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



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Case MO.

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Application

Transcripts.

Small Exhibits

BRUCE KING GOVERNOR LARRY KEHOE SCORETARY

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

POST OFFICE BOX 2030 STATE LAND OFFICE BURGING BANTA FE, NEW MEXICO 87501 (505) 827-2434

December 29, 1981

Mr. Ken Bateman White, Koch, Kelly & McG	ORDER NO. R-6857-A
Attorneys at Law Post Office Box 787 Santa Fe, New Mexico	Applicant:
	Texaco Inc.
Dear Sir:	
Enclosed herewith are tw Division order recently	o copies of the above-referenced 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	



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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

STATE OF NEW MEXICO OIL CONSERVATION DIVISION

JOE D. RAMEY,

Director



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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

	, Kellý, & McC	Re:	CASE NO. R-61	400 3 57
Attorneys a Post Office Santa Fo, N	Box 787		Applicance	
		11.	Texaco Inc.	Att.
Andrew Agency William				

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



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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.

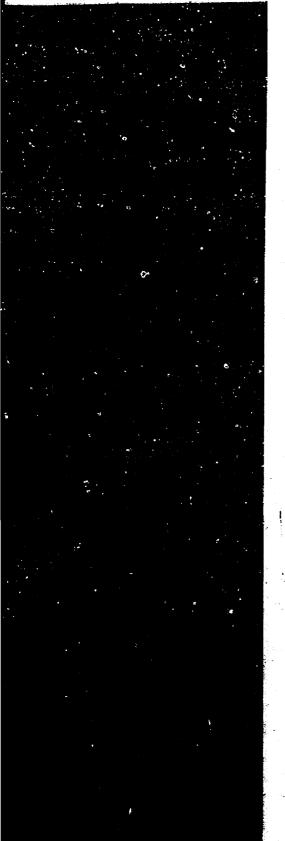
NOW, on this 18th day of December, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

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:



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-2-Case No. 7400 Order No. R-6857

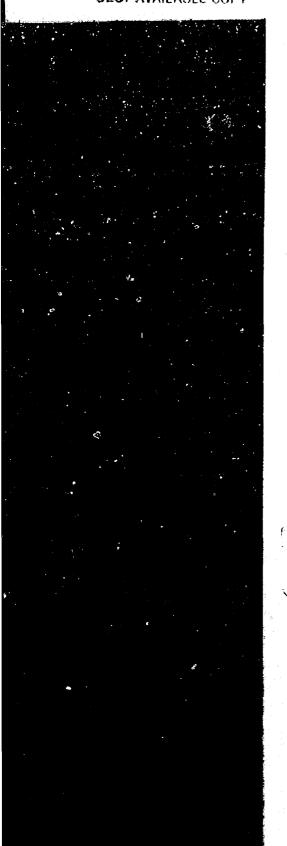
TOWNSHIP 15 SOUTH, RANGE 34 EAST, NMPM

Vacuu Well N	n Abo Wes umber	st	Unit <u>Letter</u>		Section
_					
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	\$ 1		F		27
21			P		28
22			N		27
25			${f L}$	en e	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



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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 cf 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:

North Va Unit Wel		Unit Lette	<u>r</u>	Section
2 4 6		F N H		15 15 21
, 10	8	F N		22 21
11		P N		21
16		F H		28
18 21		F		27 28
22 25		N L		27 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,



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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 Manage gignated.

STATE OF NEW MEXICO OIL CONSERVATION DIVISION

JOE D. RAMEY

Director

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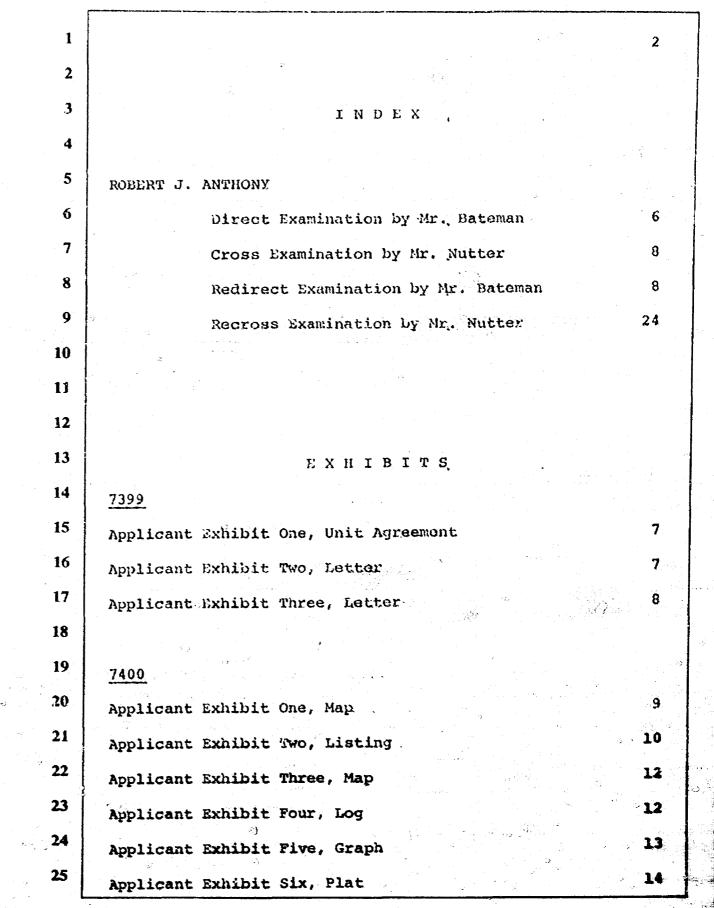


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2	STATE O	F NEW MEXICO	
	ENERGY AND MI	NERALS DEPARTMENT	
3	OIL CONSER	VATION DIVISION	
	STATE LAN	D OFFICE BLDG.	
4	SANTA FE	, NEW MEXICO	
	4 Novemb	per 1981	
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,	EXAMINE	er hearing	
6			· · · · · · · · · · · · · · · · · · ·
7			
	IN THE MATTER OF:		
g	Application of Texa	ago Ing for a	
V	Unit Agreement, Lea		CASE
9	Mexico.		7399
	and		and
10	Application of Texa	co, Inc., for a	7400
	pressure maintenanc		
11	County, New Mexico.		
12			`. *
13		1.0	
13	BEFORE: Daniel S. Nutter		
14		and American Specific	
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15	TRANSCRIFT	P OF HEARING	
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	A P P D L I	CARCES	
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	For the Oll Conservation	We Famry Pearce, Lag Counsel to	
!	Division:	State Land Office	
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		WHITE, KOCH, KELL	Y, & MCCARTHY
i		220 Otaro Street	
i		Carrie Da Mana Mana	J 07503

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3	EXHIBITS	
4		A
5	Applicant Exhibit Seven, Hap	15
6	Applicant Exhibit Eight, Map	15
7	Applicant Exhibit Nine, Schematic	15
8	Applicant Exhibit Ten, Schematic	15
9	Applicant Exhibit Eleven, Schematic	15
10	Applicant Exhibit Twelve, Graph	20
11	Applicant Exhibit Thirteen, Water Apalysis	22
12	Applicant Exhibit Fourteen, Water Analysis	23
13		
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15 16		
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22 23		
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MR. NUTTER: Call Case Number 7399.
MR, PEARCE: Application of Texaco, In-
corporated, for a unit agreement, Lea County, New Mexico.
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.
MR. NUTTER: We'll now call Case 7400.
MR. PEARCE: Application of Texaco, In-
corporated for a pressure maintenance project, Lea County,
New Mexico.
MR. NUTTER: Casos Numbers 7399 and 740
will be consolidated for purpose of testimony. Please pro-
ceed.
MR. BATEMAN: Thank you. I have one
witness.
(Witness sworn.)
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.



	
2	MR. BATEMAN: 80 acres, excuse me, an
3	
4	
5	nance project application.
.,6	MR. NUTTER: Well now, the 39-acre trac
7	in Section 33 does have an injection well on it, is that
8	correct?
9	MR. ANTHONY: No, sir. That injection
10	well is in the San Andres pay.
1,1	MR. NUTTER: Well, where is the error
12	the then, Mr. Bateman? We didn't describe the project.
13	We described the location of the wells, the thirteen wells
14	are located in these sections.
15	MR. BATEMAN: I stand corrected. I'm
16	sorry.
17	Mh. NUTTER: So that are all the wells
18	in the named sections?
19	MR. ANTHONY: Yes.
20	MR. BATEMAN: Apparently they are.
21	MR. NUTTER: Okay, we don't have an
22	error, then.
23	MR. BATEMAN: All right, thank you.
25	



1	6
2	ROBERT J. ANTHONY
. 3	being called as a witness and being duly sworn upon his oath
4.	testified as follows, to-wit:
5	
6	DIRECT EXAMINATION
7	BY MR. BATEMAN:
8	Q Would you state your full name and
9	place of employment for the record, please?
10	A. My name is Robert J. Anthony. I'm
11	employed by Texaco, Incorporated.
12	Q. And in what capacity are you employed?
13	A. I am District Reservoir Engineer,
14	located in Hobbs, New Mexico.
15	0. And in that capacity are you familiar
16	with the two applications that we have before us today?
17	A. Yes, in my capacity I chaired the En-
18	gineering Committee that developed the studies for the unit
19	in question today.
20	Q Have you previously testified before
21	the Division?
22	A, Yes, I have.
23	Q And made your qualifications a matter
24	of record?
ne.	



BEST AVAILABLE COPY	4	MR. NUTTER: Mr., Anthony i
DEG! WANIFABLE COPA	5	Q Would you proceed, then, w
	6	been marked Exhibit Number One in Case Number 7
	7	posed unit agreement.
	8	A Exhibit Number One is the
	9	We have 100 percent working interest approval o
	10	ment. The royalty interest is owned 100 percen
	11	State of New Mexico.
	12	Exhibit Number Two is a le
	13	the Commissioner of Public Lands approving this
	14	as to form and content. You will note in the m
	15	page there he indicated some advised changes.
	16	were made, are incorporated in this unit exhibi
	17	agreement, Exhibit One, and were approved by the
	18	terest owners.
	19	Q Mr. Anthony, the ipso fact
	20	date as initially expressed has been reached, i
	21	rect?
	22	A. Yes. I'd like to bring yo
		and the second of the second o

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25

I offer Mr. Anthony as an MR. BATEMAN:

expert.

s qualified.

with what's 399, the pro-

unit agreement of this agreet by the

etter from unit agreement iddle of the These changes t -- unit e working in-

o termination s that cor-

ur 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



	U	actor date to bepreament 1, 1982.
BEST AVAILABLE COPY	4	Now, Exhibit Number Three
	5	letter to the Commissioner of Public Lands app
	6	the fact that the working interest owners had
	7	ipso facto termination data of this unit agreen
	8	Q Were Exhibit One through
	y	by you or under your direction?
	10	A. That's correct.
er komun (j. 1964) en generalen er en	11	MR. BATTMAN: I offer at t
	12	hibits one through Three in Case Number 7399.
	13	MR. NUTTER: Exhibits One
	14	will be admitted in evidence.
	15	
	16	CROSS EXAMINATION
	17	BY MR. NUTTER:
	18	Q Mr. Anthony, now what was
And the second s	19	statement you said, that the Texaco and the wor
Pro-	20	extended that termination date, and you advised
	21	Office.
	22	Has the Land Office approv
	23	tension?
*		

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

then, is a ising him of extended the ent.

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his time Ex-

through Three

that last king interests the Land

ed that ex-

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

24



	J	since they did not advise ds otherwise.
BEST AVAILABLE COPY	4	9 But that would have to b
	5	an amendment to this unit agreement, then, wo
	6	cause the unit agreement states that the thin
	7	in effect.
The second second for the second second	8	A Yes, I believe that would
	9	procedure, yes, sir.
	10	Q Since you haven't receive
	11	tion from the Land Commissioner as yet.
	12	A. No, sir, we have not
	13	MR. NUTTER: Are there ar
	14	tions of Mr. Anthony? He may be excused.
	15	MR. BATEMAN: Mr. Anthony
	16	proceed with testimony in Case 7400.
	17	MR. NUTTER: Oh, okay.
	18	Mr. Anthony, would you th
	19	what's been marked Exhibit Number One in Cause
and distance of the control of the c	20	Number 7400?
	21	A Exhibit Number One is a m
	22	of the Vacuum Field in Lea County, New Mexico,
	23	all the completions within a two-mile area of
\$		

24

25

2

we received a letter disapproving. We have assumed approval

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uldn't it, be-

g is terminated,

d be the legal

ed any communica-

y other ques-

g is going to

en proceed with No. -- Case

ap of a portion indicating ...

the proposed

unit boundary. It also indicates the completions within a

half mile radius, as indicated by the circles, around each



1	10
2	proposed injection well.
3	You'll note at the bottom of the page
4	an index of abbreviations indicating the zone that each of
5 ,	the wells is completed in.
6	There are quite a number of productive
7	horizons in this area, then.
8	A. That is true.
9	Q Would you proceed then with Exhibit Num-
10	ber Two?
11	A. Exhibit Number Two is a listing of all
12	of the wells within the half mile radius of the injection
13	wells in the proposed unit. This listing gives the well name
14	and number; the casing sizes and setting depths; and the
15	cement program; and the top of the cement behind each string
16	of casing. It also gives the total depth, completion inter-
17	val, the location of the well, the completion date, and the
18	initial stimulation treatment.
19	I'd like to call attention to the center
20	of the page under production casing cement top. You will
21	note some numbers there with "see remarks" beside each,
22	These refer to some remarks on the second page of this exhibit
23	wherein the original cement top behind the production string
24	was not sufficiently high to protect the salt section and
25	isolate it from the Ogalalla formation near the surface here,



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and in each of these cases a remedial procedure was performed on these wells to perforate the production casing at the indicated dapth and bring cement from that point up to the surface behind the production pipe.

This effectively isolates the sait section from the Ogalalla formation at the surface.

MR. NUTTER: And this was done as the result of surveys -
A. That's right.

MR. NUTTER: --, or possible problems resulting from the other waterflood in the area, is that correct

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

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

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

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

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



2 · · · · · · · · · · · · · · · · · · ·	3	Number Three?
BEST AVAILABLE COPY	4	A. Exhibit Number Three
	5	underlying the proposed unit area of the U
	6	dicating a structural dip to the west of a
	7	feet per mile. The productive limits in the
	8	defined by a permeability pinchout to the v
	9	determined by a couple of noncommercial well
	10	the west of the proposed unit area.
	11	Q Would you give the Exa
	12	development history of the proposed unit ar
	13	A. Drilling in the unit a
	14	1971 with Southland Royalty's "NV" State No
	15	located in the southeast quarter of the nor
	16	Section 28. Development continued, then, t
	17	into early 1973 throughout the area.
	18	Q Let's proceed, then, w
	19	ber Four.
	20	A Exhibit Number Four is
	21	Sidewall Neutron Porosity Log on Texaco's No
	22	State Noncontiguous Tract No. 4 Well No. 3.
*10:39	23	This indicates the prop
	24	interval from a subsea depth of -4500 feet t

2

12

Would you proceed then with Exhibit

is a structure map pper Abo zone, inpproximately 100 his area have been west. This was lls drilled just to

miner a brief ea?

rea began in late . 2, which is theast quarter of hrough 1972 and

ith Exhibit Num-

a porosity log, ew Mexico "T"

posed unitized o -4850 feet. The completions in the proposed unit area are in the porous



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4	jected into the Mobil's offsetting North Vacuum Abo Unit.
5	What is the production history of the wells
6	in the proposed unit?
7	A Exhibit Number Five indicates the primary
8	production of the proposed unit area, which encompasses 2000
9	acres, 25 active producing wells.
10	As of August 1st, 1981, the cumulative
11	primary production from this area was 1,666,000 barrels.
12	The ultimate primary for the area, as
13	determined by the Engineering Committee from decline curve
14	extrapolation was 2,449,000 barrels. Therefor, the remaining
15 [©]	primary as of August 1st, 1981, is 783,000 barrels.
16	Our prediction of pressure maintenance
17	recovery from this recommended unit is 1,837,000 barrels.
18	Q What is the present production from the
19	Wells in the area?
20	A July being the last date complete re-
21	cords were available, the producing rate was 296 barrels of
22	oil per day. This breaks down to 12 barrels of oil per day
23	per well, which is more than what is classified stripper;
24	therefor, this unit area will be necessarily defined as a
25	pressure maintenance project, also.

interval indicated on this log from 8800 to 8900 feet. This

porosity interval does correlate with the interval being in-

13



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	14
2	And would you describe to the Examiner
3	what the proposed plan of operation would be?
4	A The plan of operation will be to inject
5	
6	
7	
8	uation of Mobil's North Vacuum Abo Unit pattern and it is
9	
	compatible with that with that pattern.
10	Q Is that shown on Exhibit Number Six?
11	A. Yes, that is Exhibit Number Six. Now,
12	the on the east east side of the field, or the right
13	side of this map, Mobil has the North Vacuum Abo East Unit,
14	which is currently injecting water.
15	The center portion of the map, the large
16	portion of the field, is Mobil's North Vacuum Abo Unit, and
17	the proposed unit, then, is on the left side of the map, or
18	the west side of the field, and encompasses then this will
19	encompass almost all the remaining Vacuum Abo North wells;
20	therefor the entire field will be under pressure maintenance
21	operations if this application is approved.
22	MR. NUTTER: Are those other projects
23	also classified as pressure maintenance?
24	
	A That's true.
25	O Will you because the next the second

Will you proceed, then, with Exhibits



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	No.

2 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.

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, therefor 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?

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 the 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?

W.N.M.D.F.



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2	h 6248.
3	MR. NUTTER: And they were authorized
4	3500 psi, then?
5	A. That is correct.
6	MR. NUTTER: And the rule of thumb, .2
7	of a pound, would give you probably about 1700 psia.
8	A. That is correct. That is correct. And
9	we feel that we could not inject more than say three to four
10	weeks at that at that pressure, and probably less. We
11	might not be able to inject for any length of time at all
12	at 1700. MR. NUTTER: What volume of water do
13	you anticipate injecting into these wells?
14.	you anticipate injecting into the your anticipate injecting inject
15	
16	barrels of water per day and our pressures will probably
17	start out, as I indicated, at 3000 psi, and before the flood
18	is depleted, it will probably reach 4500 psi. That's been
19	the experience of Mobil in their floods.
20	MR. NUTTER: That's surface pressure
21	you're talking about.
22	mbatic surface pressures I'm talking
23	Faut at all times.
	Now I will state that Texaco, as open-
24	as soon as possible after injection
2.0	



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1	18
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 ! hillips?
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 centra
17	project there, the big one that they operate, what pressure
18	are they using there?
19	A. Their maximum pressure currently is
20 21	4800, I understand.
22	They have, I believe, or I have heard
	LLAL LNA! NA! AAPAA AAPAA WAYMIBBIAN AA AMAYSAA ST TRIB RIAMA

that they have asked for permission to operate at this higher

range and have shown by step rate testing that they are not

fracing the reservoir at this pressure at this late stage in

life of the flood. They've been injecting since August of

23

24



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AMILHBLE COBA	3 .	MR. NUTTER: So they p
	4	before the door was shut on injection press
	5	A. That is correct. That
	б	MR. NUTTER: They star
	· · · · · · · · · · · · · · · · · · ·	pressures
	8	A. Yes.
	9	Q from the beginning.
	10	A. Uh-huh.
	11	MR. NUTTER: Maybe that
	12	that survey in that other one.
	13	A. Yes.
	14	Q. Mr. Anthony, to go back
	15	the data introduced in Case Number 6248 by 1
	16	was by data obtained from the North Vacuum 1
	17	correct?
	18	A. Yes, I believe they use
0	19	62 step rate tests on various wells within
	20	Abo North Vacuum Abo Unit. Some of those
	21	very near the proposed unit. Well No. 220
	22	Vacuum Abo Unit was one of those wells which
	23	sets our unit boundary, one 80-acre location
	24	Q That's shown on Exhibit
	25	is it not?

1 19 1973. robably got in ures, didn't they? is correct. ted out with high t's why they had k a little bit, Mobil, I believe, Abo Unit, is that ed a total of the North Vacuum e wells being In the North h directly offthere in --Six, I believe



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1	20
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 Twolve is the one we were
0	just talking about, Ken, in the where this
1	All right, but I don't believe we've
2	described it for the record yet.
3	A Exhibit Number Twelve is the frac pressu
4	determination from these 62 step rate tests that Mobil ran in

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

the North Vacuum Abo Unit. They were taken over a 3-year

period starting immediately after injection was commenced in

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

Well No. 220 was tested in December of



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ject?

1 2 1974. It had been injecting -- on injection for approximately 3 18 months. The cumulative injection was approximately 100,000 barrels. 5 The step rate test on that well indicated 6 a parting pressure of 4150 psi. I don't know what the bot-7 tom hole pressure was, which certainly affects the fracture pressure of the reservoir; however, it was probably increased 9 above the initial bottom hole pressure at the commencement 10 of injection, but it was at4150 psi after 18 months of in-11 jection. 12 MR. NUTTER: Is that all part of the re-13 cord there in ---14 In Case 6248. A. 15 MR. NUTTER: -- Case Number 6248? 16 That is correct. That's part of the 17 record. 18 MR. NUTTER: If you don't mind, Mr. 19 Bateman, we'd like to make reference to that case in making 20 an analysis of this case. MR. BATEMAN: Certainly. 22 Just one further question on Exhibit 23

Twelve. It indicates that the fracture pressure increases

over time. Would you expect that to occur also in this pro-



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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	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	(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 chlorid					
18	content of the Ogalalla 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						
24	proposed pressure maintenance project?					
-	TOURDO 10 AUTHORITY PARAMETER TO THE TOP					

City of Carlsbad, the owner of the Double Eagle Water Com



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

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

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

A I do.

Were Exhibits One through Fourteen prepared by you or under your direction?

They were.

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

MR. NUTTER: Exhibits One through Four



1	24
2	teen will be admitted in evidence.
3	
4	CROSS EXAMINATION
5	BY MR, NUTTER:
6	& Mr. Brooks, I notice down here at the
7	bottom of this last exhibit that the Martin Laboratories in-
8	
	dicate that if you combine produced water with this fresh
9	water and allow oxygen into the water that you're going to
10	have an iron oxide precipitate unless you treat the water.
11	Do you intend to recycle your produced
12	water?
13	A. That's true.
14	And you will treat it to avoid that?
15	A We will treat the fresh water to
16	Q. Remove the oxygen.
17	A remove any oxygen from the fresh
18.	water. That's standard
19	
20	
,	A. That's right. That's standard operating
21	procedure.
22	g. But you will be recycling your produced
13	water.
4	A That's true.
5	Noware the integtion wells also show



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1			25			
2	on Exhibit Number	r Two?				
3	A.	Yes, sir, I believe	every completion			
4	within that circ	le around each injection	well, including the			
5	proposed injection wells, is included.					
6		Okay.				
7	**************************************	Yes, they are.	•			
8	Q	Now on those figures	you gave for pro-			
9	duction figures,	those were through Augus	t of '81 or beginning			
10	of August of '81:					
11	A.	Up to August 1st; th	rough July.			
12	Q	Okay. That's at 8-1	, then.			
13	A.	Yas.				
14	Q	Now what was the cum	at that time?			
15	A.	1,666,000 barrels.				
16	Q	And you estimated yo	ur total ultimate			
17	cum would be two	four forty nine?				
18	Λ.	Yes.				
19	Q	So you predict you h	ave remaining pri-			
20	mary reserves of	783,000.				
21	And the second s	That is correct.				
22	* Q	Now did you give us	an estimate of what			
23	you expect on pre	essure maintenance to inc	rease those?			
24	A	That's right, we exp	ect to recover an			
25	additional 1,837,	,000 barrels.				
-						



. 1				26
2		Q.	That's additional on top of the	remaini
3	primary of	783?		
4,		Α,	That is correct.	V
5	+ 2	Ø saker	All right, now you say you're pr	coducing
6	at about 29	6 barrels	per day. You have, what is it,	25 wells
7	in there?			
8		Λ.	Yes.	
9		Q	What is the range of production	on the
10	individual	wells in	this area?	
11		A	they run from 3 barrels a day up	to
12	maximum of	25, I bel	ieve.	Market (1997) The Control of the Con
13			The majority of the wells produc	e in
14	excess of 1	.0 barrels	a day, which is normally classif	ied as
15	a stripper	well.		. No.
16		Q.	Well, it would be at a shallow of	lepth.
17		A.	Right.	τ
18	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Q	I don't think I'd say 10 barrels	at
19	this depth	ould be	stripper wells. I think you coul	d say
20	12 at this	depth wou.	ld be considered a stripper.	
21	en de la companya de La companya de la companya de	A.	We would certainly accept that.	
22		Q	You wouldn't have an objection t	o, this
23	being class	ified as	a waterflood rather than a pressu	re main-
24	tenance?			
25		n	No cir we would not We would	l have

W.N.M.C.F.



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27 2 no objection whatsoever. It's simpler to administer. Yes, sir, certainly is. Takes a lot less MR. NUTTER: Are there any further ques-Anthony? He may be excused. Do you have anything further, Mr. Bate-MR. BATEMAN: Nothing further, thank you MR. NUTTER: Does anyone have anything 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.A.

Rt. 1 Box 193-16 Santa Fe, New Mexico 87501 4

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the agoing Transcript of Hearing before the Oil Conservation dision was reported by me; that the said transcript is all, true, and consent record of the hearing, prepared by the best of my ability.

Soury W. Byd CSE

7399-7400

, Examiner

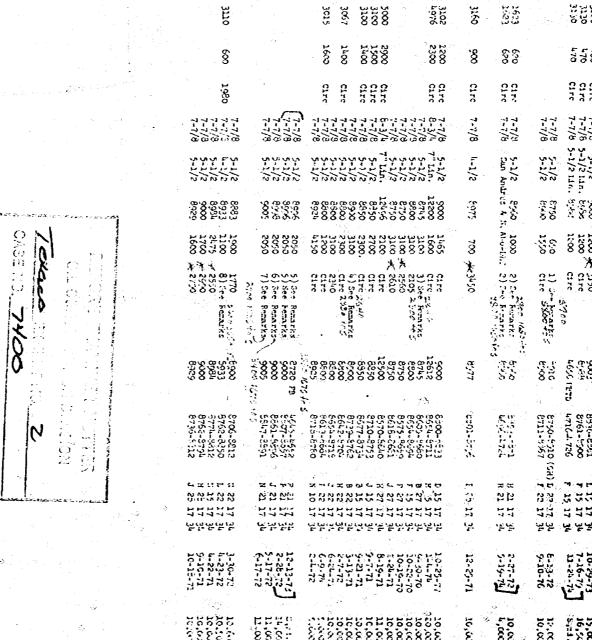
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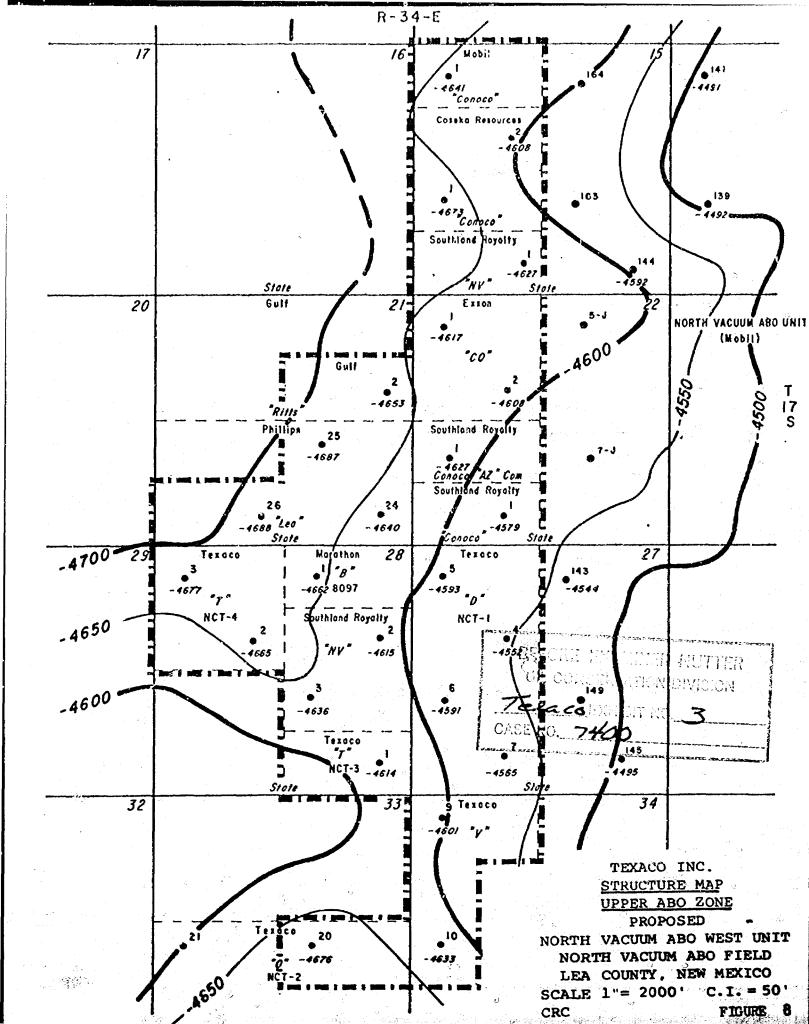
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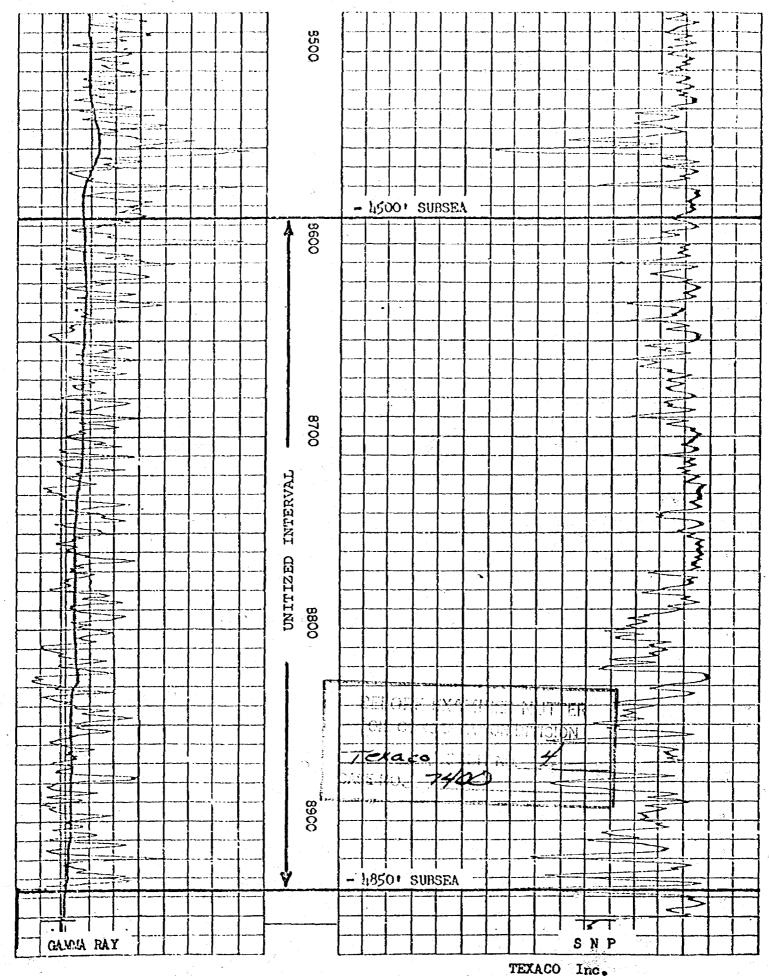
(Coment tops determined by Temp. surveys unless otherwise noted.)

1. Original coment top # 5500", coment behind 5-1/2 easing from 5800" to surface 2. Original coment top # 2500", coment behind 5-1/2 easing from 1650" to surface 3. Original coment top # 2346", coment behind 5-1/2 easing from 2300" to surface 4. Original coment top # 2540", coment behind 5-1/2 easing from 2300" to surface 5. Original coment top # 2500", coment behind 5-1/2 easing from 1675" to surface 6. Original coment top # 2600", coment behind 5-1/2 easing from 1675" to surface 6. Original coment top # 2700", coment behind 5-1/2 easing from 1725" to surface 6. Original coment top # 2630", coment behind 4-1/2 easing from 3550" to surface 6. Original coment top # 2630", coment behind 4-1/2 easing from 3550" to surface 6. Original coment top # 2630", coment behind 4-1/2 easing from 2000" to surface 9. Original coment top # 2630", coment behind 5-1/2 easing from 2000" to surface 9.

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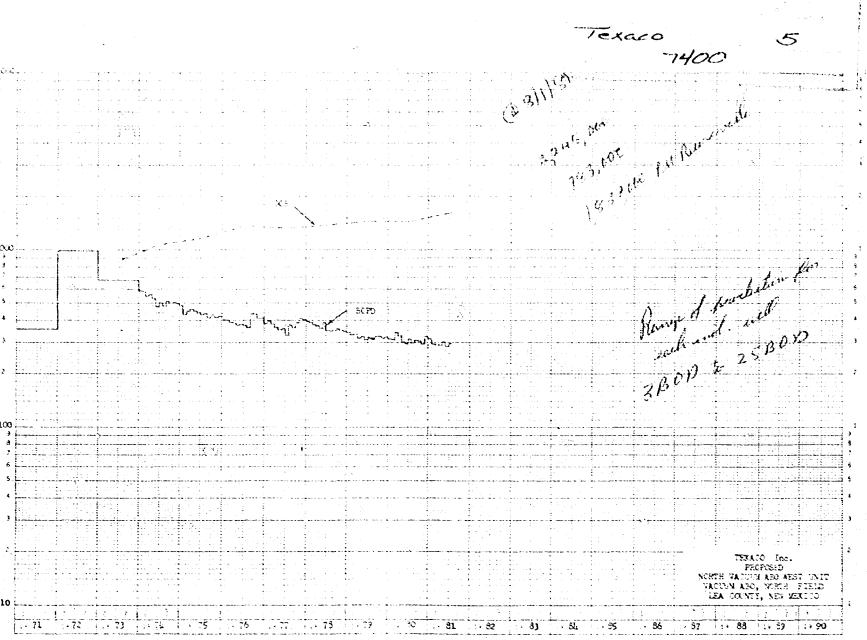


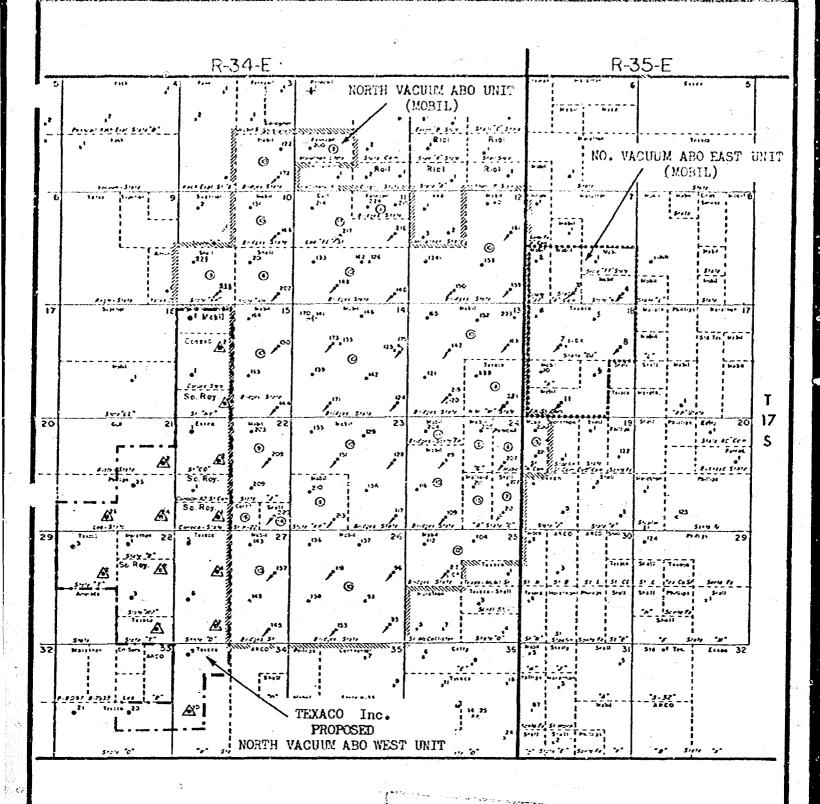




TEXACO Inc.
NEW MEXICO "T" STATE NCT-4 NO. 3

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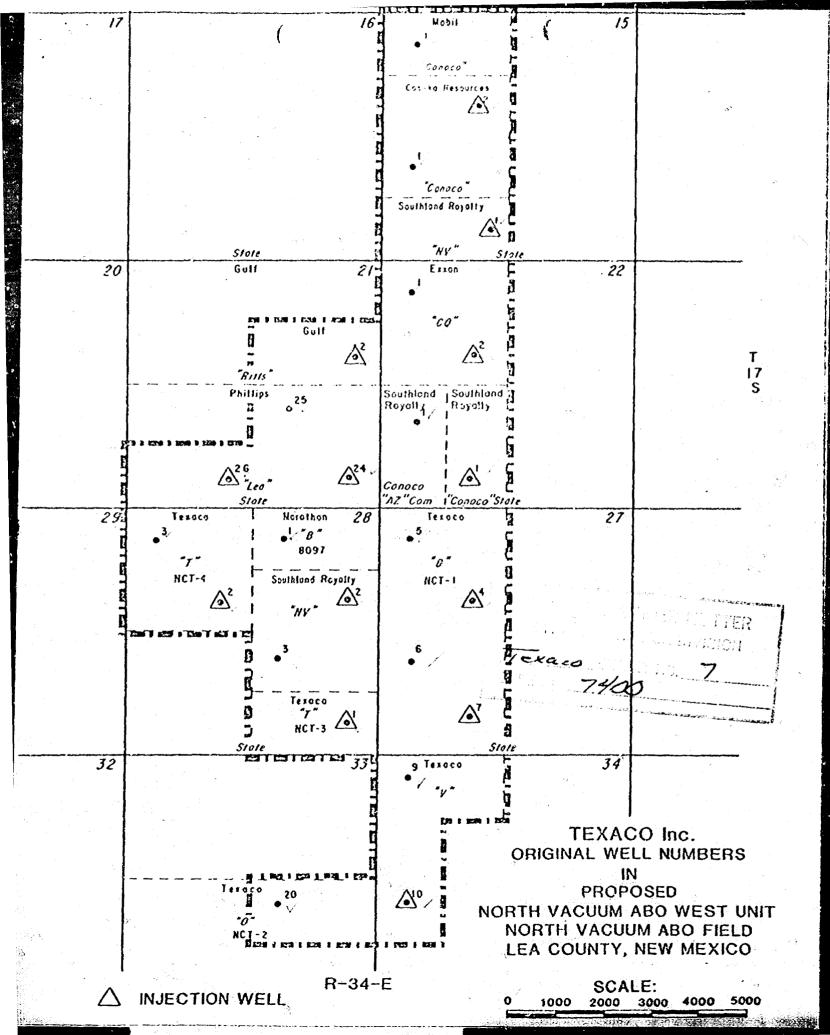


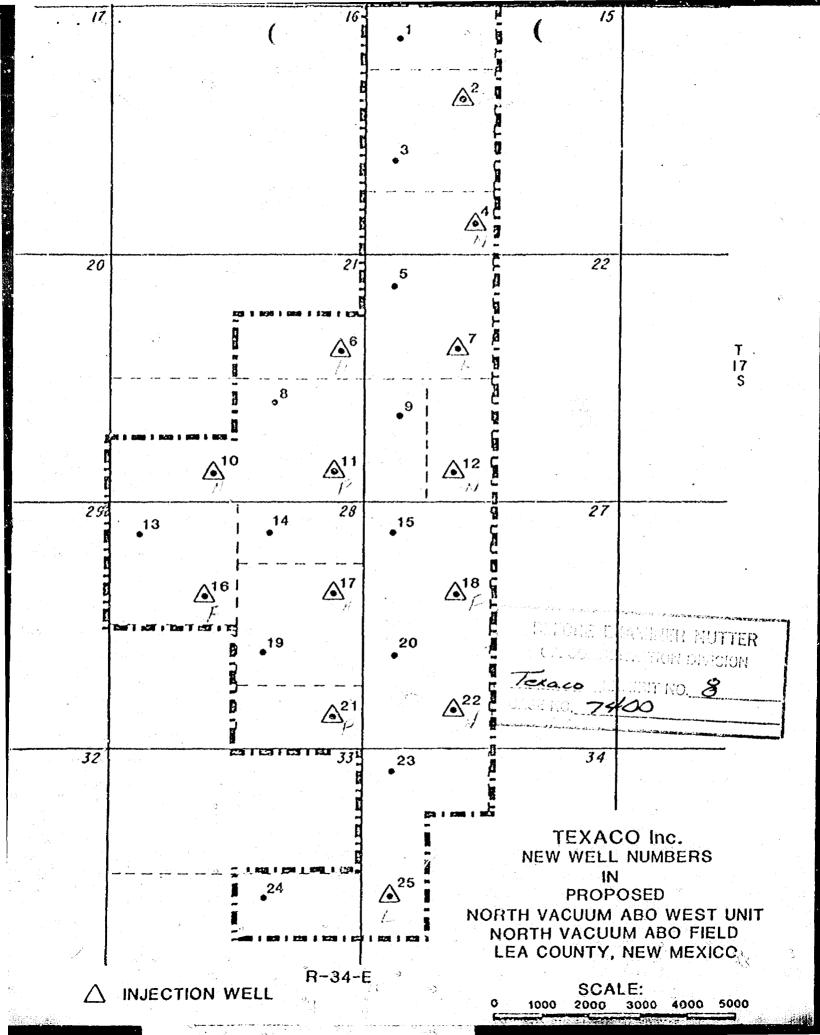
PRODUCING WELL
INJECTION WELL
PROPOSED INJECTOR
PROPOSED UNIT BOUNDARY
N. VACUUM ABO WEST UNIT

NORTH VACUUM ABO FIELD
IEA COUNTY, NEW EXICO

CRC

FIGURE 2







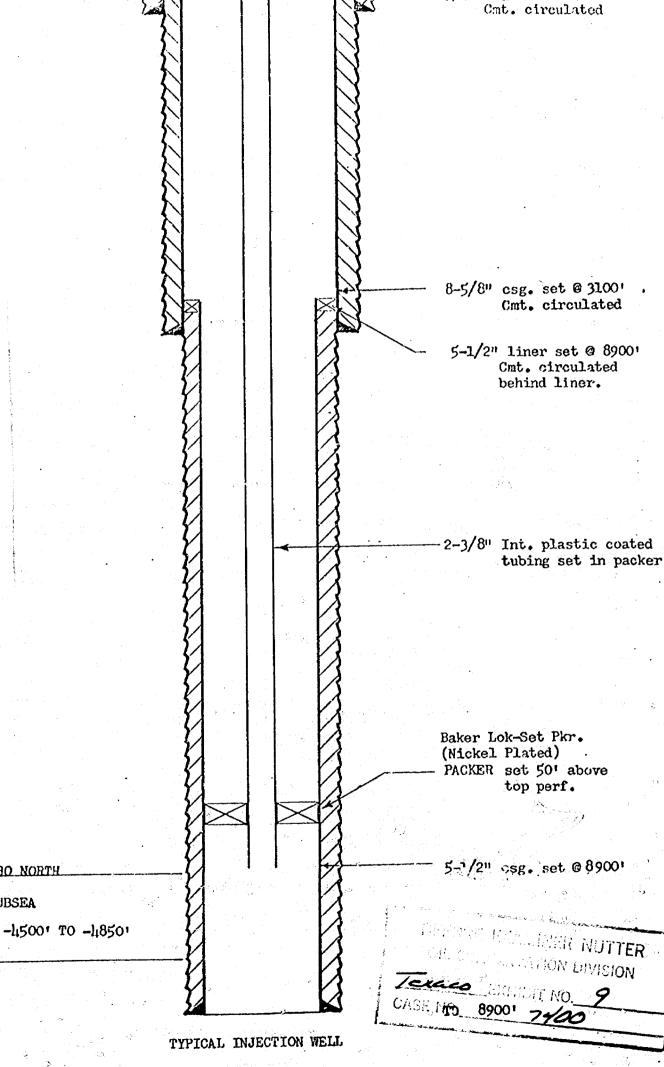
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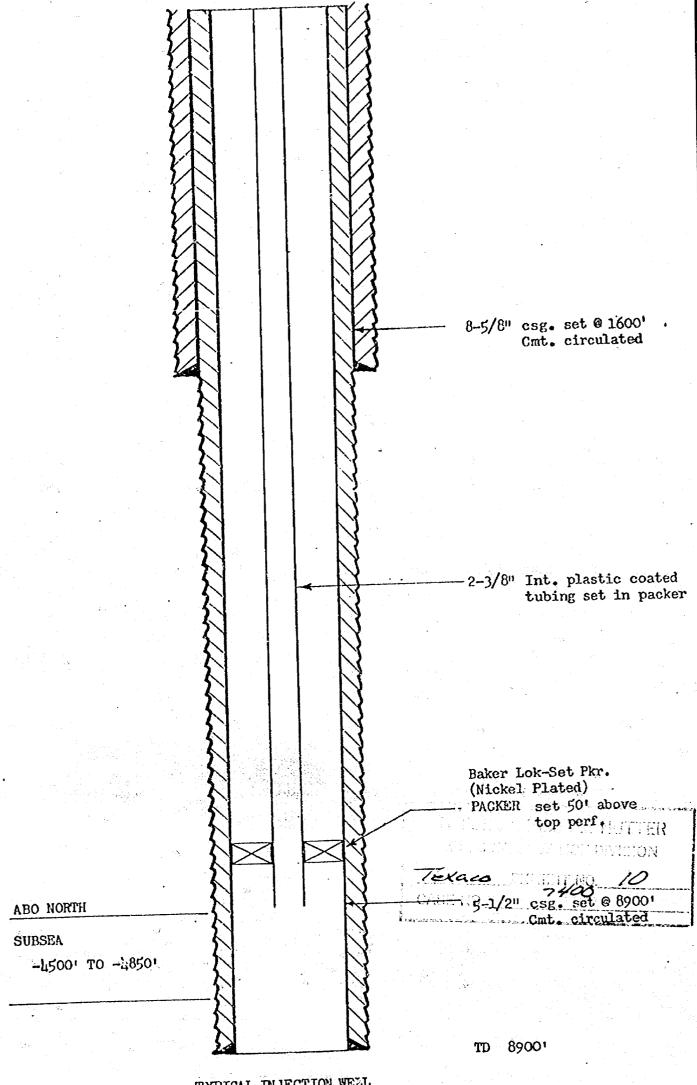
ABO NORTH

SUBSEA



- 11-3/h" csg. set @ 400'

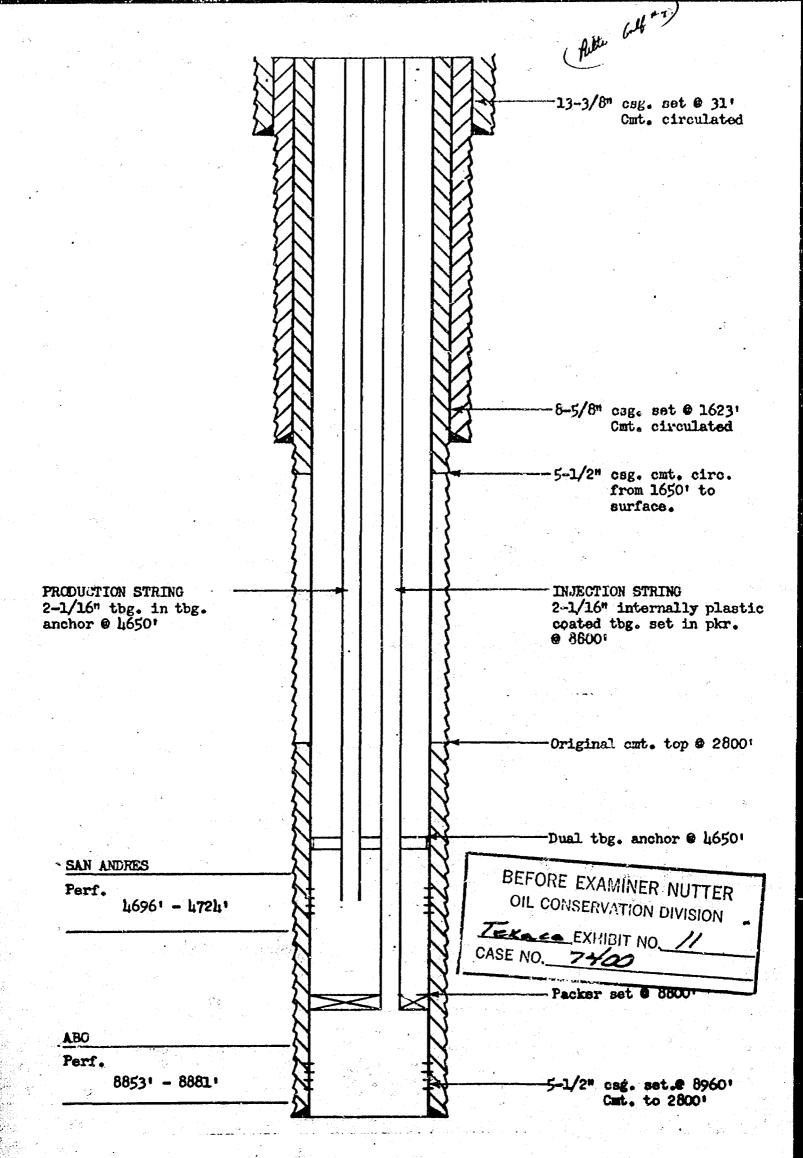
TEXACO Inc. PROPOSED NORTH VACIJUM ABO WEST UNIT VACUUM ABO, NORTH FIELD LEA COUNTY, NEW MEXICO



TYPICAL INJECTION WELL

TEXACO Inc.
PROPOSED

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

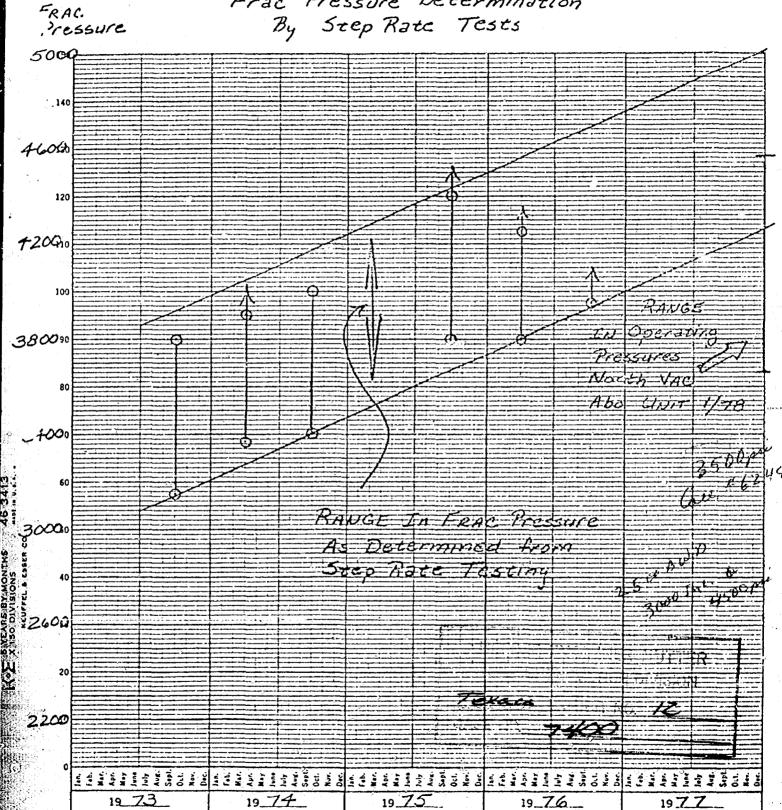


DUALLY COMPLETED INJECTOR

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



Martin Water Laboratories, Inc.

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

RESULT OF WATER ANALYSES

# **	t A	BORATORY NO	781184		
To: Area Engineer			72121		
P.O.Box 727, Lovington, NM					
இத்திகள் இது					
COMPANY Texaco, Inc.	Lt.AST _	West Vacuum			
FIELD OR POOL		acuua			
SECTION BLOCK SURVEY	COUNTY Lea	ST	ATE NH		
SOURCE OF SAMPLE AND DATE TAKEN				of SE 1/4	Sec.
NO. 1 Raw water - taken from Du	val water supply	well #1. 7-1	7-81 T-17-S	, R-311-E	
RO. 2 Row water - taken from Ke					E 1/1
		and all and and and are an area of the same and area.	S	ec. 34, T-	17-S
NO. 3				-311-E	
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REMARKS:	بر مورود به در ۱۹۰۵ ماداد د در داداد است در باید در				
CHEMIC	AL AND PHYSICAL P				
	NO. 1	NO. 2	ИО. 3	NO. 4	
Specific Gravity at 60° F.	1.0016	1.0010		 	
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pH When Received	1.48	7.52		<u> </u>	
Bicarropate as HCO3	192	192			
Supersaturation as CaCO3 Undersaturation as CaCO3				 	
Total Hardness as CaCO3		037		+	
Calcium as Ca	240	216 70		<u> </u>	
Magnesium as Mg	85	10			
Sodium and/or Potassium	7	28	, 	 	
Sulface as SO4	28	24		1	
Chloride as Ci	82	67			
Iron as Fe	0.22	0.24		 	
Barium as Ba		u.24		 	
Turbidity, Electric					
Color as Pt					
Total Solids, Calculated	422	391			
Temperature °F.					
Carbon Dioxide, Calculated					
Dissolved Oxygen, Winkler				<u> </u>	
Hydrogen Sulfide	0,0				
Resistivity, ohms/m at 77° F.	19.00	24.00			
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Martin Water Laboratories, Inc.

709 W. INDIANA MIDLAND, TEXAS 79701 PHONE 683-4821

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er could be injected into the producing interval represented by the produced. This warrants electification, however, in that if the supply water contains exygen, then combining the waters on the surface would result in the precipitation of tron exide 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 Form No. 3 would need to be physically or chemically removed prior to mixing.

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

Waylan C. Martin, H. A.

Dockets Nos. 36-d1 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, 1937

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. Mutter, Examiner or Richard L. Stamets, 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 anunorthodox 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 WolfcampPenn 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 unorthodoxoil 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 7384: (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 about 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 wellbere 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.
- 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 Stoyall Justis Well No. 1 to an 80-acre non-standard proration unit comprising the E/2 NE/4 of said Section 19.





PRODUCING DEPARTMENT

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

Cuse 7400

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

Attention: Mr. Joe D. Ramay

Secretary-Director

Gentlemen:

Toxaco 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 "RITTS" - S/2 NE/4 Sec. 21

Harathon Oil Company
State "B" - N/2 NE/4 Sec. 28

Nobil 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 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. 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:

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



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

Yours very truly,

James W Coffeel

James W. Cox Petroleum Engineering Manager

CRW/pw

Attachments

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

WNMCF



PPLIC	ATION FOR AUTHORIZATION TO INJECT
1.	Purpose: Secondary Recovery Recovery Pressure Maintenance MANTA FE XIO
11.	Operator: Texaco Inc.
	Address: P. O. Box 728 Hobbs, New Mexico 88240
	Contact party: J. V. Gannon - District Manager Phone: (505) 393-7191
111.	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
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

- Attach a tabulation of data on all wells of public record within the area of levies in 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:
 - Proposed average and maximum daily rate and volume of fluids to be injected;

Whether the system is open or closed;

Proposed average and maximum injection pressure; Sources and an appropriate analysis of injection fluid and compatibility with

the receiving formation if other than reinjected produced water; and analysisattached 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.).

- Attach appropriate geological data on the injection zone including appropriate lithologic <VIII. detail, geological name, thickness, and death. Give the geologic name, and death 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.
 - Attach appropriate logging and test data on the well. (If well logs have been filed Χ. with the Division they need not be resubmitted.)
- 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. XI.
 - 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.

Title Division Operations Engineer Name: Charles R. Wolle Charle L. Wolle 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.C.F.



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INJUSTION WELL DATA SHEET

	ERATOR					LEXTE	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	handra distribution (garante de	rterritoriale delirectoriosis industriales del del del conserva	-	
		Inc.									
	LE NO.		GE LOCALI						TOUNSHIP	RAMGE	
	2	1980'	FNL &	1980'	FWL	15			17-S	34-E	
										,	
	<u>5</u>	chematic						Tobula	r Oata		
					Sur	face Casi	σ <u>σ</u>				
					Size	11-3	14	"	Comented wi	th 275	sx.
	_				TOC	Cmt Ci	rc	fent	determined b	y	
		tached al Inject	ion Wal	1"	Ita 1 d	size					-:
	etch	ir mjecc	TOIL WEI	- d.							*
						rmediate		•			
					5120	8-5/	8	*1	Cemented wi	th 470	sx.
					toc	Cmt	Circ	feet	determined b	У	
		•			Hole	size					
	-,	17 :									
						string	T 2	* **		1000	
								_	Cemented wil		sx.
									determined by	y `	
				· · · · · · · · · · · · · · · · · · ·	Hole	size	7-7/8"		- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		
		•		•	Tota	l depth	89881				
					lnie	ction int	orval				
					-				9000		
					(per	forated 4	<u>reet</u>	olo, i	8900 ndicate which	Teet	
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		N= 18.		ing. Singapangan					٠,		
Lah	ina ei	ze <u>2-3</u>	3/8"	lines	with	inter	nal pl	astic	-coating	sat	in a
	3.5			_ 11			(mat	erial)			7
		r Lok-Set					packer	at	± 8711	fe	et
10)		ibe any oth		-tubing	seal)	•			eria. Talah		
	er Dat					19. 1				e de la companya de	
		= of the inje	akitan "far	mation	Ab	0	- 1			•	
							Abo N	orth	1 J 5		
2.	9	of Field or								· · · · · · · · · · · · · · · · · · ·	
3.		is a new we			1 -	· · · · · · · · · · · · · · · · · · ·		汉 7 N			
	If no	, for what p	purpose w	as the i	cell a	riginally	drille	d? <u>'Ui</u>	1 & Gas Pr	oduction	
	 	·									
4.	Has U and g	he well ever ive pluggin	r teen po j detail	efyrate (sacku c	lin a	ny other ent or hi	zane(s): idge plu	? List ug(s) u	all such per sed) Yes	rforated in	tervals
		San Andr	es 47	16-472	6	Sqzd w	/200 s	x			,
5.		and the second second	and name	e of any	over	lying and	Var unde	erlying	oil or que a	rones (poal	s) in
	thin i	20.0	Car 1	Indres	<u></u>	4700'			<u> </u>		
		verlying:	San P	MIGLES	- I	7700					

artaxion

MELL	co Inc.		ICATION TO THE	964 11	SECTION			est Unit		RANGE	
4	a No. of the Contract of the C	660' FSI	. & 2180°	FWL.	15	or the state of th		17-S		34-E	ومرسورة والمقاملة
- "	- -										
.5	Schemat	lic					<u>labula</u> :	r Data			
					ce Caping						
				Size	8-5/8			Cemented	with	750	s
Saa /	Arraalia	د		100	Cmt Ci	rc	feet	determined	by _	<i>-</i>	
''Typi		id ijection	Well"	Hole	size						
Sketo	ch .			Inter	rediate C	asion					
	•			Stee			н	Cemented	vith		,
*											
	*	•			size				-		
				Long :	string						
							,	Cementeri	ei Eh	2475	•
				-			-		•	Survey	
					ize			detelatuen	Uy _	<u>survey</u>	<u>'</u>
					*******				-		
				10031	depth	0904	<u> </u>		_		
				Inject	ion inter	val					
				87	74	feet	to	8812		feet	
- 4				(perro	rated on	орен-г	101 0, 1	ndicate wh	ien)		
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		41.7 -									
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p ==											
a i											
ubing	size	2-3/8"	lined	with _	interna		astic erial)	-coating		set in	а
Ba	ker Lol				p:	scker	at	± 8724		feet	
or do		and model)	sing-tubing	anal).							
		iy other ca	Jimy Conting	00027.			. •;				
ther !			Nedana e e e e e e e e e e e e e e e e e e	Abo							
		-	Formation .		Jacuum d	ho N	orth			· 	
			(if applies								
			illed for it				XZ N		D		
310	no, for	what purpo	se was the v	ell or	iginally d	lrille	j? <u>U1</u>	1 & Gas	Proa	action	
i Hə	e the wel	l ever lice	n perforate	l in any	r ather u	nc(s)	list	all such	perfor	ated, inter	val
and	a dive bi	lugging det	ail (sacks c	ji çem e t	TO OF OUR	si ida br (1472) g		10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
<u></u>	 										
				i i i	A Same						
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the second second	ye the do is area.	epth to and	name of any	overly	zing and/o	r unde	rlying	oil or gn	s zone	s (paols)	

Тека			propo		orth Vaeu	ium Abo V	lest Unit		
NELL	SO. CONTAC						1048SHTP	RASILE	
6	2080'	FNL 8	560'	FEL	21	manaria promonomento a	17-S	34-E	
						2			
	Schematic		4° .			Inbula	r Data		
San	Attached			100	Cmt Cir	C feet	determined by		
		ion We	11"	Hole	size				
Sket	ch			Inter	rmediate Cas	inn		ا ^ر اني	
							Companied with	620	SX.
		a. N		_					
	•						· ·	`	······································
				11016	Size				
				Long	string				
				Size	5-1/2	"	Cemented with	1000	sv.
	4			TOC	*	feet	determined by	Survey	
• • .				Hole					
			* .	Total	depth	8960'			
ž.			•		-				
							3001		
	$\frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} - \frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} - \frac{1}{2} - \frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} - \frac$			(perf	orated or oc	reet to <u> </u>	ndicate which)	feet	
				*Ori	ginal cem	ent top	@ 2800' ceme	nt behind	d ?
				5-1,	/2" casin	g from 1	650 to surf	ace.	
					eta e e				
44, 5									
						.`	•		
				e 1					
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			• •		• . •				
Tubing	size <u>2-3</u>	/8"	line	J with _		plastic (material)	-coating	set in	а
Ва					рас	ker at	± 8803	feet	
(an da			n - tubi oc	. (leas r	. 11 - ≥ 	2			
		t Casim) - Call Cin	, 30017.			,		
7				Abo		e e e e e e e e e e e e e e e e e e e			
The second second		1 4				o North		<u> بسبب حتر حق</u>	
A Sec. 19	the state of the s				<u></u>				
10 m	. ک			47					
ıı	no, for what p	urpose, v	ias the	well or	iginally dri	illed? <u>U1</u>	1 & Gas Prod	uction	
Scheratic Surface Casima Size 13-3/8 Concented with N.A. 10c Cmt Circ Feet determined by 10c Cast Injection Well" Sketch Size 3-5/8 Concented with 620 Tor Catt Circ Feet determined by 10c Cmt Circ Feet determined by 10c Cm									
								rated inter	vals
				1.65	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			omminal -	<u> </u>
		٠ <u>٠</u>		<u> </u>	e ja i k				
	ith the Abo ill be sque						leted as a du		
	o the depth to	ุลผู้ชี กละ	เดียโล้ท	y overl	ying and/or	underlying	oil or gas zone	·a (pools)	in
	Overlying:	San	Andres	± 4	700'	e de la companya de l			
y ij e Ma	Underlying	: None	in are	a of	review				

27. 7.1.1 7.11			
Texaco Inc. Pro	posed North Vacuum	Aho West Unit	
WELL SO. FOOTAGE LOCATION		100 West Offic	RANGE
7 2020' FNL & 198		17-S	34-E
	and the state of t		- According to the Control of the Co
Schematic		Tabular Data	
	Surface Casing		
		Cemented with	. 1100 -
See Attached		feet determined by	
"Typical Injection Well"	Hole size		
Sketch	Intermediate Casina	*	
	Size	Cemented with	
		feet determined by	3
	Hole size		The state of the s
		Company of the Compan	
	Long string		
	Size <u>5-1/2</u>	Cemented with	1550s
	TOC Cmt Circ	feet determined by	44. 44.
	Hole size 7-7/8		
	Total depth 8900)	
	Injection interval		
	8711 feet	t to <u>8867</u> Mala x indicate which)	_ feet
	AAA	AAAA	
	•	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
			<u>-</u>
to a second control of the second control of the second control of the second control of the second control of			
			ta filozofia
ubing size 2-3/8" lin	ed with internal p	lastic-coating	set in a
		terial)	561 111 0
Baker Lok-Set (brand and model)	packer	ac <u>± 8661</u>	feet
or describe any other casing-tubi	ng seal).		1. 11 18 1. 11 18
her Oata			
. Name of the injection formatio	Abo		in the second se
		North	
Name of Field or Pool (if appl	* *		
. Is this a new well deilled for			
If no, for what purpose was th	e well originally drill	ed? Oil & Gas Pro	duction
Has the well ever been perfora	ted in any other consis)? List all such perfo	erated interval
and give plugging detail (suck	s of coment or bridge p	lug('s) used) <u>NO</u>	
			·
. Give the depth to and name of	any overlying and/or und	lerlying oil or gas zor	nes (pools) in
this prep.		3	
	es ± 4700'		
. Underlying: None in a	rea of review		:

OPERATOR		and the second s	UNA		Therefore will have produced observations and the state of the state o	The state of the s
Texaco	Inc.	Prope		Vacuum Abo I	Vest Unit	
MELL SOL	FOUTABLE L	OCALLON	SUE	1109	100450111	RANGE
10	2180' FW	L & 660'	FSL 21		17-S	34-E
Set	hematic	*		Tabul:	ir Data	
			Surface Car	iing		
					Comented with	600
					determined by	
See Atta		**********				
Typica) Sketch	l Injection	well.				8
			intermediat			
	y W		Size	14	Cemented with	More material management and a second and a
•			100	Cent	determined by	
	•		Hole size			
			Long string		ear ear	
			Size 5-	1/2 "	Cemented with	2050
				•	determined by	
				7-7/8''		
		•	iotal depth	9005'		
			Injection i			
		in de la seconda de la second	8847	feet to _	8891 indicate which)	feet
14 - 14 - 14 - 14 - 14 - 14 - 14 - 14 -			(perforated	0F-0000-10-10-10-	indicate which)	
					•	
			ا د سند نیان	amont ton 0 2	'00', cement be	hind 51/20
	*			m 1725' to sur		amid 3-1/2
				÷	÷	
	•	4				4 * ×
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				*.		
	• •			see a surface of the see of	and the state of t	
	2 2/01		into	vnol nlooti	o-coating	
ubing siz	e <u>2-3/8'</u>	lined	s with	ernal plasti (material)		set in a
	Lok-Set			oacker at	± 8797	feet
	be any other c	* * *	scal).			
ther Data				* * * * * * * * * * * * * * * * * * *		
	14 N	n Convotion	Abo			
	f the injection			m Alva North		
Name of	f Field or Poo	l (if applic	able) vacut	m Abo North		
	s a new well d					
lf no.	for what purp	ose was the	well original	ly drilled? 0	il & Gas Pro	duction
					t all such perf	orated interva
🤼 ənd gir	ve plugging de	lail (sacks	of cement or	bridge (lug(s)	usčď) <u>No</u>	
4						
		d nase of an	y overlying a	nd/or underlyin	g oil ar gan zoi	nes (paols) ³³ tr
this ar			1 / 700!			
		San Andres				
Un	derlying: No	one in are	ea of revie	W :	12	

		n		CASC orth Mag	cisim Aba U	last Unit		,
WELL NO.		Propo		oren vac		rest unit	RANGE	
11		'SL & 660'				17-S	34-E	
					nd grammana between the stage of temp			
Scho	ematic				Inbula	r Data		
			Surfa	ace Casing	٠			
			Size	8-5/8	н	Comented with	550	_9 x
		ě	TOC _	Cmt Circ	feet	determined by		
ee Attad Typical ketch	ched Injection	on Well"						
Recen			Inter	emediaté Ca	sina			
			Size		11	Cemented with		s
	*		TOC		feet	determined by $\underline{\sim}$		
	• •		Hole	size				
- -			7.	string			2050	
						Cemented with		
				.,		determined by _	Survey	
				size				
			fotal	depth	9000'	· · · · · · · · · · · · · · · · · · ·	N	
			Injec	tion inter	val			
			88	307	feet to	8857	feet	
			(perf	orated or	open-holo, i	8857		
		er Maria de La Caracteria de la Caracteria La caracteria de la Caracteria del Caracteria de la Caracteria	The Carry	$\frac{\mathbf{x}_{i}}{i} = i$				
			**		.675' to s	•		•
,	•							
	2.37	QII		intarns	ol nlastic	-coating		
		8" line	d with		(material)	e-coating	set in	a
Baker	Lok-Set		d with		(material)		set in	a
Baker (b.c.	Lok-Set			pa	(material)			.
Baker (by:	Lok-Set and mode any other	(el)		pa	(material)			à
Baker (by: r describe	Lok-Set	lel) casing-tubin	g scol)	, pa	(material)			
Baker (by: r describe her Data Name of	Lok-Set	casing-tuhin	g scol)	, ,	(material) cker at			a
Baker (by: or describe her Data Name of	Lok-Set and mode any other the inject	icl) casing-tubing ion formation ool (if applie	Abo	,) Vacuum A	(material) ucker at	± 8757		a
Baker (by: r describe her Data Name of Name of	Lok-Set and mode any other the inject field or P	casing-tuhing ion formation col (if application drilled for	Abo	pa Vacuum A po? <u>/</u> 7 Y	(material) cker at bo North	± 8757	feet	
Baker (b,r) or describe her Data Name of Name of	Lok-Set and mode any other the inject field or P	casing-tuhing ion formation col (if application drilled for	Abo	pa Vacuum A po? <u>/</u> 7 Y	(material) cker at bo North	± 8757	feet	3 3 3
Baker (by: or describe her Data Name of Name of Is this If no, the	Lok-Set and and mode e any other the inject field or P a new well for what pu well ever e plugging	casing-tubing casing-tubing casing-tubing can formation called for capplication can be called call (sucks	Abo cable) injection	Vacuum A	(material) cker at bo North cs /X/ cilled? Of	± 8757 No il & Gas Proc	feet	
(by: or describe ther Data Name of Name of Is this If no, i	Lok-Set and and mode e any other the inject field or P a new well for what pu	ion formation ool (if appli- drilled for rposo was the	Aborable) injection well and in an of comme	Vacuum A	(material) cker at bo North cs X cilled? Of	± 8757 No il & Gas Proc	feet	
Baker (by: controlled the controlled	Lok-Set and and mode e any other the inject field or P a new well for what pu	casing-tubing casing-tubing casing-tubing can formation called for capplication can be called call (sucks	Aborable) injection well and in an of comme	Vacuum A	(material) cker at bo North cs X cilled? Of	± 8757 No il & Gas Proc t all such perfoused) Yes	feet	
Baker (by: or describe her Data Name of Name of Is this If no, the part of San Ai	Lok-Set and and mode e any other the inject field or P a new well for what pu well ever e plugging ndres 4	casing-tubing casing-tubing casing-tubing cases and cases are the cases are the cases are cases	Aborable) injection well an of common Sq	Vacuum A on? /7 Y riginally d ny other to ent or brid zd w/150	(material) cker at bo North cs /X/ cilled? Of	± 8757 No il & Gas Proc	luction	val:
Baker (by: or describe ther Data Name of Name of Is this If no, i Has the pnd give San Ai Give the	Lok-Set and and mode e any other the inject field or P a new well for what pu well ever e plugging ndres 4	casing-tubing casing-tubing casing-tubing cases and cases are the cases are the cases are cases	Aborable) injection well an of common Square	Vacuum A on? /7 Y riginally d ny other to ent or brid zd w/150	(material) cker at bo North cs /X/ cilled? Of	± 8757 No il & Gas Proc t all such perfoused) Yes	luction	val:

UPERAT	1011	į	EXSC		The second of th		
Texac	o Inc.	Proposed N	lorth Vacu	um Abo W	lest Unit		
HELL S	O. FORTAGE COC	TITON	SECTION		TOMYSHIP	RASLE	****
12	660' FSL	& 1880' FWL	22		17-S	34-E	
		:			and the second s		
	Schematic			Inbula	r Data		
		Surf	ace Casing		3 (4)		
		7		"	Cemented with	550	
See A	ttached				determined by _	-	
"Typi	cal Injection W	ell" Hole	size			<u>_</u> -	
Sketo	e h	Inte	rmediate Casi	ine			
					Comented with		
					**		
		TOC		reet	determined by _	ودايية بدويون بري ويت برسطان سيطين دخاري المراجع المراجع	
		Hole	size				
		Lona	string				ř.
						1000	
ĵ:	r.				Cemented with		sx.
		100	1770	feet	determined by	Survey	
		Hole	size <u>7-7</u>	/8"			
		Total	depth 8	900'	· · · · · · · · · · · · · · · · · · ·		
*							
			tion interva				
		7005	1706 r	eet to	8812 ndicate which)	feet	
		(peri	orateo or op	811(13-1-6-) 1	naicate whien)		
			d ·				
				7		t', t	
				erti i i i i i i i i i i i i i i i i i i			
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			the second				
- •	in the second se						
				14 V			
			3				
*	No. of the contract of the con						
				2			
			~				
1. 1.	2 2 (011		internal	nlactio	-coating		
Tubing	size 2-3/8"	lined with		(material)	-coating	set in	а
Ba	ker Lok-Set		pack	er at ±	8656	feet	
	(brand and model)					47.0	
(or des	cribé ny other casi	ud-cooxud gear)	•			and the second second	
Other (<u>Data</u>					4.4	
	ne of the injection f						
2. Nam	ne of Field or Pool (if applicable)	Vacuum Ab	o North			<u>`</u>
	this a new well dril		And the second second		io Io	9	
	no, (or what purpose	the state of the s				uction	
	not the minar harbase	has the Mett/Oi	riginally ori	1160:	-		 .
. 							
4. Has	the well ever been	perforated in a	y other zone	(s)? List	all such perfor	rated inter	vals
ang	l give plunging detai	i (sacks of come	at or pridge	trad(2) o	sea) · NO		
3			2.3				<u>_</u>
			April 1985				
	e the depths to and no	ame of any over)	ying and/or	underlying	oil or gas zone	e (pools)	in .
; 	Overlying: San	Andres ± 4	700'	ing the grant			
	Underlying: None	in area of	review	4.	3.		
		بيسور والمساور والمساور والمساور والمساور والمساور					

LU SO. FOOTSGE LOCKETON		n Vacuum Abo	tisovsiite	RANGE
16 1980' FNL & 19	80' FWL :	28	17-S	34-E
Schematic		T abo	olar Data	
	Surface C	-	11.10 17.10.11	
			Comented vi	850
			et determined b	
e Attached				y
ypical Injection Well" etch	note stre			
		ate Casino		4
			Cementedari	
•			et determined by	y <u></u>
	Hole size			
	Long stri	<u>าๆ</u>		
	Size5.	-1/2"	Cemented wit	h 3000
	roc2]	<u>156</u> fe	et determined by	Survey
	Hole size	7-7/8"		· · · · · · · · · · · · · · · · · · ·
	Total dept	h 8910'		e,
*	Injection	interval		
	8777	feet to	8859	feet
		d or open-hole	indicate which	$\sum_{i=1}^{n} \frac{1}{i} \int_{0}^{\infty} dx dx$
		distribution of the second		
; + 3		-d 8		
	4.		,	
	•			
				Ar Comment
			•	
2_2/8#	ili. Guardina se ili di n it	ernal plast	ic-coating	
	ned with	(materia	1)	set in a
Baker Lok-Set (brand and model)		packer at _	± 8727	feet
describe any other casing-tub	ing scal).			
er Oata				
Name of the injection formati		 		
Name of field or Pool (if app	licable) Vacu	um Abo Nort	<u>h</u>	<u> </u>
Is this a new well drilled fo			1.4	
If no, for what purpose was t	he well origina	illy drilled?	Oil & Gas Pr	oduction
			S 25 25 25 25 25 25 25 25 25 25 25 25 25	
Has the well ever been perfor	ated in any old	ier zanc(s)? Li	stall such per	forated interv
and give plugging detail (sac	ks of scement of	r nridge pluĝ(s)	- used). <u></u> NO	

Underlying: None in area of review

PRICETON WELL DATA SHEET

TEN I

OPERATOR

	Inc.		roposed					:4
SELE NO.		AGE LUCASTON		SECTIO	4	TOUNSHIP	RANGE	
17	<u> 1852'</u>	FNL & 55	4' FEI.	28	ingré viente, literaturaner de da des des descriptos de la composició de la composició de la composició de la	17-S	34-E	
) ³				75 .			
Sch	hematic				Interla	r Data		
			Sur	faca Casino	1			
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Baker (br	bne bne	model)	ubing scal)				**************************************	
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Baker (br or describ ther Data Name of Name of Is this If no,	the injusting of the in	model) her casing-t ection forma r Pool (if a ell drilled purpose was	tion About the well of orated in a	O Vacuum on? <u>/</u> 7 Originally	Abo North Yes /X/ / drilled? Oi	to 1 & Gas Prod	uction	

INSTITUTE WITE DATA SPEET

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Texaco In				sed No		uum Abo				
	00170				SECTION		TOTAL STATE		RANGE	
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ther Data . Name of				able) V	acuum A	00 1101 611				
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Name of Name of Is this If no, f	Field or a new Wel or what p	Paol (ii il drille purpasa v	appliced for i	njection	ginally 6	os \sqrt{X} rilled? 0	No il & Gas			val
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Overlying: San Andres ± 4700'

Underlying: None in area of review

INJUSTION NEUL/COATA SCREE

Texaco Inc.	Proposed Nort	h Vacuum Abo			;.
MELL NO. FOOTAGE LUCK			TOWNSHIP	RANGE	
21 660' FSI. &	660' FEL	28	17-S	34-E	
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Schematic	.*		ular Data		
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	Size 5	-1/2 "	Cemented with	2650	s
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	Total dep	th 8900'			
	Injection	interval			
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bing size <u>2-3/8"</u>	lined with <u>in</u>	ternal plast	the contract of the contract o	set in a	3
Baker Lok-Set	lined within		the contract of the contract o	set in a	3
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Baker Lok-Set (brand and model) r describe any other casin	ng-tuhing scal).	(materia	(Γ)		a
Baker Lok-Set (brand and model) r describe any other casin her Data Name of the injection for	ng-tuhing scal).	(materic packer at _	± 8660		3
Baker Lok-Set (brand and model) r describe any other casin her Data Name of the injection for	ng-tuhing scal).	(materic packer at _	± 8660		- J
Baker Lok-Set (brand and model) r describe any other casin her Data Name of the injection for	ng-tubing scal). ormation Abo if applicable) Vac	(materic packer at _ uum Abo Nort	± 8660		3 · · · · · · · · · · · · · · · · · · ·
Baker Lok-Set (brand and model) r describe any other casin her bata Name of the injection for Name of field or Pool (in	ormation Abo if applicable) Vac	(materic packer at uum Abo Nort /// Yes /X/	± 8660 :h	foet	
Baker Lok-Set (brand and model) r describe any other casin her Data Name of the injection for	ormation Abo if applicable) Vac	(materic packer at uum Abo Nort /// Yes /X/	± 8660 :h	foet	
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Baker Lok-Set (brand and model) or describe any other casin her Data Name of the injection for Name of field or Pool (in	ormation Abo if applicable) Vac led for injection? was the well origin	(materic packer at	th No Oil & Gas Proc	feet	
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Underlying: None in area of review

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		Proposed						
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Has th	ie well ever been ;	erfornted in	any other	zone(s)?	list all s	uch perfor	rated inter	val
and gl	ive plugging detail	CBUCKE OF C	caent of 01	crade hind((8) A26A) [—]	NO		17. 7
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		Andres ±	4700'					
								

فيارك

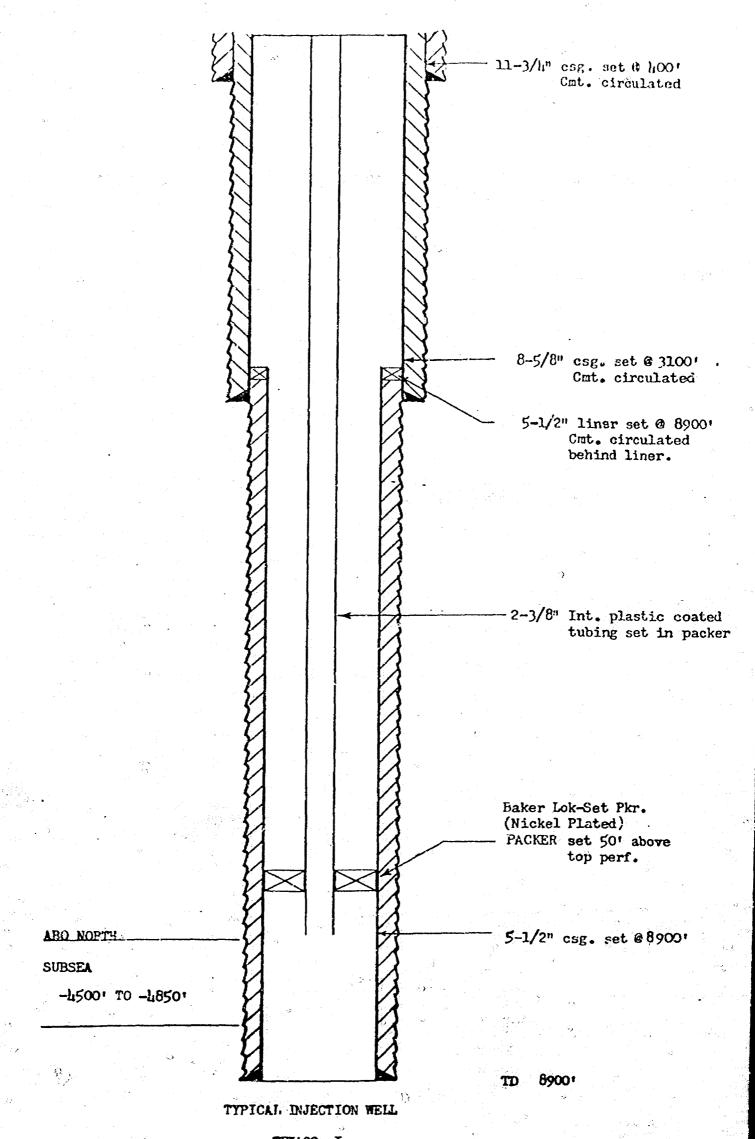
Underlying: None in area of review

INHERTION WILL DATA SHIFT

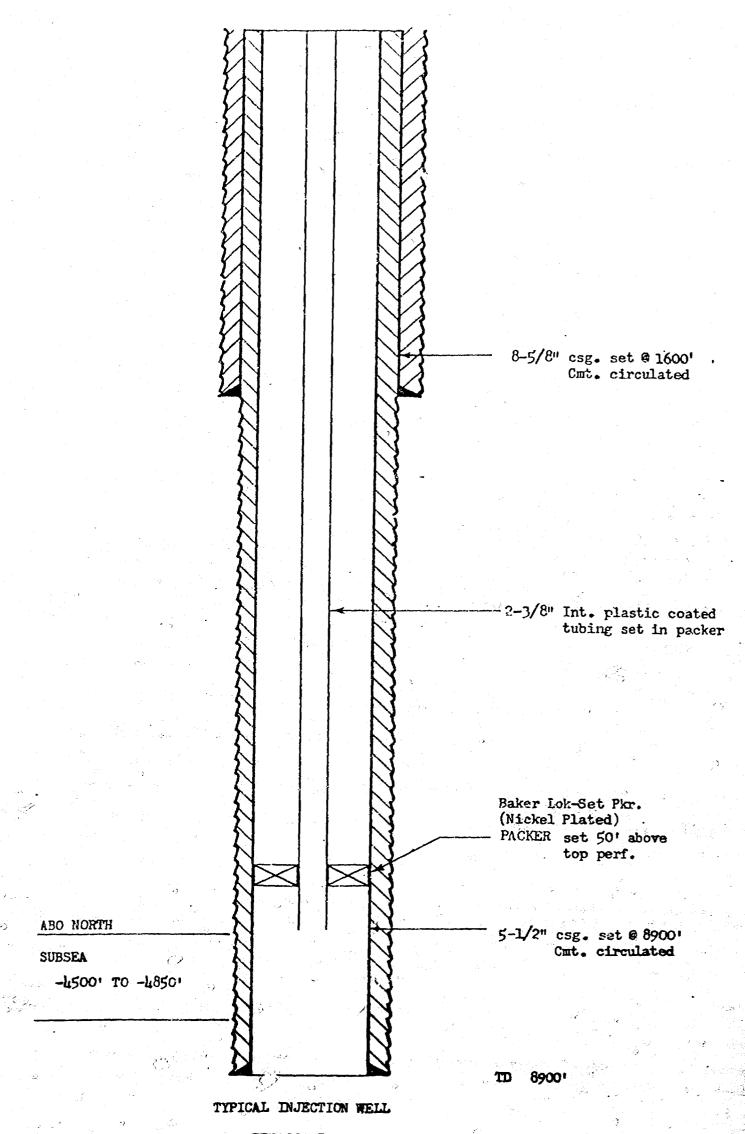
760' FSL & 198 atic led injection Well'	O' FWL. Sur Size TOC Hole Lone Size TOC Hole Lone Size TOC	face Casing a 3-5/8 Cmt Cir a size craediate Casing craediate Casing craediate Casing craediate Casing	labula " C feet	Township 17-S Township to Data Comented with determined by	
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ied	Size TOC Hole Size Hole Lana Size TOC Hole	Cmt Cir cractice cractic	C feet	Cemented with determined by	
	Size TOC Hole Size Hole Lana Size TOC Hole	Cmt Cir cractice cractic	rect	Cemented with determined by	
	Intersection of the Land	Cmt Cir	C feet	Cemented with determined by	
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	TOC Hole Land Size TOC	size string 5-1/2	feet	determined by	
	Hole Long Size TBC Hole	size			
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	Tec		79		
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ell ever been perfortugging detail (sa	orated in a icks of cem	ny other zo ent or beid	ne(s)? Lis lge nlug(s) i	t all such pertonsed) No	rated interval
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		<u> </u>		· · · · · · · · · · · · · · · · · · ·	
	ok-Set d and model) any other easing-to he injection format feld or foot (if ap new well drilled to r what purpose was fell ever been performat alleging detail (sa	2-3/8" lined with ok-Set d and model) any other easing-tubing seal) he injection formation Aborded or Pool (if applicable) new well drilled for injection what purpose was the well need over been perforated in a plugging detail (sacks of cemberth to and name of any over	2-3/8" lined with interns ok-Set production formation Abo ield or Pool (if applicable) Vacuum A new well drilled for injection? [7] is r what purpose was the well originally of pull ever been perforated in any other re- pullinging detail (sacks of cement or brid depth to and name of any overlying and/o	2-3/8" lined with internal plastic (material) ok-Set packer at packer at many other ensing-tubing seal). The injection formation Abo ield or fool (if applicable) Vacuum Abo North new well drilled for injection? 77 Yes AT what purpose was the well originally drilled? Of the purpose was the well originally drilled?	2-3/8" lined with internal plastic-coating (material) ok-Set (material) d and model) any other casing-tubing seal). The injection formation Abo icid or Pool (if applicable) Vacuum Abo North new well drilled for injection? These X7 North what purpose was the well originally drilled? Oil & Gas Production of the process of the control of the cont

INDUCTION WHIL DATA SHEET

Texaco In	C		D		Vorth Va	ourm Abo	West Unit	The depth of the second subsequent and the second subsequent subse
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							Comented with	
				TOC	Cmt Ci	rc fee	t determined by	
lee Attacl Typical ketch		ion V	We11"					
RECCH		÷ ,		Inte	ermediate C	asing	•¥ 1	
		€.	.*	Size	2		Comented with	
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describe	any oth	er casi	ing-tuh	ing scal)	, '	ing the second	en e	
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				··· —		ho North		
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If no, for	r what	purpose	ะ พาซ ํ โ	he ugll o	riginally o	icilled? 0	il & Gas Proc	luction
			<i>i</i>				i. <u>Linguista di Alb</u> erta	
Has the w	oll ave	r been	portar	aled in a	ay ather "	mu(s)? lie	t all sych perfo	rated interval
and give (el unqua	, detai	l (sac	ks of cea	ent or brid	qe pluq(s)	used) No	
				*	e e e e e e e e e e e e e e e e e e e			
	3 %. 							\$



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



TEXACO Inc.
PROPOSED
NORTH VACUUM ABO WEST UNIT

Р. О. ВОХ 1468 МОНАНА, ТЕХАS 79786 PHONE 943-3234 OR 563-1040

709 W, INDIANA MIDLAND, TEXAS 79701 PHONE 693-4521

	WATER	

	ι	ABORATORY NO	731135	
ro: Acaa Engliser		SAMPLE RECEIVED -	7-21-31	
P.O. Box 727. Lovington, Mi	f	RESULTS REPORTED.	7-22-31	
3				
COMPANY Texaco, Inc.	LEASE	As listed		
FIELD OR POOL				The state of the s
SECTION BLOCK SURVEY	COUNTY	Lea	are Hen Ha:	dco
SOURCE OF SAMPLE AND DATE TAKEN:		The state of the s	// / L	man Bushambu mananbala penghibupatan dalah girama da
NO. 1 Bay notar - taken from 1	Double Reele water	or gumble 7.17	_81	
				17 01
No. 2 Produced water - taken	trom Texaco an Si	care Crank	Dartery). /-	-1/-01
NO. 3 Vacuum Abo, M. Field				-
4. СИ				
REMARKS:				
	CAL AND PHYSICAL	PRODERTIES		
7.0 / T. (1)	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0017	1.1.150		
off When Sampled		1 3		
ell When Received	7,89	6.74		
Bicarbonate as HCQ3	194	95		
Supersaturation as CaCOs	11	6		
Undersaturation as CaCO3				
Total Hardness as CaCO3	467	·		
Calcium as Ca	167	30,000		
	59	8,500		
Magnesium as Mg	5	2,055		
Sodium and/or Potassium		53,375		
Sulfate as SO4	3 <i>7</i>	1,691		
Chloride as CI	27	102,267		
Iron as Fe	0.19	16.3		
Barium as Ba				
Turbidity, Electric			·	
Color as Ps				
Total Splids, Calculated		153,024		
Temperature °F.				
Carbon Dioxice, Calculated				
Dissolved Oxygen, Winkler				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Hydrozen Sulfide				•
Resistivity, ohms/m at 77° F.	24.59	0.064		
Suspended Oil				
Filtrable Solids as mg/1				
Volume Filtered, ml				
Ro	sults Reported As Milligran	ms Per Liter		
Additional Determinations And Remarks A and	soful compazioca	of the share is	anulta reuse	La mainet
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initerioraly industration of				
ply water could be injected int vator. Tala warrants clarifies	mater browns 4	n that Aft than	menda of the	- produces
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Formition 3 would need to be physica	dly or chemicall	y removed prior	to mixing.	1,10

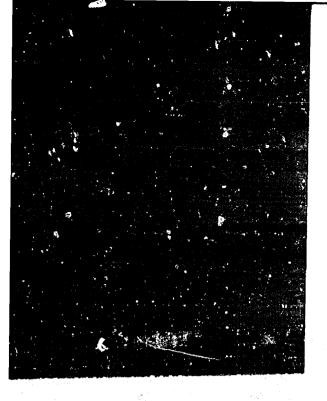
Martin Water Laboratories, Inc.

709 W. INDIANA MIDLAND, TEXAS 79701 PHONE 583-4521

RESULT OF WATER ANALYSES

	t.	ABORATORY NO	731184	· .			
ro: Area Engluser	SAMPLE RECEIVED 1-21-3).						
P.O.Box 727, Lov. agton, Mil	RESULTS REPORTED 7-22-31						
Savage Tea		. Maranan					
COMPANY TAXACO, Inc.	LEASE'	LEASE VICTORIES					
FIELD OR POOL		Vacuus	NIM		, سب		
SECTION BLOCK SURVEY							
SOURCE OF SAMPLE AND DATE TAKEN:		44 84 44 4	SE 1/4	of SE 1/4 8	3ec. 20		
NO. 1 Ray water - taken from D	uval water supply	1 1011 11. 1-T	7-81 T-17-S	R-34-E	/		
NO. 2 Rm water - taken from K	err McCee water	jumply well 05	. 7-17-31 S	1 1/4 of SE	1/4		
NO. 3	entermination description and description and description and the second construction and construction and con-		Sec. 34,	T-17-S, R-3	<u>} -E</u>		
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REMARKS:					Applica a		
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	NO. 1	NO. 2	NO. 3	NO. 4			
Specific Gravity at 60° F.	1,0015	1,0010			-		
pH When Sanipled					-1		
pH When Received	7.48	7,52			7		
Bicarbonate as HCO3	192	192			-		
Supersaturation as CaCO3		1			-1		
Undersaturation as CaCO3					7		
Total Hardress as CaCO3	240	215			7		
Calcium as Ca	85	70			1		
Magnesium as Hg	7	10			7		
Sodium and/or Potassium	23	23			7		
Sulfate as SQ4	23	24		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	7		
Chloride as C1	82	67					
Iron as Fe	0.22	0.24			7		
Barium as Ba					7		
Turbicity, Electric					7		
Color as Pt	73.1				7		
Total Solids, Calculated	622	301		·	7		
Temperatura ⁶ F.					-		
Carbon Dioxide, Calculated					7		
Dissolved Oxygen, Winkler]		
Hydrozen Sulfide		0.0]		
Resistivity, ohms/m as 77° F.		24,00-			_		
Suspended Oil					_1		
Filtrable Solids as'mg/1		******			1		
Volume Filtered, ml				·	.]		
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Additional Determinations And Remarks	a-love/Lyned-court.	Alas-the-abova	- to ha auua	- a:}-[_		
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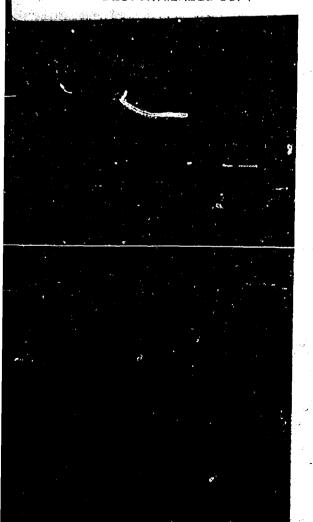
Form No. 3



W.N.M.C.F.



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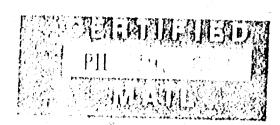


TEXACO

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

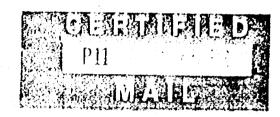
Commissioner of Public Lands State of New Mexico P. O. Box 1148 Santa Fe, New Mexico 87501



TEXACO

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

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

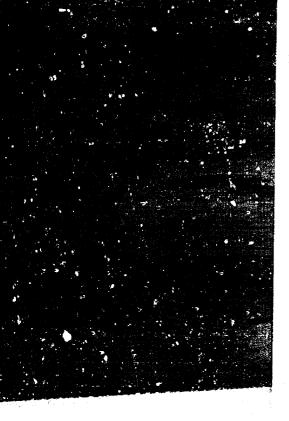




TEXACO INC.
MIDLAND DIVISION
P. O. BOX 3109
MIDLAND, TEXAS 79702

The Superior Oil Company P. O. Box 1521 Houston, Texas 37002





W.N.M.C.F.

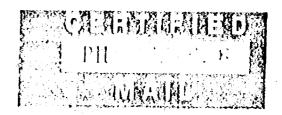


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TEXACO INC.
MIDLAND DIVISION
P. O. BOX 3109
MIDLAND. TEXAS 79702

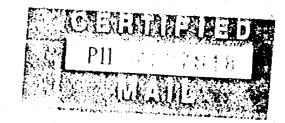
Shell Oil Company
Attn: Mid-Continent Div. Prod.
P. O. Box 991
Houston, Texas 77001



MIDIAND DIVISION PLAR, ENCE, D. C. TEXACO

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

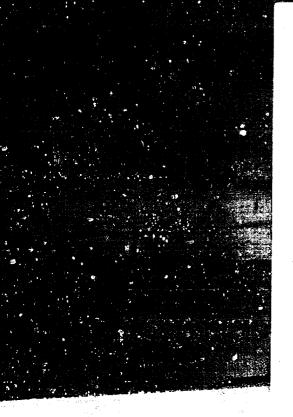




TEXACO INC.
MIDLAND DIVISION
P. O. BOX 3109
MIDLAND, TEXAS 79702

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





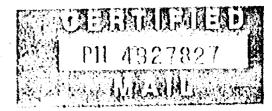
TEXACO INC.

MIDLAND DIVISION
P. O. BOX 8109

MIDLAND, TEXAS 79702

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

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W.N.M.C.F.

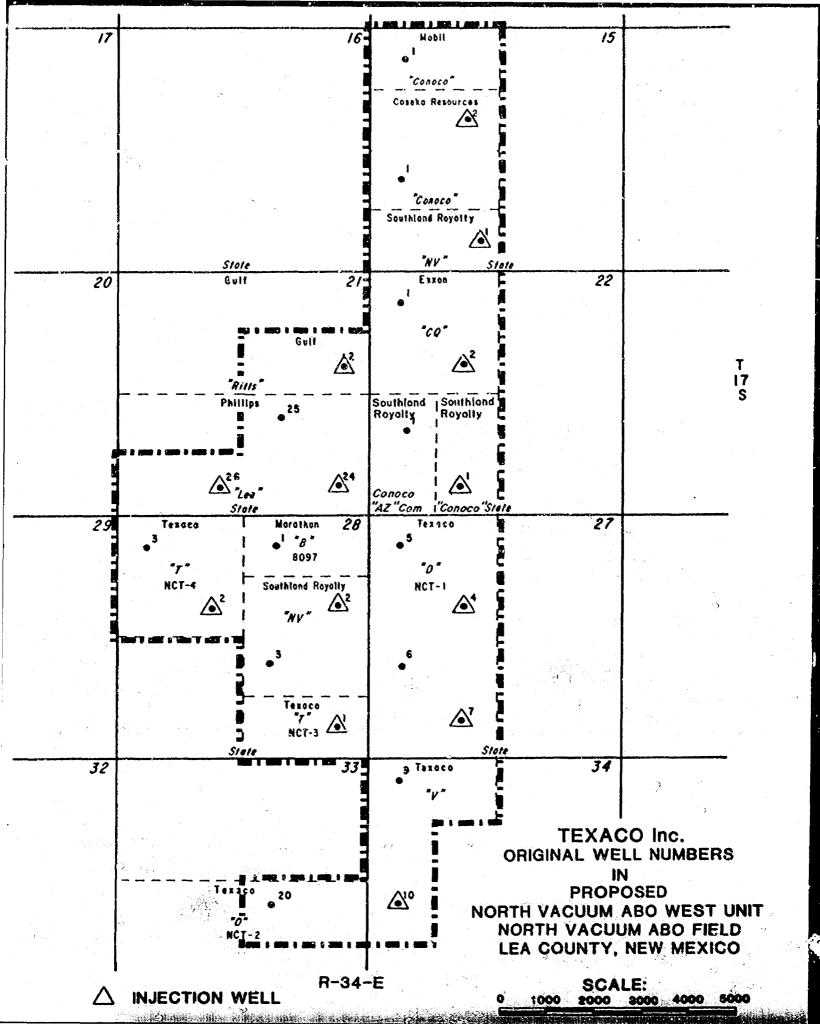


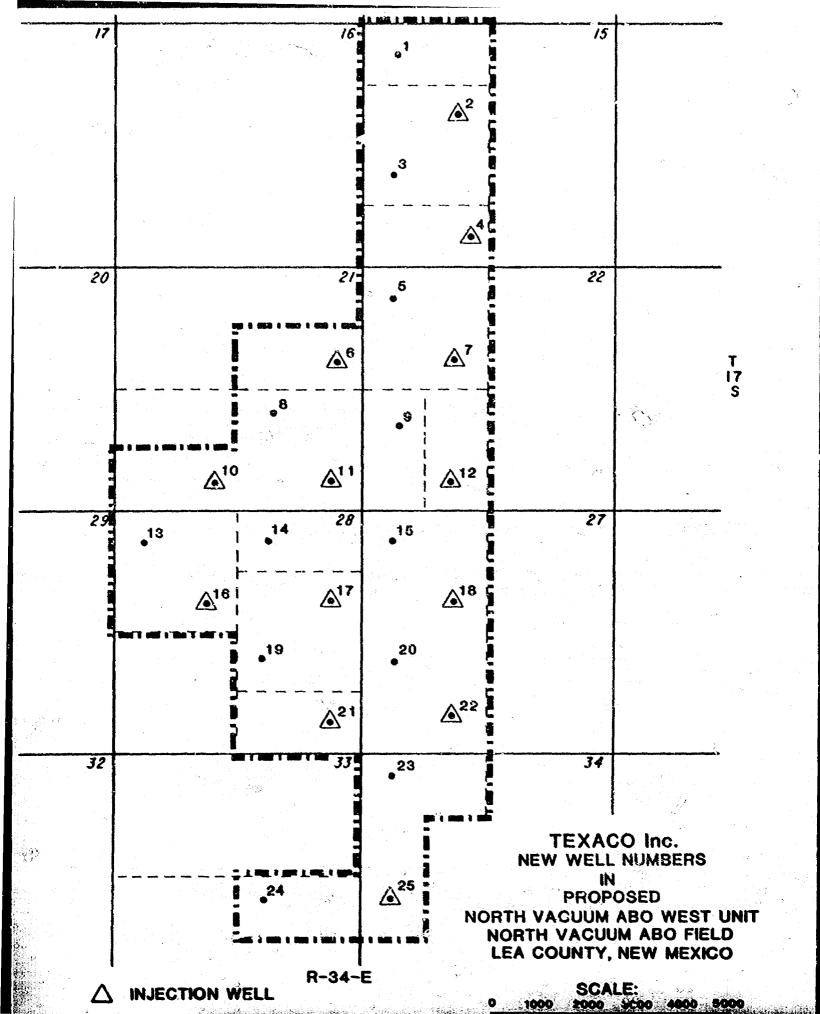
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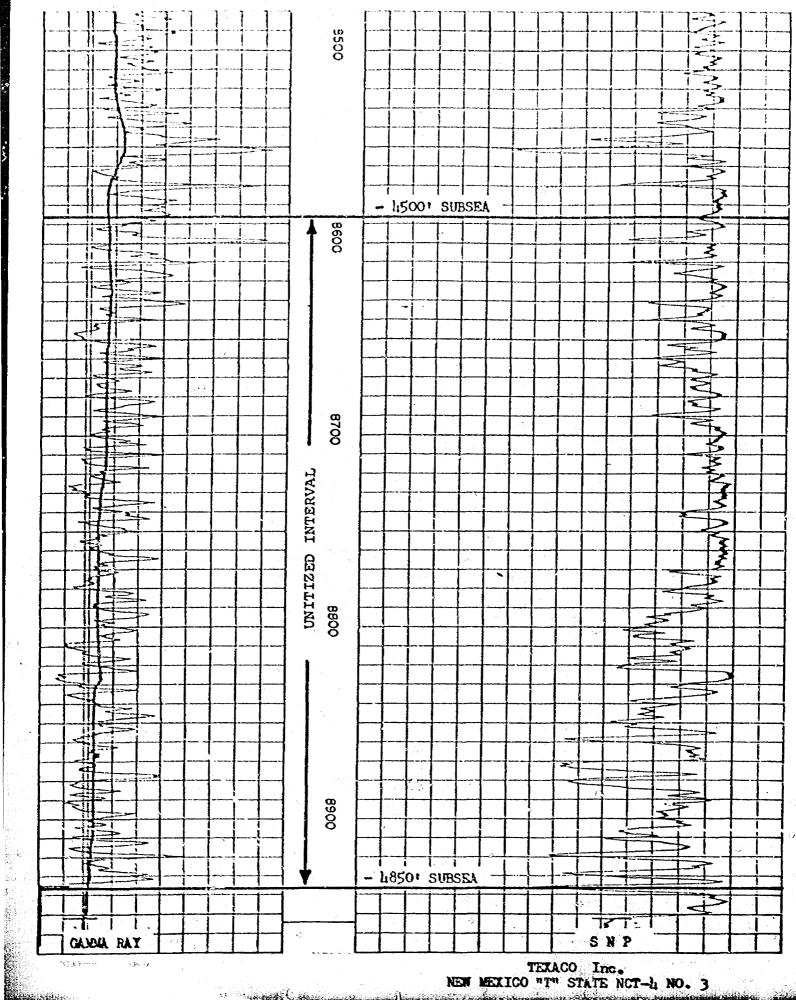
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V Sales Cate

TEXACO Inc.
NEW MEXICO "T" STATE NOT-4 NO. 3

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. Susan 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. Eox 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 Bidg. 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 JerBie Dirichanges

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

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

CASE NO. 7400

Order No. R- (85)

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:

13

- (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

North Vacuum Abo West Unit Well Number	Unit Letter	Section
2	F	15
4	N	15
6	H	21
7	${f F}$	22
10	N	21
11	${f P}$	21
12	N	22
16	\mathbf{F}	28
17	н	28
18	\mathbf{F}	27
21	P	28
22	Ni -	27
25	$\mathbf{L}_{\mathbf{r}}$	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.
- 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:

North Vacuum Abo West	Unit	
Unit Well Number	Letter	Section
2	F	15
4	N	15
· 6	Н	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
2.2	N	27
25	${f r}$	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 703 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

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVACION 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.

Open

NUNE PRO TUNE ORDER

BY THE DIVISION:

It appearing to the Division that Order No. R-6857, Lated December 18, 1981, Lows 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 Orlering Paragraph nall) on Page 3 of said Order each be and the same is hereby sorrected to describe certain were as being in Township 17 South, Range 34 East, NMPM, Rea County, hew mexico.

(2) That the corrections get forth in this order he entered name pro tune as of Doctuber 18, 1981

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STATE OF NIM