CASE 3414: Application of PHILLIPS for salt water disposal, Lea County, New Mexico.

Case Number

3414

Application

Transcripts.

Small Exhibits

ETC.

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

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

June 15, 1966

Mr. Jason Kellahin
Kellahin & Fox
Attorneys at Law
Post Office Box 1769
Santa Fe, New Mexico

Re: Case No. 3414
Order No. R-3079
Applicant:

Phillips Petroleum Company

Dear Sir:

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

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC

Other Mr. Frank Irby

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. 3414
Order No. R-3079

APPLICATION OF PHILLIPS PETROLEUM
COMPANY FOR SALT WATER DISPOSAL,
LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 8, 1966, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 15th 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, Phillips Petroleum Company, is the owner and operator of the following wells:

Phillips Santa Fe Well No. 97, located in Unit N of Section 33, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico;

Phillips Santa Fe Well No. 86, located in Unit C of Section 26, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico;

Phillips Santa Fe Well No. 58, located in Unit G of Section 35, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico, and

Phillips M.E. Hale Well No. 11, located in Unit A of Section 35, Township 17 South, Range 34 East, NMPM, Lea County, New Mexico.

(3) That the applicant proposes to utilize the aforesaid Wells Nos. 97, 86, and 58 to dispose of produced salt water from the Vacuum Field area into the lower portion of the San Andres formation, with injection into the following intervals: Well No. 97: from 5092 feet to 5500 feet; Well No. 86: from 5115 feet to 5760 feet; and Well No. 58: from 4970 to 5720 feet.

(4) That the injection should be accomplished through 2 3/8-inch internally plastic-coated tubing installed in a packer set at approximately 5050 feet on the Phillips Santa Fe Well No. 97.

(5) That the injection should be accomplished through 2 3/8-inch internally plastic-coated tubing and under a blanket of oil in the annulus in the Phillips Santa Fe Well No. 58 and the Phillips Santa Fe Well No. 86.

(6) That the applicant, Phillips Petroleum Company, seeks authority to complete its Phillips M.E. Hale Well No. 11, located in Unit K of Section 35, Township 17 South, Range 34 East, NMPM, Lea County, New Mexico, as a dual completion to produce gas from the Vacuum-Yates Gas Pool through the casing-tubing annulus and to dispose of produced salt water into the lower portion of the San Andres formation, with injection into the perforated interval from 5014 feet to 5235 feet through 2 3/8-inch internally plastic-coated tubing installed in a packer set at approximately 4850 feet.

(7) That approval of the subject application will prevent the drilling of unnecessary wells, and will otherwise prevent waste and protect correlative rights.

(8) That the applicant further seeks the establishment of an administrative procedure whereby additional wells could be placed on salt water disposal.

(9) That an administrative procedure should be established for approval of additional disposal wells, provided that the disposal will be into the lower portion of the San Andres formation, and provided further that the disposal interval is between 250 feet below the oil-water contact and 250 feet above the top of the Glorieta formation.

IT IS THEREFORE ORDERED:

(1) That the applicant, Phillips Petroleum Company, is hereby authorized to utilize the following three wells:

Phillips Santa Fe Well No. 97, located in Unit N of Section 33, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico;

Phillips Santa Fe Well No. 86, located in Unit C of Section 26, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico; and

Phillips Santa Fe Well No. 58, located in Unit G of Section 35, Township 17 South, Range 35 East, NMPM, Lea County, New Mexico;

to dispose of produced salt water from the Vacuum Field area into the lower portion of the San Andres formation, injection to be accomplished through 2 3/8-inch internally plastic-coated tubing installed in a packer set at approximately 5050 feet in the Phillips Santa Fe Well No. 97, and through 2 3/8-inch internally plastic-coated tubing and under a blanket of oil in the annulus in the Phillips Santa Fe Well No. 58 and Phillips Santa Fe Well No. 86, with injection into the following perforated intervals: Well No. 97: from 5092 feet to 5500 feet; Well No. 86: from 5115 feet to 5760 feet; and Well No. 58: from 4970 feet to 5720 feet.

(2) That the applicant, Phillips Petroleum Company, is hereby authorized to complete its Phillips M.E. Hale Well No. 11, located in Unit K of Section 35, Township 17 South, Range 34 East, NMPM, Lea County, New Mexico, as a dual completion to produce gas from the Vacuum-Yates Gas Pool through the casing-tubing annulus and to dispose of produced salt water into the lower portion of the San Andres formation in the perforated interval from 5014 feet to 5235 feet through 2 3/8-inch internally plastic-coated tubing installed in a packer set at approximately 4850 feet;

PROVIDED HOWEVER, that the applicant shall complete, operate, and produce said well in accordance with the provisions of Rule 112-A of the Commission Rules and Regulations insofar as said rule is not inconsistent with this order;

PROVIDED FURTHER, that the applicant shall take packer-leakage tests upon completion and annually thereafter during the Annual Shut-In Pressure Test Period for the Vacuum Yates Gas Pool.

(3) That the applicant shall submit monthly reports of its disposal operations in accordance with Rules 706 and 1120 of the Commission Rules and Regulations.

(4) That as an exception to Rule 701 of the Commission Rules and Regulations, the Secretary-Director is hereby authorized to approve additional salt water disposal wells in the Vacuum Field when an application for such authority has been filed in accordance with the requirements of Rules 701-B and 701-C of the Commission Rules and Regulations and the Secretary-Director determines that approval of the application will prevent the drilling of unnecessary wells and otherwise prevent waste and protect correlative rights;

PROVIDED HOWEVER, that the disposal is into the lower portion of the San Andres formation between 250 feet below the oil-water contact and 250 feet above the top of the Glorieta formation.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JACK M. CAMPBELL, Chairman

GUYTON B. HAYS, Member

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

eer/

Case 3414
Heard 6-8-66
Rec. 6-10-66

1. Grant Phillips permission to inject produced water from the vacuum field area into 4 designated wells. Listed on page 1 of application.
2. Injection shall be thru internally coated tubing and under a packer on the M.E. Hale #11 and Santa Fe #87. Packers shall be set at approx. 4850 and 5050 ft. respectively.
3. Injection shall be thru internally coated tubing and under a blanket of oil in the ~~gasoline~~ Santa Fe #58 and Santa Fe #86
4. ~~Grant~~ The above wells shall inject salt water into the San Andres formation at least 250 ft. below the ~~top of the~~ gas-oil contact of San Andres and at least 250' above the top of the Glorieta.
5. Grant administrative procedure for approval of ~~water~~ SWD wells when injection zone is as described in 4 above.

Fred Kay

CASE 3413: Application of Amerada Petroleum Corporation for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Permo-Pennsylvanian zone through three injection wells located in Section 3, Township 15 South, Range 33 East, Saunders Permo-Pennsylvanian Pool, Lea County, New Mexico.

CASE 3414: Application of Phillips Petroleum Company for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water in the lower San Andres formation, below the oil-water contact, in the following wells, Vacuum Field, Lea County, New Mexico:

TOWNSHIP 17 SOUTH, RANGE 34 EAST
Phillips Hale No. 11, Unit K Section 35

TOWNSHIP 17 SOUTH, RANGE 35 EAST
Phillips Santa Fe No. 97, Unit N Section 33
Phillips Santa Fe No. 86, Unit C Section 26
Phillips Santa Fe No. 58, Unit G Section 35

Applicant further seeks establishment of an administrative procedure whereby additional wells could be placed on salt water disposal below the oil-water contact in the San Andres formation of the Vacuum Field.

CASE 3415: Application of Sun Oil Company for a non-standard gas proration unit, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 790-acre non-standard gas proration unit comprising all of Section 5 and 150 acres in the eastern portion of Section 6, Township 22 South, Range 23 East, Indian Basin-Upper Pennsylvanian Gas Pool, Eddy County, New Mexico. Said unit would be dedicated to applicant's Bogle Flats Unit Well No. 8 located in Unit G of said Section 5. Although applicant has drilled a non-commercial well in the NE/4 of said Section 6, it contends that there are approximately 150 acres in said Section 6 which are underlain by the Indian Basin-Upper Pennsylvanian Gas Pool.

CASE 3416: Application of Signal Oil & Gas Company for a dual completion and salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (conventional) of its State "AP" Well No. 1 located in Unit I of Section 17, Township 10 South, Range 34 East, Simanola-Pennsylvanian Pool, Lea County, New Mexico, in such a manner as to produce oil from the Pennsylvanian formation through perforations from 9962 feet to 9966 feet and to dispose of produced salt water into the San Andres and Glorieta formations through the annulus between the 8 5/8 inch and the 5 1/2 inch casing in the interval from 4100 feet to 9260 feet.

CASE 2844 (Reopened):
In the matter of Case No. 2844 being reopened pursuant to the provisions of Order No. R-2627, which order established temporary 320-acre gas proration units for the Teas-Pennsylvanian Gas Pool, Lea County, New Mexico, for a period of one year from the date of first pipeline connection. The Commission will consider indefinite extension of Order R-2627 in the absence of evidence to the contrary.

Docket No. 14-66

DOCKET: EXAMINER HEARING - WEDNESDAY - JUNE 8, 1966

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

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

CASE 3410: Application of Pennzoil Company for the creation of a new pool and for special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new oil pool for Morrow production for its Bridges-State Well No. 1 in Unit A of Section 11, Township 17 South, Range 34 East, Lea County, New Mexico, and for the promulgation of special pool rules therefor including a provision for 80-acre spacing and a limiting gas-oil ratio of 12,000 to one. In the alternative, applicant requests that the subject well be classified as a gas well and a new Morrow gas pool be created.

CASE 3411: Application of SEC Operating for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Yates formation through one well in Unit A of Section 14, Township 20 South, Range 33 East, Teas Pool, Lea County, New Mexico. Applicant further seeks an administrative procedure whereby said project could be expanded to include additional lands and injection wells in Sections 11, 13, 14 and 15, Township 20 South, Range 33 East, under cooperative offset operating agreements.

CASE 3412: Application of SEC Operating for an exception to Commission Order No. R-111-A, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an exception to the potash-oil area casing and cementing rules as set forth in Commission Order No. R-111-A. Applicant proposes to drill and complete a well in Unit D of Section 14, Township 20 South, Range 33 East, Teas Pool, Lea County, New Mexico, with surface casing set at approximately 950 feet, cement circulated, and production casing set at approximately 3400 feet and cemented to approximately 2500 feet above the casing point. The well would be plugged and abandoned in accordance with the provisions of Order No. R-111-A.

CASE 3261 (Reopened):

In the matter of Case No. 3261 being reopened at the request of Amerada Petroleum Corporation to consider the amendemnt of the special rules for the Jenkins-Cisco Pool, Lea County, New Mexico, to provide for 160-acre oil proration units. Applicant also seeks the extension of said pool to include certain lands in Township 9 South, Ranges 34 and 35 East. The present temporary special rules promulgated by Order No. R-2931 in Case 3261 provide for 80-acre proration units, and are subject to reconsideration in July, 1966.

JASON W. KELLAHIN
ROBERT E. FOX
FORREST S. SMITH

KELLAHIN AND FOX
ATTORNEYS AT LAW
54½ EAST SAN FRANCISCO STREET
POST OFFICE BOX 1769
SANTA FE, NEW MEXICO 87501

TELEPHONE 982-4315
AREA CODE 505

May 13, 1966

-3414

Mr. A. L. Porter, Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Dear Mr. Porter:

Enclosed for filing, in triplicate, is the application of Phillips Petroleum Company for approval of a salt water disposal system in the various pools of the Vacuum Field, Lea County, New Mexico.

I have discussed this application with Mr. Dan Nutter, and am forwarding it at this time in order that it may be advertised for the June 8 hearing, if possible. For that reason the required exhibits have not been attached, and they will be submitted when I receive them from Midland.

Your cooperation in getting this case set for an early hearing will be appreciated.

Yours very truly,

Jason W. Kellahin

Jason W. Kellahin

JWK:cc
cc: Mr. Joe V. Peacock
Mr. W. J. Mueller

BEFORE THE

OIL CONSERVATION COMMISSION OF NEW MEXICO

A P P L I C A T I O N

Comes now Phillips Petroleum Company and applies to the Oil Conservation Commission of New Mexico for approval of a salt water disposal system in the Vacuum Field, Lea County, New Mexico, and for an administrative procedure for expansion of such system by inclusion of additional wells and the disposition of additional amounts of water from the various pools of the Vacuum Field and for dual completion of its Phillips Hale No. 11 well, and in support thereof would show the Commission:

1. Applicant proposes to dispose of water into four wells, as follows:

Phillips Hale No. 11 - Located 1980 feet from the South line and 2310 feet from the West line of Section 35, Township 17 South, Range 34 East, N.M.P.M.

Phillips Santa Fe No. 97 - Located 990 feet from the South line and 1980 feet from the West line of Section 33, Township 17 South, Range 35 East, N.M.P.M.

Phillips Santa Fe No. 86 - Located 990 feet from the North line and 2307 feet from the West line of Section 26, Township 17 South, Range 35, East, N.M.P.M.

Phillips Santa Fe No. 58 - Located 1982 feet from the East Line and 1986 feet from the North line of Section 35, Township 17 South, Range 35 East, N.M.P.M.

2. Water will be disposed of in the lower or basal San Andres Formation, below the oil-water contact, estimated at a sub-surface of from 4900 feet to 5800 feet.

3. Water to be disposed of is produced water from the Vacuum Yates, Vacuum Grayburg-San Andres, Vacuum Glorieta, Vacuum Blinebry, Vacuum Wolfcamp, Vacuum Abo, Vacuum Pennsylvanian, and the Vacuum Devonian Formations.

4. Permission is sought for approval of the disposition of approximately 3,000 barrels per well per day, with initial disposition of approximately 500 barrels per day, with increases as facilities are installed.

5. It is proposed that disposition will be made in the Hale No. 11 well through coated tubing, under a packer, with the well to be dually completed for disposition of salt water in the basal San Andres through perforations, and for the production of gas from the Vacuum-Yates gas zone through the casing-tubing annulus.

It is further proposed that disposition of water through the Santa Fe Nos. 97, 86, and 58 be through coated tubing, the casing-tubing annulus to be filled with oil or inert fluid.

6. Because of the volumes of water being produced in the pools of the Vacuum Field, it is necessary that provision be made for future expansion of the salt water disposal system in the event the proposed system proves inadequate for future operations. Applicant, therefore, proposes that an administrative procedure be adopted for future expansion of the system upon such terms as may appear proper to the Commission.

By copy of the application, notice thereof has been given to the Office of the New Mexico State Engineer, as required by the provisions of New Mexico Oil Conservation Commission Rule 701.

WHEREFORE, it is requested that this application be set for hearing before the Commission's examiner at an

early a date as possible, and that after notice and hearing, the application be approved.

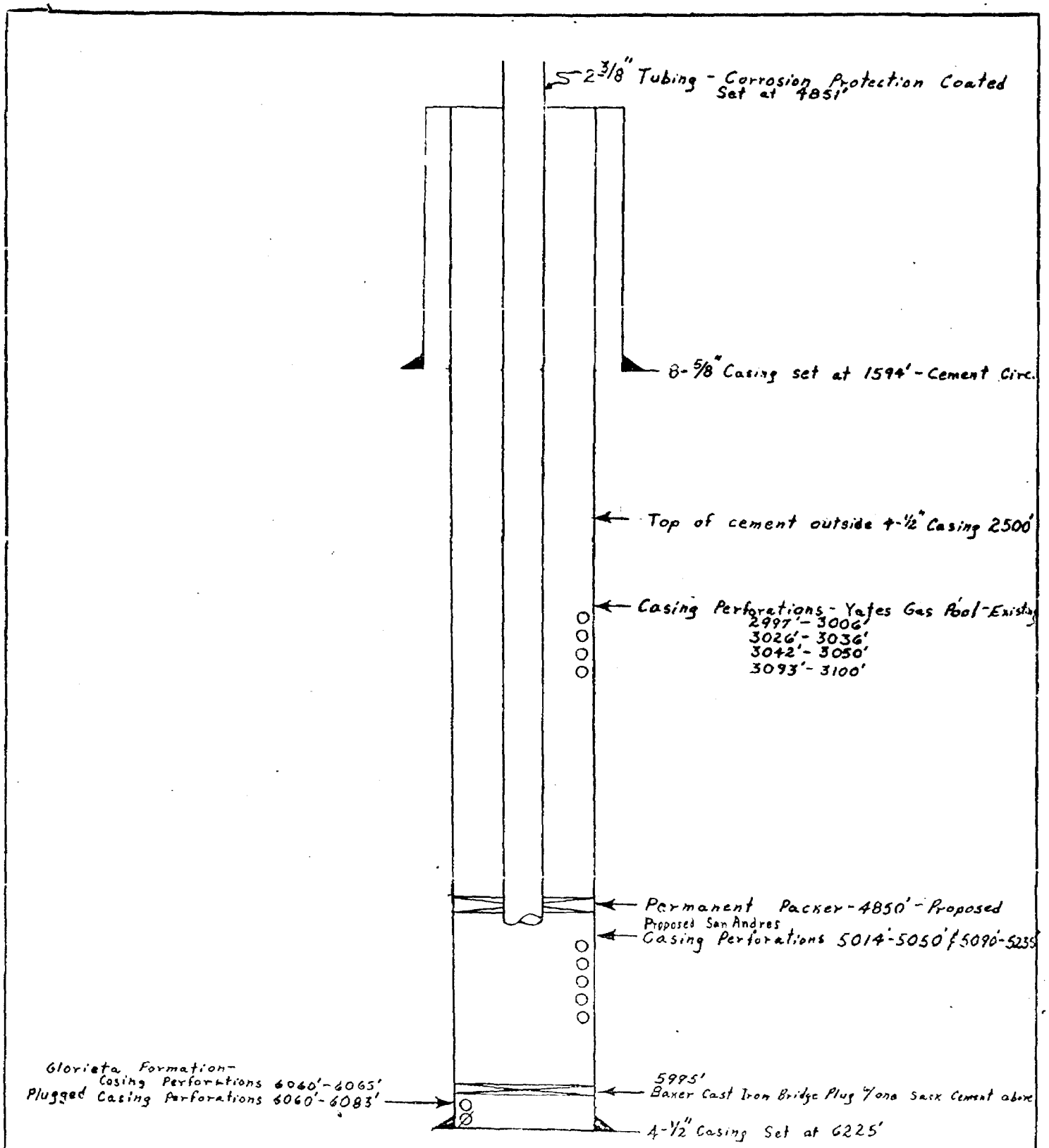
Respectfully submitted,

PHILLIPS PETROLEUM COMPANY

By _____

Kellahin & Fox
P. O. Box 1769
Santa Fe, New Mexico

ATTORNEYS FOR APPLICANT

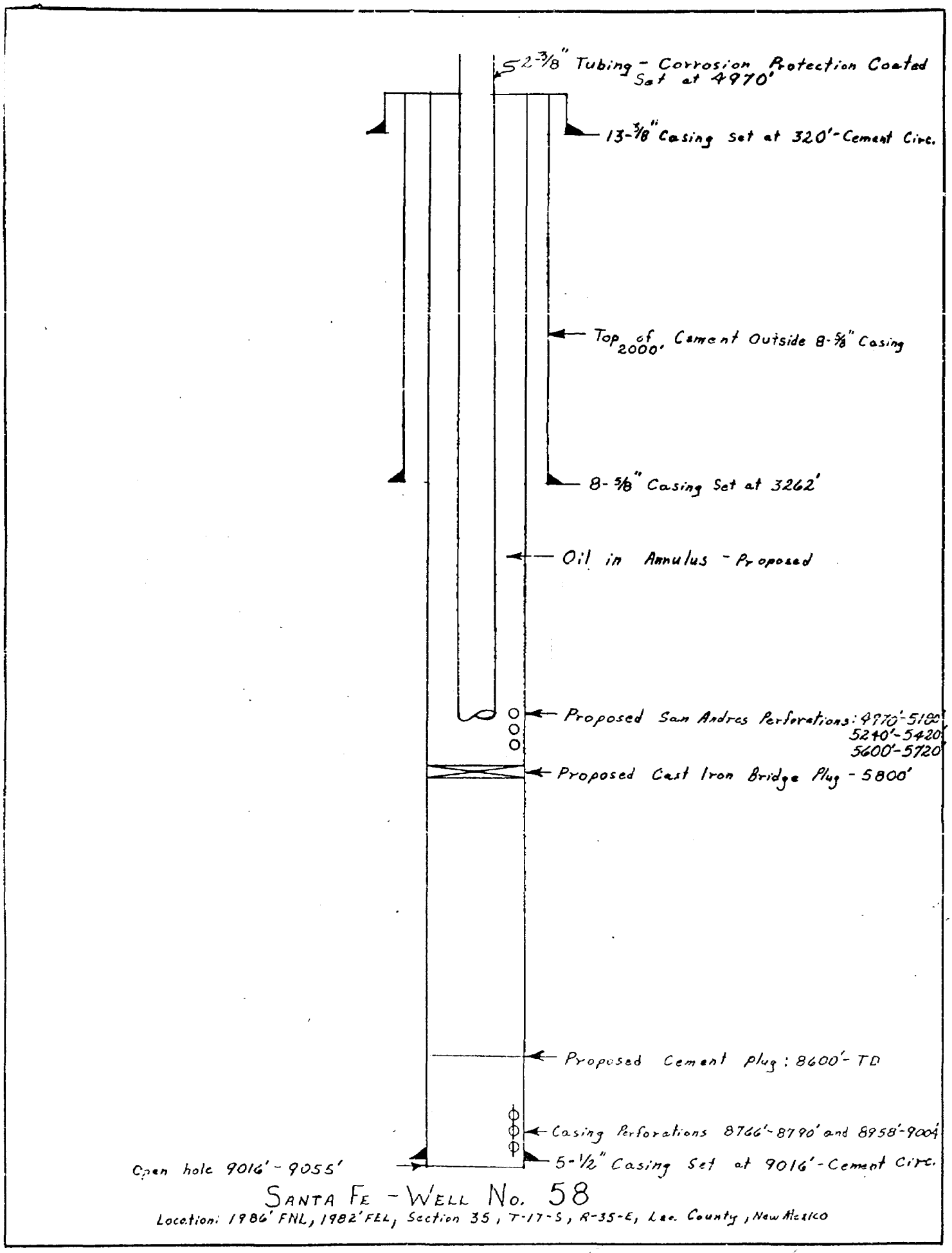


M. E. Hale - Well No. 11

Location: 1980' FSL, 2310' FWL, Section 35, T-17-S, R-34-E, Lea County, New Mexico

Proposed Dual Completion: Yates Gas and San Andres Salt Water Disposal

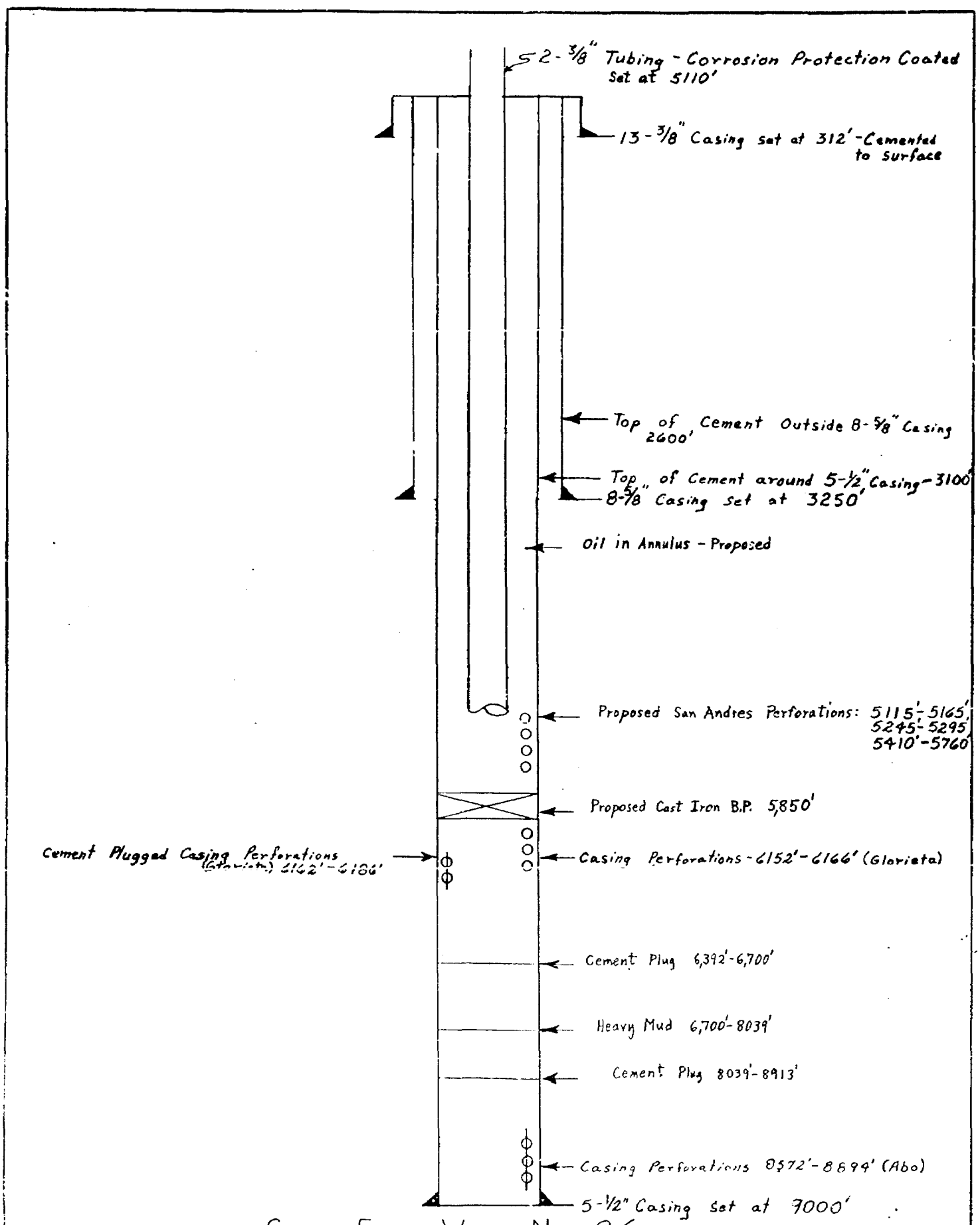
Form 203 5-57—101593-D



SANTA FE - WELL NO. 58

Location: 1986' FNL, 1982' FEL, Section 35, T-17-S, R-35-E, Lea County, New Mexico

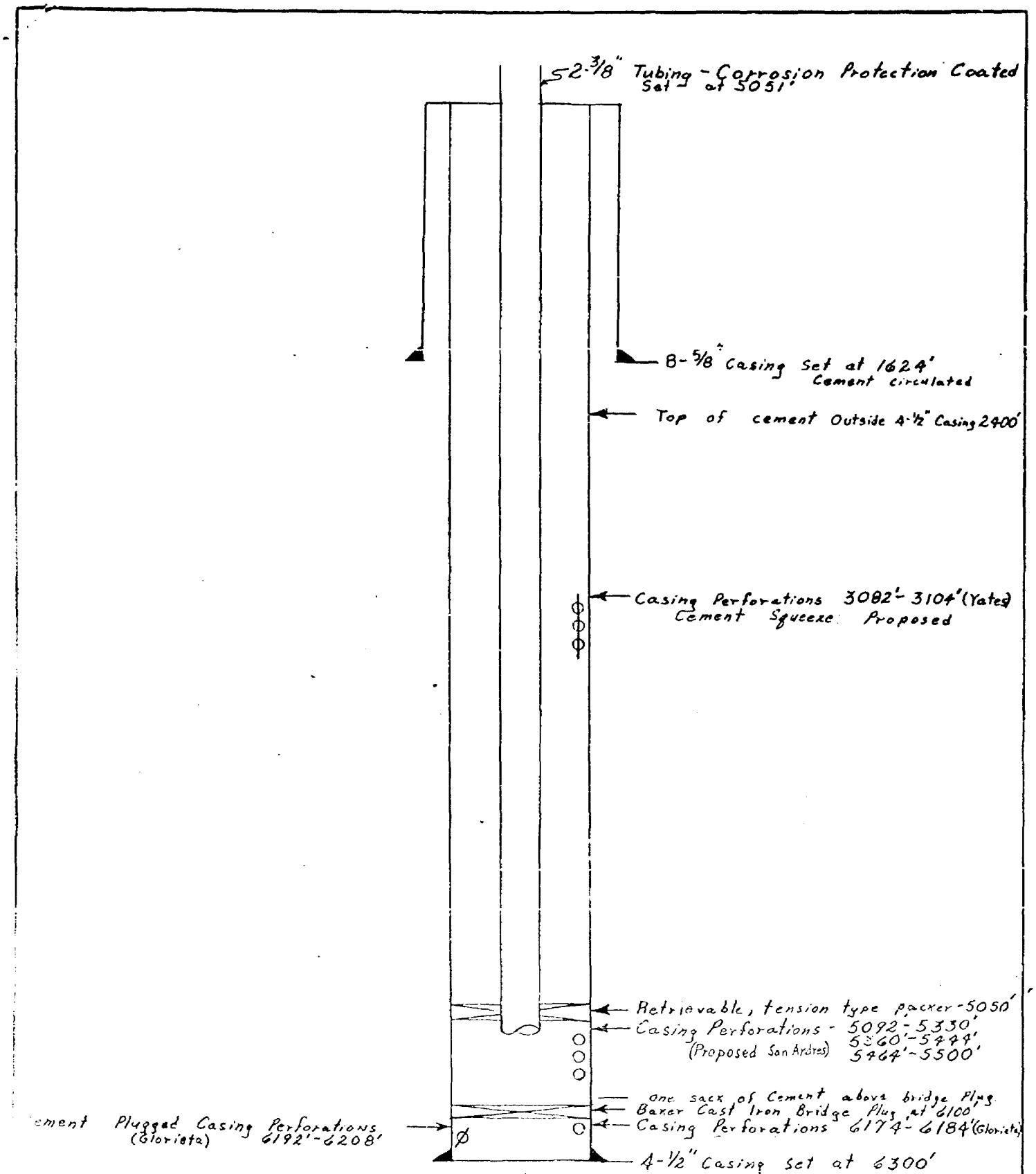
Form 203 5-57—101593-D



SANTA FE - WELL NO. 86

Location: 990' FNL, 2307' FWL, Section 26, T-17-S, R-35-E, Lea County, New Mexico

Form 205 5-57—101393-D



SANTA FE - WELL No. 97

Location: 990' FSL, 1980' FWL, Section 33, T-17-S, R-35-E, Lea County, New Mexico

Form 203 5-57—101593-D

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

June 8, 1966

Examiner HEARING

IN THE MATTER OF:

Application of Phillips Petroleum Company for salt water disposal, Lea County, New Mexico.

Case No. 3414

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order. The next case is No. 3414.

MR. HATCH: Application of Phillips Petroleum Company for salt water disposal, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner, please, Jason Kellahin, Kellahin and Fox, Santa Fe, New Mexico, representing the applicant. We have one witness I would like to have sworn, please.

(Witness sworn.)

MR. UTZ: Are there other appearances in this case?

MR. IRBY: Frank Irby, State Engineer Office.

W. J. MILLER

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A W. J. Miller.

Q By whom are you employed and what position?

A I am employed by Phillips Petroleum as District Reservoir Engineer.

Q And where are you located?

A Odessa, Texas.

Q In connection with your duties as District Reservoir Engineer at Odessa, is the area involved in the application of Phillips in Case 3414 under your jurisdiction?

A Yes, sir.

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

A No, sir.

Q For the benefit of the Examiner, would you briefly outline your experience as a reservoir engineer?

A Graduated from Washington University St. Louis, 1953. I have been employed by Phillips ever since. I was promoted to reservoir engineer about ten years ago and have occupied that capacity about ten years.

Q Where have you been located as a reservoir engineer?

A Throughout the whole Permian Basin. I have been in Odessa, Big Spring, Hobbs.

Q Have you worked in the area involved in this application?

A Yes, sir, for the last five years.

MR. KELLAHIN: Are the witness's qualifications acceptable?

MR. UTZ: Yes, sir, they are.

Q (By Mr. Kellahin) Are you familiar with the application by Phillips in Case 3414?

A Yes, sir.

Q Briefly, what does Phillips propose in this application?

A Establishment of the lower San Andres below the oil-water contact as a suitable saltwater disposal zone for the produced brines of the Vacuum Field.

Q Now, would you, for the benefit of the Examiner, briefly outline the history of this project and how it came about?

A Hobbs Commission called a meeting of the Vacuum Field operators on April 24th and verbally requested that the operators in the Vacuum Field expedite early saltwater disposal of all produced water in that field and at a subsequent operators' meeting held one week later the two other big operators in the field, Texaco and Mobil, said they were willing to handle their own water and Phillips was then elected chairman of the operators' committee to handle the minority group and its troup plus the other that Texaco and Mobil did not wish to handle.

Q You say to handle the minority. Do you have any concrete arrangement or contracts with these others for the disposal of water at this time?

A No, not at this time.

Q Do you propose to make this system available to them

in the event the Commission approves?

A We hope following the Commission approval that the economics of a cooperative system versus individual salt water disposal have been made available to each operator and he can then decide how he wants to go.

Q Attached to the application was the plat of the area involved.

A Yes, sir.

Q Now, you referred to the Vacuum Field and when you use the term "field" are you using that as defined by New Mexico Statute, as including all of the producing pools within the Vacuum area?

A Yes, sir.

Q How many of those pools are there?

A I believe there are six.

Q Do they all produce some water?

A All but the Yates. The Yates makes very little water.

Q And what is the present distribution of the water in the area involved in Phillips' application?

A Surface pit disposal.

Q Now, the plat shows the proposed location of your disposal well, does it not?

A Yes, sir.

Q How are they marked on that plat?

A They are marked on that plat with blue arrows. I think there are four of them.

Q Does Texaco have a disposal well shown on the plat, too?

A Not on the plat. In section 10, 18, South, 34 East, Right South, see the well marked 1A, that is currently a salt water disposal in the base of San Andres operated by Texaco.

Q Are there any other disposal wells in the area?

A To my knowledge, this is the only one in which water is currently going. Texaco had a Commission Order approved on another well location in Section 36.

Q That is Order No. R 2413, is that correct?

A Yes, sir.

MR. KELLAHIN: I ask the Commission to take note of its Order No. R 2413.

Q And the order for this well in Section 10 was a saltwater SWD Order No. 47. Now, Mr. Miller, do the disposal wells as proposed by Phillips coupled with the Texaco wells take care of the area where substantially most of the water is being produced?

A This is right, sir, they will.

Q What is your plan of operation in constructing this saltwater disposal system?

A Our plan of operation will depend upon how each individual operator wants to vote at subsequent meetings to be called, but our immediate concern is as evidenced or requested by the Commission at the Hobbs meeting, is the Hale area and we plan immediately to convert that area for our own use on the Hale lease. I know for Continental and Tidewater that have expressed desire to come into that one and we will immediately convert that to Santa Fe 97 to elect a Vacuum Unit and let the wells in that area come in and I believe Tidewater has said they will have an application here at this hearing for their No. 10 and those three wells will immediately, we hope, take care of the concern in what the Commission called the critical area where they expressed the desire to have water as soon as possible put underground.

Now, the area lying roughly east of the township line and it's roughly Township 17 South, 35 East, that whole area up there was less critical area and this is where we have to deal with considerable other operators and the system will have to be designed.

Q You refer to basal San Andres as the point in which you intend to dispose of the water. Is that now, or has it ever been oil porductive?

A No, sir.

Q Do you know where the water-oil contact is in the San Andres.

A Approximately. Phillips and most of the operators accept oil-water contact at approximately minus 700 feet subsea.

Q And your injection area involved here would be where?

A Below a minus 950.

Q You would have approximately 200 feet below what you agreed as the water-oil contact?

A And this is evidenced by many of the completions in this field since--I will say that 75 per cent in the Vaccum Field are completed above minus 700 feet.

Q Is that completion data shown?

A No.

(Whereupon, Applicant's Exhibit No. 1 marked for identification.)

Q Referring to what has been marked as our Exhibit No. 1, would you identify that exhibit and discuss it?

A Exhibit 1 is our proposed completion in the Hale 11 for salt water disposal.

Q Now, does that Exhibit differ from the Exhibit that was attached to the application?

A It differs only insofar as the Exhibit we attached

to our application had left off the volume of the cement used on the casing strings and we have added that in.

Q Other than that the information is identical, is that correct?

A Yes, sir.

Q Now, you show two injections through tubing and under the packer, is that right?

A Yes, sir.

Q Will this be internally coated tubing?

A Yes, sir.

Q The Hale No. 11 Well, do you propose to dually complete that well?

A Yes, sir, it is currently a low-volume Yates gas well producing in the neighborhood of 50 MCF a day. We feel that this well can be safely and adequately dually completed producing Yates gas at annulus and saltwater disposing down the tubing.

(Whereupon, Applicant's Exhibit 2 marked for identification.)

Q Now, referring to what has been marked Exhibit No. 2, would you identify that exhibit and discuss it?

A This is a proposed completion of saltwater disposal to the Santa Fe Well No. 58.

Q In that instance you do not show that there is a packer

on the tubing, is that right?

A No, sir, we do not feel that the Order should request or specify the definite use of the packer, but we thought that this was probably too much detail and we do not want to be limited to a packer. Should the system be a vacuum system like we hoped, Texaco is a vacuum system, and if it is, we feel there is practically no danger to the casing in the vacuum system that will require a packer.

Q You have a gauge in the annulus to test the pressures?

A Yes, sir.

Q And the oil will be an inert oil?

A Yes, it would be diesel, kerosene, something like that.

(Whereupon, Applicant's Exhibit No. 3 marked for identification.)

Q Now, referring to what has been marked as Exhibit No. 3, would you identify that exhibit?

A This is the proposed completion for saltwater disposing into Santa Fe No. 86.

Q And are there -- again, does this call for injection through tubing with oil in the casing, tubing, and annulus?

A Yes, sir.

Q The same type of completion as in the Well No. 53?

A That is right.

Q Is your exhibit the same on this well and the previous well as on the exhibit attached to your application?

A Except for the cement volume on the casing.

(Whereupon, Applicant's Exhibit No. 4 marked for identification.)

Q Now, referring to Exhibit 4, would you identify that exhibit and discuss it, please?

A Exhibit 4 is a salt water disposal proposed for Santa Fe No. 97 V. This one is different from the one we submitted initially with our application and so far as in that one, we had shown the Yates perforations squeezed and had packer and injection under a packer. We now would like to propose rather that these Yates perforations just be temporarily abandoned under a packer. The reason we did not wish to squeeze them at this time is that we do not know that this well will make a satisfactory well and we do have marginal Yates production in the upper zone that produces from 5 to 6 barrels of oil a day. Should this well prove satisfactory for injection pressure in the basal San Andres we could go back to the Yates.

Q Will any damage result to the Yates formation or any formation by leaving it open in this disposal line?

A No, sir.

Q Will any significant pressure in the Yates formation result?

A No, sir, it is very low volume.

Q What volume did you say it was producing?

A 5 to 6 barrels of oil per day.

Q That was on the pumper?

A Yes, sir.

Q In each case, you anticipate that the water can be injected on the vacuum?

A Yes, sir.

Q What surface pressure would you anticipate you will have?

A On the tubing we anticipate zero surface injection pressure.

Q And in each case you are using plastic coated tubing?

A Yes, sir.

Q Or at least a corrosion protection coated tubing?

A Yes, sir.

Q Were Exhibits 1 through 4 prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer

in evidence Exhibit 1 through 4. Off the record.

(Whereupon, a discussion was held off the record.)

MR. UTZ: Without objection Exhibits 1 through 4 will be entered in the record in this case.

(Whereupon, Applicant's Exhibits 1 through 4 admitted in evidence.)

Q (By Mr. Kellahin) Mr. Miller, do you know what volumes of water you will be called upon to dispose of in the system as you propose it at the present time?

A The actual volume, or a reasonable guess, is about all we can give you right now, is that we know Phillips' currently was 900 barrels of produced salt water a day out there and we know that the other operators that are outside of current disposal system or outside of a waterflood project, with their using or producing in the neighborhood of 3500 barrels of water a day, and it is anticipated by Phillips that our salt water production will increase to maybe 4000 barrels per day and the other operators think maybe 12,000 barrels of water a day.

Q Do you anticipate that the system as you propose it here will take care of all of the water disposal problem?

A The system as proposed here would take care of the immediate problems and subsequent disposal wells will be

needed at the time this total 16,000 barrels of water is produced.

Q Is that the reason that you are asking for an administrative procedure for the approval of further disposal wells?

A Yes, sir.

Q Do you have any particular recommendations to make to the Commission in setting up a procedure for administrative approval?

A A recommendation would be that the application would be the same as the hearing except the hearing would not be held. There would be a schematic diagram area plat of each proposed well.

Q And that would be forwarded to the State Engineer as required?

A Yes, sir.

Q And in the event there were no objections, then you would ask for an administrative approval?

A After ten or fifteen days' waiting period.

Q Then if there were no objections have it set for hearing, is that correct?

A Yes, sir.

Q Is this your proposal?

A Yes, sir.

MR. KELLAHIN: That is all I have on Direct Examination, Mr. Utz.

MR. UTZ: Other questions of the witness? Mr. Irby.

MR. IRBY: Frank Irby, State Engineer's Office.

CROSS EXAMINATION

BY MR. IRBY:

Q You, in your Exhibit 2, Mr. Miller, you will have some pressure down in the San Andres where you are disposing, will you not?

A Yes, sir.

Q And I am not familiar with this procedure of not using a packer there. Will you tell me how this works with the oil in the annulus and the gauge up there and how this salt water maintains the constant level of the inert oil that is put in the annulus?

A Well, this oil will, of course, be placed to the bottom of the tubing by circulation of the fluid and then maintaining a hydrostatic head of produced water in the tubing is balanced, is forcing theoil up so that there is a difference in the hydrostatic head in the annulus and produced water in the tubing of some 500 pounds and such that theoretically this will allow you to operate with a casing pressure

from zero to 500 pounds, without ever seeing pressure on the tubing.

Q Now, if I understand you, this isn't likely, but if you were actually putting water in there on a vacuum without hydrostatic head in the casing, then you would lose this oil into the injection formation, right, if you had zero bottomhole pressure?

A We will never have zero bottomhole pressure. We will have a surface pressure, but with oil to the annulus we could have a surface pressure reading of an oil column, we anticipate test bottomhole pressure here, roughly in the neighborhood of 1700 pounds is our best guess right now and with 1700 pounds we can balance a column of oil against this and still read surface pressures, whereas a column of produced water will have no pressure on it because it would, at 5000 feet, exert a pressure of 2200 pounds at 5000 feet. This is a common procedure, I think, used by Rice Engineering throughout all their disposal levels.

Q Now, if you develop a leak in this casing and some other permeability formation, is this vacuum up here going to register? I mean, are gauges going to register vacuum?

A Yes, it will immediately give indication of tubing or casing leak, which a normal casing won't do, a packer system.

Q You will have several hundred feet above your oil in this annulus.

A For this to work properly it has to be oil from the base of the tubing all the way to the surfacing gauge. There can be no air space up there, and if our bottomhole pressure is so low that it won't establish a hydrostatic head of oil then we are not going to have the benefit of being able to because these different ranges in bottomhole pressures, we hope.

Q Is your 1700 estimate of PSI bottomhole going to hold your column of oil up there?

A Yes, sir.

Q It is at 5000 feet?

A Yes, sir, I believe any oil lighter than 40-39 balance gravity will balance that.

Q Let's see if I have got any more questions. Is the well in which you have the dual completion where you are going to produce gas and disposal water?

A Yes, sir.

Q Is this non-corrosive gas?

A Yes, sir. It has only a very small percentage of CO_2 that we figure will be negligible corrosion.

Q There are two of those completions?

A And th other one is a Yates well and we will have to

temporarily abandon it because we can not complete a full pumper.

MR. UTZ: Is that the No. 86?

A 97, sir.

Q (By Mr. Irby) Do these water analyses indicate which well they are from?

A No, sir, those were obtained from the various -- on our batteries where there was sufficient water to get a good sample. They were not obtained at the points at the top where -- they were obtained from a battery or well. I think all those were obtained from the batteries. In other words, where we would be pumping the water up is really --

Q I notice considerable variation in the chemical components in this water is the reason that I was interested. I assume that these are all from the same formation?

A No, sir, those are all from the different formations.

Q I see.

A Those are from San Andres.

MR. KELLAHIN: There are six different vacuum pools in the field and this is from all of them.

(Whereupon, Applicant's Exhibit No. 5 marked for Identification.)

Q (by Mr. Irby) Referring to what has been marked as Exhibit No. 5, would you identify that?

A This is an answer to Mr. Irby's request. He

wrote Mr. Jason Kellahin requesting additional data relative to the Phillips application here and one of his requests in there was that he be furnished an analysis of the San Andres injection water and of the various other produced waters in the field and these are the requested analyses that we sent him.

MR. KELLAHIN: At this time we will offer this with the letter to the State Engineer in evidence.

(Whereupon, Applicant's Exhibit No. 5 offered in evidence.)

Q (By Mr. Irby) Are you able to identify for me which analysis is applicable to which pool?

A Yes, sir. Going through the very first one, of course, was the gas analysis of the Vacuum Yates you requested. The second analysis, it says, "Source:" up here, "Company: Phillips Petroleum Company." The second line says, "Source: Hale." That means our Hale lease San Andres, so it came from our San Andres formation on the Hale lease.

Q The San Andres is non-oil bearing?

A No, this is the oil producing San Andres zone.

Q So you would call this the San Andres pool of the --

A Yes, sir, this would be the Vacuum Grayberg San Andres Pool; in reference to that we also have another one on the Vacuum Grayberg which is the second one went to you

from our Santa Fe batter number 14 and that battery is located on 26, 17, 35, if you would want the location of the third water analysis from our Hale Lease, the Vacuum Glorieta Pool.

The next analysis we did not have any Blinebry production. We obtained one from the Tidewater battery.

Q It is a Blinebry water sample from the Vacuum Blinebry Pool?

A Yes, sir, and that battery is located on 36, 17, 34. The next sample is from the Vacuum-Abo Pool. It was obtained at Phillips Santa Fe battery 14 which is located in Section 26, 17, 35. The next water sample was from the Vacuum-Wolfcamp Pool obtained on Phillips Hale Lease. The next water sample is from the Devonian formation, Vacuum Devonian Pool. We have no Devonian. This was obtained from the Sinclair battery. I believe that is located in 17, 18 South, 35. The water analysis we were unable to get for you was the Vacuum Yates because it makes so small water we couldn't get an adequate sample.

Q Is that briny water, though, or can you say?

A The sample would be so small you couldn't really say.

Q In your testimony you said that there would be approximately 4000 barrels per day to be disposed of by

Phillips and approximately 12,000 by others. These others, are they the majors who are going to put in their own system, or are they the people who will be disposing, may dispose through your system?

A These are people who may dispose through our system and this was anticipated maximum, this 4000 Phillips and 12,000 of the other operators. The current total water produced by the Phillips and the other operators as defined as you did is currently only about 5000 barrels a day.

MR. IRBY: That is all the questions I have, Mr. Examiner.

MR. HATCH: Did you prepare Exhibit No. 5?

A Yes, sir.

MR. UTZ: Are there other questions of the witness?

MR. PORTER: Is this application an outgrowth of the meeting, recent meeting, between the Vacuum Field operators and Commission Representatives?

A Yes, sir.

Q I notice you are requesting for administrative procedure here to allow other wells to be used for injection. Does that apply to the entire Vacuum Pool?

A Yes, sir.

Q It would not be confined just to Phillips?

A No, in fact I have mentioned, probably before you

came in, that Tidewater has already made application.

Q That is what I had in mind.

A We are prepared to let them get in on it too. The only thing I might say relative to this administrative procedure is that the intervals we have discussed in this hearing are representative by a minus 950 feet as the upper limit being 250 feet below the oil-water contact and we have stayed also 250 feet above the Glorieta formation.

Q This is the limits that could be approved by administrative procedure?

MR. UTZ: What were those figures again?

A The upper limit was a minus 950 feet subsea, which is estimated 250 feet below the oil-water contact and our lowest point not subsea, but structure-wise was 250 feet above the top of the Glorieta, which is the next formation. In other words, this is the interval Phillips would be agreeable to letting administrative procedure be exercised in.

MR. UTZ: If I understand that right, that would be 950 minus 950 plus 250 feet?

A No, sir, the upper limit would be minus 950.

MR. PORTER: Which is 250 feet above.

A Which is 250 feet below the oil-water contact and the lower limit would be 250 feet above the top of the Glorieta. In other words, there is roughly 400 to 500 feet

in the San Andres structure so you can't really define it between subsea interval. You can define the upper top as the subsea top but the other can dip way off as they can outside the confines of the Grayberg Vacuum productive.

MR. UTZ: I believe you said the tubing in all these would be plastic coated, is that right?

A Yes, sir.

MR. UTZ: Are there other questions? Witness may be excused. Statements in this case?

MR. IRBY: I would like to say for the State Engineer that the office sincerely appreciates the prompt response of the operators to the Secretary-Director's request to take care of this saltwater problem.

MR. UTZ: The case will be taken under advisement.

STATE OF NEW MEXICO)
)
COUNTY OF BERNALILLO)

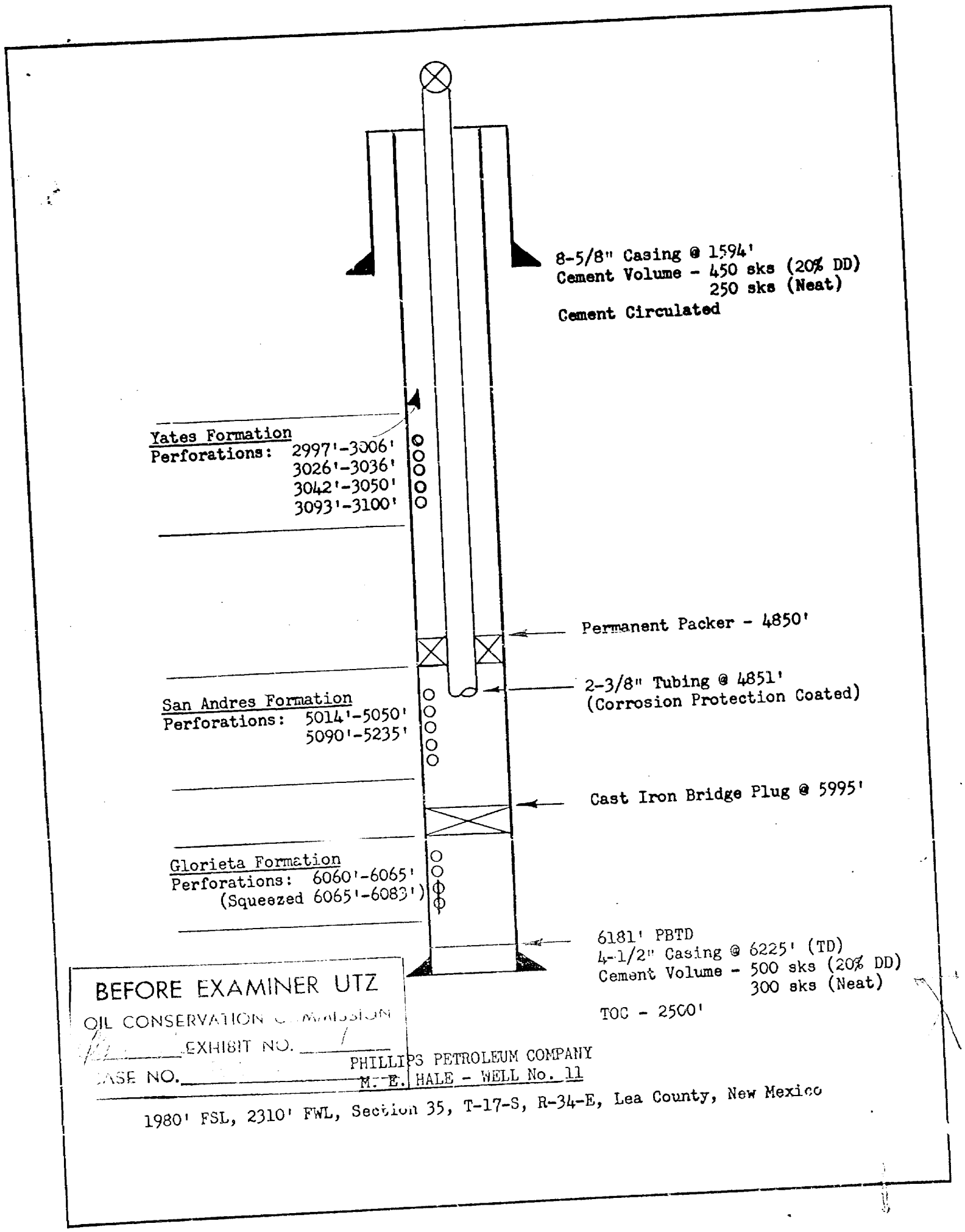
I, KAY EMBREE, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission Examiner at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand this 23rd day of June, 1966.

Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3414, heard by me on June 8, 1966.

, Examiner
New Mexico Oil Conservation Commission

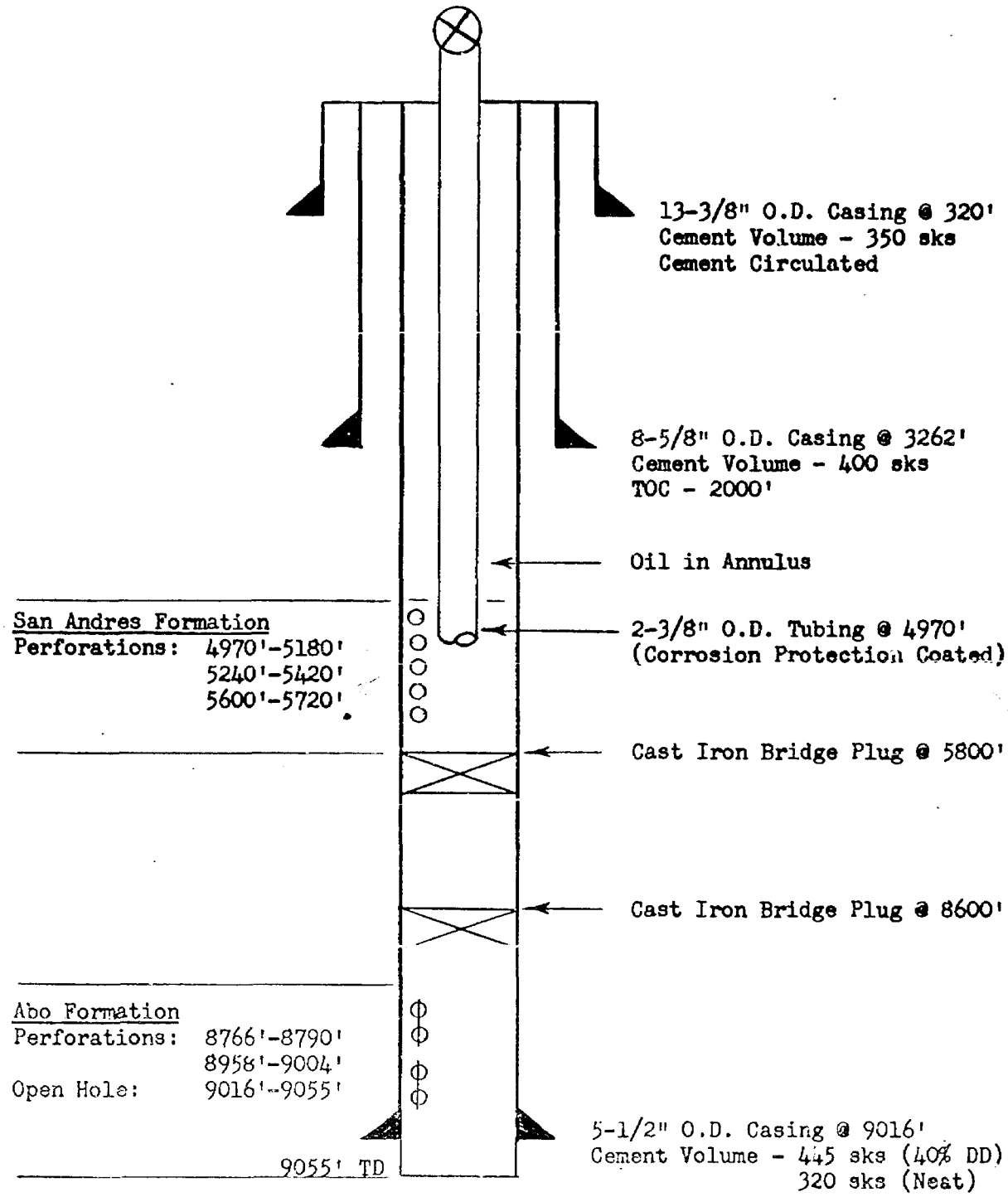


BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 1
CASE NO.

PHILLIPS PETROLEUM COMPANY
M. E. HALE - WELL No. 11

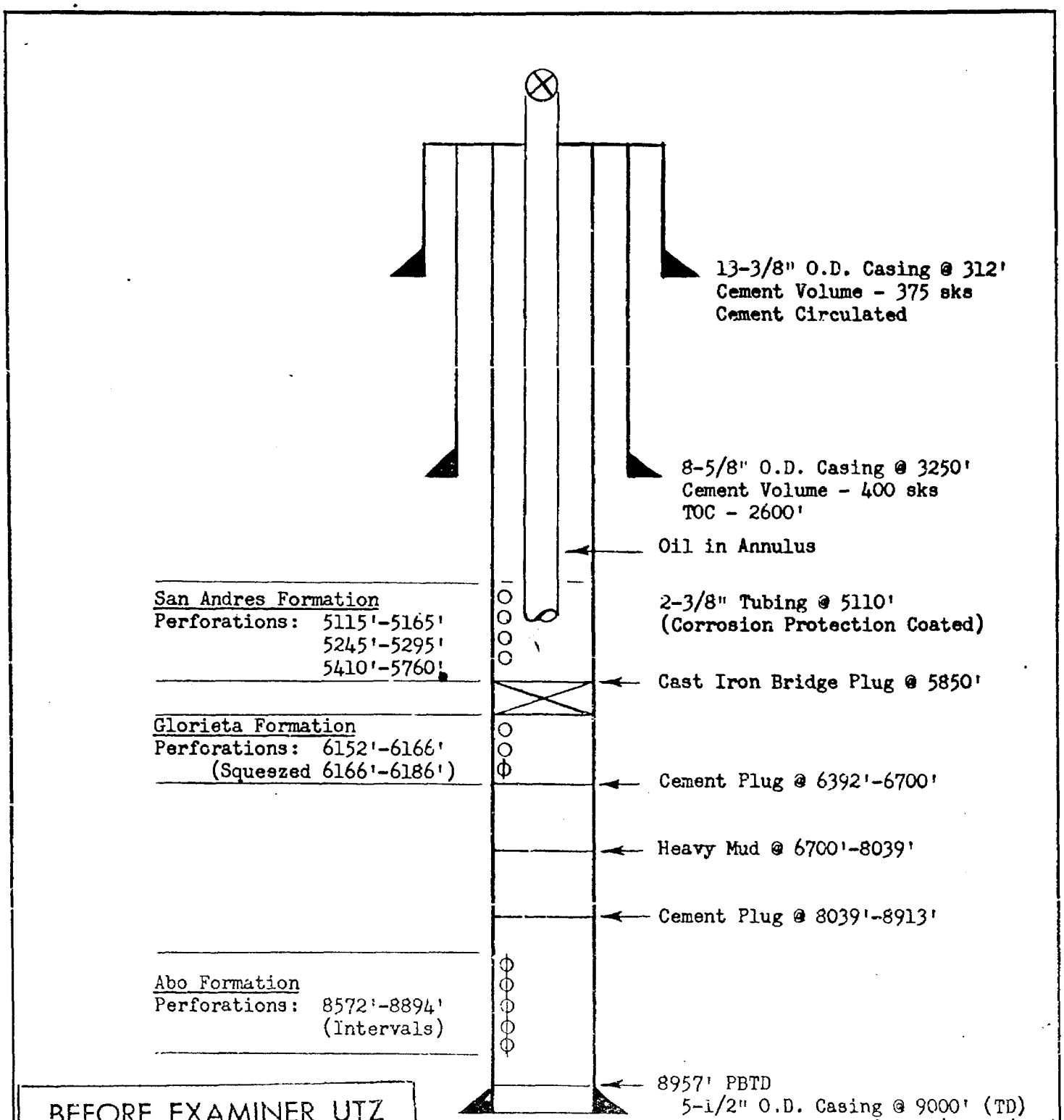
1980' FSL, 2310' FWL, Section 35, T-17-S, R-34-E, Lea County, New Mexico

Form 203—68277-D



PHILLIPS PETROLEUM COMPANY
SANTA FE - WELL No. 58

1986' FNL, 1982' FEL, Section 35, T-17-S, R-35-E, Lea County, New Mexico

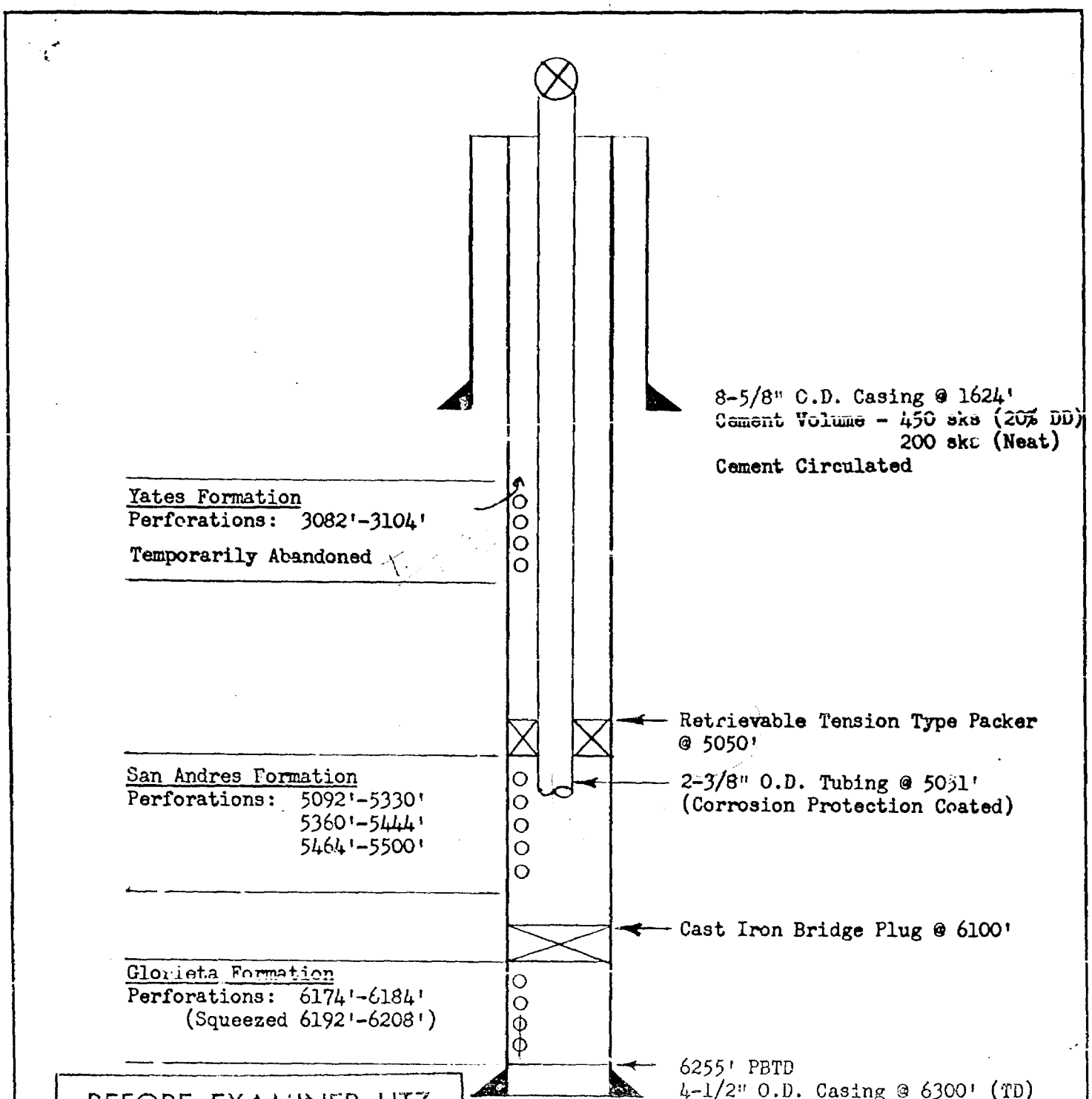


BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 5
CASE NO.

PHILLIPS PETROLEUM COMPANY
SANTA FE - WELL No. 86

990' FNL, 2307' FWL, Section 26, T-17-S, R-35-E, Lea County, New Mexico

Form 203—68277-D



BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
Phillips EXHIBIT NO. 11
CASE NO. 7447

PHILLIPS PETROLEUM COMPANY
SANTA FE - WELL No. 97

990' FSL, 1980' FWL, Section 33, T-17-S, R-35-E, Lea County, New Mexico

Form 203—68277-D

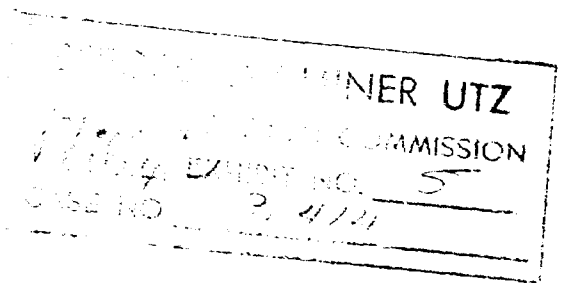
Exploration and Production Department
Phillips Building, Room B-2
Odessa, Texas

June 2, 1966

Vacuum Field--Salt Water
Disposal, Lea County,
New Mexico

File: W3-McC-170-66

State of New Mexico
State Engineers Office
State Capitol
Santa Fe, New Mexico 87501



Attention: Mr. S. E. Reynolds,
State Engineer

Gentlemen:

Reference is made to your letter by Mr. Frank E. Irby, dated May 20, 1966, addressed to Mr. Jason W. Kellahin, requesting additional information relative to Phillips Petroleum Company's application for salt water disposal in the Vacuum Field, Lea County, New Mexico.

The following data, relative to the individual requests enumerated in your letter, are submitted:

1. Utilization of the tubing-casing annulus in the Hale Well No. 11 for producing the Yates gas zone is believed to be an efficient method of producing this low pressure dry gas well. This is an accepted method of multiply completing in gas-oil dual completions. The Yates gas is a sweet dry gas and no corrosion problems are anticipated. An analysis of this gas is attached for your review.

2. The analyses you requested of the San Andres injection zone water and of the various other produced waters in the Vacuum Field are attached.

3. It is currently anticipated that disposal of produced water into the basal San Andres can be accomplished with a vacuum system that is at 0 psi injection pressure. It is possible with this type of system to observe daily variations in the bottom-hole injection pressure, from surface casing pressure readings, on an oil filled tubing-casing annulus. This oil is held in the annulus of the injection wells without the aid of packers due to the difference in hydrostatic head between the produced water in the tubing and the oil in the annulus. Utilization of an oil filled annulus without a packer in a vacuum disposal system also yields immediate indication at the surface of a

tubing or casing leak. Should high injection pressures subsequently be required to dispose of the produced water, then packers would be run to reduce the possibility of casing damage.

It is sincerely hoped the foregoing additional data sufficiently answers your questions relative to Phillips' application for salt water disposal in the Vacuum Field.

Very truly yours,

PHILLIPS PETROLEUM COMPANY

F. F. Lovering

F. F. Lovering
Manager, Southwestern Region

WJH:dva
Attachments

cc: Mr. Jason W. Kellahin (w/attachments)
P. O. Box 1769
Santa Fe, New Mexico 87501

...06 3-61

PHILLIPS PETROLEUM COMPANY
Gasoline Department
Analysis Results Summary

SS No. Z-[illegible]-1
Run No. 1385-B
Date Run 11-19-64
Date Secured 11-17-64
Time
Sampler's Ident.

Location [illegible]

Sample of: Dry Gas, Vacuum Field, Yates Gas Formation
Dry Gas, Vacuum Field, Yates Gas Formation,
Phillips Petroleum Company
...ured from Well 11, N. E. Hale Lease
...ation 1980' S & 2310' W 35-17-34 County Lea State New Mexico
...pose Gas Survey Secured by Payne & Wallis
...pling Conditions: Atmos. Temp. 43 °F; Pressure on Bomb lbs./sq. in.; Bbls oil/day ;
...ume/day ; Weather conditions at time of sampling ;
...ld Gas Pressure PSIG: Line Pressure PSIG.

Chromo Analysis 14.65 PSI at 60°F

	Mol. %	Liq. %	
...on Dioxide	.60		
...gen			
...ogen	37.71		
...drogen Sulfide			
...thane	52.24		
...ane	6.18		
...pane	2.77		
...Butane	.34		
...Butane	.73		
...Pentane	.15		
...Pentane	.16		
...anes	.07		
...tanes Plus	.05		
...tal	100.00	100.00	

Propane Calc. G.P.M.	.760
iso-Butane Calc. G.P.M.	.111
Nor-Butane Calc. G.P.M.	.229
Pentane+ Calc. G.P.M.	.163
Propane + Calc. G.P.M.	1.263
Test Car (Date	
B.T.U./ cu. ft. W.B.	735
Calc. Specific Gravity	.797
Calc. A.P.I. @ 60°F	
Observed A.P.I. Av.	
$H_2S + CO_2$ by orsat	0.60%
H_2S grains/100 cu. ft.	Negative
Mercaptans gr/100 cu. ft.	
Calc. Vap. Press. #/sq. in.	
Reid Vap. Press. #/sq. in.	
Cu. Ft. gas/Gal. Liq.	
Calc. Gasoline Factors	
26-70 Gasoline	0.
Excess Butane	0.
Excess Propane	0.
Excess Ethane & Lighter	0.
	1.0000

...by Jones Calculated by
...ked by Hachten Approved by

...ditional Data and Remarks: No Trap
Choke 12/64"
Flowing Tubing Press. 475#
Gas Temp. 55°

Distribution:

B. E. Brocks
C. R. Bigham
C. S. Turner
C. L. Sites
C. C. Haheart
C. C. Mitchell
(r) R. T. O'Neill
Lab Files

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye, N.M. DATE 5-9-66

SOURCE Hale; San Andres DATE SAMPLED 5-5-66 ANALYSIS NO. WA-368

Analysis	Mg/L		*Meq/L
1. PH 6.5 (7.70 lab.)			
2. H_2S (Qualitative) Negative			
3. Specific Gravity 1.142			
4. Dissolved Solids	102,558		
5. Suspended Solids			
6. Phenol Alkalinity ($CaCO_3$)			
7. M. O. Alkalinity ($CaCO_3$)	60		
8. Bicarbonate (HCO_3)	73	HCO_3	1
9. Chlorides (Cl)	60,100	Cl	1,693
10. Sulfates (SO_4)	4,945	SO_4	103
11. Calcium (Ca)	1,720	Ca	86
12. Magnesium (Mg)	4,060	Mg	333
13. Total Hardness ($CaCO_3$)	21,000		
14. Total Iron (Fe)	1.8	ppm	
15. Barium (Qualitative)	Negative		
16.			

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

86	Ca	HCO_3
333	Mg	SO_4
1,378	Na	Cl

1	
103	
1,693	

Saturation Values Distilled Water 20°C

Ca CO_3	13 Mg/L
Ca SO_4	2,980 Mg/L
Mg CO_3	106 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
Ca $(HCO_3)_2$	81.04	1	81
Ca SO_4	68.07	85	5,785
Ca Cl_2	55.50		
Mg $(HCO_3)_2$	73.17		
Mg SO_4	60.19	18	1,082
Mg Cl_2	47.62	315	15,100
Na HCO_3	84.00		
Na_2 SO_4	71.03		
Na Cl	58.46	1,378	80,510

REMARKS Reported to: Mr. John Mihms; Mr. Buford Parmer;

cc: Farish; St. Louis; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan

FORM 10-64 U

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye, N.M. DATE 5-10-66

SOURCE Santa Fe, Battery # 11, San Andres DATE SAMPLED 5-5-66 ANALYSIS NO. WA-371

Analysis		Mg/l	*Meq/l	
1. PH	7.10			
2. H_2S (Qualitative)	Positive			
3. Specific Gravity	1.061			
4. Dissolved Solids		45,488		
5. Suspended Solids				
6. Phenol Alkalinity ($CaCO_3$)				
7. M. O. Alkalinity ($CaCO_3$)				
8. Bicarbonate (HCO_3)		580	HCO_3	12
9. Chlorides (Cl)		708	Cl	693
10. Sulfates (SO_4)		24,602	SO_4	71
11. Calcium (Ca)		3,394	Ca	107
12. Magnesium (Mg)		2,140	Mg	70
13. Total Hardness ($CaCO_3$)		851		
14. Total Iron (Fe)		8,850		
15. Barium (Qualitative)		1.1	ppm	
16.		Negative		

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

107	Ca	HCO_3
70	Mg	SO_4
599	Na	Cl

12
71
693

Saturation Values Distilled Water 20°C

Ca CO_3 13 Mg/l

Ca SO_4 2,980 Mg/l

Mg CO_3 106 Mg/l

Compound	Equiv. Wt.	X	Meq/l	=	Mg/L
Ca $(HCO_3)_2$	81.04		12		972
Ca SO_4	68.07		71		4,833
Ca Cl_2	55.50		24		1,332
Mg $(HCO_3)_2$	73.17				
Mg SO_4	60.19				
Mg Cl_2	47.62		70		3,333
Na HCO_3	84.00				
Na_2 SO_4	71.03				
Na Cl	58.46		599		35,018

REMARKS Reported to: Mr. John Mihms; Mr. Buford Parmer;

cc: Farish; St. Louis; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye, N.M. DATE: 5-9-66

SOURCE Hale; Glorietta DATE SAMPLED 5-5-66 ANALYSIS NO. WA-367

	Analysis	Mg/L		*Meq/L
1.	PH 7.2 (8.17 lab.)			
2.	H_2S (Qualitative) Positive			
3.	Specific Gravity 1.134			
4.	Dissolved Solids	100,197		
5.	Suspended Solids			
6.	Phenol Alkalinity ($CaCO_3$)			
7.	M. O. Alkalinity ($CaCO_3$)	420		
8.	Bicarbonate (HCO_3)	512	HCO_3	8
9.	Chlorides (Cl)	57,400	Cl	1,617
10.	Sulfates (SO_4)	3,938	SO_4	82
11.	Calcium (Ca)	1,900	Ca	95
12.	Magnesium (Mg)	547	Mg	45
13.	Total Hardness ($CaCO_3$)	7,000		
14.	Total Iron (Fe)	0.8 ppm		
15.	Barium (Qualitative)	Trace		
16.				

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

95	Ca ←	→ HCO_3
45	Mg →	→ SO_4
1,567	Na ←	→ Cl

8	
82	
1,617	

Saturation Values Distilled Water 20°C

Ca CO_3	13 Mg/L
Ca SO_4	2,980 Mg/L
Mg CO_3	106 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
Ca $(HCO_3)_2$	81.04	8	648
Ca SO_4	68.07	82	5,580
Ca Cl_2	55.50	5	278
Mg $(HCO_3)_2$	73.17		
Mg SO_4	60.19		
Mg Cl_2	47.62	45	2,141
Na HCO_3	84.00		
Na_2 SO_4	71.03		
Na Cl	58.46	1,567	91,550

REMARKS Reported to: Mr. John Mims; Mr. Buford Parmer;

cc: Farish; St. Louis; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye, N.M. DATE: 5-28-66

SOURCE Tidewater battery, Blinebry DATE SAMPLED ANALYSIS NO WA-422

Analysis		Mg/L	*Meq/L	
1. PH	7.56			
2. H_2S (Qualitative)	Negative			
3. Specific Gravity	1.146			
4. Dissolved Solids		106,844		
5. Suspended Solids				
6. Phenol Alkalinity ($CaCO_3$)		190		
7. M. O. Alkalinity ($CaCO_3$)		232	HCO_3	4
8. Bicarbonate (HCO_3)		65,435	Cl	1,843
9. Chlorides (Cl)		1,066	SO_4	22
10. Sulfates (SO_4)		13,040	Ca	652
11. Calcium (Ca)		972	Mg	80
12. Magnesium (Mg)		36,600		
13. Total Hardness ($CaCO_3$)		2.3 ppm		
14. Total Iron (Fe)				
15. Barium (Qualitative)				
16.				

*Milli equivalents per lifer

PROBABLE MINERAL COMPOSITION

652	Ca	HCO_3	4
80	Mg	SO_4	22
1,137	Na	Cl	1,843

Compound	Equiv. Wt.	X Meq/L	= Mg/L
Ca $(HCO_3)_2$	81.04	4	324
Ca SO_4	68.07	22	1,498
Ca Cl_2	55.50	626	34,743
Mg $(HCO_3)_2$	73.17		
Mg SO_4	60.19	80	3,810
Mg Cl_2	47.62		
Na HCO_3	84.00		
$Na_2 SO_4$	71.03		
Na Cl	58.45	1,137	66,469

Saturation Values Distilled Water 20°C

Ca CO_3	13 Mg/L
Ca SO_4	2,980 Mg/L
Mg CO_3	106 Mg/L

REMARKS Reported to: Mr. Buford Parmer;

cc: Farish; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan

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TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye, N.M. DATE 5-10-66

SOURCE Santa Fe, Battery # 14, Abo DATE SAMPLED 5-5-66 ANALYSIS NO. WA-372

	Analysis	Mg/L		*Meq/L
1.	PH 7.50			
2.	H_2S (Qualitative) Positive			
3.	Specific Gravity 1.041			
4.	Dissolved Solids	31,983		
5.	Suspended Solids			
6.	Phenol Alkalinity ($CaCO_3$)			
7.	M. O. Alkalinity ($CaCO_3$)	1,280		
8.	Bicarbonate (HCO_3)	1,562	HCO_3	26
9.	Chlorides (Cl)	15,277	Cl	430
10.	Sulfates (SO_4)	3,676	SO_4	77
11.	Calcium (Ca)	1,140	Ca	57
12.	Magnesium (Mg)	717	Mg	59
13.	Total Hardness ($CaCO_3$)	5,800		
14.	Total Iron (Fe)	5.0 ppm		
15.	Barium (Qualitative)	Negative		
16.				

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

57	Ca ←	→ HCO_3
59	Mg →	→ SO_4
417	Na ←	→ Cl

			26	
			77	
			430	

Saturation Values	Distilled Water 20°C
$CaCO_3$	13 Mg/L
$CaSO_4$	2,980 Mg/L
$MgCO_3$	106 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
$Ca(HCO_3)_2$	81.04	26	2,107
$CaSO_4$	68.07	31	2,110
$CaCl_2$	55.50		
$Mg(HCO_3)_2$	73.17		
$MgSO_4$	60.19	46	2,769
$MgCl_2$	47.62	13	619
$NaHCO_3$	84.00		
Na_2SO_4	71.03		
NaCl	58.46	417	24,378

REMARKS Reported to: Mr. John Mihms; Mr. Buford Parmer;

cc: Farish; St. Louis; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillis Petroleum Company ADDRESS Buckeye, N.M. DATE: 5-9-66

SOURCE Hale; Wolfcamp DATE SAMPLED 5-5-66 ANALYSIS NO. WA-366

	Analysis	Mg/L		*Meq/L
1.	PH 7.3 (7.5 lab.)			
2.	H_2S (Qualitative) Negative			
3.	Specific Gravity 1.109			
4.	Dissolved Solids	76,257		
5.	Suspended Solids			
6.	Phenol Alkalinity ($CaCO_3$)			
7.	M. O. Alkalinity ($CaCO_3$)	50		
8.	Bicarbonate (HCO_3)	61	HCO_3	1
9.	Chlorides (Cl)	47,090	Cl	1,324
10.	Sulfates (SO_4)	1,081	SO_4	23
11.	Calcium (Ca)	8,800	Ca	440
12.	Magnesium (Mg)	1,773	Mg	145
13.	Total Hardness ($CaCO_3$)	29,300		
14.	Total Iron (Fe)	41.2 ppm		
15.	Barium (Qualitative)	Positive		
16.				

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

440	Ca ← → HCO_3	1
145	Mg → → SO_4	23
763	Na ← → Cl	1,324

Saturation Values Distilled Water 20°C

$Ca CO_3$	13 Mg/L
$Ca SO_4$	2,980 Mg/L
$Mg CO_3$	106 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
$Ca(HCO_3)_2$	81.04	1	81
$Ca SO_4$	68.07	23	1,566
$Ca Cl_2$	55.50	416	23,100
$Mg(HCO_3)_2$	73.17		
$Mg SO_4$	60.19		
$Mg Cl_2$	47.62	145	6,910
$Na HCO_3$	84.00		
$Na_2 SO_4$	71.03		
Na Cl	58.46	763	44,600

REMARKS Reported to: Mr. John Mihms; Mr. Buford Parmer;

cc: Farish; St. Louis; File;

Respectfully submitted
TRETOLITE COMPANY
Max Slean

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis 19, Missouri /

WATER ANALYSIS REPORT

COMPANY Phillips Petroleum Company ADDRESS Buckeye , N.M. DATE: 5-29-66

SOURCE Sinclair batt., Devonian form. DATE SAMPLED ANALYSIS NO. WA-426
Vacuum Pool, Well # 6

Analysis		Mg/L		*Meq/L
1. PH	7.30			
2. H_2S (Qualitative)	Negative			
3. Specific Gravity	1.027			
4. Dissolved Solids		15,667		
5. Suspended Solids				
6. Phenol Alkalinity ($CaCO_3$)				
7. M. O. Alkalinity ($CaCO_3$)		420		
8. Bicarbonate (HCO_3)		512	HCO_3	8
9. Chlorides (Cl)		7,958	Cl	224
10. Sulfates (SO_4)		1,600	SO_4	33
11. Calcium (Ca)		1,232	Ca	62
12. Magnesium (Mg)		296	Mg	24
13. Total Hardness ($CaCO_3$)		4,300		
14. Total Iron (Fe)		11.2	ppm	
15. Barium (Qualitative)				
16.				

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

*			*
62	Ca	HCO_3	8
24	Mg	SO_4	33
179	Na	Cl	224

Saturation Values Distilled Water 20°C

$CaCO_3$	13 Mg/L
$CaSO_4$	2,980 Mg/L
$MgCO_3$	106 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
$Ca(HCO_3)_2$	81.04	8	648
$CaSO_4$	68.07	33	2,246
$CaCl_2$	55.50	21	1,166
$Mg(HCO_3)_2$	73.17		
$MgSO_4$	60.19		
$MgCl_2$	47.62	24	1,143
$NaHCO_3$	84.00		
Na_2SO_4	71.03		
NaCl	58.46	179	10,464

REMARKS Reported to: Mr. John Milums; Mr. Buford Parmer;

cc: Farish; File;

Respectfully submitted
TRETOLITE COMPANY
Max Sloan