaturation as CaCO <sub>3</sub>	11	6		
Undersaturation as CaCO <sub>3</sub>	---	---		
Total Hardness as CaCO <sub>3</sub>	167	30,000		
Calcium as Ca	58	8,600		
Magnesium as Mg	5	2,066		
Sodium and/or Potassium	32	53,375		
Sulfate as SO <sub>4</sub>	37	1,691		
Chloride as Cl	27	102,267		
Iron as Fe	0.19	16.3		
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	353	160,094		
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler				
Hydrogen Sulfide				
Resistivity, ohms/m at 77° F.	0.0	0.0		
Suspended Oil	24.50	0.064		
Filtrable Solids as mg/l				
Volume Filtered, ml				
		Texaco		
			7400	

Results Reported As Milligrams Per Liter

Additional Determinations And Remarks

A careful comparison of the above results reveals no evidence of any incompatibility between these two waters; therefore, these results would indicate that they could either be combined on the surface for reinjection or the supply water could be injected into the producing interval represented by the produced water. This warrants clarification, however, in that if the supply water contains oxygen, then combining the waters on the surface would result in the precipitation of iron oxide and result in a potential plugging condition. This would not be considered sufficiently detrimental to prevent the injection of the supply water into the producing interval. If the waters are mixed on the surface, any oxygen in the supply water would need to be physically or chemically removed prior to mixing.

cc: Mr. Larry Schlotterback, Hobbs  
District Engineer, Hobbs

Waylan C. Martin, M. A.

Dockets Nos. 36-81 and 37-81 are tentatively set for November 19 and December 4, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - NOVEMBER 4, 1981

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

The following cases will be heard before Daniel S. Nutter, Examiner or Richard L. Starets, Alternate Examiner:

- CASE 7396: In the matter of the hearing called by the Oil Conservation Division on its own motion to permit Sentry Oil Exploration Company and Lawyers Surety Corporation to appear and show cause why Farr Well No. 1, located in Unit G of Section 6, Township 31 North, Range 34 East, Union County, New Mexico, should not be ordered plugged and abandoned in accordance with a Division-approved plugging program.
- CASE 7380: (Continued and Readvertised)
- Application of Bird Oil Corporation for an unorthodox location, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Entrada location of a well to be drilled 2110 feet from the North line and 1120 feet from the East line of Section 10, Township 22 South, Range 9 West, the SE/4 NE/4 of said Section 10 to be dedicated to the well.
- CASE 7397: Application of Belco Petroleum Corporation for downhole commingling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Atoka and Strawn production in the wellbore of its Kimbley Well No. 1, located in Unit G of Section 21, Township 23 South, Range 28 East.
- CASE 7398: Application of El Paso Natural Gas Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a Wolfcamp-Penn well, to be drilled 660 feet from the South and West lines of Section 23, Township 26 South, Range 30 East, Ross Draw Area, the S/2 of said Section 23 to be dedicated to the well.
- CASE 7399: Application of Texaco, Inc. for a Unit Agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the North Vacuum Abo West Unit Area, comprising 2000 acres, more or less, of state lands in Township 17 South, Range 34 East.
- CASE 7400: Application of Texaco, Inc. for a pressure maintenance project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a pressure maintenance project in its North Vacuum Abo West Unit Area by the injection of water into the Abo formation through 13 wells located in Sections 15, 21, 22, 27, 28 and 34, Township 17 South, Range 34 East, North Vacuum - Abo Pool.
- CASE 7401: Application of Morris R. Antweil for an unorthodox oil well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 2410 feet from the North line and 330 feet from the West line of Section 21, Township 18 South, Range 38 East, Hobbs Grayburg-San Andres Pool, the SW/4 NW/4 of said Section 21 to be dedicated to the well.
- CASE 7394: (Continued from October 21, 1981, Examiner Hearing)
- Application of Morris R. Antweil for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests from the surface to the base of the Abo formation underlying the NE/4 SW/4 of Section 5, Township 20 South, Range 38 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.
- CASE 7402: Application of MGF Oil Corporation for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Strawn formation underlying the NW/4 NW/4 of Section 5, Township 20 South, Range 39 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7403: Application of Arco Oil and Gas Company for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of the Jalmat and Langlie Mattix production in the wellbore of its E. L. Steeler WN Well No. 5, located in Unit J of Section 19, Township 23 South, Range 37 East.

CASE 7359: (Continued from October 7, 1981, Examiner Hearing)

Application of Energy Reserves Group for creation of a new gas pool and an unorthodox location, Roosevelt County, New Mexico.

Applicant, in the above-styled cause, seeks creation of a new Cisco gas pool for its Miller Com Well No. 1, located in Unit M of Section 12, Township 6 South, Range 33 East.

Applicant further seeks approval for an unorthodox location for its Miller "A" Well No. 1-Y, to be drilled 1800 feet from the South line and 1700 feet from the East line of Section 11 of the same township. The S/2 of said Section 11 to be dedicated to the well.

CASE 7383: (Continued from October 21, 1981, Examiner Hearing)

Application of Amoco Production Company for compulsory pooling, Eddy County, New Mexico.

Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Upper Pennsylvanian formation underlying the NW/4 of Section 19, Township 19 South, Range 25 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7404: Application of TXO Production Corporation for an unorthodox well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of an infill well to be drilled 2000 feet from the North line and 660 feet from the East line of Section 18, Township 21 South, Range 26 East, Catclaw Draw-Morrow gas pool.

CASE 7405: Application of Carl Schellinger for dual completion and an unorthodox location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of his Campbell Station Unit Well No. 1, to produce gas from the Abo and Pennsylvanian formations. Applicant further seeks approval of the unorthodox Pennsylvanian location of said well 660 feet from the South and West lines of Section 34, Township 9 South, Range 27 East, the S/2 of said Section 34 to be dedicated to the Pennsylvanian and the SW/4 to the Abo.

CASE 7406: Application of Depco, Inc. for compulsory pooling, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests down through the Abo formation underlying the SE/4 of Section 23, Township 5 South, Range 24 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

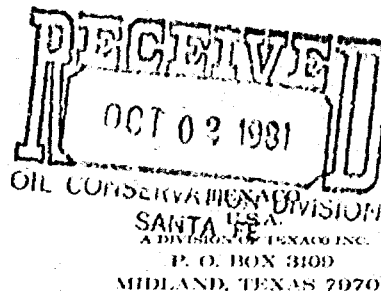
CASE 7407: Application of Mesa Petroleum Company for compulsory pooling, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Abo formation underlying the NE/4 of Section 23, Township 5 South, Range 24 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7408: Application of Doyle Hartman for directional drilling, a non-standard proration unit, an unorthodox well location and simultaneous dedication, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to directionally drill his Justis Well No. 10, the surface location of which is 1940 feet from the North line and 120 feet from the West line of Section 20, Township 25 South, Range 37 East, in such a manner as to bottom said well in the Jalmat Gas Pool at an unorthodox location 1980 feet from the North line and 330 feet from the East line of Section 19, Township 25 South, Range 37 East. Applicant further proposes to simultaneously dedicate said well and the Bettis, Boyle and Stovall Justis Well No. 1 to an 80-acre non-standard proration unit comprising the E/2 NE/4 of said Section 19.



PETROLEUM PRODUCTS

PRODUCING DEPARTMENT



**REQUEST FOR HEARING  
UNITIZATION AND PRESSURE MAINTENANCE  
OPERATIONS  
PROPOSED NORTH VACUUM ABO WEST UNIT  
VACUUM ABO NORTH FIELD  
LEA COUNTY, NEW MEXICO**

The State of New Mexico  
Dept. of Energy & Minerals  
Oil Conservation Division  
P. O. Box 2088  
Santa Fe, New Mexico 87501

*Case 7400*

Attention: Mr. Joe D. Ramay  
Secretary-Director

Gentlemen:

Texaco Inc., as operator of the Proposed North Vacuum Abo West Unit, respectfully requests that evidence be considered at the Examiner Hearing in Santa Fe, New Mexico for an application to:

- (1) Unitize 2000 acres, more or less, in the Vacuum Abo North Field, and
- ✓(2) Initiate water injection operations for pressure maintenance purposes.

The Proposed North Vacuum Abo West Unit area is comprised of the following leases, all located in T-17-S, R-34-E in Lea County, New Mexico:

Coseka Resources (U.S.A.) Ltd.  
Conoco State - S/2 NW/4 & N/2 SW/4 Sec. 15

Exxon Corporation  
State "CQ" - NW/4 Sec. 22

Gulf Oil Exploration & Production Company  
State "RITS" - S/2 NE/4 Sec. 21

Marathon Oil Company  
State "R" - N/2 NE/4 Sec. 28

The State of New Mexico  
Dept. of Energy & Minerals  
Oil Conservation Division

-2-

Mobil Producing Texas & New Mexico Inc.  
Conoco State - N/2 NW/4 Sec. 15

Phillips Petroleum Company  
State "LEA" - SE/4 & S/2 SW/4 Sec. 21

Southland Royalty Company  
State "NV" - S/2 SW/4 Sec. 15; S/2 NE/4 & N/2 SE/4 Sec. 28  
Conoco State Comm. "AZ" - W/2 SW/4 Sec. 22  
Conoco State - E/2 SW/4 Sec. 22

Texaco Inc.  
N.M. "D" State NCT-1 - W/2 Sec. 27  
N.M. "T" State NCT-4 - NW/4 Sec. 28  
N.M. "T" State NCT-3 - S/2 SE/4 Sec. 28  
N.M. "V" State - N/2 NW/4, SW/4 NW/4 & NW/4 SW/4 Sec. 34  
N.M. "O" State NCT-2 - N/2 SE/4 Sec. 33

It is planned to implement a 160-acre five-spot flood pattern which is compatible with the offsetting North Vacuum Abo Unit. This pattern will be developed by converting 13 currently producing wells to water injection service. Water injection will be into the Vacuum Abo formation through internally plastic-coated tubing with a packer set above the injection interval. The injection system will be a closed system. Based on injection histories in the North Vacuum Abo Unit and the North Vacuum Abo East Unit, surface injection pressures of 3,000 psi or more are anticipated and consequently an injection pressure limitation of 3,500 psi will be requested initially. The estimated injection rate is 2,500 BWPD, with the injected fluid being fresh water purchased from the Double Eagle Water Company.

The proposed unitized interval, the Abo, is a lime/dolomite formation located between the subsea depths (-4500') to (-4850') in Texaco's New Mexico "T" State (NCT-4) Well No. 3. This zone is overlain by the Ogallala formation, a fresh water interval found above approximately 180 feet. There are no fresh water zones underlying the Abo.

Attached are the following:

1. Form C-108, "Application for Authorization to Inject" with attachments as required thereon, including proof of notification to offset operators,
2. A plat of the proposed project area showing current lease operators and well numbers,
3. A plat showing proposed well numbers, and
4. A type log showing proposed unitization interval.

U. S. DEPARTMENT OF THE INTERIOR





The State of New Mexico  
Dept. of Energy & Minerals  
Oil Conservation Division

-3-

A copy of this letter is being furnished to the Commissioner of Public Lands in Santa Fe, New Mexico; to the Working Interest Owners; and to the Offset Operators.

Yours very truly,

*James W. Cox*

James W. Cox  
Petroleum Engineering Manager

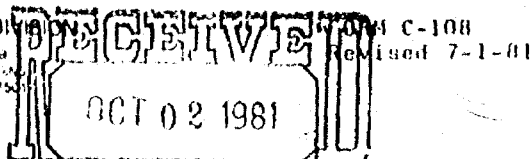
CRW/pw

**Attachments**

cc: Commissioner of Public Lands  
Working Interest Owners (Mailing List Attached)  
Offset Operators (Mailing List Attached)  
OCD District Office-Hobbs

**W.N.M.C.F.**





APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☐ Secondary Recovery ☒ Pressure Maintenance ☐ Storage  
Application qualifies for administrative approval? ☒ YES ☐ NO
- II. Operator: Texaco Inc.  
Address: P. O. Box 728 Hobbs, New Mexico 88240  
Contact party: J. V. Gannon - District Manager Phone: (505) 393-7191
- III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
- IV. See Attachment  
Is this an expansion of an existing project? ☐ yes ☒ no  
If yes, give the Division order number authorizing the project \_\_\_\_\_
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review. See attachment
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail. See attachment
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
  2. Whether the system is open or closed;
  3. Proposed average and maximum injection pressure;
  4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and analysis attached
  5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval. See cover letter
- IX. Describe the proposed stimulation program, if any.
- X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
- XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken. See attached analyses.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification  
I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.  
Name: Charles R. Wollé Title Division Operations Engineer  
Signature: Charles R. Wollé Date: 9/29/81
- \* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. #X Data previously submitted at time of well completions.

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division district office.

W.N.M.E.F.



WELL NAME AND NUMBER		SPACE CASING			INTERMEDIATE CASING			PRODUCTION CASING			TOTAL DEPTH		INITIAL					
Casing Size	Depth	Sx	Int	Top Cement	Casing Size	Depth	Sx	Int	Top Cement	Well Casing Size	Depth	Sx	Int	Top Cement	U. S. T. S.	DATE	INITIAL	
CORONA RE-ENTRY																		
Corona State #1	11-3/4"	309'	250	Circ	8-5/8"	3120'	400	Circ	7-7/8"	5-1/2"	9000'	1200	3150'	9003'	8966-8961	11 15 17 34	10-29-73	15,000 gals 1 1/2 Acid
Corona State #2	11-3/4"	310	275	Circ	8-5/8"	3130	470	Circ	7-7/8"	5-1/2" Lin.	8988	1200	Circ	8988	8761-8960	11 15 17 34	7-16-79	16,500 gals 1 1/2 Acid
Corona State #3	11-3/4"	310	275	Circ	8-5/8"	3130	470	Circ	7-7/8"	5-1/2" Lin.	8988	1200	Circ	8988	8761-8960	11 15 17 34	11-26-74	8942 S. A. peris w/300 r. (C.)
NEW MEXICO "C" ST. #1																		
New Mexico "C" St. #1	8-5/8"	1600	562	Circ	7-7/8"	5-1/2"	8750	650	1) See Remarks	8920	8750-8920 (CH)	11 22 17 34	8-13-72	12,000 gals 1 1/2 Acid				
New Mexico "C" St. #2	8-5/8"	1605	1100	Circ	7-7/8"	5-1/2"	8900	1550	Circ	8900	8711-8967	11 22 17 34	9-10-76	10,000 gals 1 1/2 Acid				
HILL STATE #1																		
Hill State #1	13-3/8"	31	N/A	Circ	8-5/8"	1623	620	Circ	7-7/8"	5-1/2"	8960	1000	2) See Remarks	8760	8960-8961	11 22 17 34	5-27-72	10,000 gals 20% Acid
Hill State #2	13-3/8"	31	N/A	Circ	8-5/8"	1623	620	Circ	7-7/8"	5-1/2"	8960	1000	2) See Remarks	8760	8960-8961	11 22 17 34	5-19-74	1,000 gals 1 1/2 Acid
WAGGON																		
State #1	13-3/8"	255	275	Circ	8-5/8"	3160	900	Circ	7-7/8"	4-1/2"	8975	700	3450	8977	8901-8976	11 29 17 34	11-29-71	10,000 gals 20% Acid
CORONA ST. #1																		
Corona St. #1	11-3/8"	365	500	Circ	8-5/8"	3102	1200	Circ	7-7/8"	5-1/2"	9000	1465	Circ	9000	8900-8933	11 15 17 34	10-29-77	10,000 gals 1 1/2 Acid
Corona St. #2	11-3/8"	326	495	Circ	8-5/8"	14976	2300	Circ	7-7/8"	5-1/2"	12200	1600	Circ	12612	8654-8711	11 15 17 34	1-1-74	20,000 gals 1 1/2 Acid
Corona St. #3	11-3/8"	1695	1000	Circ	8-5/8"	1720	1000	Circ	7-7/8"	5-1/2"	8745	3100	3) See Remarks	8745	8650-8650	11 27 17 34	9-30-70	10,000 gals 1 1/2 Acid
Corona St. #4	11-3/8"	1620	1000	Circ	8-5/8"	1620	1000	Circ	7-7/8"	5-1/2"	8600	3100	2105	8600	8651-8659	11 27 17 34	10-22-70	10,000 gals 1 1/2 Acid
Corona St. #5	11-3/8"	1630	1000	Circ	8-5/8"	1630	1000	Circ	7-7/8"	5-1/2"	8750	3100	2260	8750	8975-8975	11 27 17 34	10-19-70	10,000 gals 1 1/2 Acid
Corona St. #6	11-3/8"	1630	1000	Circ	8-5/8"	1630	1000	Circ	7-7/8"	5-1/2"	8750	3100	2610	8750	8618-8631	11 27 17 34	2-24-71	10,000 gals 1 1/2 Acid
Corona St. #7	11-3/8"	150	375	Circ	8-5/8"	5000	2900	Circ	7-7/8"	5-1/2"	8750	2100	Circ	12500	8970-8940	11 27 17 34	8-15-71	12,000 gals 1 1/2 Acid
Corona St. #8	11-3/8"	260	400	Circ	8-5/8"	3100	1500	Circ	7-7/8"	5-1/2"	12956	2100	Circ	8950	8710-8713	11 15 17 34	9-21-71	10,000 gals 1 1/2 Acid
Corona St. #9	11-3/8"	250	400	Circ	8-5/8"	3100	1400	Circ	7-7/8"	5-1/2"	8850	2300	Circ	8850	8677-8714	11 15 17 34	9-21-71	10,000 gals 1 1/2 Acid
Corona St. #10	11-3/8"	1120	1000	Circ	8-5/8"	3100	1400	Circ	7-7/8"	5-1/2"	8850	2300	Circ	8850	8715-8762	11 22 17 34	5-15-71	10,000 gals 1 1/2 Acid
Corona St. #11	11-3/8"	265	450	Circ	8-5/8"	3067	1400	Circ	7-7/8"	5-1/2"	8800	2300	Circ	8800	8661-8704	11 22 17 34	2-7-72	10,000 gals 1 1/2 Acid
Corona St. #12	11-3/8"	1675	900	Circ	8-5/8"	3015	1600	Circ	7-7/8"	5-1/2"	8800	3100	2240	8800	8654-8718	11 22 17 34	6-24-71	10,000 gals 1 1/2 Acid
Corona St. #13	11-3/8"	252	400	Circ	8-5/8"	3015	1600	Circ	7-7/8"	5-1/2"	8800	1200	Circ	8800	8613-8664	11 22 17 34	6-9-74	5,000 gals 1 1/2 Acid
Corona St. #14	11-3/8"	2702	800	Circ	8-5/8"	3015	1600	Circ	7-7/8"	5-1/2"	8924	4150	Circ	8925	8713-8760	11 10 17 34	2-1-72	5,000 gals 1 1/2 Acid
CORONA ST. #2																		
Corona St. #2	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #3	8-5/8"	1606	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #4	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #5	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
CORONA ST. #3																		
Corona St. #3	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #4	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #5	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
CORONA ST. #4																		
Corona St. #4	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #5	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #6	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #7	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #8	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #9	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #10	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #11	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #12	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #13	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #14	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #15	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #16	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #17	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #18	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #19	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #20	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #21	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #22	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #23	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #24	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #25	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #26	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #27	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #28	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #29	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #30	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #31	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #32	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #33	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #34	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #35	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #36	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #37	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #38	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,000 gals 1 1/2 Acid				
Corona St. #39	8-5/8"	1600	550	Circ	7-7/8"	5-1/2"	8996	2050	5) See Remarks	8720	8996-8720	11 22 17 34	12-13-73	12,0				

[illegible][illegible]

(Percent caps determined by "deep" surveys unless otherwise noted.)

1. Original cement top @ 5600', cement behind 5-1/2 casing from 5600' to surface
2. Original cement top @ 2900', cement behind 5-1/2 casing from 1650' to surface
3. Original cement top @ 2546', cement behind 5-1/2 casing from 2300' to surface
4. Original cement top @ 2000', cement behind 5-1/2 casing from 1830' to surface
5. Original cement top @ 3550', cement behind 5-1/2 casing from 1675' to surface
6. Original cement top @ 3400', cement behind 5-1/2 casing from 1675' to surface
7. Original cement top @ 2900', cement behind 5-1/2 casing from 1725' to surface
8. Original cement top @ 3600', cement behind 4-1/2 casing from 3590' to surface
9. Original cement top @ 2635', cement behind 5-1/2 casing from 2000' to surface

## INJECTION WELL DATA SHEET

OPERATOR	LEASE			
Texaco Inc.	Proposed North Vacuum Abo West Unit			
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
2	1980' FNL & 1980' FWL	15	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tubular DataSurface CasingSize 11-3/4 " Cemented with 275 sx.IDC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize 8-5/8 " Cemented with 470 sx.IDC Cmt Circ feet determined by --Hole size                     Long stringSize 5-1/2 Liner " Cemented with 1200 sx.IDC Cmt Circ feet determined by --Hole size 7-7/8"Total depth 8988'Injection interval8761 feet to 8900 feet  
(perforated or open hole, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8711 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) Yes  
San Andres 4716-4726 Sqzd w/200 sx
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LOCALITY		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
4	660' FSL & 2180' FWL	15	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 8-5/8 " Cemented with 750 sy.TOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sy.TOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 2475 sy.TOC 2550 feet determined by SurveyHole size 7-7/8"Total depth 8984'Injection interval8774 feet to 8812 feet  
(perforated or open hole, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8724 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR	LEASE			
Texaco Inc.	Proposed North Vacuum Abo West Unit			
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
6	2080' FNL & 560' FEL	21	17-S	34-E

## Schematic

See Attached  
"Typical Injection Well"  
Sketch

## Tabular Data

## Surface Casing

Size 13-3/8 " Cemented with N.A. sx.  
IOC Cmt Circ feet determined by --

Hole size                                 

## Intermediate Casing

Size 8-5/8 " Cemented with 620 sx.  
IOC Cmt Circ feet determined by --

Hole size                                 

## Long string

Size 5-1/2 " Cemented with 1000 sx.  
IOC \* feet determined by Survey

Hole size 7-7/8"

Total depth 8960'

## Injection interval

8853 feet to 8881 feet  
(perforated or ~~xxxxxxx~~ indicate which)

\*Original cement top @ 2800' cement behind  
5-1/2" casing from 1650' to surface.

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8803 feet  
(brand and model)  
(or describe any other casing-tubing seal).

## Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) Yes  
San Andres 4696'-4724'. This zone is presently downhole commingled with the Abo North. Prior to conversion to injection, the San Andres will be squeezed off or the well will be completed as a dual.
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
7	2020' FNL & 1980' FWL	22	17-S	34-E

SchematicTabular Data

See Attached  
"Typical Injection Well"  
Sketch

Surface CasingSize 8-5/8 " Cemented with 1100 gr.IOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      gr.IOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 1550 gr.IOC Cmt Circ feet determined by --Hole size 7-7/8"Total depth 8900

## Injection interval

8711 feet to 8867 feet  
 (perforated or ~~open hole~~ indicate which)

 Tubing size 2-3/8" lined with internal plastic-coating set in a  
 (material)

Baker Lok-Set packer at ± 8661 feet  
 (brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
 If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review



### PRODUCTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
10	2180' FWL & 660' FSL	21	17-S	34-E

### Schematische

## Tabular Data

### Surface Casing

Size 8-5/8 " Cemented with 600 gr.

100 Cmt Circ feet determined by --

Hole size \_\_\_\_\_

intermediate Casino

Size \_\_\_\_\_ " Cemented with \_\_\_\_\_ gr.

10C \_\_\_\_\_ feet determined by \_\_\_\_\_

Hole size \_\_\_\_\_

Long string

Size 5-1/2 " Cemented with 2050 gr.

TOC \* feet determined by Survey

Hole size 7-7/8"

Total depth 9005'

### Injection interval

8847 feet to 8891 feet  
(perforated or open hole, indicate which)

\*Original cement top @ 2700', cement behind 5-1/2" casing from 1725' to surface.

Tubing size 2-3/8" lined with internal plastic-coating set in a  
 (material)  
Baker Lok-Set packer at ± 8797 feet  
 (brand and model)

(or describe any other casing-tubing seal).

### Other Data

1. Name of the injection formation Abo
2. Name of Field or Pool (if applicable) Vacuum Abo North
3. Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR	LEASE			
Texaco Inc.	Proposed North Vacuum Abo West Unit			
WELL NO.	CONTACT LOCATION	SECTION	TOWNSHIP	RANGE
11	660' FSL & 660' FEL	21	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 8-5/8 " Cemented with 550 sx.TOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sx.TOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 2050 sx.TOC \* feet determined by SurveyHole size 7-7/8"Total depth 9000'Injection interval8807 feet to 8857 feet  
(perforated or open hole, indicate which)

\*Original cement top @ 3550', cement behind 5-1/2"  
casing from 1675' to surface.

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)Baker Lok-Set packer at ± 8757 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data1. Name of the injection formation Abo2. Name of field or Pool (if applicable) Vacuum Abo North3. Is this a new well drilled for injection? ☐ Yes ☒ NoIf no, for what purpose was the well originally drilled? Oil & Gas Production4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) YesSan Andres 4645'-4652' Sqzd w/150 sx

5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.

Overlying: San Andres ± 4700'Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR	LEASE			
Texaco Inc.	Proposed North Vacuum Abo West Unit			
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
12	660' FSL & 1880' FWL	22	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface casingSize 8-5/8 " Cemented with 550 sx.TOC Cmt Circ feet determined by --Hole size                     Intermediate casingSize                      " Cemented with                      sx.TOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 1900 sx.TOC 1770 feet determined by SurveyHole size 7-7/8"Total depth 8900'Injection interval8706 feet to 8812 feet  
(perforated ~~or open hole~~, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8656 feet  
(brand and model)  
(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of Field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
16	1980' FNL & 1980' FWL	28	17-S	34-E

SchematicTabular Data

See Attached  
"Typical Injection Well"  
Sketch

Surface CasingSize 8-5/8 " Cemented with 850 sx.TOC Cmt Circ feet determined by --

Hole size \_\_\_\_\_

Intermediate Casing

Size \_\_\_\_\_ " Cemented with \_\_\_\_\_ sx.

TOC \_\_\_\_\_ feet determined by \_\_\_\_\_

Hole size \_\_\_\_\_

Long stringSize 5-1/2 " Cemented with 3000 sx.TOC 2156 feet determined by SurveyHole size 7-7/8"Total depth 8910'Injection interval
8777 feet to 8859 feet  
 (perforated or open-hole, indicate which)

 Tubing size 2-3/8" lined with internal plastic-coating set in a  
 (material)
Baker Lok-Set

(brand and model)

packer at ± 8727 feet

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
17	1852' FNL & 554' FEL	28	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 8-5/8 " Cemented with 550 sx.IOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sx.IOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 1700 sx.IOC 2990 feet determined by SurveyHole size 7-7/8"Total depth 9000'Injection interval8762 feet to 8794 feet  
(perforated or open hole, indicate which)Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)Baker Lok-Set packer at ± 8712 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR	LEASE			
Texaco Inc.	Proposed North Vacuum Abo West Unit			
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
18	1980' FNL & 1980' FWL	27	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 8-5/8 " Cemented with 850 sx.IOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sx.IOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 2660 sx.IOC 1620 feet determined by SurveyHole size 7-7/8"Total depth 8800'Injection interval8651 feet to 8722 feet  
(perforated or open-hole, indicate which)Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)Baker Lok-Set packer at ± 8601 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area:  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
21	660' FSL & 660' FEL	28	17-S	34-E

SchematicTabular Data

See Attached  
"Typical Injection Well"  
Sketch

Surface CasingSize 8-5/8 " Cemented with 850 sx.IDC Cmt Circ feet determined by --

Hole size \_\_\_\_\_

Intermediate Casing

Size \_\_\_\_\_ " Cemented with \_\_\_\_\_ sx.

IDC \_\_\_\_\_ feet determined by \_\_\_\_\_

Hole size \_\_\_\_\_

Long stringSize 5-1/2 " Cemented with 2650 sx.IDC 1620 feet determined by SurveyHole size 7-7/8"Total depth 8900'Injection interval8710 feet to 8800 feet  
(perforated ~~or open hole~~, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8660 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
21	660' FSL & 660' FEL	28	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 8-5/8 " Cemented with 850 sx.IOC Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sx.IOC                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 2650 sx.IOC 1620 feet determined by SurveyHole size 7-7/8"Total depth 8900'Injection interval8710 feet to 8800 feet  
(perforated or open hole, indicate which)Tubing size 2-3/8" lined with internal plastic-coating set in a

(material)

Baker Lok-Set packer at ± 8660 feet

(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'  
Underlying: None in area of review



## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
22	760' FSL & 1980' FWL	27	17-S	34-E

Schematic

See Attached  
"Typical Injection Well"  
Sketch

Tabular DataSurface CasingSize 3-5/8 " Cemented with 800 sy.inc Cmt Circ feet determined by --Hole size                     Intermediate CasingSize                      " Cemented with                      sy.inc                      feet determined by                     Hole size                     Long stringSize 5-1/2 " Cemented with 2400 sy.inc 2134 feet determined by SurveyHole size 7-7/8"Total depth 8500'Injection interval8654 feet to 8739 feet  
(perforated or open hole, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
(material)  
Baker Lok-Set packer at ± 8604 feet  
(brand and model)

(or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Abo
- Name of field or pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
If no, for what purpose was the well originally drilled? Oil & Gas Production
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.  
Overlying: San Andres ± 4700'

## INJECTION WELL DATA SHEET

OPERATOR		LEASE		
Texaco Inc.		Proposed North Vacuum Abo West Unit		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
25	1980' FSL & 490' FWL	34	17-S	34-E

SchematicTabular DataSurface Casing

Size 8-5/8 " Cemented with 750 sx.  
 IBC Cmt Circ feet determined by --

Hole size \_\_\_\_\_

Intermediate Casing

Size \_\_\_\_\_ " Cemented with \_\_\_\_\_ sx.  
 IBC \_\_\_\_\_ feet determined by \_\_\_\_\_

Hole size \_\_\_\_\_

Long string

Size 5-1/2 " Cemented with 2000 sx.  
 IBC 1656 feet determined by Survey

Hole size 7-7/8"

Total depth 8850'

Injection interval

8687 feet to 8826 feet  
 (perforated or open hole, indicate which)

Tubing size 2-3/8" lined with internal plastic-coating set in a  
 (material)  
Baker Lok-Set packer at ± 8637 feet  
 (brand and model)

(or describe any other casing-tubing seal).

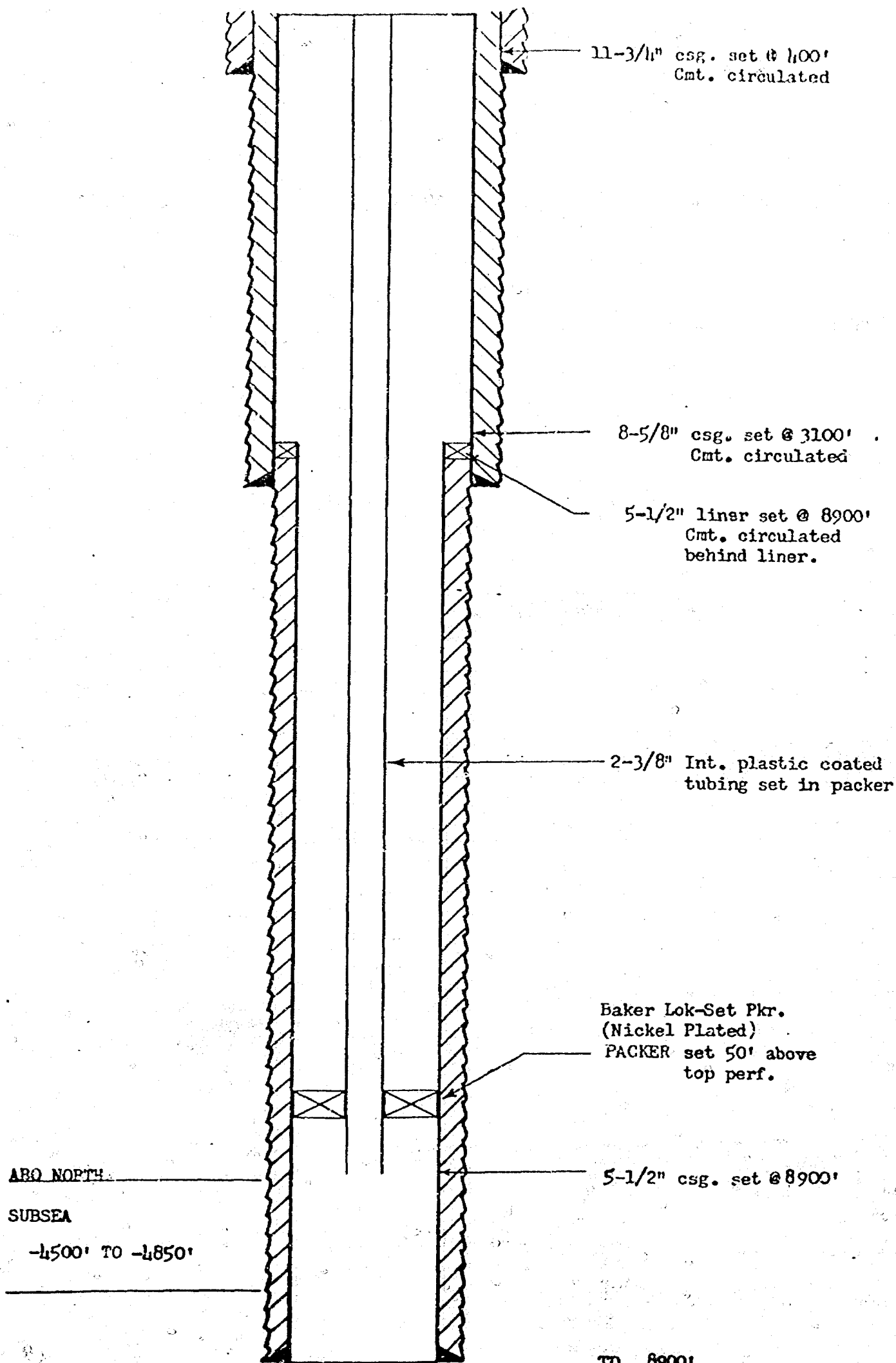
Other Data

- Name of the injection formation Abo
- Name of field or Pool (if applicable) Vacuum Abo North
- Is this a new well drilled for injection? ☐ Yes ☒ No  
 If no, for what purpose was the well originally drilled? Oil & Gas Production

- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No

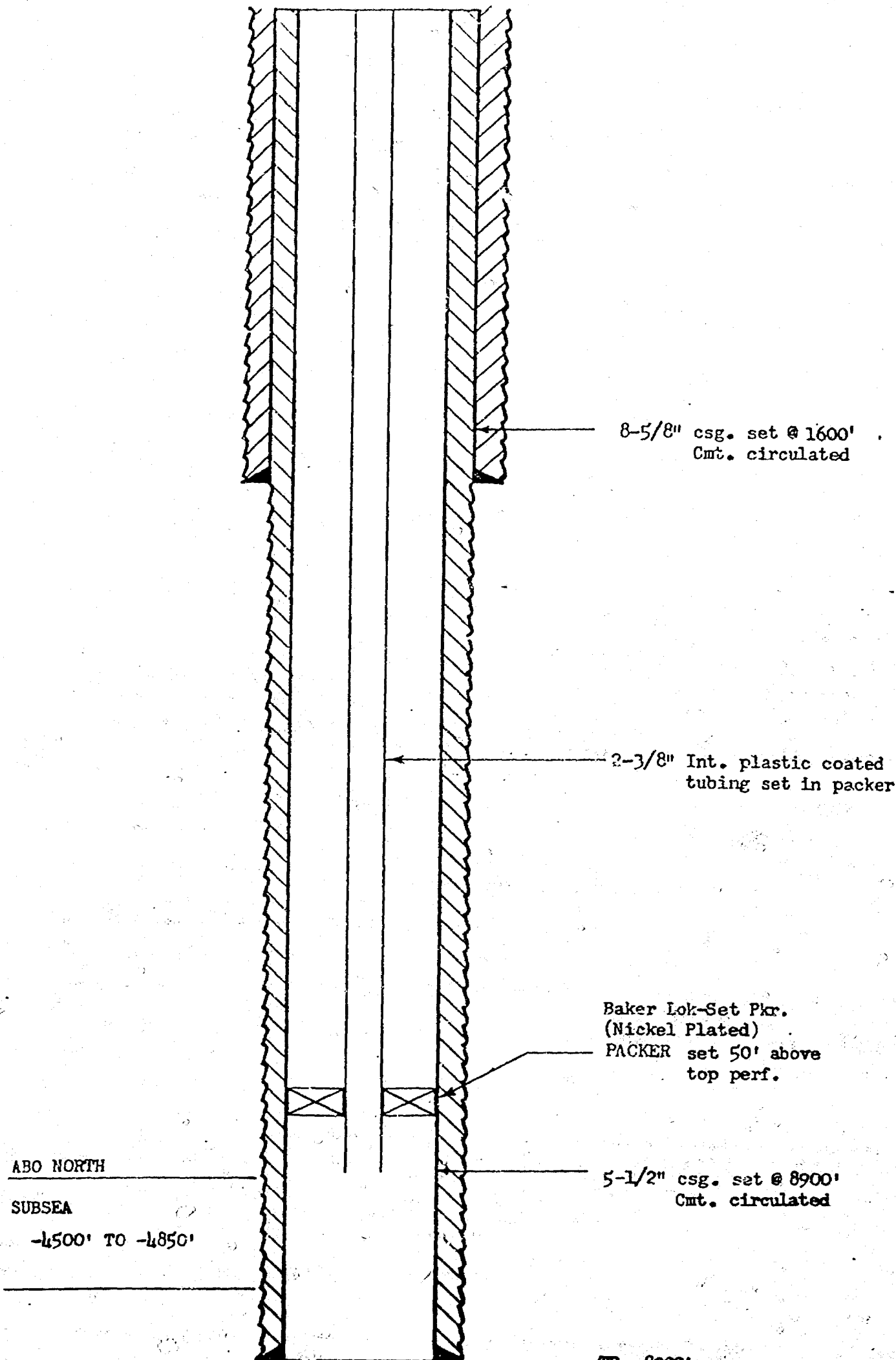
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.

See Attached  
 "Typical Injection Well"  
 Sketch



TYPICAL INJECTION WELL

TEXACO Inc.  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
VACUUM ABO, NORTH FIELD



TYPICAL INJECTION WELL

TEXACO Inc.  
 PROPOSED  
 NORTH VACUUM ABO WEST UNIT

P. O. BOX 1463  
MONAHANS, TEXAS 79786  
PHONE 943-3234 OR 563-1040

Martin Water Laboratories, Inc

709 W. INDIANA  
MIDLAND, TEXAS 79701  
PHONE 683-4521

RESULT OF WATER ANALYSES

TO: Acme Engineer  
P.O. Box 727, Lovington, NM  
LABORATORY NO. 781135  
SAMPLE RECEIVED 7-21-81  
RESULTS REPORTED 7-22-81

COMPANY Texaco, Inc. LEASE As Listed  
FIELD OR POOL \_\_\_\_\_  
SECTION \_\_\_\_\_ BLOCK \_\_\_\_\_ SURVEY \_\_\_\_\_ COUNTY Lea STATE New Mexico  
SOURCE OF SAMPLE AND DATE TAKEN:

- NO. 1 Raw water - taken from Double Eagle water supply. 7-17-81  
NO. 2 Produced water - taken from Texaco NM State "V" (bank battery). 7-17-81  
NO. 3 Vacuum Abo, N. Field  
NO. 4 \_\_\_\_\_

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES				
	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0017	1.1150		
pH When Sampled				
pH When Received	7.89	6.74		
Bicarbonate as HCO <sub>3</sub>	194	95		
Supersaturation as CaCO <sub>3</sub>	11	6		
Undersaturation as CaCO <sub>3</sub>	--	--		
Total Hardness as CaCO <sub>3</sub>	167	30,000		
Calcium as Ca	58	8,600		
Magnesium as Mg	5	2,055		
Sodium and/or Potassium	32	53,375		
Sulfate as SO <sub>4</sub>	37	1,691		
Chloride as Cl	27	102,267		
Iron as Fe	0.19	16.3		
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	253	168,024		
Temperature, °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler				
Hydrogen Sulfide	0.0	0.0		
Resistivity, ohms/cm at 77° F.	24.50	0.064		
Suspended Oil				
Filtrable Solids as mg/l				
Volume Filtered, ml				

Results Reported As Milligrams Per Liter

Additional Determinations And Remarks A careful comparison of the above results reveals no evi-  
dence of any incompatibility between these two waters; therefore, these results would  
indicate that they could either be combined on the surface for reinjection or the sup-  
ply water could be injected into the producing interval represented by the produced  
water. This warrants clarification, however, in that if the supply water contains  
oxygen, then combining the waters on the surface would result in the precipitation of  
iron oxide and result in a potential plugging condition. This would not be considered  
sufficiently detrimental to prevent the injection of the supply water into the produc-  
ing interval. If the waters are mixed on the surface, any oxygen in the supply water  
Form No. 3 would need to be physically or chemically removed prior to mixing.

cc: Mr. Larry Schlotterback, Hobbs  
District Engineer, Hobbs

Waylan C. Martin, M. A.

709 W. INDIANA  
MIDLAND, TEXAS 79701  
PHONE 683-4521

### RESULT OF WATER ANALYSES

TO: Area Engineer  
P.O. Box 727, Lovelock, NM

LABORATORY NO. 731134  
SAMPLE RECEIVED 7-21-31  
RESULTS REPORTED 7-22-31

COMPANY Texaco, Inc. LEASE Vacuum  
FIELD OR POOL Vacuum  
SECTION      BLOCK      SURVEY      COUNTY Lea STATE NM

SOURCE OF SAMPLE AND DATE TAKEN:

NO. 1	<u>Riv water - taken from Duval water supply well #1. 7-17-81 T-17-S, R-34-E</u>	SE 1/4 of SE 1/4 Sec. 20,
NO. 2	<u>Riv water - taken from Kerr McCae water supply well #5. 7-17-81 SW 1/4 of SE 1/4</u>	
NO. 3	<u>_____</u>	Sec. 34, T-17-S, R-34-E
NO. 4	<u>_____</u>	

## REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES				
	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0015	1.0010		
pH When Sampled				
pH When Received	7.68	7.52		
Bicarbonate as HCO <sub>3</sub>	192	192		
Supersaturation as CaCO <sub>3</sub>				
Undersaturation as CaCO <sub>3</sub>				
Total Hardness as CaCO <sub>3</sub>	240	215		
Calcium as Ca	85	70		
Magnesium as Mg	7	10		
Sodium and/or Potassium	28	28		
Sulfate as SO <sub>4</sub>	28	24		
Chloride as Cl	82	67		
Iron as Fe	0.22	0.24		
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	422	391		
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler				
Hydrogen Sulfide				
Resistivity, ohms/in at 77° F.	0.0	0.0		
Suspended Oil	19.00	24.00		
Filtrable Solids as mg/l				
Volume Filtered, ml				

Results Reported As Milligrams Per Liter

Additional Determinations And Remarks

Additional Determinations And Remarks The entomologist certifies the above to be true and correct to the best of his knowledge and belief.

cc: Mr. Larry Schlottorback, Hobbs  
District Engineer, Hobbs

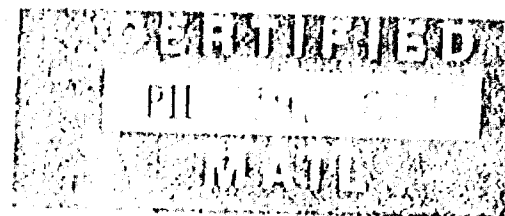
Waylan C. Martin, M. A.

60213  
PCH



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Commissioner of Public Lands  
State of New Mexico  
P. O. Box 1148  
Santa Fe, New Mexico 87501

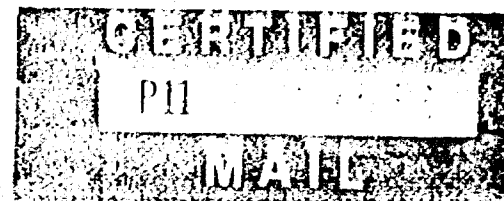


MIDLAND DIVISION  
PCH



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Mr. H. J. Ledbetter  
P. O. Box 95  
Loco Hills, New Mexico 88255



W.N.M.C.F.



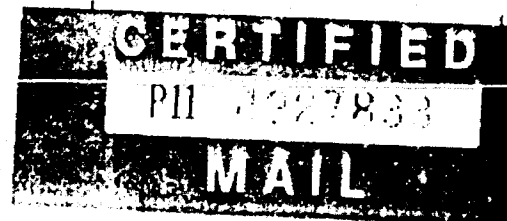
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MIDLAND DIVISION  
PCH



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

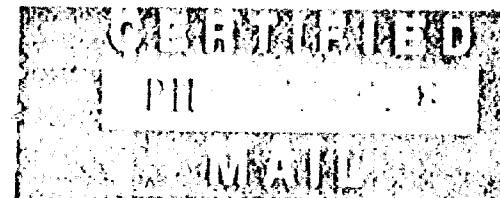
The Superior Oil Company  
P. O. Box 1521  
Houston, Texas 77002



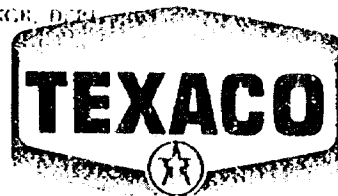


TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Shell Oil Company  
Attn: Mid-Continent Div. Prod.  
P. O. Box 991  
Houston, Texas 77001

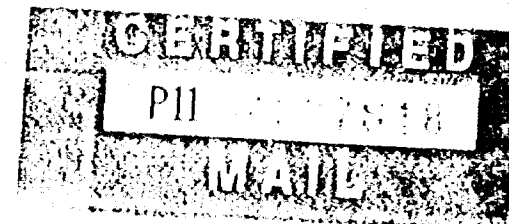


MIDLAND DIVISION  
PETR. ENGR. DEPT.



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Gulf Oil Exploration &  
Production Co.  
Attn: Mr. R. A. Coleman  
P. O. Box 1150  
Midland, Texas 79702

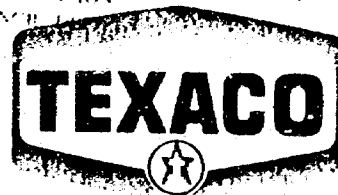


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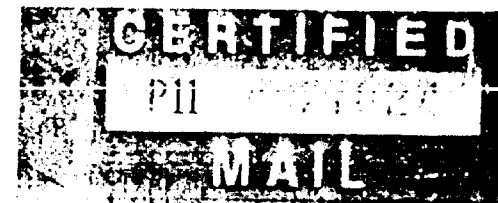
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MIDLAND DIVISION  
PETR. ENGR. DEPT.



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Mobil Producing Texas & N.M. Inc.  
Attn: Mr. H. C. Patton  
Suite 2700  
Nine Greenway Plaza  
Houston, Texas 77046



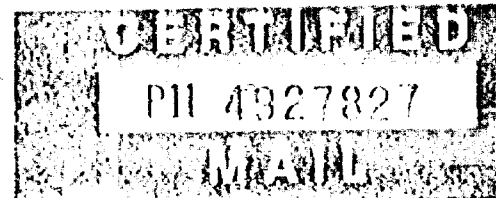


MIDLAND DIVISION  
P. O. BOX 3109



TEXACO INC.  
MIDLAND DIVISION  
P. O. BOX 3109  
MIDLAND, TEXAS 79702

Phillips Petroleum Company  
Attn: Mr. J. E. Chrisman  
P. O. Box 1967  
Houston, Texas 77001



W.N.M.C.F.

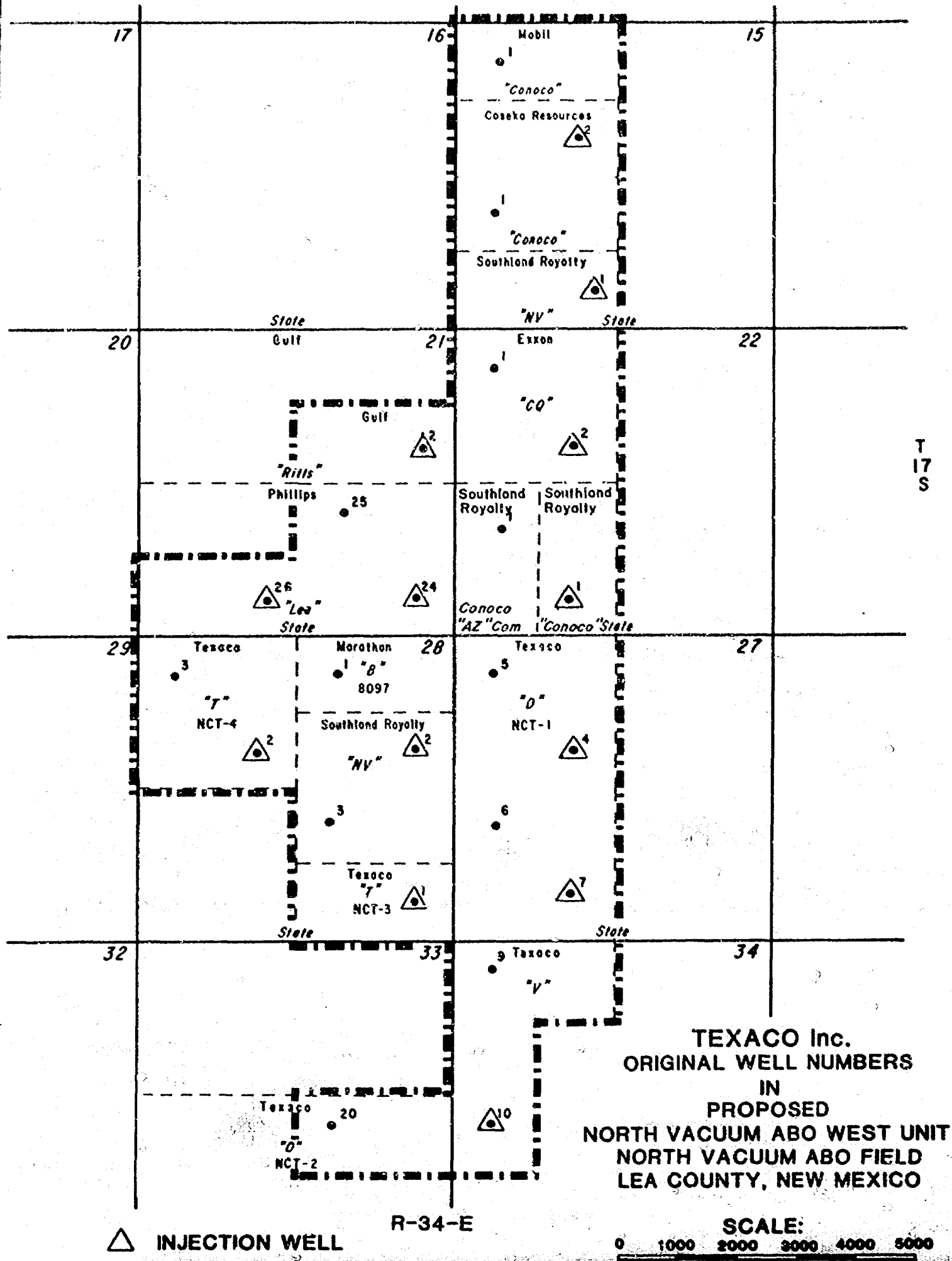


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TEXACO Inc.  
NEW WELL NUMBERS

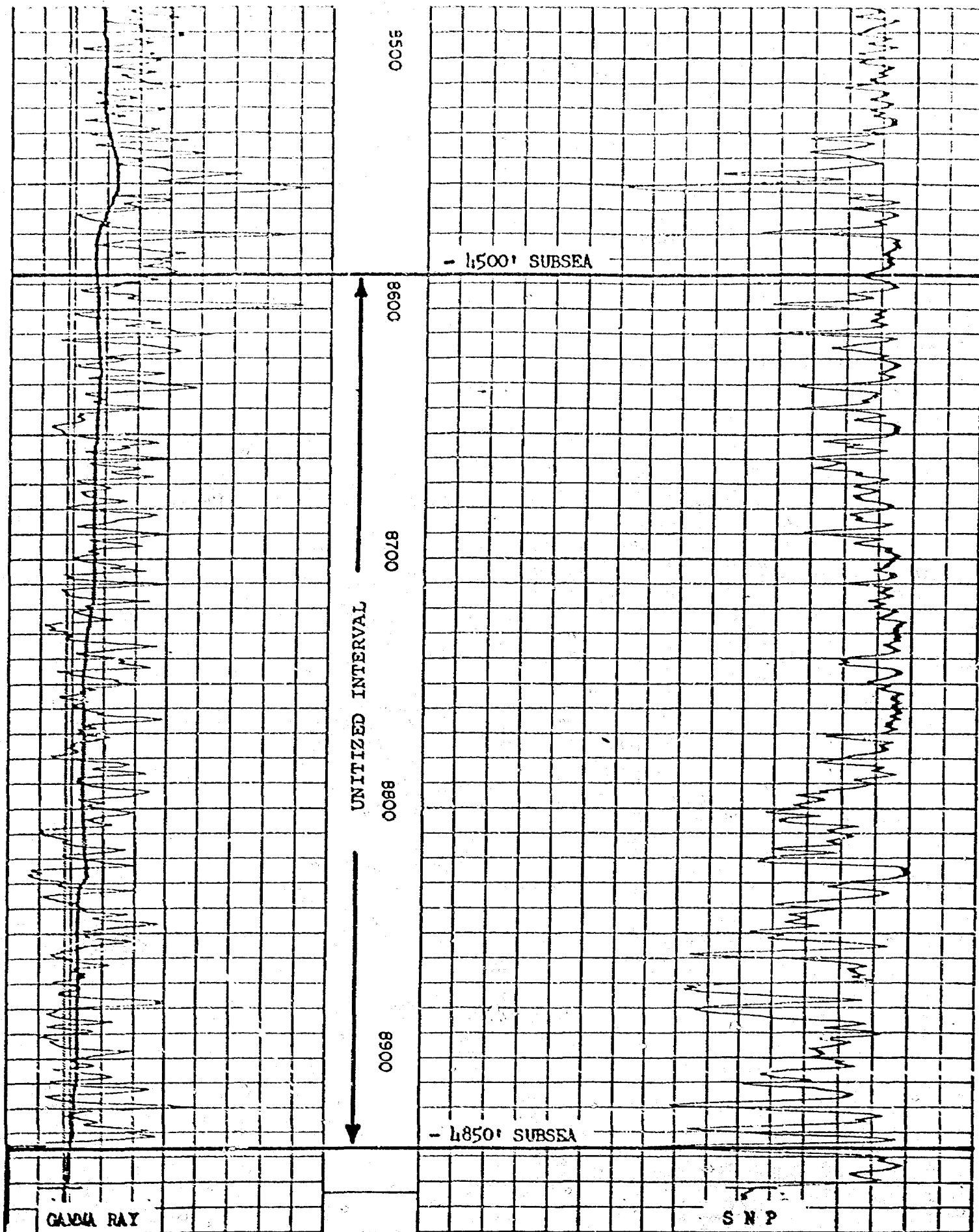
IN  
PROPOSED  
NORTH VACUUM ABO WEST UNIT  
NORTH VACUUM ABO FIELD  
LEA COUNTY, NEW MEXICO

△ INJECTION WELL

R-34-E

SCALE:

0 1000 2000 3000 4000 5000



WORKING INTEREST OWNERS MAILING LIST

PROPOSED NORTH VACUUM ABO WEST UNIT  
VACUUM ABO NORTH FIELD  
LEA COUNTY, NEW MEXICO

Amerada Hess Corporation  
P. O. Box 2040  
Tulsa, Oklahoma 74102

Martin Anderson  
1717 Edgewater Drive  
Orlando, Florida 32804

Coseka Resources (USA) Limited  
Suite 630  
718 Seventeenth Street  
Denver, Colorado 80202

J. A. Davidson  
P. O. Box 494  
Midland, Texas 79702

Exxon Company, U.S.A.  
Attn: Mr. J. B. Campbell  
P. O. Box 1600  
Midland, Texas 79702

Gulf Oil Exploration &  
Production Co.  
P. O. Box 1150  
Midland, Texas 79702  
Attn: Mr. R. A. Coleman

Mr. E. H. Holcomb  
1253 Michelbodic Lane  
McMinnville, Oregon 97128

Wesley T. House  
1201 Bedford Drive  
Midland, Texas 79701

R. W. Keener  
4444 Parkview Drive  
Salt Lake City, Utah 84117

Ladd Petroleum Corp.  
830 Denver Club Bldg.  
Denver, Colorado 80202  
Attn: Mr. John E. Stein

M & B Investments  
P. O. Box 3356  
Lubbock, Texas 79408

Partnership Properties Company  
c/o Petro-Lewis Corporation  
P. O. Box 2250  
Denver, Colorado 80201  
Attn: Ms. Suzan Treece

Marathon Oil Company  
P. O. Box 552  
Midland, Texas 79702  
Attn: Mr. G. A. Naert

Mobil Producing Texas & New Mexico Inc.  
Suite 2700  
Nine Greenway Plaza  
Houston, Texas 77046  
Attn: Mr. H. C. Patton

Phillips Petroleum Company  
P. O. Box 1967  
Houston, Texas 77001  
Attn: Mr. J. E. Chrisman

Shell Oil Company  
P. O. Box 991  
Houston, Texas 77001  
Attn: Mid-Continent Div. Prod.

Southland Royalty Company  
1100 Wall Towers West  
Midland, Texas 79702  
Attn: Mr. Ken Harbin

Texaco Inc.  
P. O. Box 3109  
Midland, Texas 79702  
Attn: Mr. R. D. Tomberlin

David K. Watkiss  
400 El Paso Natural Gas Bldg.  
Salt Lake City, Utah 84111

Francis S. Williams  
c/o F. Eberstadt & Co., Inc.  
61 Broadway  
New York, New York 10006

OFFSET OPERATOR LIST

PROPOSED NORTH VACUUM ABO WEST UNIT  
VACUUM ABO NORTH FIELD  
LEA COUNTY, NEW MEXICO

Gulf Oil Exploration and Production Company  
Attn: Mr. R. A. Coleman  
P. O. Box 1150  
Midland, TX 79702

H. J. Ledbetter  
P. O. Box 95  
Loco Hills, New Mexico 88255

Mobil Producing Texas & New Mexico Inc.  
Suite 2700  
Nine Greenway Plaza  
Houston, Texas 77046  
Attn: Mr. H. C. Patton

Phillips Petroleum Company  
Attn: Mr. J. E. Chrisman  
P. O. Box 1967  
Houston, Texas 77001

Shell Oil Company  
P. O. Box 991  
Houston, Texas 77001  
Attn: Mid-Continent Div. Prod.

The Superior Oil Company  
P. O. Box 1521  
Houston, Texas 77002

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3 from charges  
DAN

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
DIVISION FOR THE PURPOSE OF  
CONSIDERING:

*[Signature]*

CASE NO. 7400

Order No. R- 685)

APPLICATION OF TEXACO INC. FOR  
A PRESSURE MAINTENANCE PROJECT,  
LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 4,  
1981, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this \_\_\_\_\_ day of December, 1981, the Division  
Director, 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 Division has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Texaco, Inc., seeks authority to institute a pressure maintenance project in its North Vacuum Abo West Unit Area, North Vacuum-Abo Pool, Lea County, New Mexico, by the injection of water into the Abo formation through the following wells:

TOWNSHIP 15 SOUTH, RANGE 34 EAST, NMPM

<u>North Vacuum Abo West Unit Well Number</u>	<u>Unit Letter</u>	<u>Section</u>
2	F	15
4	N	15
6	H	21
7	F	22
10	N	21
11	P	21
12	N	22
16	F	28
17	H	28
18	F	27
21	P	28
22	N	27
25	L	34

(3) That there are 25 wells completed in the North Vacuum-Abo Pool in the unit area, and these wells are currently producing a total of approximately 296 barrels of oil per day, for an average daily rate of production of 11.8 barrels of oil per well.

(4) That considering the depth of the Abo reservoir in the unit area, from approximately 8700 feet to approximately 8900 feet, 11.8 barrels per day should be considered "stripper" production, and the subject project, under the provisions of Rule 701 F of the Division Rules and Regulations, should be

classified as a waterflood project rather than a pressure maintenance project.

(5) That the proposed project should result in the recovery of otherwise unrecoverable oil, thereby preventing waste.

(6) That the operator should take all necessary steps to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface from injection, production, or plugged and abandoned wells.

(7) That based on the data submitted in Case No. 6248 relating to injection pressures in the North Vacuum-Abo Pool, which was incorporated by reference into the record of the instant case, the injection wells or injection pressurization system for the subject project should be so equipped as to limit injection pressure at the wellhead to no more than 3500 psi, but the Division Director should have authority to increase such pressure limitation, should conditions warrant.

(8) That the subject application should be approved and the project should be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations.

IT IS THEREFORE ORDERED:

(1) That the applicant, Texaco Inc., is hereby authorized to institute a waterflood project on its North Vacuum Abo West Unit Area, North Vacuum-Abo Pool, by the injection of water into

the Abo formation through the following described wells in Township 15 South, Range 34 East, NMPM, Lea County, New Mexico:

<u>North Vacuum Abo West</u> <u>Unit Well Number</u>	<u>Unit</u> <u>Letter</u>	<u>Section</u>
2	F	15
4	N	15
6	H	21
7	F	22
10	N	21
11	P	21
12	N	22
16	F	28
17	H	28
18	F	27
21	P	28
22	N	27
25	L	34

(2) That injection into each of said wells shall be through internally coated tubing, set in a packer which shall be located as near as practicable to the uppermost perforation; that the casing-tubing annulus of each injection well shall be loaded with an inert fluid and equipped with an approved pressure gauge or attention-attracting leak detection device.

(3) That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing or packer in any of said injection wells, the leakage of water or oil from or around any producing well, or the leakage of water or oil from any plugged and abandoned well within the project area and shall take such timely steps as may be necessary or required to correct such failure or leakage.

(4) That the injection wells herein authorized and/or the injection pressurization system shall be so equipped as to limit injection pressure at the wellhead to no more than 3500 psi, provided however, the Division Director may authorize a higher

surface injection pressure upon satisfactory showing that such pressure will not result in fracturing of the confining strata.

(5) That the subject waterflood project is hereby designated the North Vacuum Abo West Waterflood Project and shall be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations.

(6) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Division in accordance with Rules 706 and 1115 of the Division Rules and Regulations.

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

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

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

JOE D. RAMEY,  
Director

S E A L

ROUGH

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
DIVISION FOR THE PURPOSE OF  
CONSIDERING:

CASE NO. 7400

Order No. R- 6857-A

*BH*  
APPLICATION OF TEXACO INC. FOR  
A PRESSURE MAINTENANCE PROJECT,  
LEA COUNTY, NEW MEXICO.

NUNC PRO TUNC ORDER

BY THE DIVISION:

It appearing to the Division that Order No. R-6857, dated December 18, 1981, does not correctly state the intended order of the Division,

IT IS THEREFORE ORDERED:

as being (1) That finding no. (2) on Page 2 of Order No. R-6857 and Ordering Paragraph no. (1) on Page 3 of said Order each be and the same is hereby corrected to describe certain wells in Township 17 South, Range 34 East, NMPM, Lea County, New Mexico.

(2) That the corrections set forth in this order be entered nunc pro tunc as of December 18, 1981.

DONE at Santa Fe, New Mexico on this      day  
of     , 198  .

STATE OF NM  
OCD