

CASE 3404: Application of TENNECO
OIL CO. for a waterflood project,
Eddy County, New Mexico

ASE No.

3404

Application,
Transcripts,

Mail Exhibits

ETC.

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

July 7, 1966

C
O
P
Y

Mr. Charles White
White, Gilbert, Koch & Kelly
Attorneys at Law
Post Office Box 787
Santa Fe, New Mexico

Dear Sir:

Reference is made to Commission Order No. R-3069 recently entered in Case No. 3404, approving the Tenneco Grayburg Jackson West Water-flood Project.

Injection is to be through the four authorized water injection wells, which shall be equipped with tubing and packers, with the casing tubing annulus loaded with corrosion-inhibited fluid. Packers shall be set within 100 feet of the casing shoe in the three open-hole completions, and no higher than 200 feet above the uppermost perforation in the fourth injection well.

As to allowable, our calculations indicate that when all of the authorized injection wells have been placed on active injection, the maximum allowable which this project will be eligible to receive under the provisions of Rule 701-E-3 is 504 barrels per day, providing the ownership of all leases is identical or provided said leases are covered by some agreement consented to by all owners permitting the transfer of project allowable across lease lines. In addition to the above 504 barrels of allowable, the project will be eligible to receive 42 additional barrels each for wells nos. 20 and 21, located in Units C and F respectively, of Section 28, Township 17 South, Range 29 East, when completed.

OIL CONSERVATION COMMISSION

P. O. BOX 2088

SANTA FE, NEW MEXICO

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Mr. Charles White
Santa Fe, New Mexico

July 7, 1966

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Please report any error in this calculated maximum allowable immediately, both to the Santa Fe office of the commission and the appropriate district proration office.

In order that the allowable assigned to the project may be kept current, and in order that the operator may fully benefit from the allowable provisions of Rule 701, it behooves him to promptly notify both of the aforementioned commission offices by letter of any change in the status of wells in the project area, i.e., when active injection commences, when additional injection or producing wells are drilled, when additional wells are acquired through purchase or unitization, when wells have received a response to water injection, etc.

Your cooperation in keeping the commission so informed as to the status of the project and the wells therein will be appreciated.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/DSN/ir

cc: Mr. Frank Irby
State Engineer Office
Santa Fe, New Mexico

Oil Conservation Commission - Artesia, New Mexico

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

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

**CASE No. 3404
Order No. R-3069**

**APPLICATION OF TENNECO OIL COMPANY
FOR A WATERFLOOD PROJECT, EDDY COUNTY,
NEW MEXICO.**

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on May 25, 1966, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 1st day of June, 1966, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Tenneco Oil Company, amended its application for water injection into the Grayburg and San Andres formations through six wells in Sections 22 and 28 at the hearing and now seeks permission to institute a waterflood project in the Grayburg-Jackson Pool by the injection of water into the San Andres formation only through four injection wells in Section 28, Township 17 South, Range 29 East, NMPM, Eddy County, New Mexico.

(3) That the wells in the project area are in an advanced state of depletion and should properly be classified as "stripper" wells.

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

CASE No. 3404
Order No. R-3069

(5) That the applicant further seeks the establishment of an administrative procedure whereby additional wells could be placed on water injection and additional leases could be included in the waterflood project area upon unitization.

(6) That the subject application should be approved and the project should be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

IT IS THEREFORE ORDERED:

(1) That the applicant, Tenneco Oil Company, is hereby authorized to institute a waterflood project in the Grayburg-Jackson Pool by the injection of water into the San Andres formation through the following-described wells in Section 28, Township 17 South, Range 29 East, NMPM, Eddy County, New Mexico:

<u>Well Name and Number</u>	<u>Location</u>
State "L" No. 16	NE/4 SW/4
State "L" No. 18	SW/4 NE/4
State "K" No. 11	SW/4 SE/4
State "K" No. 13	NE/4 SE/4

(2) That the subject waterflood project is hereby designated the Grayburg Jackson West Waterflood Project and shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations; provided, however, that the Secretary-Director of the Commission may approve expansion of said waterflood project to include additional injection wells and leases as may be necessary to complete an efficient waterflood injection pattern upon unitization, and provided that the name of said waterflood project shall be changed to Grayburg Jackson West Unit Waterflood Project upon such unitization.

(3) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Commission in accordance with Rules 704 and 1120 of the Commission Rules and Regulations.

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

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CASE No. 3404

Order No. R-3069

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Jack M. Campbell

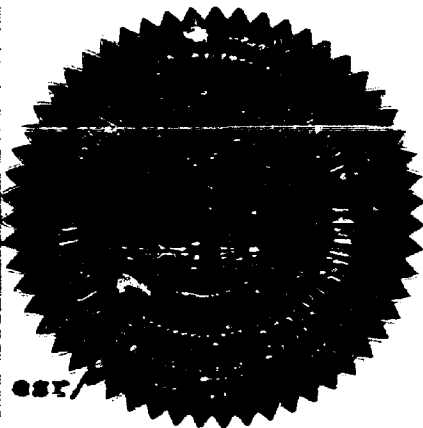
JACK M. CAMPBELL, Chairman

Guyton B. Hays

GUYTON B. HAYS, Member

A. L. Porter, Jr.

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



GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission



LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

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

P. O. BOX 2088
SANTA FE

June 1, 1966

Mr. Charles White
White, Gilbert, Koch & Kelly
Attorneys at Law
Post Office Box 787
Santa Fe, New Mexico

Re: Case No. 3404

Order No. R-3069

Applicant:

Tenneco Oil Company

Dear Sir:

Enclosed herewith is a copy of the above-referenced Commission order recently entered in the subject case. Letter pertaining to conditions of approval and maximum allowable to follow.

Very truly yours,

A handwritten signature in cursive script, reading "A. L. Porter, Jr.", written in dark ink.

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC x

Artesia OCC x

Aztec OCC

Other Mr. Frank Irby

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF
TENNECO OIL COMPANY FOR PERMISSION
TO CONDUCT SECONDARY RECOVERY OPERA-
TIONS BY WATERFLOODING THE GRAYBURG-
SAN ANDRES FORMATION UNDERLYING ITS
STATE "I", STATE "K", STATE "L", STATE
"M", STATE "N" LEASE AND ITS MIDWEST
FEE LEASES LOCATED IN SECTIONS 15, 16,
21, 22, 27 AND 28, TOWNSHIP 17 SOUTH,
RANGE 29 EAST, N.M.P.M., GRAYBURG-
JACKSON POOL, EDDY COUNTY, NEW MEXICO

CAUSE NO. 3704

A P P L I C A T I O N

TO THE HONORABLE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO:

COMES NOW Tenneco Oil Company, hereinafter called Applicant, and respectfully alleges and states that:

1. Applicant is the owner and operator of certain oil and gas leases within the above described area located in Eddy County, New Mexico.
2. Applicant hereby seeks approval of the Commission to conduct secondary recovery operations by waterflooding that portion of the Grayburg-San Andres formation, which is encountered between the depths of 2200 feet and 3600 feet and which underlies Applicant's State "I" Lease, State "K" Lease, State "L" Lease, State "M" Lease, State "N" Lease and Midwest Fee Lease in Sections 15, 16, 21, 22, 27 and 28, Township 17 South, Range 29 East, N.M.P.M., Grayburg-Jackson Pool, Eddy County, New Mexico.
3. Applicant further seeks approval to expand said waterflooding upon administrative approval by the Secretary-Director of the Commission without notice and hearing after proper showing to the Secretary-Director of justification for any such expansion.
4. Applicant intends to initially operate the proposed water flood with injection into the Grayburg-San Andres formation at an average depth of 2700 feet through the following wells:

<u>Well Name and Number</u>	<u>Location</u>
State "I" No. 12	NE/4 SW/4, Section 22
State "I" No. 11	SW/4 SW/4, Section 22
State "L" No. 18	SW/4 NE/4, Section 28
State "L" No. 16	NE/4 SW/4, Section 28
State "K" No. 13	NE/4 SE/4, Section 28
State "K" No. 11	SW/4 SE/4, Section 28

and upon approval by the Secretary-Director, as above requested, Applicant intends to expand said waterflooding by drilling or converting the wells designated for drilling or conversion as shown on the attached Exhibit I.

5. An initial injection rate of 500 barrels of water per well per day is anticipated with a surface injection pressure of approximately 1500 psig.

6. Attached, as Exhibit I, is a plat showing the outline of Applicant's leases which are subject to this application. Said plat also shows the wells which are proposed to be initially converted to injection wells, the wells which Applicant proposes to drill as injection wells or convert to injection wells upon expansion of the initial waterflooding program. Said plat further shows the wells which may be necessary to be drilled as producing wells upon expansion of the proposed waterflooding program.

7. Attached, as Exhibit II, is a plat showing the outline of Applicant's leases which are subject to this application together with the location of all wells within a radius of two (2) miles of Applicant's proposed initial injection wells.

8. Attached, as Exhibits III to X inclusive, are the available logs of the proposed injection wells and diagrammatic sketches of the proposed injection wells.

9. Attached, as Exhibit XI, is a graph showing the production history to date of the wells, within the area subject to this application, from the zone for which application is made for secondary recovery operations.

10. Applicant proposes to acquire water for the proposed water flooding program from Double Eagle Corporation of New Mexico, P. O. Box 1556, Roswell, New Mexico. Attached, as Exhibits XII and XIII, are reports rendered by Martin Water Laboratories, P. O. Box 1468, Monahans, Texas, on tests made by such Company of samples of water which Double Eagle Corporation of New Mexico proposes to furnish to Applicant for Applicant's waterflooding operations.

11. Attached, as Exhibit XIV, is a list of names and addresses of all principal lessees or operators known to Applicant to be interested in this application and the hearing thereon.

12. Applicant believes that the waterflooding of the above mentioned zone will economically recover substantial quantities of oil and other hydrocarbons which cannot be recovered by primary recovery operations. In the interests of conservation, the prevention of waste, the protection of correlative rights and to secure the greatest ultimate recovery of oil and other hydrocarbons from that portion of the Grayburg-San Andres formation described in Paragraph 2 hereinabove, this application should be granted.

13. This application may be set for hearing before an examiner if it is so desired.

14. A copy of this application, complete with all attachments, has been sent to the State Engineer Office, Capitol Building, Santa Fe, New Mexico.

WHEREFORE, Applicant prays that this application be set for hearing, that notice thereof be given as required by law and that upon evidence adduced at such hearing, the Commission issue an order granting this application as herein requested.

Dated at Santa Fe this the 29 day of April, 1966.

TENNECO OIL COMPANY

By J. D. Moon
J. D. Moon
Division Attorney
4th Floor, 201 Wall Building
Midland, Texas 79701

WHITE, GILBERT, KOCH AND KELLY

By L. C. White
L. C. White
Attorneys at Law
P. O. Box 787
Santa Fe, New Mexico

MAIL ROOM

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Case
3469

May 12, 1966

Mr. L. C. White
Attorney at Law
Box 787
Santa Fe, New Mexico

Dear Mr. White:

I have reviewed the application of Tenneco Oil Company which you handed me last week and which seeks approval of the Oil Conservation Commission to conduct a waterflood of the Grayburg-San Andres formation in Sections 15, 16, 21, 22, 27 and 28, all in Township 17 South, Range 29 East. In reviewing the diagrammatic sketches of the wells involved, I note that Exhibit V indicates this well to be a triple completion with injection into the Metex & Premier zones going through the casing-tubing annulus and no cement behind the casing from depth 300' to 1800'; Exhibit VIII indicates this well to be a dual completion with injection into the oolitic zone going through the casing-tubing annulus and no cement behind the casing from depth 280' to 1675'; Exhibit X shows no packer on the tubing and indicates casing-tubing annulus is open. No cement is shown behind the 7" casing from depth 292' to 1203'.

It is my opinion that the casing wall alone is not adequate to maintain the separation of the injected fluid from the outside formations for an indefinite period.

The indicated program for the other three wells appears to be adequate.

FEI/ma
cc-A. L. Porter, Jr.

Yours truly,

S. E. Reynolds
State Engineer

By:

Frank E. Irby, Chief
Water Rights Div.

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BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 25, 1966

EXAMINER HEARING

IN THE MATTER OF:

Application of Tenneco Oil Company for a
waterflood project, Eddy County, New Mexico.)

Case No. 3404

BEFORE:

Daniel S. Nutter, Chief Engineer

TRANSCRIPT OF HEARING

MR. NUTTER: Call Case 3404. Application of David Fasken for special pool rules, Eddy County, New Mexico.

MR. WHITE: Charles White of White, Gilbert, Koch and Kelly appearing on behalf of the applicant. Mr. J. D. Moon is an associate with me. We have one witness to be sworn at this time.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1 through 13 marked for identification.)

* * *

J O H N S O M E R S, a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Will you state your name for the record?

A John Somers.

Q By whom are you employed, and in what capacity?

A Tenneco Oil Company as a Petroleum Engineer.

Q Have you previously testified before the New Mexico Oil Conservation Commission?

A No, I have not.

Q Will you briefly give your educational and professional background?

A I was educated at the Colorado School of Mines,

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graduated with a professional degree of Petroleum Engineer; worked for Cities Service Oil Company, Humble, and most lately Tenneco Oil Company. I have had experience as a petroleum engineer in the Los Angeles Basin in California, in the Permian Basin in West Texas and New Mexico, and in the Kansas Oklahoma area, central United States.

MR. WHITE: Are the witness' qualifications acceptable?

MR. NUTTER: Yes.

Q (By Mr. White) Are you familiar with the application?

A Yes.

Q What does Tenneco seek?

A Tenneco seeks the approval of the Commission for a secondary recovery project by waterflooding of the River Jackson interval from 2200 feet to 3600 feet in the State leases, 1, K, L, M, N, and T. Midwest Fee Lease of Sections 16, 17, 20, 21, 22, 27 and 28, of Township 17 South, Range 29 East, and that's in Eddy County, New Mexico, Grayburg-Jackson Pool. We further seek approval to expand this flood, for the administrative approval of the Secretary-Director of the Commission at such time as we are able to furnish data that is feasible to expand this flood to full scale.

Q Now, refer to Exhibit 1 and explain that exhibit,

please?

A Exhibit 1 is a map that shows the Tenneco Leases, the outline of the said West Unit in the Grayburg-Jackson Pool. It shows the initial 5-spot area that we are seeking approval to waterflood.

Q Is that depicted in dark green?

A That is depicted in dark green with the wells to be converted in red. The expanded full scale unit is shown in pale green; well developed wells as solid circles, and the wells that are to be drilled in our present drilling and development program are shown as blank circles and dashed lines. This program is presently active. We are drilling on two wells shown as wells Number 22, I-22 and M Number 2.

Q Where are they located?

A Located in Section 21; and these wells should be completed this week. The rest of this map is up to date. This also shows the Sunray DX waterfloods that have been approved to the East of the West Unit. These are Metex and Keely floods.

It also shows in red the pattern which is contingent upon cooperative injection agreements with the Cabb Petroleum Company to the South of the Unit, and it indicates the producing wells to be drilled in the center of each of these 5-spots as blank circles as well.

Q Now, refer to Exhibit 2 and explain that exhibit, please?

A Exhibit Number 2 is a map showing the unit area outlined in red and the surrounding wells for a two-mile radius, indicating the zone from which they produce and lessee of each of the leases in a two-mile radius around the West Unit.

Q Exhibits 3,4,5 and 6 are your logs, is that correct?

A That's correct, these are the logs of the proposed injection wells on the initial 5-spot.

Q And what are depicted on those logs?

A The top and base of the interval at 2700 feet, I'm going to refer to as an oolitic interval, is depicted on the logs. This is the interval which is to be flooded. It's approximately on your first log which would be Well A-16. The top of the oolitic is shown at 26, approximately 2640. This is shown on each of the other three logs.

Q Are perforation points shown?

A No perforation points on the logs, but they are shown on the diagrammatic sketches which are the following four exhibits. Only one of the wells to be converted to injection is perforated, the others are open hole intervals.

MR. WHITE: If the Examiner please, in our petition

we showed, I believe, six injection wells and we have done away, we've abandoned our injection well in State IM-12 and State IM-11, both in Section 22, that correspondingly we have substituted, we have done away with Exhibit 5 and Exhibit 8 and Exhibit 10.

MR. NUTTER: Those exhibits related to those two injection wells?

MR. WHITE: Right, so our diagrammatic sketches will not coincide with the others in every detail.

Q Refer to Diagrammatic Sketch 5.

A This is a diagrammatic sketch of Well L Number 19 showing the perforations in the oolitic interval of the San Andres, showing the tubing, packer, casing, top of cement in this well. Also, it shows the top of the pay and any other pertinent mechanical data with reference to the well. This is the only cased completion in the initial 5-spot.

Q Okay. Now, go to your next exhibit.

A This L Number 16 shows the open hole completion and the waterflood, mechanical setup for waterflooding, showing the packer, tubing string, the top of the cement and the casing string, as well as other pertinent mechanical information.

Q Do you want to go to your State K?

A K Number 13, this diagrammatic sketch also shows the

casing strings, the tubing strings, packer, open hole interval, the top of the pay in this injection well, as well as all other pertinent mechanical data on the well.

Q And your last well?

A This is a diagrammatic sketch of K Number 11 showing the casing, tubing, cementing, the top of the pay and the interval to be flooded, as well as the type of waterflooding completion.

Q This eliminated your triple completion, is that correct?

A Yes, it did. We don't anticipate triple completion in this initial class file.

Q And you have packers in all?

A We have packers in all of the wells and we plan on putting corrosion inhibited water in the annulus and pickling the annulus for protection of the permanent casing string.

Q What is the source of your water supply?

A We propose to get our water from the Red Lakes or the Double Eagle Corporation which gets its water from a shallow limestone.

Q Would that be an adequate supply of water, in your opinion?

A Yes, it will.

Q Do you have any lab test as to the water analysis?

A Yes, by Martin Laboratories and Treat-Rite in Monahans, Texas, showing the two waters available through Double Eagle Corporation. One is the Ogallala water from the Caprock system, the other is the East Red Lake water from this shallow limestone aquifer.

Q Do you have an exhibit showing the productive history of the well?

A Our next exhibit shows the productive history of the composite leases that are to go into the West Unit. This shows that the leases have been declining and also the gas-oil ratio or the gas production on the composite lease.

Q Mr. Somers, I direct your attention to a letter from the State Engineer dated May 12th, where the State Engineer's office commented on Exhibit 5, that this was a triple completion. Now, that is one of the wells that have been eliminated?

A This well has been eliminated from the initial 5-spot pattern.

Q And Exhibit 8 was a dual completion which the State Engineer made reference, that well has been out?

A Yes, there are no dual or triple completions in the application as such. Right now they're all single.

Q Exhibit 10 attached to the application, the State

Engineer made the comment, "No packer" and pointed that out.
Has that been amended?

A This has been amended to include a packer to isolate the annulus.

Q You've given your initial rates of injection, is that right?

A No, our initial rate of injection is anticipated to be 500 barrels of water per day at a surface pressure of 1500 pounds PSIG.

Q What estimate do you have as to the additional recoveries you might have?

A We should at least recover 1.25 times primary, or double the recovery of hydrocarbons from this unit.

Q In your opinion, will this project provide for the economic recovery of oil and other hydrocarbons?

A Yes.

MR. WHITE: We move the introduction of Exhibits 1 through 13.

(Whereupon, Applicant's Exhibits 1 through 13 offered into evidence.)

MR. NUTTER: If there are no objections Exhibits 1 through 13 will be admitted.

(Whereupon, Applicant's Exhibits 1 through 13 admitted into evidence.)

MR. NUTTER: Are there any questions of the witness?

MR. IRBY: I have one, Mr. Nutter.

CROSS-EXAMINATION

BY MR. IRBY:

Q You said your injection rate would be 500 barrels per day at 1500 PSIG. Is this 500 per well?

A 500 barrels of water per day per well.

MR. IRBY: That's all I have at the moment, Mr. Nutter.

CROSS-EXAMINATION

BY MR. NUTTER:

Q Mr. Somers, it is the proposal of Tenneco to unitize these leases?

A Yes, these are State and Fee leases and we plan to unitize on the basis of surface acreage.

Q What stage is the unitization at this time?

A Mr. Moon, Mr. White, and I are in negotiation with the State Land Department now.

Q Is Tenneco the only working interest?

A Yes.

Q Just unitize some royalty and --

A We have two royalty owners in the State.

Q When do you anticipate the unit would be coming ✓

up for hearing?

MR. WHITE: I don't know. We're going to see Mr. Hays after this hearing.

A We believe our development program as shown on this initial exhibit should take care of any objections the State might have. In our previous exhibit we did not have these under development, and as shown here these should be developed by the end of the month.

MR. NUTTER: You are aware, are you not, that until the area is unitized each lease would have to stand on its on?

MR. MOON: Right.

Q (By Mr. Nutter) Mr. Somers, what is the productive capacity of these wells in this immediate waterflood area at the present time?

A In the immediate area they're at the stripper stage of production, 5 to 10 barrels per day.

Q And this graph shown on Exhibit 11 is for the production from all of the wells within the unit area?

A This is for all the wells developed at the time in the unit area.

Q Well, it appears that the last month shown on this graph, which was probably February, the unit area produced almost 5,000 barrels of oil. How many wells contributed to that?

A This should be all of the wells except Wells Number 21, I-21, and N Number 4 should have contributed to this. We've been carrying on this development program very rapidly and this is the cause of this jump in production.

Q I see. Prior to that it had been producing closer to 2,000 than 5,000?

A Correct.

Q You mentioned two wells were drilling I-22?

A M Number 2 is the other one in A position in Section 21. In fact, this I-22 should be completed today.

Q And both of them are relatively far removed from the pilot area?

A Yes, they are. However, the next location to be drilled is ^{where the rig} ~~the rig~~ skids off of I-22, is down close to our waterflood area, I Number 24, and it will develop then in a line going South L20, L21, L22, and it's taking about four days apiece to drill these wells. So it shouldn't be very long before we'll have this entire area developed.

Q I see. And it's your proposal that each one of the injection wells would have a packer, that productive water would go down tubing, and annulus would be filled with inert fluid?

A That's right, in an attempt to protect the uncemented portion of the casing string.

Q And what was your estimate for the primary recovery

in this area?

A On the total unit area, is approximately 1.4 million barrels.

Q And you anticipate 1.25 times that?

A Right, times primary, and this is the lower limit, it do far exceed this.

MR. NUTTER: Any further questions?

MR. IRBY: Yes, sir, if I may.

RECROSS-EXAMINATION

BY MR. IRBY:

Q Mr. Somers, have you prepared new Exhibits 1 and 2 which are the plats?

A Yes, we have. This is Exhibit 1.

Q The one that replaces this small one?

A This shows the expanded development program. We expanded this as a result of our welling and drilling and coring program, Grayburg Sand and San Andres.

Q And this ticked outline closing your area?

A This is the area for the West Unit.

Q Now, you haven't substituted a new exhibit 2?

A No, we have not.

Q The water analyses which were submitted with the application, I'm not sure that I have exhibit numbers on those. I want to determine which water is from which source,

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in the chemical analysis, particularly.

A Okay. The source which we definitely plan to use is labeled Laboratory Number BM46412. It is an analysis by Treat-Rite Laboratories in Monahans.

Q Let me check one point in that analysis. If you have an extra one I'll take it and kill this other one. Thank you. You're going to use some of this Ogallala water; I know that you gave an analysis of a sample.

A We don't anticipate this because we already have a pipeline on our lease from the Red Lakes Area, but in the case that we do require more water than is anticipated, or they're able to provide with their present pipeline system, they serve at least a half dozen other operators, it may become necessary to obtain water from the Ogallala to fully keep our injection at top rate.

Q Will your produced water be recycled?

A Mixed and reinjected.

MR. IRBY: That's all the questions I have.

MR. NUTTER: Are there any other questions?

The witness may be excused. Do you have anything further Mr. White?

MR. WHITE: That concludes our testimony.

MR. NUTTER: Does anyone have anything else to offer in case 3304? The Commission will take the case

under advisement.

I N D E X

<u>WITNESS:</u>	<u>PAGE</u>
JOHN SOMERS	
Direct Examination by Mr. White	2
Cross-Examination by Mr. Irby	10
Cross-Examination by Mr. Nutter	10
Recross-Examination by Mr. Irby	13

E X H I B I T S

<u>NUMBER</u>	<u>MARKED FOR IDENTIFICATION</u>	<u>OFFERED</u>	<u>ADMITTED</u>
Applt's. 1	2	9	9
Applt's. 2	2	9	9
Applt's. 3	2	9	9
Applt's. 4	2	9	9
Applt's. 5	2	9	9
Applt's. 6	2	9	9
Applt's. 7	2	9	9
Applt's. 8	2	9	9
Applt's. 9	2	9	9
Applt's. 10	2	9	9
Applt's. 11	2	9	9
Applt's. 12	2	9	9
Applt's. 13	2	9	9

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1203 FIRST NATIONAL BANK EAST • PHONE 256-1294 • ALBUQUERQUE, NEW MEXICO

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, BOBBY J. DAVIS, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 7th day of June, 1966.

Bobby J. Davis
NOTARY PUBLIC

My Commission Expires:

March 13, 1969.

I do hereby certify that the foregoing is a complete record of the proceedings in the Executive Hearing of Case No. 3404 heard by me on 5/25, 1966.

A. J. [Signature]
New Mexico Oil Conservation Commission

Docket No. 13-66

DOCKET: EXAMINER HEARING - WEDNESDAY - MAY 25, 1966

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

The following cases will be heard before Daniel S. Nutter, Examiner, or
Elvis A. Utz, Alternate Examiner:

CASE 3399: (Continued and Readvertised)

Application of Tenneco Oil Company for two non-standard gas pro-
duction units, San Juan County, New Mexico. Applicant, in the
above-styled cause, seeks approval of two non-standard gas pro-
duction units adjacent to the Blanco-Pictured Cliffs Pool and
described as follows:

- (1) A 155.40-acre unit comprising the SE/4 SW/4 and Lot
4 of Section 19, and the E/2 NW/4 and Lots 1 and 2
of Section 30, Township 30 North, Range 9 West;
- (2) A 150.08-acre unit comprising the E/2 SW/4 and lots
3 and 4 of Section 30 and the NE/4 NW/4 and lot 1 of
Section 31, Township 30 North, Range 9 West, all in
San Juan County, New Mexico.

CASE 3404: Application of Tenneco Oil Company for a waterflood project,
Eddy County, New Mexico. Applicant, in the above-styled cause,
seeks authority to institute a waterflood project by the
injection of water into the Grayburg and San Andres formations
through six wells in Sections 22 and 28, Township 17 South,
Range 29 East, Grayburg-Jackson Pool, Eddy County, New Mexico.
Applicant further seeks an administrative procedure for expan-
sion of said project to include additional injection wells and
leases.

CASE 3405: Application of David Fasken for special pool rules, Eddy County,
New Mexico. Applicant, in the above-styled cause, seeks the
promulgation of special pool rules for the North Indian Hills-
Morrow Gas Pool in Section 4, Township 21 South, Range 24 East,
Eddy County, New Mexico, including a provision for 640-acre
spacing units.

CASE 3406: Application of Pan American Petroleum Corporation for special
pool rules, Lea County, New Mexico. Applicant, in the above-
styled cause, seeks the promulgation of special pool rules for
the Bough-Devonian Pool, Lea County, New Mexico, including a
provision for 80-acre production units.

CASE 3002: (Continued and Readvertised)

In the matter of Case No. 3002 being reopened pursuant to the
provisions of Order No. R-2684-A, which order continued the
original order for an additional year, establishing 320-acre
spacing for the Fowler-Lower Paddock Gas Pool, Lea County,
New Mexico. The original applicant, Pan American Petroleum
Corporation, seeks continuation of the 320-acre spacing for

- 2 -

MAY 25, 1966, EXAMINER HEARING

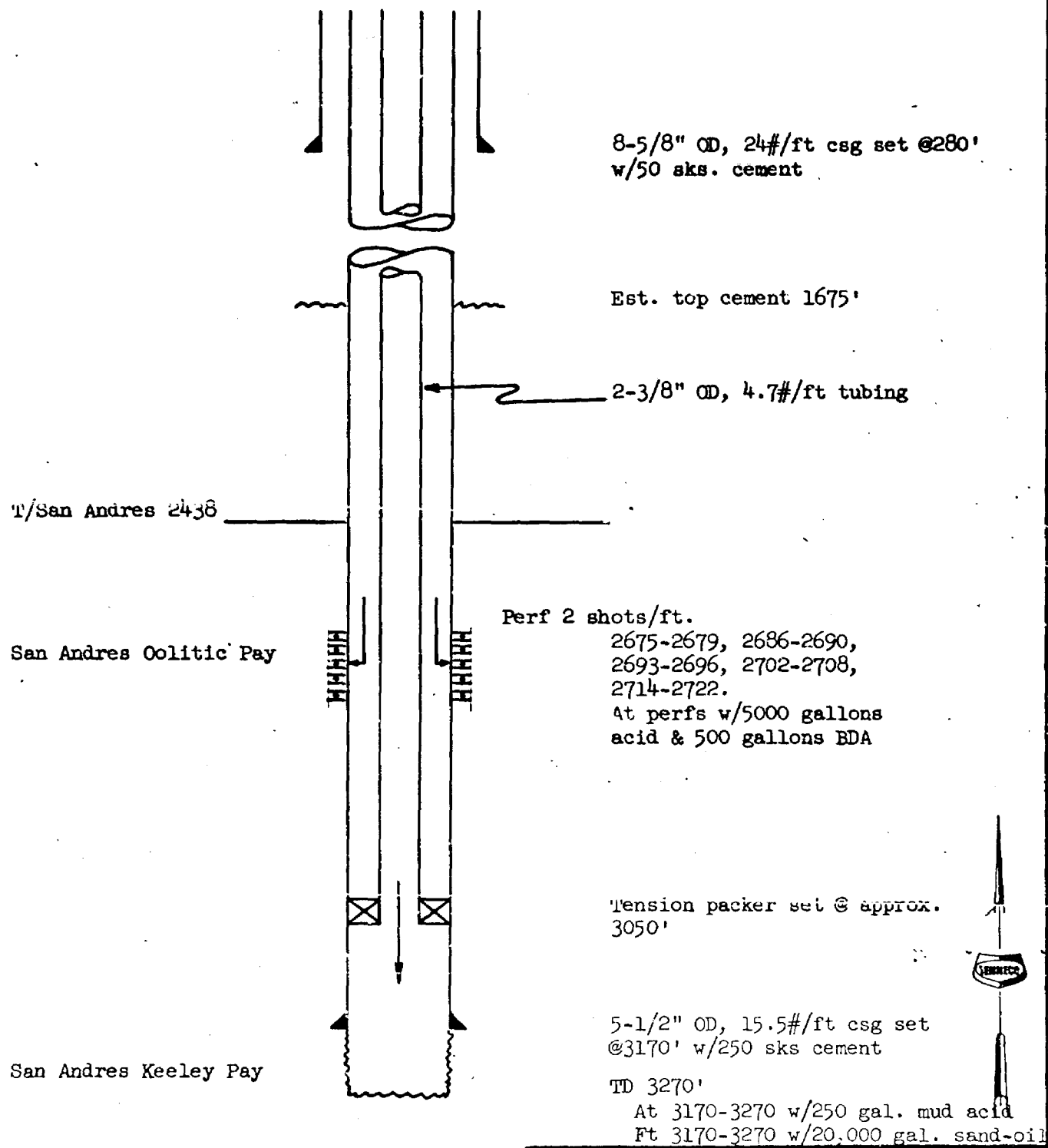
CASE 3002 - Continued:

said gas pool and the amendment of the special pool rules to include the classification of oil and gas wells in said pool, a provision for 80-acre spacing for oil wells, and the establishment of a limiting gas-oil ratio of 6000 to 1.

CASE 3407: Application of Midwest Oil Corporation for a pressure maintenance project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a pressure maintenance project by the injection of water into the Upper Pennsylvanian formation through its Harris State Well No. 1, located in Unit N, Section 29, Township 13 South, Range 34 East, Nonombre-Upper Pennsylvanian Pool, Lea County, New Mexico.

CASE 3408: Application of Marathon Oil Company for a waterflood project, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Queen formation through three wells in Sections 10 and 15, Township 18 South, Range 31 East, Shugart Pool, Eddy County, New Mexico.

CASE 3409: Application of Dr. Sam G. Dunn for a secondary recovery project, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a secondary recovery project by the injection of air into the Upper San Andres formation through three wells located in Section 26, Township 7 South, Range 26 East, Leslie Spring-San Andres Pool, Chaves County, New Mexico. Applicant further seeks an administrative procedure to place additional wells on air injection if necessary.



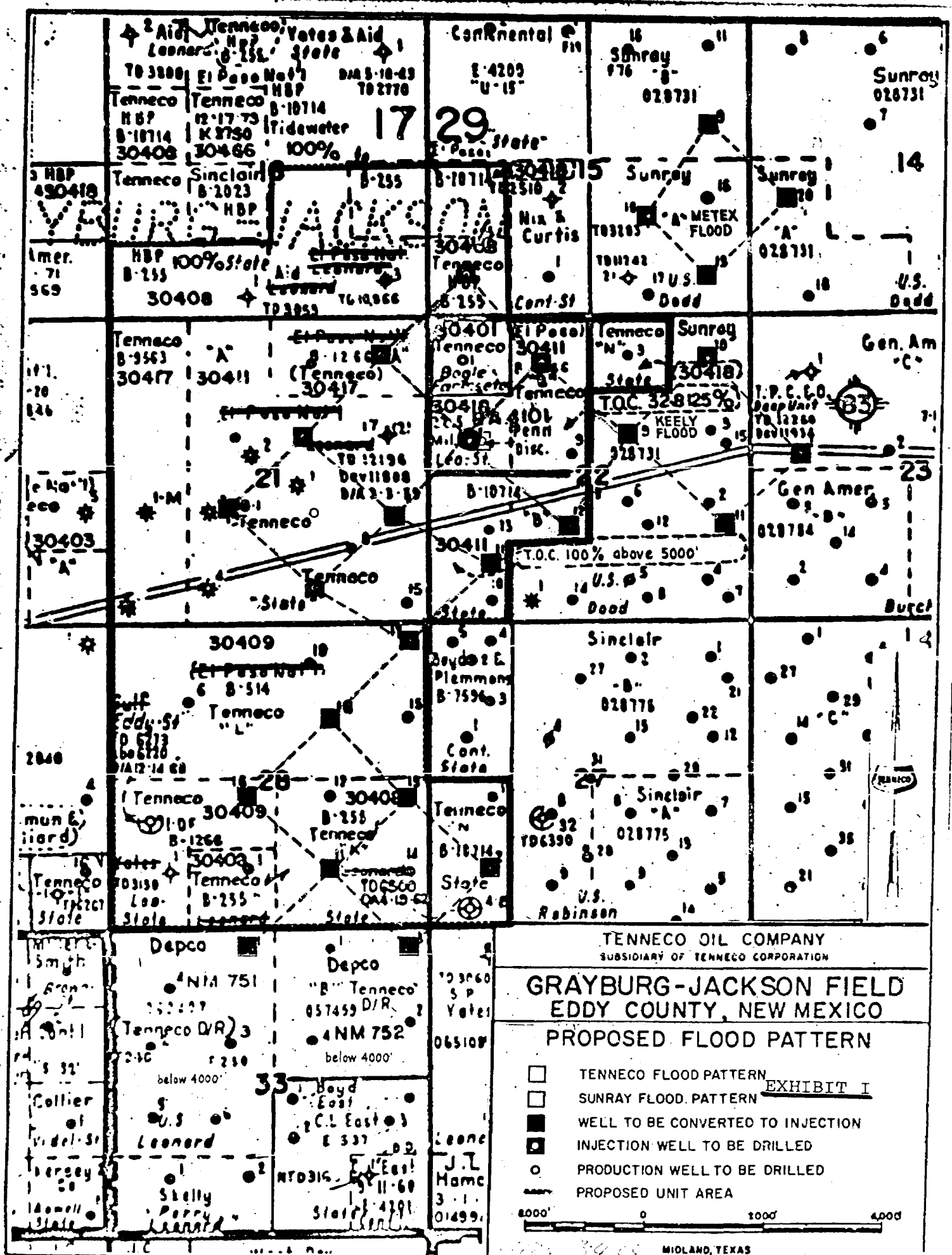
TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO CORPORATION

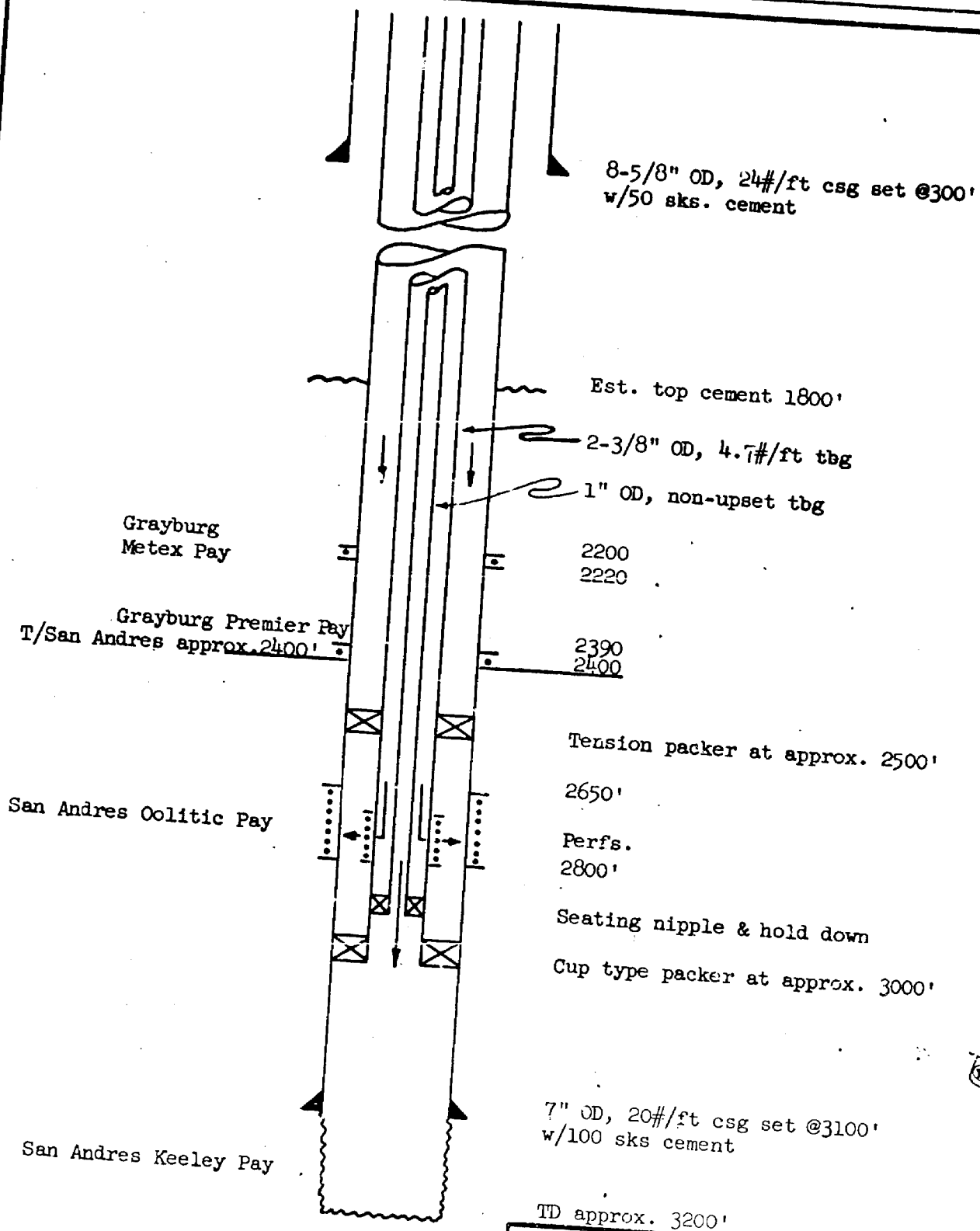
PROPOSED WI WELL

State "I" #12, 1650' FSL & 2310' FWL
of Section 22, T-17-S, R-29-E, Eddy
County, New Mexico.

Elevation: 3540'

EXHIBIT VIII





TENNECO OIL COMPANY	
SUBSIDIARY OF TENNECO CORPORATION	
PROPOSED WI WELL	
GRAYBURG-JACKSON FIELD	
T-17-S, R-29-E, Eddy	
County, New Mexico	
Typical Dual or Triple	
Completed Well	
EXHIBIT V	

an-340

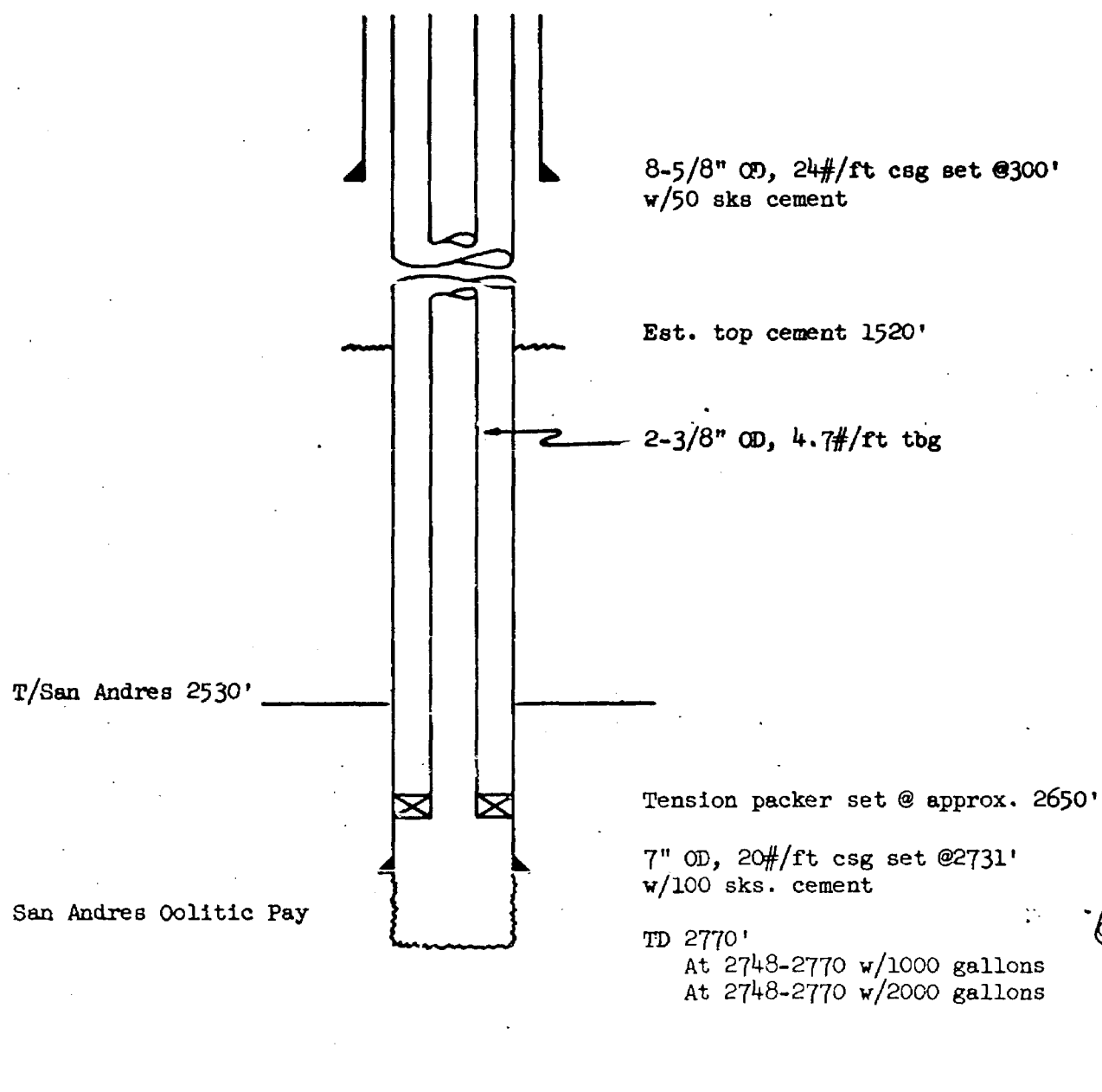


EXHIBIT VI

TENNECO OIL COMPANY SUBSIDIARY OF TENNECO CORPORATION
PROPOSED WI WELL
State "L" #16, 2310' FSL & 2310' FWL of Section 28, T-17-S, R-29-E, Eddy County, New Mexico Elevation: 3576'

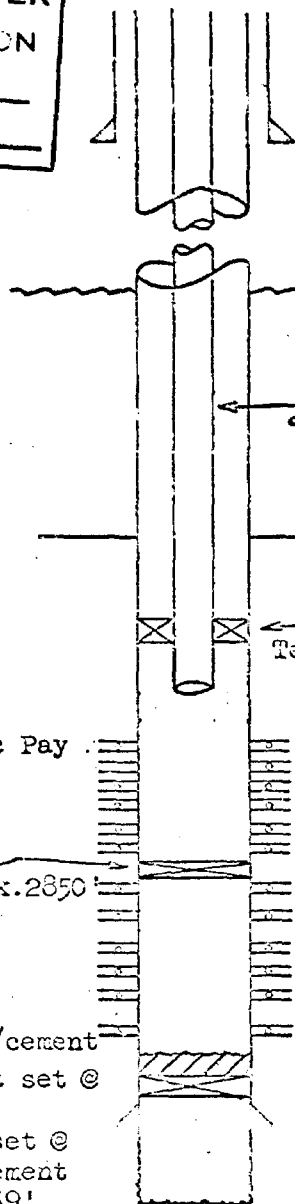
Jan 34/66

BEFORE EXAMINER NUTTER

OIL CONSERVATION COMMISSION

340- EXHIBIT NO. 7

CASE NO. 3401



8-5/8" OD, 24#/ft csg set
@292' w/50 sks. cement

Est. top cement @1203'

2-3/8" OD, 4.7#/ft tbgs.

T/San Andres 2433'

Tension packer @ approx. 2500'

San Andres Oolitic Pay

Perf 1 shot/ft.

2698-2704, 2714-2720, 2743-2753
2758-2766, 2791-2795, 2800-2804
2874-2884, 2895-2903, 2954-2958
2962-2972, 2977-2985, 3076-3086

communicated between perfs.
Squeezed all perfs w/500 sks.
cement. Drilled out cement &
reperforated same intervals.

At perfs 2954-3086 w/5000
gallons in 2 stages.

At perfs 2874-2903 w/5000
gallons in 2 stages.

At perfs 2698-2804 w/6000
gallons

PBD 3118' w/cement

CEBP w/1 sk. cement set @
3150'

7" OD, 20#/ft csg set @
3223' w/150 sks. cement
TD 3359'

TENNECO OIL COMPANY
SUSIDIARY OF TENNECO CORPORATION

GRAYBURG JACKSON FIELD
PROPOSED W. WELL

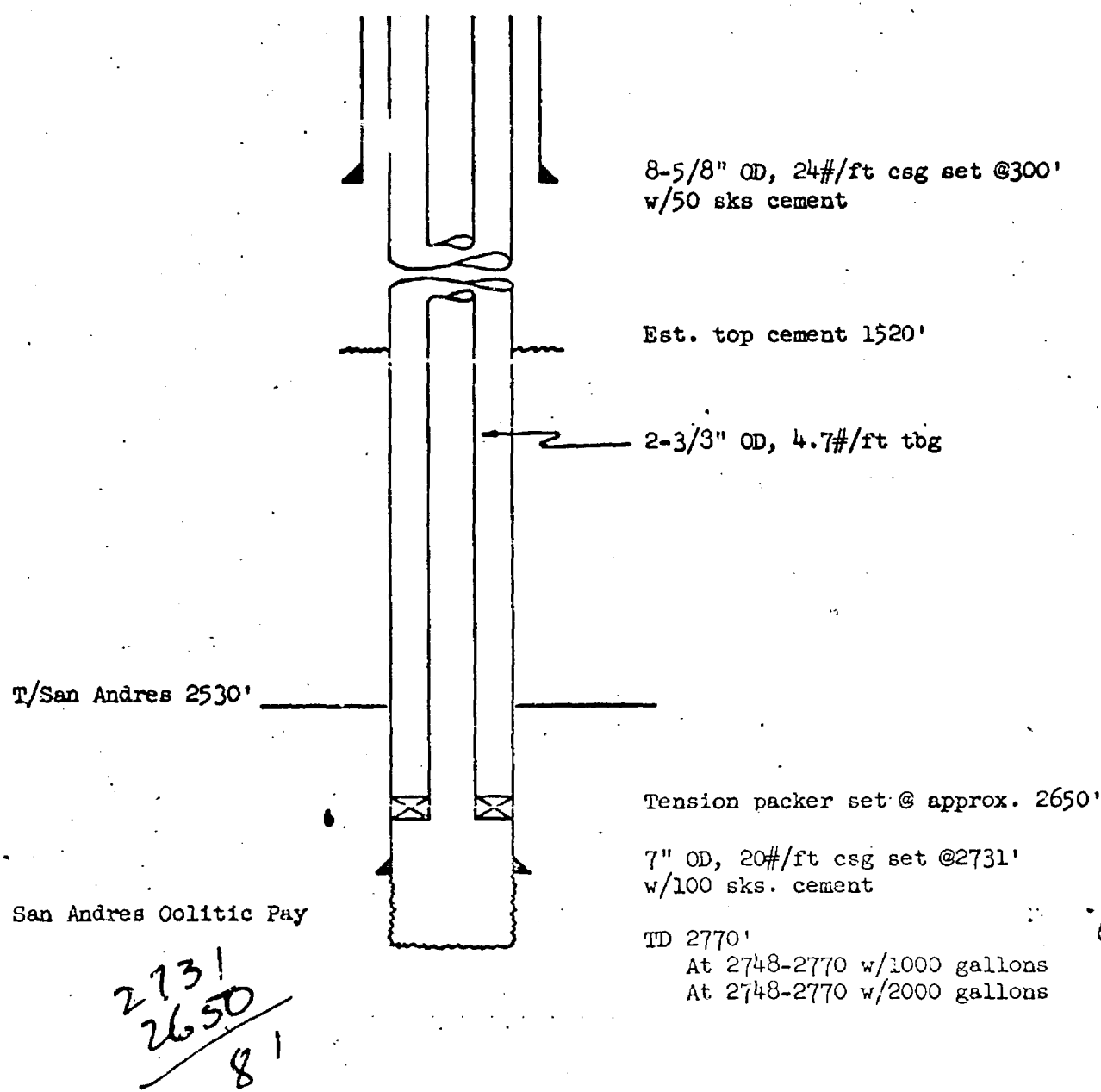
State "L" No. 18

1650' FNL & FBL of Sec. 28, T-17-S,
R-29-E, Eddy County, New Mexico

Elev. 3562' GL

2698
2800
198

Ap. Sec. 1



2731
2650
81

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
3404 EXHIBIT NO. 8
CASE NO. _____

TENNECO OIL COMPANY SUBSIDIARY OF TENNECO CORPORATION
PROPOSED WI WELL
State "L" #16, 2310' FSL & 2310' FWL of Section 28, T-17-S, R-29-E, Eddy County, New Mexico Elevation: 3576'

7/11 Ex 7

T/San Andres 2525'

San Andres Oolitic Pay

~~2650~~
2740
2650
90

PBTD 2866'
TD 2886'

8-5/8" OD, 32#/ft csg set
@287' w/60 sks. cement

Est. top cement 1396'

2-3/8" OD, 4.7#/ft tbg.

Tension Packer set @ approx.
2650'

7" OD, 24#/ft csg set @2740'
w/100 sks. cement

At 2750-80 w/100 gal.

4-4-46

At 2750-80 w/1000 gal.

4-5-46

At 2750-80 w/2000 gal.

4-7-46

At 2750-80 w/4000 gal.

4-10-46

At 2844-62 w/3000 gal.

11-2-46

At 2792-2824 w/4000 gal.

11-9-46



TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO CORPORATION

GRAYBURG JACKSON FIELD
PROPOSED WI WELL

State "K" No. 13

2310' FSL & 330' FEL of Sec. 28,
T-17-S, R-29-E, Eddy County, New
Mexico.

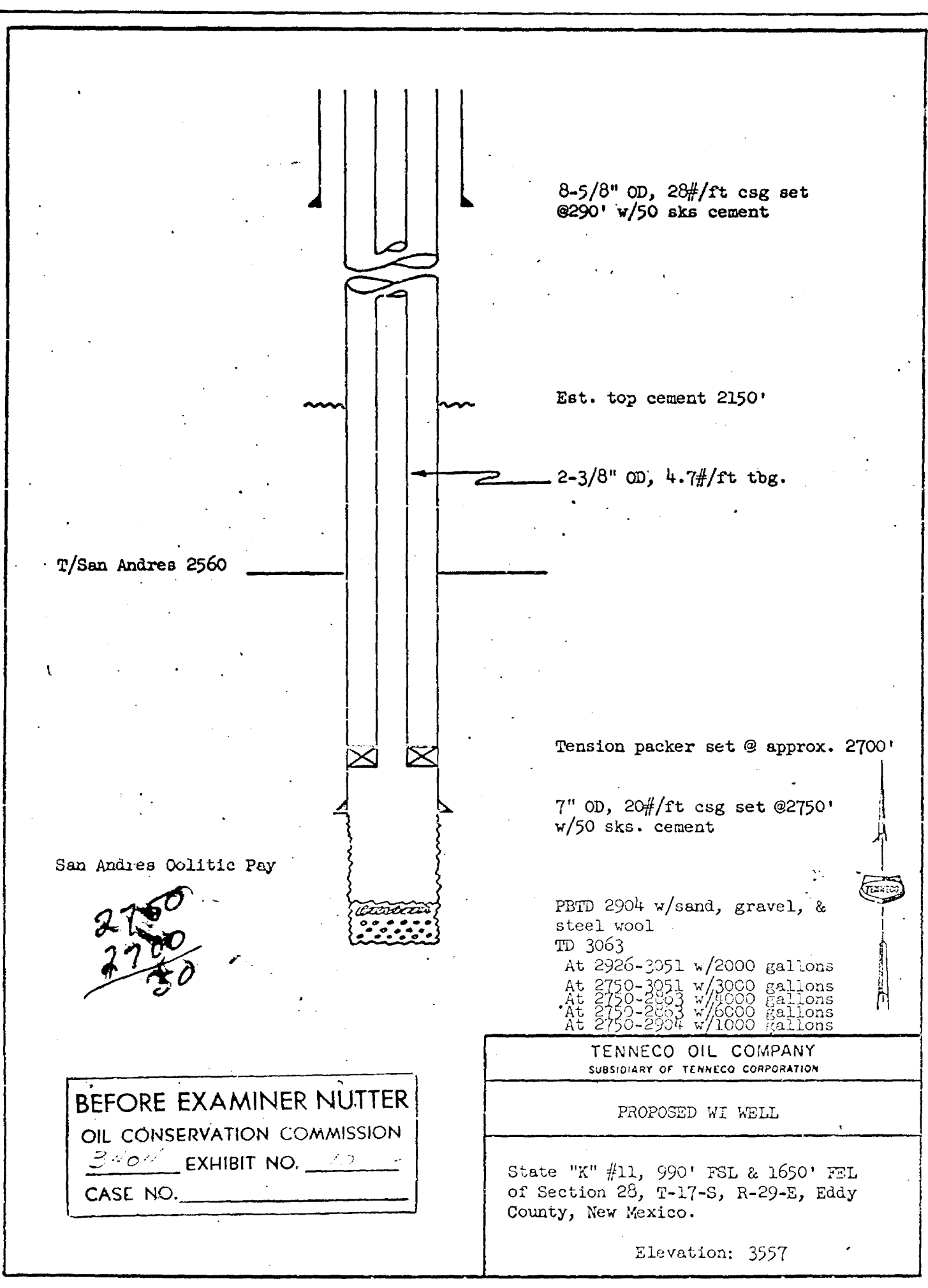
Elev. 3562'

BEFORE EXAMINER NUTTER

OIL CONSERVATION COMMISSION

EXHIBIT NO. 7

CASE NO. 1650



8-5/8" OD, 28#/ft csg set
@290' w/50 sks cement

Est. top cement 2150'

2-3/8" OD, 4.7#/ft tbg.

T/San Andres 2560

Tension packer set @ approx. 2700'

7" OD, 20#/ft csg set @2750'
w/50 sks. cement

San Andres Oolitic Pay

PBTD 2904 w/sand, gravel, &
steel wool

TD 3063

- At 2926-3051 w/2000 gallons
- At 2750-3051 w/3000 gallons
- At 2750-2853 w/4000 gallons
- At 2750-2853 w/6000 gallons
- At 2750-2904 w/1000 gallons

2750
2700
50

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
3401 EXHIBIT NO. 12
CASE NO.

TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO CORPORATION

PROPOSED WI WELL

State "K" #11, 990' FSL & 1650' FEL
of Section 28, T-17-S, R-29-E, Eddy
County, New Mexico.

Elevation: 3557

BEFORE EXAMINER NUTTER

OIL CONSERVATION COMMISSION

3404 EXHIBIT NO. 1

CASE NO. CV 7-107

100,000.

10,000

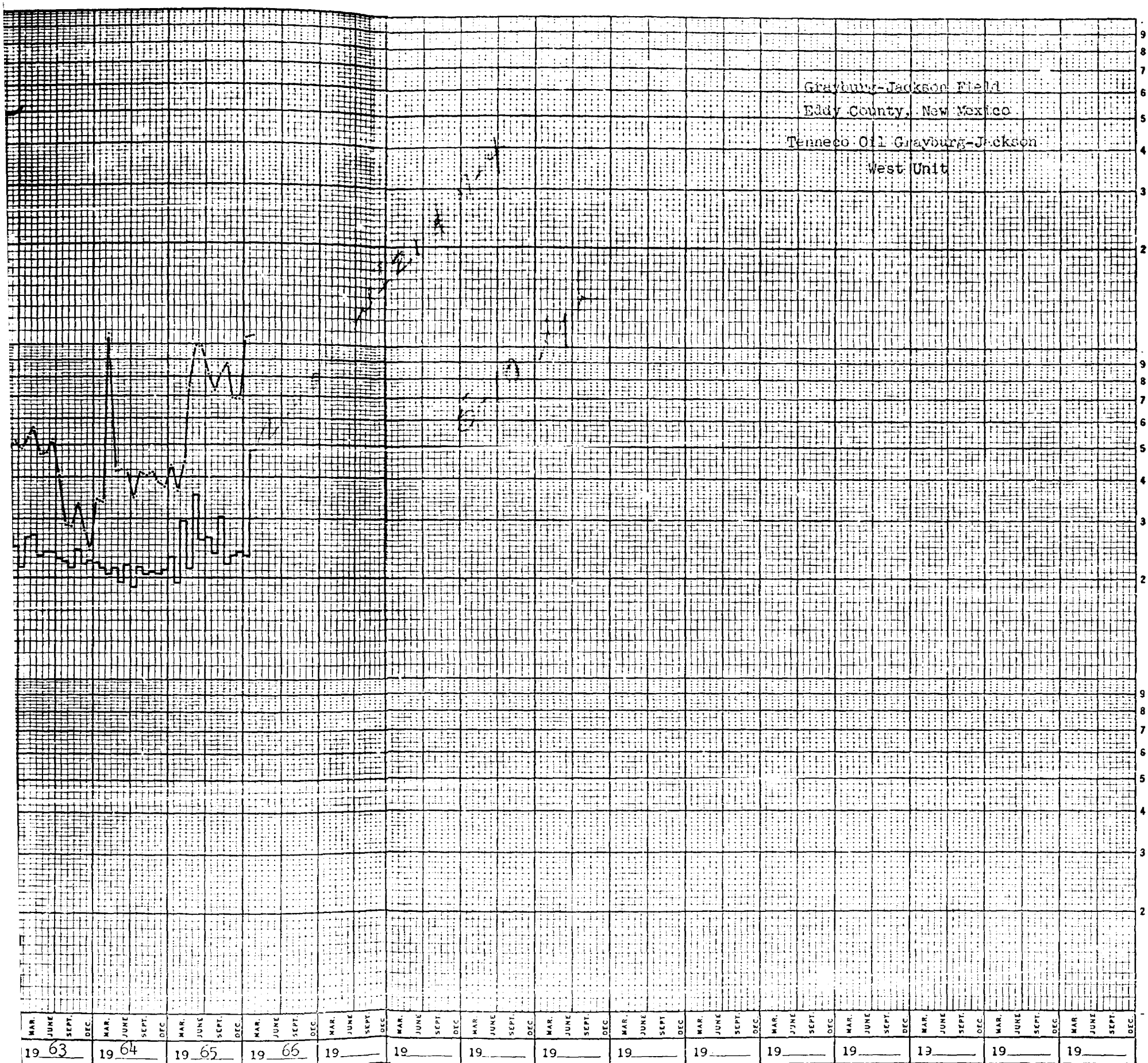
1,000

100

Production	Bbls/Month	-Oil
	Mcf/Month	-Gas

IN 2 X 3 LOG CYCLES
KEUFFEL & ESSER CO.

[illegible]



Martin Water Laboratories
 WATER CONSULTANTS SINCE 1953
 BACTERIAL AND CHEMICAL ANALYSES
 P. O. BOX 1468 PHONE WI 3-3234
 MONAHANS, TEXAS 79766

BEFORE EXAMINER NUTTER
 OIL COMMISSION COMMISSIONER
 3404 IT NO. 12
 CASE NO. 3404

To: Mr. L. D. Crumly, Jr.
 401 1st Savings Building
 Midland, Texas

Laboratory No. B106527
 Samples received 10-12-65
 Results reported 10-19-65

Company: Double Eagle Corporation of N. M.
 County: Lea & Eddy
 Field:
 Lease: Ogallala Water System

Source of samples and date taken: *Double Eagle*
 #1. Supply water - taken from ~~Amador~~ lease water supply well #3. 10-12-65
 #2. Supply water - taken from end of 12 inch line west of Loco Hills. 10-12-65

	#1	#2
Iron bacteria	Not detected	Not detected
Sulfur bacteria	260	330
Sulfate-reducing bacteria	Not detected	Not detected
Other aerobes	1,200	730
Other anaerobes	18	210
Fungi (& aciduric bacteria)	5	2
Algae	Not detected	Not detected
Protozoa	Not detected	Not detected
Total count	1,483	1,272
pH	7.5	7.5
Temperature	76	69
Chlorine residual	0.0	0.0

Note: All numerical results are reported as the number of cells per cubic centimeter of the sample as determined by plate counts; except iron, algae, and protozoa, which are determined microscopically.

Remarks: The above results are interpreted to indicate that this water is not experiencing biological activity in sufficient quantity to render it significant in regard to the utilization of this water for injection purposes.

Waylan C. Martin
 Waylan C. Martin, M. A.

BOX 1488 MONAHANS, TEXAS W13-3234
RESULT OF WATER ANALYSES

COMPANY Double Eagle Corporation of N.M. LEASE Ogallala Water System
FIELD OR POOL _____

SOURCE OF SAMPLE AND DATE TAKEN:

NO. 1 Supply water - taken from Ambassador lease- water supply well #3. 10-12-65
 NO. 2 Supply water - taken from end of 12 inch line west of Loco Hills. 10-12-65
 NO. 3 _____
 NO. 4 _____

REMARKS:

All Results Reported As Parts Per Million (mg/l)

Additional Determinations And Remarks The above results are interpreted to indicate that the quality of this Ogallala water is holding up satisfactorily through this transmission line. The results further demonstrate a reasonably satisfactory quality in regard to injection is being maintained.

87

Waylan C. Martin, M. A.

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
3404 EXHIBIT NO. 13
C

Treat-Rite Water Laboratories, Inc.
WATER CONSULTANTS SINCE 1938
BACTERIAL AND CHEMICAL ANALYSES
P. O. BOX 1468 PHONE W1 3-4781
MONAHANS, TEXAS 79756

To: Mr. L. D. Crumly
503 Oil & Gas Building
Midland, Texas

Laboratory No. BM46412
Samples received 4-9-64
Results reported 4-16-64

Company: Double Eagle
~~Caprock Water Co.~~
County: Eddy, N. M.
Field: East Red Lake
Lease: East Red Lake Supply System

Source of sample and date taken:

#1. Raw water - taken from Neil E. Salsich, Ltd's raw water line. 4-9-64

	<u>#1</u>
Iron bacteria	Not detected
Sulfur bacteria	49
Sulfate-reducing bacteria	Not detected
Other aerobes	210
Other anaerobes	220
Fungi (& aciduric bacteria)	94
Algae	Not detected
Protozoa.	Not detected
Total count	<u>573</u>
pH.	7.5
Temperature	63
Chlorine residual	<u>0.0</u>

Note: All numerical results are reported as the number of cells per cubic centimeter of the sample as determined by plate counts; except iron, algae, and protozoa, which are determined microscopically.

Remarks: The above results are considered favorable in demonstrating no significant biological activity in the supply line. It is significant to compare this with the counts on General American leases as we have concluded the bacteria on that lease were the result of activity in the storage tank. These results are indicative that conclusion was correct.

Waylan C. Martin, M. A.

2cc: Double Eagle Corp.

STATE OF TEXAS
DEPARTMENT OF AGRICULTURE
BUREAU OF WATER ANALYSES

TO **Mr. Earl Murphy**
816 Continental Bldg. Fort Worth, Texas
COMPANY *Double Eagle Corp.*
Caprock Water Co.
FIELD OR POOL _____ LEASE _____

ANALYST *Mr. J. S.*
SAMPLE RECEIVED **1-2-62**
RESULTS REPORTED **1-3-62**

SECTION _____ BLOCK _____ SURVEY _____ COUNTY _____ STATE _____
SOURCE OF SAMPLE AND DATE TAKEN
NO. 1 **Raw water - taken from Watson water supply well, Sec. 2.**
NO. 2 _____
NO. 3 _____
NO. 4 _____

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES				
	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60 degs.	1.0054			
pH When Sampled				
pH When Received				
Total Alkalinity as CaCO ₃	7.3			
Supersaturation as CaCO ₃	112			
Undersaturation as CaCO ₃	—			
Total Hardness as CaCO ₃	12			
Calcium as CaCO ₃	2,288			
Magnesium as CaCO ₃	1,729			
Sodium and/or Potassium	559			
Sulfate as SO ₄				
Chloride as NaCl	1,987			
Silica as SiO ₂	1,641			
Iron as Fe	10.3			
Manganese as Mn	0.56			
Barium as Ba				
Turbidity Electric	0.0			
Color as Pt	0.0			
Dissolved Solids at 180 degs.	1.5			
Total Solids at 103 degs.				
Total Solids, Calculated				
Temperature Degs. F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler	11.2			
Hydrogen Sulfide				
Residual Chlorine	0.0			
Resistivity OHM/CM at 68 degs. F.				
Total Suspended Solids	230			
All Results Reported As Parts Per Million				
Additional Determinations And Remarks				
Letter of recommendation attached.				

Anardarko Production Company
217 First Savings & Loan Bldg.
Midland, Texas

Boyd & Plemons
510 W. Texas
Artesia, New Mexico

Bright & Schiff
Mercantile Continental Bldg.
Dallas, Texas

Bassett Birney Oil Corp.
323 Carper Bldg.
Artesia, New Mexico

Continental Oil Co.
P. O. Box 460
Hobbs, New Mexico

Cave Pool Unit
Continental Oil Co., operator
P. O. Box 460
Hobbs, New Mexico

Cities Service Oil Co.
P. O. Box 69
Hobbs, New Mexico

Depco, Inc.
404 W. Illinois
Midland, Texas

Donnelly Drilling Co., Inc.
Booker Bldg, P. O. Box 433
Artesia, New Mexico

Durham Drilling Co., Inc.
Drawer 273
219 South Colorado
Midland, Texas

El Paso Natural Gas Co.
El Paso Natural Gas Bldg.
P. O. Box 1492
El Paso, Texas

Franklin, Aston & Fair, Inc.
P. O. Box 1090
Roswell, New Mexico

General American Oil Co. of Texas
Meadows Building
Dallas, Texas

Gulf Oil Corporation
Petroleum Bldg.
P. O. Box 1938
Roswell, New Mexico

Jake L. Hamon
908 Vaughn Bldg.
Midland, Texas

Harlan Production Company
2000 W. Sealy Avenue
Monahans, Texas

Humble Oil & Refining Co.
Humble Building
P. O. Box 1600
Midland, Texas

Hugh L. Johnston, Sr.
Petroleum Building
Roswell, New Mexico

Kincaid & Watson Drilling Co.
P. O. Box 498
Artesia, New Mexico

Nix & Curtis
Booker Bldg.
Artesia, New Mexico

Old Loco Unit
Vilas P. Sheldon, operator
801 West Texas
Artesia, New Mexico

Sinclair Oil & Gas Company
P. O. Box 1470
Midland, Texas

Skelly Oil Company
P. O. Box 730
Hobbs, New Mexico

V. M. Shortes
818 West Avenue "I"
Lovington, New Mexico

Sunray DX Oil Company
P. O. Box 1416
Roswell, New Mexico

N. E. Salsich, Jr.
411 N. Loraine
Midland, Texas

J. Cleo Thompson Oil Co.
1203 Kirby Building
Dallas, Texas

Yates Petroleum Corp.
309 Carper Building
Artesia, New Mexico