CASE 6131: CONTINENTAL OIL COMPANY FOR A WATERFLOOD PROJECT, LEA COUNTY, NEW MEXICO

Case Number

6131

Application

Transcripts.

Small Exhibits

ETC.

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. 6131
Order No. R-5631

APPLICATION OF CONTINENTAL OIL
COMPANY FOR A WATERFLOOD PROJECT,
LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on January 18, 1978, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 24th day of January, 1978, 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, Continental Oil Company, seeks authority to institute a waterflood project on its Southeast Monument Unit Area, Warren-McKee Pool, by the injection of water into the McKee formation through 8 injection wells in Sections 18, 19, 20, and 29, Township 20 South, Range 38 East, NMPM, Lea 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.

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

(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, Continental Oil Company, is hereby authorized to institute a waterflood project on its Southeast Monument Unit Area, Warren-McKee Pool, by the injection of water into the McKee formation through the following-described wells in Township 20 South, Range 38 East, NMPM, Lea County, New Mexico:

Southeast Monument Unit Well No.	Unit Letter	Section
53	E	20
57	I	19
58	C	29
59	M	20
60	E	29
62	K	20
63	G	19
71	O	18

(2) That injection into each of said wells shall be through internally coated tubing, set in a packer which shall be located as near as practicable to the uppermost perforation; that the casing-tubing annulus of each injection well shall be tested for leaks, be loaded with an inert fluid and the annulus shall be allowed to remain open or be equipped with an approved pressure gauge or attention-attracting leak detection device, and that the injection wells or system shall be equipped in such a manner as to limit wellhead injection pressure to no more than 1800 psi.

(3) That the Secretary-Director of the Commission may administratively authorize a pressure limitation in excess of 1800 psi upon a showing by the operator that such higher pressure will not result in fracturing of the confining strata.

(4) That the wells within the project area shall be equipped with risers or in another acceptable manner such as to facilitate the periodic testing of the bradenhead for pressure or fluid production.

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

(6) That the subject waterflood project is hereby designated the Southeast Monument Unit Area Waterflood Project and shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

(7) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Commission in accordance with Rules 704 and 1115 of the Commission Rules and Regulations.

(8) 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

PHIL R. LUCERO, Chairman

EMERY C. ARNOLD, Member

JOE D. RAMEY, Member & Secretary

S E A L

jr/

Case 6131

L. P. Thompson
Division Manager

E. L. Oshlo
Assistant Division Manager

Production Department
Hobbs Division
North American Production

Continental Oil Company
P.O. Box 460
1001 North Turner
Hobbs, New Mexico 88240
(505) 393-4141

December 22, 1977

New Mexico Oil Conservation Commission
P.O. Box 2088
Santa Fe, New Mexico 87501

Attention Mr. Joe D. Ramey, Secretary-Director

Gentlemen:

Applications for Inclusion on Examiner Hearing January 18, 1978

Enclosed are three applications in triplicate for inclusion on the docket for the Examiner's hearing January 18, 1978. These applications are for approval to:

Downhole commingle Wantz Abo and Wantz Granite Wash production in Lockhart B-35 Well No. 5-H-35-21-37, Lea County, New Mexico.

Install waterflood in Warren McKee Pool in the Southeast Monument Unit, Lea County, New Mexico.

Install waterflood project in Warren McKee Pool in the Warren Unit, Lea County, New Mexico.

The latter two applications are companion applications for a cooperative waterflood program across the common boundary of the Warren Unit and Southeast Monument Unit.

Yours very truly,

E. L. Oshlo

VTL/jj
Enc
CC: V. E. Staley, Amoco Production Co., Drawer A, Levelland, TX 79336
G. Y. Ricks, Atlantic Richfield Co., Box 1710, Hobbs, NM 88240
E. E. Hagan, Chevron Oil Company, Box 1660, Midland, TX 79701
C. F. Ellis, Houston
F. O. Hull, Houston
J. W. Kellahin, Santa Fe

Case 6131

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF CONTINENTAL OIL COMPANY FOR AUTHORITY TO INSTALL A WATERFLOOD PROJECT IN THE WARREN MC KEE POOL IN SECTIONS 18, 19, 20 AND 29, TOWNSHIP 20 SOUTH, RANGE 38 EAST, LEA COUNTY, NEW MEXICO, BY CONVERTING TO INJECTION EIGHT (8) WELLS IN THE SOUTHEAST MONUMENT UNIT AND FOR ESTABLISHMENT OF ADMINISTRATIVE PROCEDURES FOR ADDING OR SUBSTITUTING INJECTION WELLS.

APPLICATION

Applicant, CONTINENTAL OIL COMPANY, hereby requests approval to install a waterflood project in the Warren McKee Pool in Sections 18, 19, 20, and 29 of T-20-S, R-38-E, Lea County, New Mexico, by converting to water injection eight (8) wells in the Southeast Monument Unit, and for establishment of administrative procedures for adding or substituting injection wells in said project, and in support thereof would show:

1. Applicant is operator and co-owner of the Southeast Monument Unit including lands in Sections 18, 19, 20, and 29, T-20-S, R-38-E, and other lands in T-20-S, R-37-E, Lea County, New Mexico,

2. Applicant has heretofore drilled and completed in the Warren McKee Pool fourteen (14) wells on the Southeast Monument Unit.

3. Said wells have reached an advanced stage of depletion and operator now desires to institute a waterflood project by converting the following wells to injection:

Southeast Monument Unit Well No. 53, Unit F, Section 20

Southeast Monument Unit Well No. 57, Unit I, Section 19

Southeast Monument Unit Well No. 58, Unit C, Section 29

Southeast Monument Unit Well No. 59, Unit M, Section 20

Southeast Monument Unit Well No. 60, Unit E, Section 29

Southeast Monument Unit Well No. 62, Unit K, Section 20

Southeast Monument Unit Well No. 63, Unit G, Section 19

Southeast Monument Unit Well No. 71, Unit O, Section 18

4. The attached plat shows the location and ownership of the properties and wells in the waterflood project and in an area within a radius of two miles from said wells.

Case 6131

5. The waterflood project is anticipated to result in the recovery of oil which otherwise would not be recovered and, therefore, is in the interest of the prevention of waste without the impairment of correlative rights.

6. Unforseen conditions requiring changes in injection wells may arise; and therefore, to avoid the necessity of further hearings, administrative procedures should be established to permit such changes.

WHEREFORE, applicant respectfully requests that this matter be set for hearing before the Commission's duly appointed examiner and upon hearing an order be entered authorizing the waterflood project described above.

Respectfully submitted,

CONTINENTAL OIL COMPANY

BY E. L. Oshlo
E. L. OSHLO, Assistant Division Manager
of Production

VTL/jj

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 · SANTA FE
87501

DIRECTOR
JOE D. RAMEY

LAND COMMISSIONER
PHIL R. LUCERO

STATE GEOLOGIST
EMERY C. ARNOLD

January 25, 1978

Re: CASE NO. 6131
ORDER NO. R-5631

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

Applicant:

Continental Oil Company

Dear Sir:

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

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC

Other

Production Department
Hobbs Division
Western Hemisphere Petroleum Division

Continental Oil Company
P.O. Box 460
1001 North Turner
Hobbs, New Mexico 88240
(505) 393-4141

January 19, 1978

Mr. Richard Stamets
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Stamets:

Application for Waterflood Project: Warren-McKee Waterflood

The 9 5/8" and 7" casing depths for Warren Unit #4 listed as Exhibit 13 of Case Nos. 6131 and 6132 were shown incorrectly. The corrected depth for the 9 5/8" casing is 2824' and not 2024'. The corrected depth for the 7" casing is 9225' and not 286'.

I have attached corrected copies for your files. If you find anything else that needs elaboration, please contact Vic Lyon or me.

Thank you for your considerate indulgence.

Yours very truly,

Mike S. Rooney

bnp

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 18, 1978

EXAMINER HEARING

IN THE MATTER OF:

Application of Continental Oil Company for a waterflood project, Lea County, New Mexico

CASE 6131

and

Application of Continental Oil Company for a waterflood project, Lea County, New Mexico

CASE 6132

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the New Mexico Oil Conservation Commission: Lynn Teschendorf, Esq.
Legal Counsel for the Commission
State Land Office Building
Santa Fe, New Mexico

For the Applicant: Jason W. Kellahin, Esq.
KELLAHIN & FOX
Attorneys at Law
500 Don Gaspar
Santa Fe, New Mexico

I N D E X

EXHIBIT INDEX

EXHIBIT INDEX (Continued)

	Offered	Admitted
Applicant Exhibit Ten-A through		
Ten-E, Schematic Diagrams	23	33
Applicant Exhibit Eleven, Dia. Sketch	25	33
Applicant Exhibit Twelve, Dia. Sketch	26	33
Applicant Exhibit Thirteen, Tabulation	26	33
Applicant Exhibit Fourteen, Water Analysis	27	33
Applicant Exhibit Fifteen, Water Analysis	27	33

MR. STAMETS: We will call next Case 6131.

MS. TESCHENDORF: Case 6131, application of Continental Oil Company for a waterflood project, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, Jason Kellahin, Kellahin and Fox, Santa Fe, appearing for the applicant and we have three witnesses to be sworn.

MR. STAMETS: I would like to have all witnesses stand and be sworn at this time.

MR. KELLAHIN: The record may show that Mr. Lyon has been sworn.

(THEREUPON, the witnesses were duly sworn.)

MR. KELLAHIN: If the Examiner please, we would like to consolidate for purposes of the record this case with Case Number 6132. They involve similar matters and we will use the same exhibits and the same witnesses.

MR. STAMETS: Please call Case 6132.

MS. TESCHENDORF: Case 6132, application of Continental Oil Company for a waterflood project, Lea County, New Mexico.

MR. STAMETS: These cases will be consolidated.

VICTOR T. LYON

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 Victor T. Lyon.

Q Are you the same Mr. Lyon who testified in the previous case and was qualified?

A Yes, sir.

Q Mr. Lyon, what does the applicant, Continental Oil Company, propose in Cases 6131 and 6132?

A Cases 6131 and 6132 are the application of Continental Oil Company for approval of waterflood projects on a cooperative basis in the Warren McKee Pool in the Southeast Monument Unit and the Warren Unit, both operated by Continental Oil Company and located in Lea County, New Mexico.

Q Now referring to what has been marked as Applicant's Exhibit Number One in the consolidated cases, would you identify that exhibit, please?

A Yes, sir, Exhibit Number One is a location and ownership plat showing the proposed injection project and the area in a two mile radius surrounding this project. The Warren Unit is shown by the small dashed area consisting of all or parts of Sections 20, 21, 22, 27, 28, 29, 33 and 34. The alternating long dash and short dash area to the west of that is the area of the Southeast Monument Unit. To the north

with the intermediate dashed boundary, is the Amerada Warren McKee Unit and just to the west of that is the Texaco Skaggs Grayburg Unit. In the southwest portion of the exhibit Continental's Eumont Hardy Unit is shown. The solid triangles in the various areas represent existing injection wells. The red boundary in the center of the exhibit shows the participating area for the McKee formation in the two units. That portion lying in the Southeast Monument Unit, of course, is the McKee participating area for that unit and that portion lying within the Warren unit is the McKee participating area for that unit. The wells marked with a red triangle and also a dashed triangle are the proposed injection wells in this unit. The wells with the green circles are the producing wells inside our project area and those green circles outside of the project are the wells which are open in the McKee to the best of our knowledge and belief.

The wells on the exhibit throughout are identified to the best of our knowledge as to the formations which are producing or which have been produced in each of the wells.

Q Now as to the ownership within the Warren McKee Unit, is that common throughout?

A Yes, sir.

Q Now how about as to the Southeast Monument portion?

A That ownership is common throughout too. It is not identical other than working interest, you know, one

participating area to the other participating area but within each participating area all ownership is common and the working interest ownership is common throughout this project, including the area covering both units.

Q But because of the two separate units is the reason for having the two separate waterflood projects, is that correct?

A Yes, sir. They are two separate properties actually.

Q Well, will they be operated then in the nature of a cooperative flood on the two different units?

A Yes, sir, and each will have its own producing facilities and the oil will be accounted for separately.

Q You expect separate tank batteries for them?

A Yes.

Q Now has this waterflood project been under consideration for some length of time?

A Yes, sir, it has been under consideration for at least fifteen years to my certain knowledge and at that time, fifteen years ago when I first became involved with it, we had under consideration a reservoir-wide unit. We had problems putting that unit together and so the attempt to unitize was dropped and Amerada proceeded to unitize the north half of the pool and attempted to waterflood without success and there have been many problems which have beset

this project and which has delayed its coming into being. This is a very deep waterflood project, about nine thousand feet and there have been a number of McKee waterfloods attempted and none have been successful. One of the problems that all of these McKee reservoirs have had is a matter of sand control. The McKee formation is very loosely consolidated and sand flow in the well has been a problem and it has caused a great deal of artificial lift problems. Another problem has been injectivity which we believe, after considerable research, has been caused by water incompatibility and there has been demonstrated in a number of tests that we have run a decided water incompatibility with produced water and the McKee water such that it just made it unsuitable for injection in this formation.

The pool has been a very prolific producer of oil and still has very substantial primary oil reserves. In years past it was considered too risky to jeopardize the remaining reserves to attempt a waterflood project that may not be successful and we have two witnesses who will follow me who are more familiar with the details as to the various aspects of this project but I would like to point out that we have taken unusually great pains to secure a water supply which we believe will be compatible and which can help this project to be successful. We have tried to anticipate and be able to react to other foreseen problems and possible problems

which could occur here.

We believe that the magnitude of possible secondary recoverable reserves justifies this effort and expense.

I would like to point out one other factor. This project is not far from an area where there have been considerable water flows and it has been our belief from the beginning of those problems that these flows have resulted through channels created by improperly cemented wells or improperly plugged wells and I would like to point out that the McKee formation is the bottom formation, it is the bottom-most formation that produces in this area and, therefore, the penetrations to the McKee are absolutely minimal. So we feel that if we can confine the water in our injection wells to the McKee formation that we present little if any danger at all to any other producing zones or fresh water resources. We also have the advantage here because of the great depth of having a large hydrostatic head so that as we foresee the operation it should not be necessary to use excessive surface pressures so we feel that this project really represents no danger to any other producing or oil producing or water producing formations.

Q In your opinion will the wells take the water on a vacuum then to that depth?

A Initially they will, now, of course, we will have to wait and see how it operates but we don't see any surface

pressures except just enough to get the water into the wellhead.

Q You referred to this as being quite deep but I don't believe you said how deep.

A Nine thousand feet.

Q Now on your Exhibit Number One you show a proposed injection pattern. Is that the final pattern that you would want approved?

A Well, this is what we are looking at at the present time but it is tentative and I might point out one reason that there may be some changes in the near future. Well No. 58 which is the SEMU Well No. 58 which is in Unit C of Section 29, was recently plugged back and recompleted for testing in the Blinebry. The Blinebry completion in that well appears to be commercial and in the very near future we are going to have to make a decision as to whether to drill a twin well either to the Blinebry or to the McKee. If the twin well is drilled to the McKee then we would need to change the injection wells at that location.

Also in the southeast portion of the project area we have some indications that this area may not have been drained as efficiently as the rest of the project area and we have plans to drill one well, perhaps two, in this area and an evaluation of those wells upon completion may indicate that some change in pattern may be desirable, so for this

reason we would like administrative procedures to be established in the order where we could add or substitute injection wells.

Q You have the Amerada waterflood project to the north?

A Yes.

Q From your Exhibit Number One it would appear that only four wells have ever been used as injectors and they are in the extreme north portion of that unit, is that correct?

A Yes, sir, that is correct.

Q Do you have any cooperative agreement with Amerada with regard to this proposed waterflood?

A We have been in contact with Amerada and hope in the very near future to work out with them a cooperative effort with them where they would place Well No. 114 on injection.

Q Was Exhibit One prepared by you or under your supervision?

A Yes, it was.

MR. KELLAHIN: At this time I would like to offer into evidence Exhibit Number One.

MR. STAMETS: Exhibit Number One will be admitted.

(THEREUPON, Applicant's Exhibit Number One was admitted into evidence.)

MR. KELLAHIN: That's all I have of this witness,

Mr. Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Lyon, this administrative procedure that you have requested, I'm not certain as to the necessity of that. Under our Rule 701(E)-4 we do have an administrative procedure for approval of additional injection wells in waterflood projects.

A Is this before any response or must you have a response in order to expand?

Q I don't believe any response is required these days.

A Well, I really hadn't checked that but I wanted to make sure that we did have the authority to make substitutions or additions administratively rather than have to come to a hearing.

Q I believe the only requirement now is that the Secretary-Director determine that the additional well is on a waterflood injection pattern which will result in a thorough and efficient sweep of oil in the project and that is all,so unless you are requesting, say, an unorthodox locations for injection wells it appears that a general rule is already applied.

A That will be fine. We don't anticipate any unorthodox locations.

Q You indicated that--

A Unless for some reason we might want to convert Well No. 24. Well No. 24 is at an unorthodox location. It was drilled to the McKee but was never completed in that formation and although we do not foresee at the present time that that well would be used it still remains a possibility.

Q It is an existing well?

A Yes, sir.

Q And that unorthodox location has already been approved?

A No, it has never been used for any purpose except to dispose of water. Incidentally, the legend on Exhibit One is for the identification of the producing formations as shown on the right side. That well was drilled off of the location that was proposed in there due to a surveying error and when we got to the McKee we just backed off from it and never produced the well.

MR. STAMETS: Any further questions of this witness?

MR. KELLAHIN: That's all we have.

MR. STAMETS: He may be excused.

(THEREUPON, the witness was excused.)

MR. KELLAHIN: I would like to call Mr. Hoover.

JERRY W. HOOVER

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 Jerry W. Hoover.

Q By whom are you employed and in what position, Mr. Hoover?

A I'm employed by Continental Oil Company as an Associate Engineer.

Q Where are you located?

A In Hobbs, New Mexico.

Q How long have you been an Associate Engineer with Continental Oil Company?

A Since May of 1977.

Q Have you ever testified before the Oil Conservation Commission or one of its examiners?

A No, sir.

Q For the benefit of the Examiner would you briefly outline your education and experience as an engineer?

A I was graduated from Texas Tech University in 1963 with a Bachelor of Music degree and from Southwestern Theological Seminary in '66 with a Masters in Music and again from Texas Tech University in 1977 with a Bachelor of Science in Petroleum Engineering.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. STAMETS: They would certainly appear to be.

Q (Mr. Kellahin continuing.) Mr. Hoover, are you familiar with the application, the two applications, before the Commission at this time?

A Yes, I am.

Q Now referring to what has been marked as the Applicant's Exhibit Number Two, would you identify that exhibit, please?

A Exhibit Number Two is a location and ownership plat of the Warren McKee Pool. Continental's Warren Unit McKee No. 3 in Section 29, Unit J, drilled in December of 1948 was the discovery well of the Warren McKee Pool. Development continued in this pool on eighty acre spacing until 1956. The northern half of the pool was originally developed as a separate pool.

Q Now you said it developed on eighty acre spacing, is that correct?

A Originally.

Q It originally was eighty acre spacing?

A Yes, that is correct.

Q Thank you.

A But in 1956 with the drilling of Southeast Monument Unit McKee No. 50 in Section 20, Unit L, the continuity of these previously supposed separate reservoirs was established. Development then continued until forty acre spacing was

achieved throughout the extent of the pool. The Continental operated wells within this pool are within our Southeast Monument Unit, there are some fourteen wells and our Warren Unit, nine wells.

The proposed injection wells for this waterflood project are identified by the broken triangular symbols and as was previously noted in testimony we are negotiating for injection in Amerada's Warren McKee Unit No. 114, Section 29, Unit A, on a cooperative basis.

Q Now referring to what has been marked as Exhibit Number Three, would you identify that exhibit?

A Exhibit Three is a structure map of the Warren McKee Pool. This pool is one of a series of McKee sand reservoirs located along the western edge of the central basin platform. The McKee sandstone is the basal member of the Tulip Creek formation of the Simpson group and is of middle-Ordivician age. The McKee sands are uniformly deposited and are continuous throughout the pool which is located on a northwest-southeast trending anticlinal fold and is separated into two well defined highs by a narrow saddle. This structure map is contoured on the top of the McKee pay section which consists of an upper sand and a main sand. The McKee section was formed by the deposition of alternate layers of argillaceous sand and relatively clean sand inter-bedded with shale layers. The sand layers are generally

several feet thick and the shale layers less than one foot thick. Much of the sand, especially these argillaceous portions, is very loosely consolidated. The clays present in the formation were identified as predominately kaolinite with some montmorillonite. The montmorillonite is water sensitive.

The average depth of the top of the McKee pay section is nine thousand feet. Only the upper and the main McKee sands are considered productive and injection is planned only for these two zones. The main sand is the principal producing interval and has an average pay interval of seventy feet. The upper sand has an average pay thickness of eight feet and is of poorer quality. Production is limited to the east by a fault or by a series of faults and elsewhere by a water-oil contact at a minus fifty-six fifty feet. The crude was undersaturated at the initial bottom-hole pressure of thirty-four forty psi so the reservoir did not have a gas cap.

Q Now referring to what has been marked as Exhibit Number Four would you identify that exhibit?

A Exhibit Four is a tabular record of the production history and the current well status. The Warren Unit McKee wells have recovered four million, seven hundred and forty-four thousand and sixty-six barrels of oil as of October 31, 1977 and are currently averaging eight barrels of oil, two

barrels of water and four MCF of gas per day, per well. The Southeast Monument Unit McKee wells have recovered four million, one hundred and sixty-three, four hundred and forty-five barrels of oil as of October 31, 1977 and are currently averaging four barrels of oil, two barrels of water and two MCF of gas per day, per well.

Q On the basis of this information would you say that the productivity from these two units has reached the stripper stage or practically so?

A Yes, sir.

Q The primary reserves are substantially depleted?

A That is correct.

Q It is ready then for secondary recovery efforts?

A Yes, it is.

Q Now referring to Exhibits Five and Six, would you discuss those two exhibits, please?

A Exhibit Numbers Five and Six are production curves for the Warren McKee and Southeast Monument Unit McKee wells respectively. Remaining primary reserves were determined from analysis of these curves.

Q Now referring to what has been marked as Exhibit Number Seven, what does that show?

A Exhibit Number Seven is a table showing basic reservoir parameters and I would like to read into the record this table.

(Reading.) The producing mechanism was solution gas. The average porosity was fourteen point five percent. The average air permeability, Upper Sand, was sixteen point eight millidarcies and the Main Sand eighty-nine point three millidarcies. The Connate water is estimated to be thirty percent. Original reservoir data consists of a bottom hole pressure of thirty-four forty psi. Oil viscosity of point five four nine centipoise. Solution GOR is six seventy-one. Formation volume factor, one point three five nine reservoir barrels per standard tank barrel, and an oil-water contact of a minus five thousand six hundred and fifty feet. In addition the bubble point pressure was twenty-one hundred and fifty-six psi. The reservoir temperature is one hundred and twenty-three degrees. Reservoir volumes, the Upper Sand is estimated to include eight thousand one hundred and ninety-two acre feet and the Main Sand eighty thousand three hundred and eighty acre feet. The original oil-in-place is calculated to be fifty-one million two hundred and eighty-three thousand barrels. The primary recovery as of October 31st, 1977 has been eight million nine hundred and seven thousand five hundred and eleven barrels. The primary reserves are estimated to be a hundred and sixty-eight thousand eight hundred and eighteen barrels and ultimate primary recovery, which would be about seventeen point seventy-five percent of the original oil in place was estimated to be

nine million seventy-six thousand three hundred and twenty-nine barrels. (End of reading.)

Q Have you made some waterflood performance calculations based on your information?

A Yes, sir, we have. Waterflood performance calculations were made for this reservoir and theoretical recoveries ranged from one to one point two five times the primary recovery, however, because of the known sand production problems from the McKee formation, secondary recovery will be limited by the operating economics and probably will range from point five to one times the primary recovery. Initially it is anticipated that each injector will inject two thousand barrels of water per day and that the reservoir fillup will occur in approximately two years. Initial injection rates were designed to achieve reservoir fillup as soon as feasible, however, because of limitations on the fluid volumes that can be lifted from the eleven producers in this waterflood, injection rates will be substantially reduced after reservoir fillup is achieved.

We anticipate low surface injection pressures during the life of the waterflood. It is difficult to estimate exactly what that maximum pressure may be because of the potential injectivity problems inherent in the McKee formation. Maintenance of relatively low surface injection pressures will depend to the degree of success achieved in

our designed water quality control programs and sand consolidation programs.

A pilot five-spot pattern, with Southeast Monument Unit McKee No. 50 as the producer, will be conducted for three to six months in order to evaluate injectivity, water compatibility and sand consolidation treatments before expansion to full scale operations. A peak oil producing rate of approximately two hundred and eighty-one barrels of oil per day per well is anticipated and the life of the waterflood is expected to be fourteen years.

Q Now your source of water and the proposed treatment of the water will be discussed by another witness?

A That is correct, the witness to follow.

Q Now referring to what has been marked as Exhibit Number Eight, would you identify that exhibit, please?

A Exhibit Number Eight is a gamma ray neutron log of the Warren McKee No. 22 extending from the surface to sixty feet below the main McKee sand. Formation tops from the salt section through the McKee are marked on the log.

Q Now referring to the group of exhibits marked Nine-A through Nine-L, would you identify those exhibits, please?

A Exhibits Nine-A through Nine-L are log sections of the McKee formation in each of the proposed injection wells.

Q Now, Mr. Hoover, were Exhibits Two through Nine-L

prepared by you or under your supervision?

A Yes, sir, they were.

MR. KELLAHIN: At this time I would like to offer into evidence Exhibits Two through Nine-L.

MR. STAMETS: These exhibits will be admitted.

(THEREUPON, Exhibits Two through Nine-L were admitted into evidence.)

MR. KELLAHIN: That's all I have of this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Hoover, both you and Mr. Lyon discussed the pressures and indicated that they probably would be quite low. Would the Commission's current two tenths of a pound per foot of depth at the surface be considered a reasonable limit to at least the end of this project?

A I don't see how in this project this would be any problem to the project.

MR. STAMETS: Okay. Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. KELLAHIN: I would like to call the next witness, Mr. Rooney.

MICHAEL S. ROONEY

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 Michael S. Rooney.

Q By whom are you employed and in what position, Mr. Rooney?

A I'm employed as an Engineer by Continental Oil Company.

Q Where are you located?

A Hobbs, New Mexico.

Q How long have you been working as an Engineer at the Hobbs Division?

A For almost three years.

Q Have you ever testified before the Oil Conservation Commission or one of its examiners?

A No, sir.

Q For the benefit of the Examiner would you briefly outline your educational background and your experience?

A Yes, sir, I graduated in March of 1975 from the Montana State University with a Bachelor of Science in Mechanical Engineering Technology, at which time I was employed by Continental Oil Company.

Q And have you been working for Continental ever since?

A Yes, sir.

Q And that is in the Hobbs Division?

A Yes, sir.

Q And that relates to the area involved here?

A Yes, sir.

Q Have you been involved in the proposed waterflood projects for some period of time?

A For two years now I have been working on the design and the construction.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. KELLAHIN: They are.

Q (Mr. Kellahin continuing.) Mr. Rooney, referring to a series of exhibits which are marked as Exhibit Numbers Ten-A through Ten-E, would you identify and discuss those exhibits, please?

A Exhibits Ten-A through Ten-E are the diagrammatic sketches of the plugged and abandoned wells within the one half mile radius as described by NMOCC Memo 3-77. The schematics show the size and location of all plugs and the casing left in the hole and the date of abandonment. These wells are the Lea "BU" State drilled by Antweil and formerly operated by Elk Oil.

Ten-B is State "A" No. 1 drilled by Shell and operated by Elk Oil.

Exhibit Ten-C is State No. 1 drilled by E. W. Mudge, Jr.

and now held by Exxon.

Exhibit Number Ten-D, Warren Unit McKee No. 5 drilled and held by Conoco. This well has never been acidized or perforated. During plugging operations a seventy sack cement plug was set over the McKee from ninety eighty-five to ninety-one eighty-five, a two hundred sack cement plug over the Devonian from seventy-seven sixteen to eighty-one ten feet, and a fifty sack cement plug over the Drinkard from sixty-seven fifty to sixty-six fifty.

Attempts to shoot off the nine and five-eighths casing were made at two thousand fifty feet, nineteen hundred feet, seventeen hundred feet, fifteen hundred feet, twelve hundred feet, eleven hundred feet, one thousand feet, eight hundred and forty feet, seven hundred feet, six hundred feet and five hundred and forty feet. The nine and five-eighths inch was finally successfully shot off and salvaged from four hundred and seventy feet at which point a seventy-seven sack cement plug was placed from four ten feet to five ten feet.

Exhibit Ten-E, the SEMU-McKee No. 12 drilled by Conoco and held by Conoco. During plugging operations a thirty-five sack cement plug was set from TD to ninety-six hundred feet, a forty-five sack cement plug was placed over the McKee from ninety-two ten feet to ninety-one ten feet, a twenty-five sack cement plug was placed from eighty-two

ninety feet to eighty-one ninety feet to isolate the Fusselman and Montoya.

MR. STAMETS: If I may interrupt, I think probably these exhibits are pretty well self-explanatory and you would only need to go into specific plugging if it looks like there were problems.

A Okay, sir.

Q (Mr. Kellahin continuing.) Mr. Rooney, based on the exhibits and your information about these wells, will a waterflood project in any way cause any problems with communication through these particular wellbores?

A No, sir.

Q Now referring to what has been marked as Exhibit Eleven, would you identify that exhibit, please?

A Exhibit Number Eleven is a diagrammatic sketch showing the plugged back San Andres salt water disposal well Warren Unit McKee No. 24 which has been periodically used for disposing of excess produced water from the Eumont Hardy Waterflood, the Skaggs Pool Waterflood and the SEMU Penn Salt Water Disposal Well.

Q And that exhibit likewise shows the cement program on that particular well?

A Yes, sir.

Q Do you anticipate using that well for an injector or any other purpose?

A At the present time we haven't really discussed it, it is just a possibility.

Q Now referring to what has been marked as Exhibit Number Twelve, would you identify that exhibit, please? Twelve-A through Twelve-L?

A Exhibits Twelve-A through Twelve-L are the twelve diagrammatic sketches of the proposed injection wells showing the proposed injection intervals, the casing patterns and the manner in which the wells will be completed as injectors.

Q And that covers all of the proposed injectors shown on the exhibits that have been offered up to date?

A Yes, sir.

Q Now referring to what has been marked as Exhibit Number Thirteen, would you identify that exhibit, please?

A Exhibit Thirteen is the tabulation of all of the wells within the one-half mile radius of any one proposed injection wells that have penetrated the intended injection zone showing all of the casing strings, the setting depths, the sacks of cement used, the cement tops, the total depth, well identification, the McKee production interval and their locations.

Q Now on the basis of that information do you anticipate any problem with water communication through those particular wells?

A No, sir.

Q Now referring to what has been marked as Exhibit Number Fourteen, would you identify that exhibit, please?

A Exhibit Number Fourteen is a water analysis completed on some of the McKee produced water.

Q And Exhibit Number Fifteen, what does that exhibit show?

A Exhibit Number Fifteen is a water analysis completed on our source water. It is a City of Hobbs secondary treated effluent.

Q Have you made a contract with the City of Hobbs to utilize this water?

A Yes, sir.

Q What kind of a treatment will you have to give the water to make it compatible with the McKee formation water?

A We will have to drill a salt brine generation well. We have a tentative location picked for it. What we are going to have to do is produce the salt brine of about twenty-five thousand parts per million to be compatible with formation water. When serious plans for this waterflood project began some four years ago compatibility tests were run on the McKee water and various produced waters which were available. When the McKee water is mixed with any of the produced waters available in the area there is an instantaneous reaction to the water, iron sulfide is formed. The reaction was caused by the iron ions mixing with sulfide ions in any of the

produced water in the nearby area.

It became necessary, therefore, to find a sulfide-free water for injection. Fresh water sources are not readily available in that area but we found that the sewage effluent from the secondary treatment plant of the City of Hobbs Sewage Treatment facilities was available in the quantities we needed and it had an absence of the sulfide ions.

The next problem was to find a satisfactory method of treating the sewage water for the removal of solids and other contaminants which might plug the formation. After three years of working with our production research group in Ponca City and with various commercial laboratories and manufacturers of equipment we have found methods and the equipment to treat the water to our specifications.

The water analysis of the McKee produced water and the City of Hobbs secondary treatment plant effluent have been obtained periodically from early 1976. Almost all of these samples have shown the scaling index to be nearly negative or less than point five. Even after mixing the waters at various ratios the scaling indices still indicate less than point six. For example, a fifty-fifty mixture of sewage water and McKee produced water has a scaling index of point zero five at one hundred and twenty-two degrees Fahrenheit.

Although these tests indicate the probability that

scaling will not occur, a scale inhibition program will be developed to prohibit any possibility of calcium sulfate or magnesium sulfate formation in the flow lines or in the reservoir. Poly phosphonate compounds will be the method of protection and will be added to the fresh water inlet at the brine mixing tank near the water supply transfer point located in the southwest quarter of the northwest quarter of Section 2, Township 20 South, Range 38 East. This location is where we would be taking the water from the City also. The amount of chemical will be very low considering the very low scaling index.

Further piping system protection and ultimate reservoir protection will be provided by the addition of an oxygen stripping chemical compatible with the reservoir characteristics and any chemical injected upstream of the injection station. The injection station will be located in the southwest quarter of the southwest quarter of Section 20, Township 20 South, Range 38 East. The positive pressure protection provided by gas blankets will be utilized in the surge and pump suction tanks at the injection station to further prevent oxygen absorption in the injection waters.

The City of Hobbs sewage effluent water supply will not be injected in the McKee reservoir as fresh water. A well is proposed for the Salado salt that will be used as a brine generation facility. A saturated salt brine will be

produced by circulating approximately one-eighth to one-fifth of the daily total flood injection volume through the Salado well known as our Warren McKee Brine Lease, Well No. 1. It is tentatively located in the southwest quarter of the southwest quarter of Section 2, Township 20 South, Range 38 East. This brine will then be mixed with the remaining supply water and pumped across country to the injection station. The brine well is tentatively located eighteen hundred feet south of our brine mixing point.

The resulting injection quality brine will be maintained at no less than twenty-five thousand parts per million chloride ions by means of control valves operating on signals sent by a continuous operating salinity monitor. The resolution of the instrument is approximately one thousand parts per million and should provide us with a reservoir quality brine.

Suspended solids will be removed down to 5-10 microns by a bank of automatically backwashable filters. These filters are in a parallel configuration and are therefore backwashed on a cyclic basis based on a preset pressure differential. Coagulation or floculation of any particulate matter will not be used. Any additional chemical or physical floculation aids will not be necessary due to the inherent qualities of the brine water.

Q What are you planning to do about sand control, has that been a problem?

A Sand control has been a problem, it has caused some pretty serious problems in our production facilities. Each one of the producing wells will undergo sand consolidation treatment. It's not felt that we need a high bottom-hole pressure before we consolidate since there are tools available to circulate. We are going to use a mechanical sand consolidation treatment consisting of screens and gravel packing. We will possibly consider it in our injectors also if conditions merit backwashing.

Q Now what are your plans of operation of these two waterflood units?

A The injection rates for each well will be continuously monitored by computer interlock and the gathered data will be used to detect any decrease or increase in our planned two thousand barrel per day rate per well. Wellhead tubing and annular pressures will be checked by field personnel on a daily basis during the proposed period of pilot operation. Annular spaces will be protected to the surface with a conventional pre-mixed packer fluid consisting of a biocide, a corrosion inhibitor, an oxygen scavenger, a pH adjustment chemical and a non-reactive Kcl water.

All buried lines will be plastic lined and externally wrapped as well as cathodically protected. All tubing will be plastic lined. All other lines not protected in that manner will be glass reinforced plastic or fiberglass lined. The

wetted surfaces of all valves, pumps, or non-coated piping system components will be manufactured from corrosion resistant materials such as three sixteen stainless steels, aluminum bronzes or ceramics and all of our tanks will be cathodically protected also.

Initial injection water will be preceded by an acid and scale inhibition treatment to further prevent the formation of carbonate or sulfate compounds in the reservoir.

Q Will you have any necessity for artificial lift in connection with the flooding?

A For our artificial lift that presently we are using gas pressure from Warren Unit McKee No. 35. Some of our wells are temporarily shut in so it has provided us with a reasonably good source of gas pressure for our gas lift system. Once we get on line and have response to our waterflood we are going to revamp or redesign a gas lift compressor system out there into a closed lift system.

Q That will be depending upon your success in consolidating the sand formations, will it not, to some extent?

A Well, we are going to have to use this to produce it. Dependent upon sand consolidation will be other forms of artificial lift, such as beam pumping.

Q Were Exhibits Ten-A through Fifteen prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer into evidence Applicant's Exhibits Ten-A through Fifteen.

MR. STAMETS: These exhibits will be admitted.

(THEREUPON, Applicant's Exhibits Ten-A through Fifteen were admitted into evidence.)

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Rooney, referring to Exhibit Ten-C, now in this particular well a cement plug of fifty sacks was set from ninety-three fifty-five to ninety-one fifty and then there is no additional plug in that hole until you get up to forty-one fifty. Does that fifty sacks cover the McKee zone that will be flooded?

A Yes, sir, if you will note there is a tabulation to the right of the wellbore there and it says the top of the McKee is ninety-two thirty-seven in that particular wellbore.

Q So you've got slightly more than a hundred feet of coverage in there?

A Yes, sir.

Q Do you think that will be adequate to keep the water in the McKee in this well?

A There is also a weighted brine or a weighted mud fluid that we have put in between these plugs in the conventional plugging operation.

Q This well is right at the limit of the half mile

from your closest injector, at least at the present time?

A That's right.

Q Okay. Now back to Exhibit Number Thirteen. I'm on the first page of that exhibit, the last well there, the Warren Unit No. 4.

A Correct.

Q That indicates that it was drilled to the McKee but not completed in the McKee? I guess that indicates that it was not completed in the McKee, is that correct?

A It was not perforated per se or completed for a producer in the McKee.

Q Is there casing through the McKee in that well?

A Well, we have indicated here to seventy-three hundred feet and I don't have the records of the well with me.

Q The only problem I have is on the two hundred and eighty-six feet of casing. I think there must be something haywire on the exhibit.

A Well, that might be an error that I hadn't checked out.

Q It is your understanding that the casing is set through the McKee and that casing is cemented back to seventy-three hundred feet?

A I would have to go back through this, sir.

Q Okay, if you will advise us on that.

A I would have to go back through the records, sir.

Q Exhibit Number One does show that as a McKee producer. I would assume that it is a McKee producer.

MR. LYON: Did you say No. 4 or 24?

MR. STAMETS: No. 4.

MR. KELLAHIN: You will supply Mr. Stamets with the information on that, won't you?

A Yes, sir.

Q (Mr. Stamets continuing.) Then on the last page of that exhibit you show the "CU" McKee No. 2 as plugged and abandoned? Is that one shown on the schematics?

A Yes, sir.

Q Okay.

A I believe No. 12 is.

Q Ten-E?

A Ten-E.

Q Very good. Will the water that you will be injecting be treated for bacteria?

A Yes, sir.

MR. STAMETS: Okay. Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. KELLAHIN: That completes our case, Mr. Stamets. Thank you.

MR. STAMETS: If there is nothing further we will

take this case under advisement and we will recess the hearing until one fifteen.

REPORTER'S CERTIFICATE

I, SIDNEY F. MORRISH, a Certified Shorthand Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Sidney F. Morrish, C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 6136 6132 heard by me on 12/18, 1978.

Richard L. Stamets, Examiner
New Mexico Oil Conservation Commission

Operator	Well (McKee Production Interval)	Location	T.D.	Casing		Cement	
				Size	Depth	Sacks	Top
Conoco	Warren Unit No. 3 (open hole)	1980' FSL & 1980' FEL Sec. 29, T-20S, R-38E	9070'	13 3/8" 9 5/8" 7"	262' 2989' 8947'	250 625 900	Surface 1600' 4330'
	Warren Unit No. 6 (9016'-9093')	660' FSL & 1980' FWL Sec. 29, T-20S, R-38E	9160'	10 3/4" 7 5/8" 5 1/2"	243' 2893' 9159'	200 1145 220	Surface 800' 4650'
	Warren Unit No. 7 (S926'-9094')	660' FNL & 1980' FEL Sec. 29, T-20S, R-38E	9145'	10 3/4" 7 5/8" 5 1/2"	286' 2859' 9144'	225 940 207	270' 850' 5975'
	Warren Unit No. 22 Injector for Warren McKee Waterflood	2090' FSL & 2090' FWL Sec. 29, T-20S, R-38E	9200'	10 3/4" 7 5/8" 5 1/2"	256' 3998' 9195'	250 700 230	Surface 1375' 5450'
	Warren Unit No. 24 (McKee plugged & not perforated)	24' FSL & 2145' FEL Sec. 29, T-20S, R-38E SWD	9240' PB-5350'	10 3/4" 7 5/8" 5 1/2"	242' 3999' 4500'	250 2300 70	Surface 1650' 1650'
	Warren Unit No. 28 (9020'-9138')	1980' FSL & 2310' FEL Sec. 20, T-20S, R-38E	9218' PB-9110'	13 3/8" 9 5/8" 7"	250' 3000' 9217'	300 1550 550	Surface 1100' 5950'
	SEMU Burger No. 21 (McKee plugged & not perforated)	660' FSL & 1980' FEL Sec. 19, T-20S, R-38E	9731' PB-7250'	13 3/8" 9 5/8" 7"	250' 3697' 8000'	250 340 730	Surface 1125' 3728'
	SEMU Warren No. 10 (8979'-9150')	1980' FNL & 1980' FWL Sec. 29, T-20S, R-38E	9391' PB-9150'	13 3/8" 9 5/8" 7"	226' 2906' 9145'	250 500 900	Surface 1989' 4665'
	Warren Unit No. 4 (9046'-9144')	1980' FSL & 660' FWL Sec. 29, T-20S, R-38E	9230' PB-9220'	13 3/8" 9 5/8" 7"	254' 2824' 9225'	250 1915 286	Surface 400' 7300'

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	Warren Unit No. 22 Injector for Warren McKee Waterflood	2090' FSL & 2090' FWL Sec. 29, T-20S, R-38E	9200'	10 3/4" 7 5/8" 5 1/2"	256' 7998' 9195'	250 700 230	Surface 1375' 5450'
	Warren Unit No. 24 (McKee plugged & not perforated)	24' FSL & 2145' FEL Sec. 29, T-20S, R-38E SWD	9240' PB-5350'	10 3/4" 7 5/8" 5 1/2"	242' 3999' 4500'	250 2300 70	Surface 1650' 1650'
	Warren Unit No. 28 (9020'-9138')	1980' FSL & 2310' FEL Sec. 20, T-20S, R-38E	9218' PB-9110'	13 3/8" 9 5/8" 7"	250' 3000' 9217'	300 1550 550	Surface 1100' 5950'
	SEMU Burger No. 21 (McKee plugged & not perforated)	660' FSL & 1980' FEL Sec. 19, T-20S, R-38E	9731' PB-7250'	13 3/8" 9 5/8" 7"	250' 3697' 8000'	250 340 730	Surface 1125' 3728'
	SEMU Warren No. 10 (8979'-9150')	1980' FNL & 1980' FWL Sec. 29, T-20S, R-38E	9391' PB-9150'	13 3/8" 9 5/8" 7"	226' 2906' 9145'	250 500 900	Surface 1989' 4665'
	Warren Unit No. 4 (9046'-9144')	1980' FSL & 660' FWL Sec. 29, T-20S, R-38E	9230' PB-9220'	13 3/8" 9 5/8" 7"	254' 2824' 9225'	250 1915 286	Surface 400' 7300'

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	Warren Unit No. 28 (9020'-9138')	1980' FSL & 2310' FEL Sec. 20, T-20S, R-38E	9218' PB-9110'	13 3/8" 9 5/8" 7"	250' 3000' 9217'	300 1550 550	Surface 1100' 5950'
	SEMU Burger No. 21 (McKee plugged & not perforated)	660' FSL & 1980' FEL Sec. 19, T-20S, R-38E	9731' PB-7250'	13 3/8" 9 5/8" 7"	250' 3697' 8000'	250 340 730	Surface 1125' 3728'
	SEMU Warren No. 10 (8979'-9150')	1980' FNL & 1980' FWL Sec. 29, T-20S, R-38E	9391' PB-9150'	13 3/8" 9 5/8" 7"	226' 2906' 9145'	250 500 900	Surface 1989' 4665'
	Warren Unit No. 4 (9046'-9144')	1980' FSL & 660' FWL Sec. 29, T-20S, R-38E	9230' PB-9220'	13 3/8" 9 5/8" 7"	254' 2824' 9225'	250 1915 286	Surface 400' 7300'

Docket No. 2-78

Dockets Nos. 4-78 and 5-78 are tentatively set for hearing on February 8 and 22, 1978. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: COMMISSION HEARING - WEDNESDAY - JANUARY 11, 1978

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

CASE 5958: (DE NOVO)

Application of Continental Oil Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Gonzales-Mesaverde and Otero-Chacra production in the wellbores of its AXI Apache "J" Wells Nos. 18, 23, and 24 located in Units A, D, and P of Section 8; Nos. 19 and 22 in Units D and L of Section 6; Nos. 20 and 21, in Units C and I of Section 5; and No. 25 in Unit A of Section 7, all in Township 25 North, Range 5 West, Rio Arriba County, New Mexico.

Upon application of Continental Oil Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6026: (DE NOVO)

Application of William G. Rabe and Alice P. Rabe for a non-standard gas proration unit, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for a 160-acre non-standard gas proration unit comprising the NE/4 of Section 25, Township 27 North, Range 8 West, Blanco-Mesaverde Pool, San Juan County, New Mexico.

Upon application of William G. Rabe and Alice P. Rabe this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6027: (DE NOVO)

Application of Great Lakes Chemical Corporation for a non-standard gas proration unit, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for a 160-acre non-standard gas proration unit comprising the SE/4 of Section 25, Township 27 North, Range 8 West, Blanco-Mesaverde Pool, San Juan County, New Mexico.

Upon application of Great Lakes Chemical Corporation this case will be heard De Novo pursuant to the provisions of Rule 1220.

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Docket No. 3-78

DOCKET: EXAMINER HEARING - WEDNESDAY - JANUARY 18, 1978

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

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

ALLOWABLE: (1) Consideration of the allowable production of gas for February, 1978, from fifteen prorated pools in Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(2) Consideration of the allowable production of gas for February, 1978, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 6123: Application of Stevens Oil Company for an unorthodox gas well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its O'Brien "F" Well No. 1 located 1650 feet from the South line and 330 feet from the East line of Section 35, Township 8 South, Range 28 East, Twin Lakes-San Andres Associated Pool, Chaves County, New Mexico, the SE/4 of said Section 35 to be dedicated to the well.

CASE 6124: Application of HNG Oil Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for its Shoebar Ranch Unit Area comprising 961 acres, more or less, of State lands in Townships 16 and 17 South, Range 35 East, Lea County, New Mexico.

CASE 6125: Application of Shell Oil Company for an exception to Rule 202(B), San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Commission Rule No. 202(B), San Juan County, New Mexico, to permit the temporary abandonment of certain wells on its Carson Unit Area in Township 25 North, Ranges 11 and 12 West, Bisti-Lower Gallup Oil Pool, San Juan County, New Mexico. Applicant further seeks that any further extensions be administratively approved.

CASE 6126: Application of Yates Petroleum Corporation for compulsory pooling and an unorthodox location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the W/2 of Section 21, Township 17 South, Range 26 East, Eddy County, New Mexico, to be dedicated to its Siegenthaler IS Well No. 2 to be drilled at an unorthodox location 1460 feet from the South line and 1980 feet from the West line of said Section 21. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6127: Application of Southland Royalty Company for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion (conventional) of its Aztec Palmillo State Com Well No. 1 located in Unit G of Section 32, Township 18 South, Range 29 East, to produce oil from the Wolfcamp and gas from the Morrow formations.

CASE 6128: Application of Champlin Petroleum Company for an unorthodox location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its State "36" Well No. 1 located 1980 feet from the South line and 660 feet from the West line of Section 36, Township 21 South, Range 27 East, East Carlsbad Gas Field, Eddy County, New Mexico, the S/2 of said Section 36 to be dedicated to the well.

CASE 6129: Application of King Resources Company for a unit agreement, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for its Gardner Draw Unit Area comprising 19,840 acres, more or less, of Federal, State, and fee lands in Townships 19 and 20 South, Ranges 20 and 21 East, Eddy County, New Mexico.

CASE 6130: Application of Continental Oil Company for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Wantz Abo and Wantz Granite Wash production in the wellbore of its Lockhart B-35 Well No. 5 located in Unit H of Section 35, Township 21 South, Range 37 East, Lea County, New Mexico.

CASE 6131: Application of Continental Oil Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project on its Southeast Monument Unit Area, Warren McKee Pool, Lea County, New Mexico, by the injection of water into the McKee formation through 8 wells. Applicant further seeks the establishment of an administrative procedure for adding or substituting injection wells.

CASE 6132: Application of Continental Oil Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project on its Warren Unit Area, Warren McKee Pool, Lea County, New Mexico, by the injection of water into the McKee formation through 4 wells. Applicant further seeks the establishment of an administrative procedure for adding and substituting injection wells.

CASE 6133: Application of Doyle Hartman for compulsory pooling and a non-standard proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests underlying the SE/4 of Section 8, Township 19 South, Range 37 East, Eumont Gas Pool, Lea County, New Mexico, to form a non-standard unit to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6134: Application of Burleson & Huff for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Queen formation underlying the SE/4 NW/4 of Section 22, Township 25 South, Range 37 East, Langlie Mattix Pool, Lea County, New Mexico, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6119: (Continued from January 4, 1978, Examiner Hearing)

Application of Caulkins Oil Company for a dual completion and downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle Pictured Cliffs, Chacra and Mesaverde production in the wellbore of its Breech Well No. 228, to be located in Unit A of Section 18, Township 26 North, Range 6 West, Rio Arriba County, New Mexico, and to dually complete the commingled formations and the Dakota formation in said well.

CASE 6120: (Continued from January 4, 1978, Examiner Hearing)

Application of Caulkins Oil Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Chacra and Mesaverde production in the wellbores of its Breech E Wells Nos. 109 in Unit M of Section 3 and 104 in Unit P of Section 5 and its Breech A Wells Nos. 627 in Unit B of Section 8, 677 and 679 in Units L and J, respectively, of Section 9, and 207 in Unit A of Section 10, all in Township 26 North, Range 6 West, Rio Arriba County, New Mexico.

CASE 6121: (Continued from January 4, 1978, Examiner Hearing)

Application of Caulkins Oil Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Pictured Cliffs and Chacra production in Sections 3, 4, 5, 7 thru 11, 13 thru 18, 21, 22, 24, and 25 in Township 26 North, Range 6 West, and Sections 13, 14, 23, and 24, Township 26 North, Range 7 West, Rio Arriba County, New Mexico.

CASE 6122: (Continued from January 4, 1978, Examiner Hearing)

Application of Caulkins Oil Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Mesaverde and Dakota production in the wellbores of its Breech E Wells Nos. 64 and 58 located in Unit A of Section 1 and Section 3, its State A Well No. 62 in Unit A of Section 2, and its Breech D Well No. 341 located in Unit B of Section 21, all in Township 26 North, Range 6 West; and its Breech F Wells Nos. 4 and 45 located in Unit A of Section 33, Unit M of Section 35, both in Township 27 North, Range 6 West, Rio Arriba County, New Mexico.

CASE 6096: Continued from January 4, 1978, Examiner Hearing

Application of Texas Oil & Gas Corporation for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the S/2 of Section 14, Township 21 South, Range 34 East, Lea County, New Mexico, to be dedicated to applicant's South Wilson State Well No. 1 to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6135: In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the extension of the Wagon Mound Dakota-Morrison Gas Pool in Township 21 North, Range 21 East, Mora County, New Mexico.

CASE 6136: In the matter of the application of the Oil Conservation Commission of New Mexico upon its own motion for an order for the creation and extension of certain pools in Lea, Chaves, and Roosevelt Counties, New Mexico.

(a) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for San Andres production and designated as the Caprock-San Andres Pool. The discovery well is the Elk Oil Company State D.J. Well No. 1 located in Unit H of Section 2, Township 12 South, Range 32 East, NMPM. Said pool would comprise:

TOWNSHIP 12 SOUTH, RANGE 32 EAST, NMPM
Section 2: NE/4

(b) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Yates production and designated as the West Scarborough-Yates Pool. The discovery well is the Gifford, Mitchell and Wisenbaker Horse Back Well No. 2 located in Unit G of Section 33, Township 26 South, Range 36 East, NMPM. Said pool would comprise:

TOWNSHIP 26 SOUTH, RANGE 36 EAST, NMPM
Section 33: NE/4

(c) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the Sombrero-Morrow Gas Pool. The discovery well is the Phillips Petroleum Company Michel Well No. 1 located in Unit C of Section 13, Township 16 South, Range 33 East, NMPM. Said pool would comprise:

TOWNSHIP 16 SOUTH, RANGE 33 EAST, NMPM
Section 13: NW/4

(d) CREATE a new pool in Chaves County, New Mexico, classified as a gas pool for Morrow production and designated as the East Vest Ranch-Morrow Gas Pool. The discovery well is the Cockrell Corporation Occidental Federal Well No. 1 located in Unit A of Section 22, Township 14 South, Range 30 East, NMPM. Said pool would comprise:

TOWNSHIP 14 SOUTH, RANGE 30 EAST, NMPM
Section 22: N/2

(e) EXTEND the Blinebry Oil and Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 23: SW/4
Section 26: NW/4

(f) EXTEND the Bluitt-Wolfcamp Gas Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 8 SOUTH, RANGE 37 EAST, NMPM
Section 10: NE/4
Section 11: NW/4

(g) EXTEND the Brinninstool-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 33 EAST, NMPM
Section 21: W/2

(h) EXTEND the South Brunson-Granite Wash Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 38 EAST, NMPM
Section 31: SW/4

(i) EXTEND the West Kemnitz-Lower Wolfcamp Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 33 EAST, NMPM
Section 29: S/2
Section 30: SE/4

(j) EXTEND the Querecho Plains-Queen Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 32 EAST, NMPM
Section 27: NW/4

(k) EXTEND the Tom Tom-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 7 SOUTH, RANGE 31 EAST, NMPM
Section 23: SW/4
Section 26: W/2
Section 33: SE/4

(l) EXTEND the Townsend-Wolfcamp Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 15 SOUTH, RANGE 35 EAST, NMPM
Section 27: SE/4

(m) EXTEND the North Vacuum-Abo Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 34 EAST, NMPM
Section 15: NW/4

(n) EXTEND the Warren-Tubb Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 23: SW/4
Section 26: NW/4

(o) EXTEND the West Warren-Blinebry Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 20: SW/4
Section 29: NW/4

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. 6131

Order No. R-5631

APPLICATION OF CONTINENTAL OIL COMPANY

FOR A WATERFLOOD PROJECT, LEA

COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on January 18, 19 78, at Santa Fe, New Mexico, before Examiner, Richard L. Stamets.

NOW, on this _____ day of January, 19 78, 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,

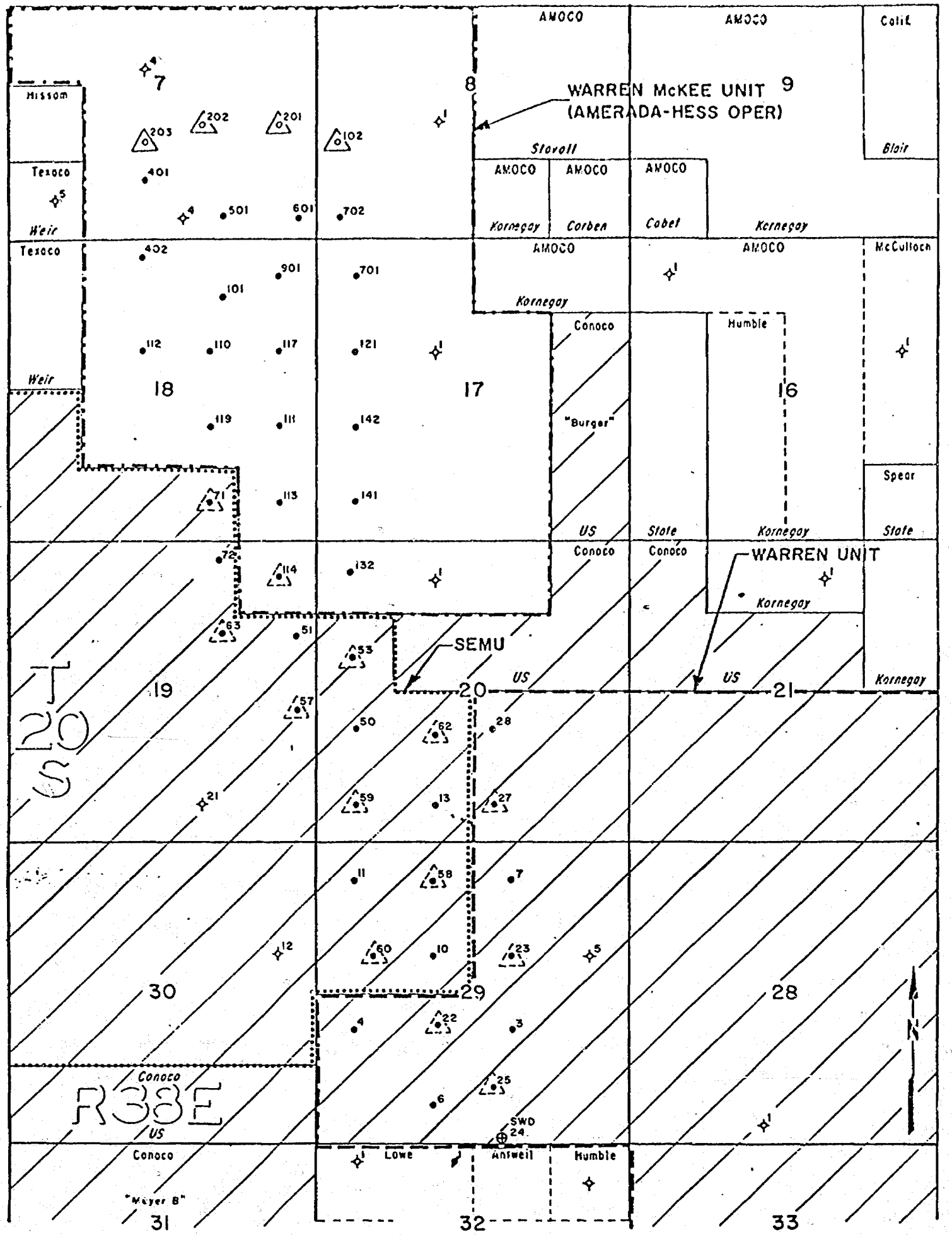
FINDS:

(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, Continental Oil Company, seeks authority to institute a waterflood project on its Southeast Monument Unit Area ~~Lease~~, Warren-McKee Pool, by the injection of water into the McKee formation through 8 injection wells in Sections 18, 19 and 20 & 29 Township 20 South, Range 38 East, NMPM, Lea 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.



conoco

PRODUCTION DEPARTMENT — HOBBS DIVISION

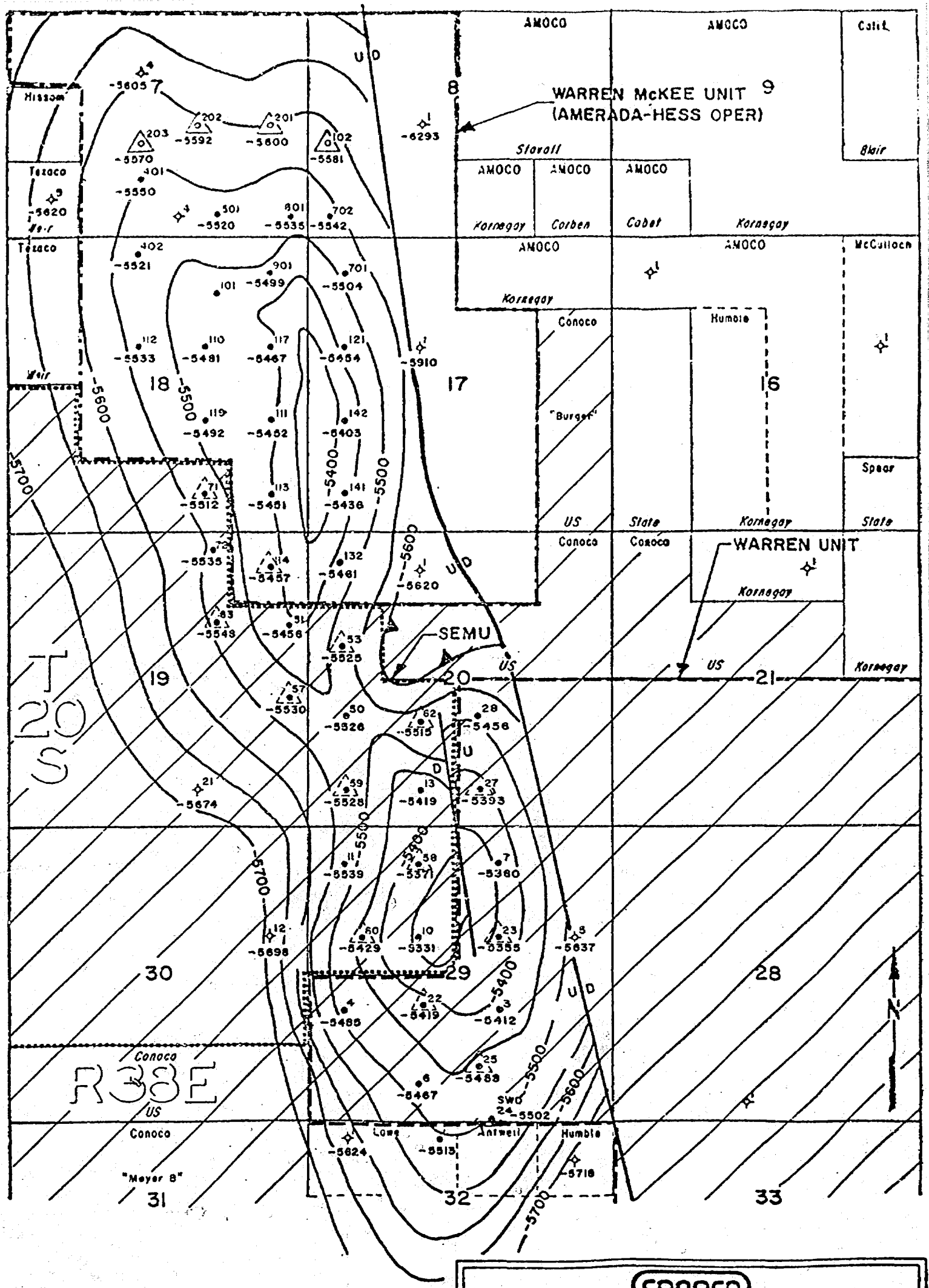
LEA COUNTY, NEW MEXICO

WARREN McKEE POOL

SCALE 0' 1000' 2000'

EXHIBIT 2

Case 6131



conoco

PRODUCTION DEPARTMENT — HOBBS DIVISION

WARREN McKEE POOL
LEA COUNTY, NEW MEXICO

TOP McKEE PAY SAND

SCALE 0' 1000' 2000'

EGS 5-74

EXHIBIT 3
Case 6131

PRODUCTION HISTORY AND WELL STATUS

LEASE AND WELL NO.	STATUS	OCT.'77 PROD. RATE BOPD	PROJECTED PRODUCER OR INJECTOR	CUMULATIVE PRIMARY PROD. AS OF 10-31-77
Warren Unit McKee No. 3	Prod. - GL*	2	P	972,113
Warren Unit McKee No. 4	S.I. - 6/73	0	P	561,628
Warren Unit McKee No. 6	Prod. - GL	9	P	659,451
Warren Unit McKee No. 7	Prod. - GL	12	P	833,251
Warren Unit McKee No. 22	Prod. - GL	27	I	320,315
Warren Unit McKee No. 23	Prod. - GL	4	I	439,797
Warren Unit McKee No. 25	Prod. - GL	13	I	483,724
Warren Unit McKee No. 27	Prod. - GL	4	I	295,048
Warren Unit McKee No. 28	Prod. - GL	3	P	178,739
		72		4,744,066
SEMU McKee No. 10	Rec. to Dev.	0	P	671,878
SEMU McKee No. 11	S.I. - 6/73	0	P	510,442
SEMU McKee No. 13	Rec. to Drinkard S.I. - 6/73	0	P	463,554
SEMU McKee No. 50	Prod. - GL	2	P	314,466
SEMU McKee No. 51	S.I. - 6/73	0	P	191,513
SEMU McKee No. 53	Prod. - GL	14	I	255,952
SEMU McKee No. 57	S.I. - 6/73	0	I	157,981
SEMU McKee No. 58	Rec. to Tubb & Blinebry	0	I	160,662
SEMU McKee No. 59	S.I. - 6/73	0	I	197,903
SEMU McKee No. 60	S.I. - 6/73	0	I	206,844
SEMU McKee No. 62	Prod. - GL	5	I	216,539
SEMU McKee No. 63	Prod. - GL	2	I	111,044
SEMU McKee No. 71	Prod. - GL	14	I	477,661
SEMU McKee No. 72	Prod. - GL	8	P	227,006
		45		4,163,445
TOTALS		117 BOPD		8,907,511 Barrels

*Gas Lift

EXHIBIT 4

Case 6131

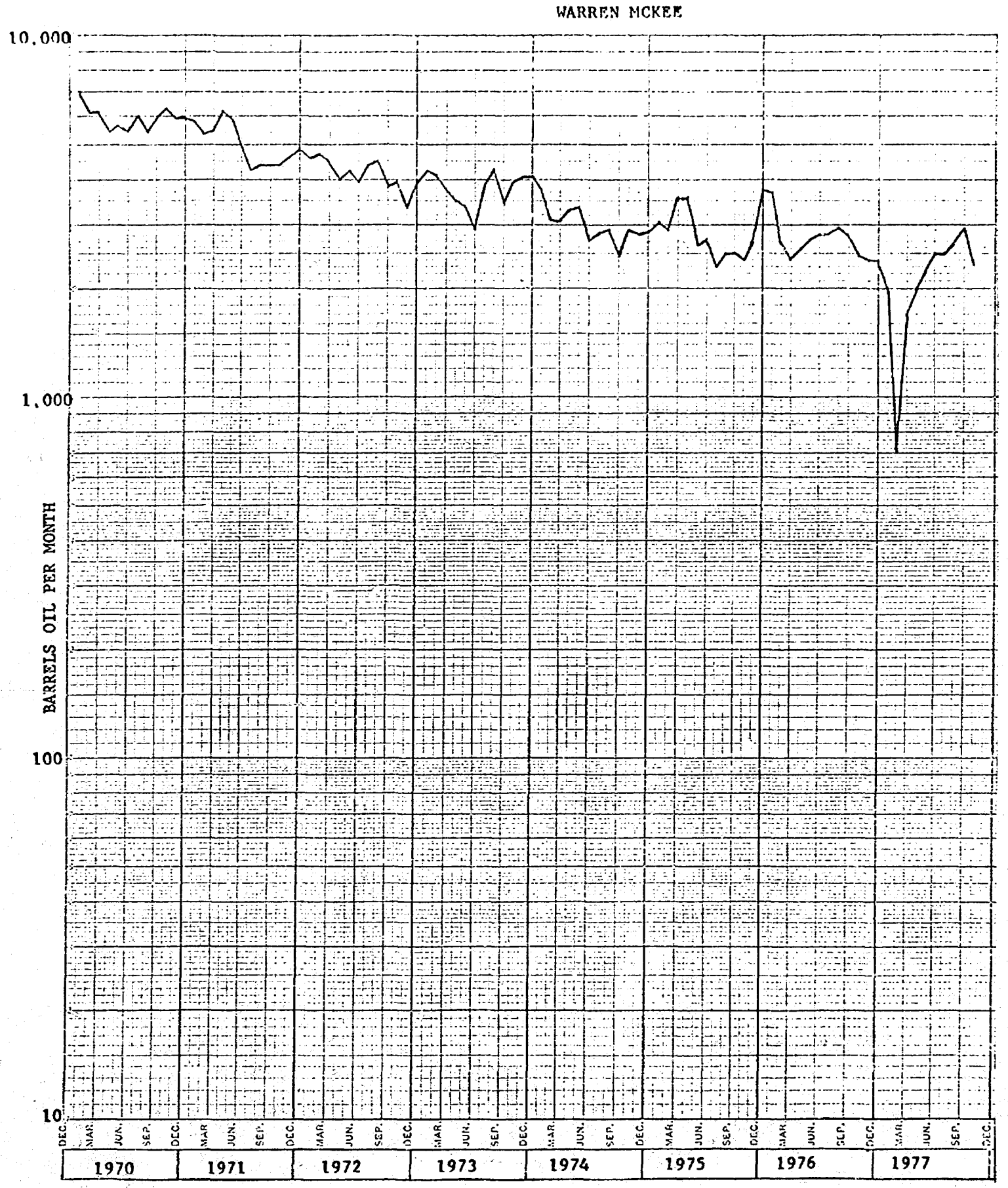


EXHIBIT 5
Case 6131

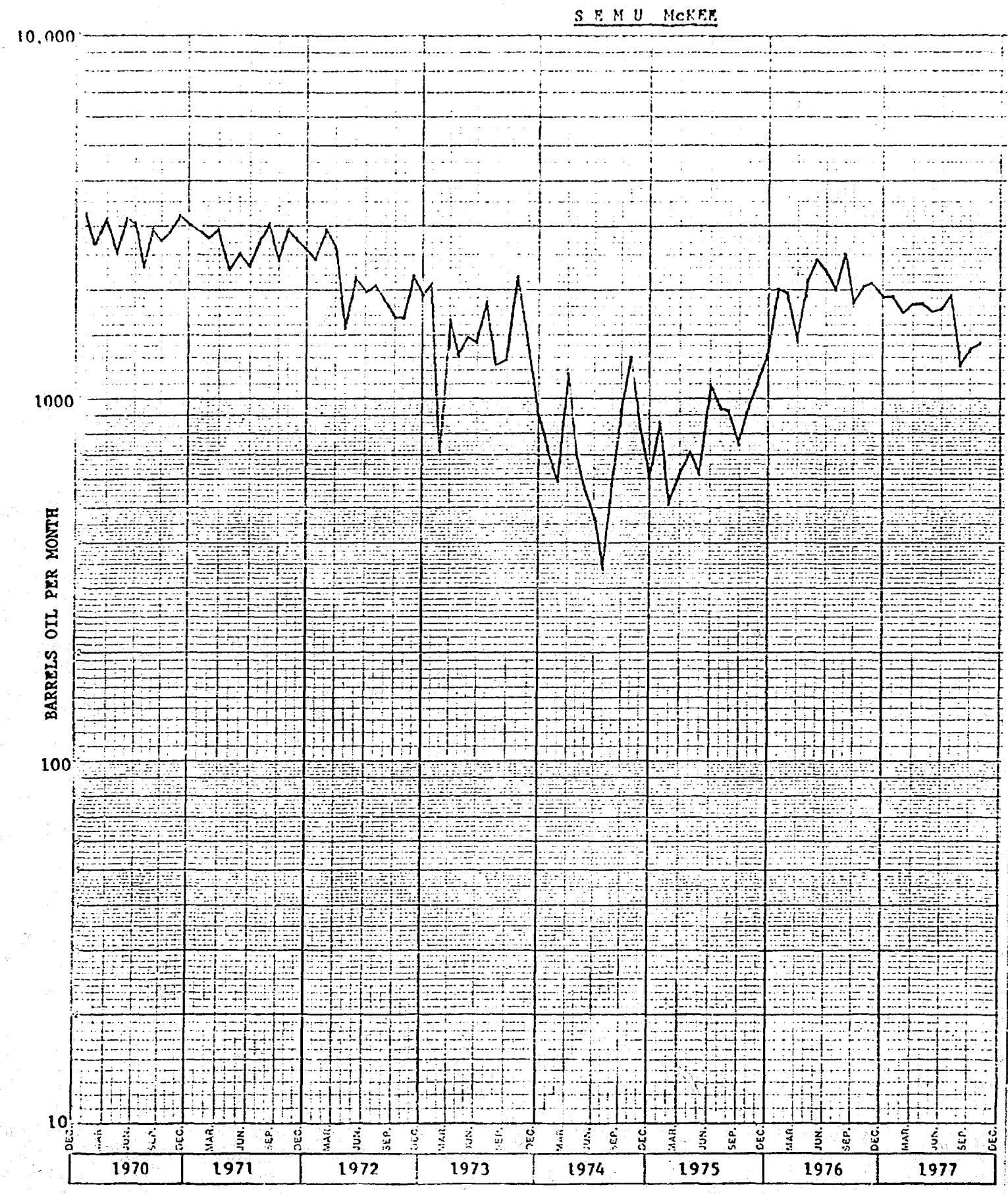


EXHIBIT 6
Case 6131

RESERVOIR PARAMETERS

Producing Mechanism	Solution Gas
Average Porosity	14.5%
Average Air Permeability:	
Upper Sand	16.8 md.
Main Sand	89.3 md.
Connate Water	30%
Original Reservoir Data:	
Bottom Hole Pressure	3440 psi
Oil Viscosity	0.549 cp
Sol. GOR	671
FVF	1.359 R-bbl/STB
Oil-Water Contact	-5650 feet
Bubble Point Pressure	2156 psi
Reservoir Temperature	123°
Reservoir Volumes:	
Upper Sand	8,192 acre-feet
Main Sand	80,380 acre-feet
Original Oil-in-Place	51,283,000 barrels
Primary Recovery (10-31-77)	8,907,511 barrels
Primary Reserves	168,818 barrels
Ultimate Primary Recovery (17.75% OOIP)	9,076,329 barrels

EXHIBIT 7
case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

SCHLUMBERGER — Electrical Log

COUNTY Lea
FIELD or LOCATION Warren McKee
WELL Warren Unit McKee #22
COMPANY Continental Oil Company

COMPANY CONTINENTAL OIL
COMPANY GEOL
WELL WARREN UNIT
MC KEE # 22
FIELD WARREN MC KEE
LOCATION SEC. 29-20S-38E
COUNTY LEA
STATE NEW MEXICO

Other Surveys
HL

Location of Well
2090' f S&W/L

Elevation: DF 3532
KB:
or GL:

FILING No.

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	RESISTIVITY ohms. m²/m	RESISTIVITY ohms. m²/m
-120		0 AMP. Normal 40	0 18" Lateral 100
		0 10" Normal 200	0 1000
		0 2000	0 10000
		0 32" LS Lateral 250	

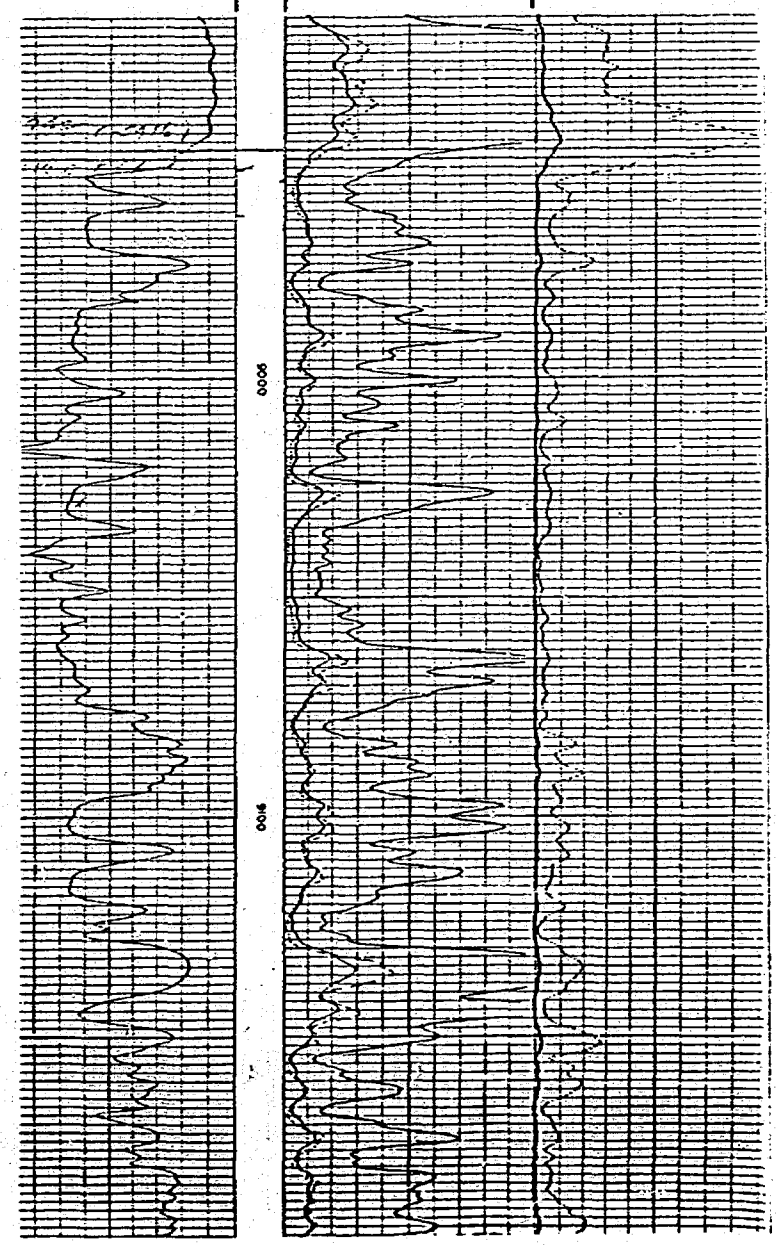


EXHIBIT 9A
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER — MicroLogging®

COUNTY Lea
FIELD or LOCATION Warren McKee
WELL Warren McKee #25
COMPANY Continental Oil Co.

COMPANY CONTINENTAL OIL COMPANY
WELL WARREN MCKEE #25
FIELD WARREN MCKEE
LOCATION SEC 29-20S-38E
COUNTY LEA
STATE NEW MEXICO

Other Surveys
ES

Location of Well
990' f S/L
2310' f E/L

Elevation: D.F. 3525
K.B. 3526
or G.L. 3614

MICROCALIPER	OHMS	RESISTIVITY ohms. m²/m	
6 7 8 9 10 11 12 13 14 15 16 Hole Diameter in Inches		0 Micro Inverse 1" x 1" 20	40
		0 Micro Normal 2" 20	40
SPONTANEOUS-POTENTIAL millivolts			
Micro ☐ ES ⊠ —☐			
-20 +80			

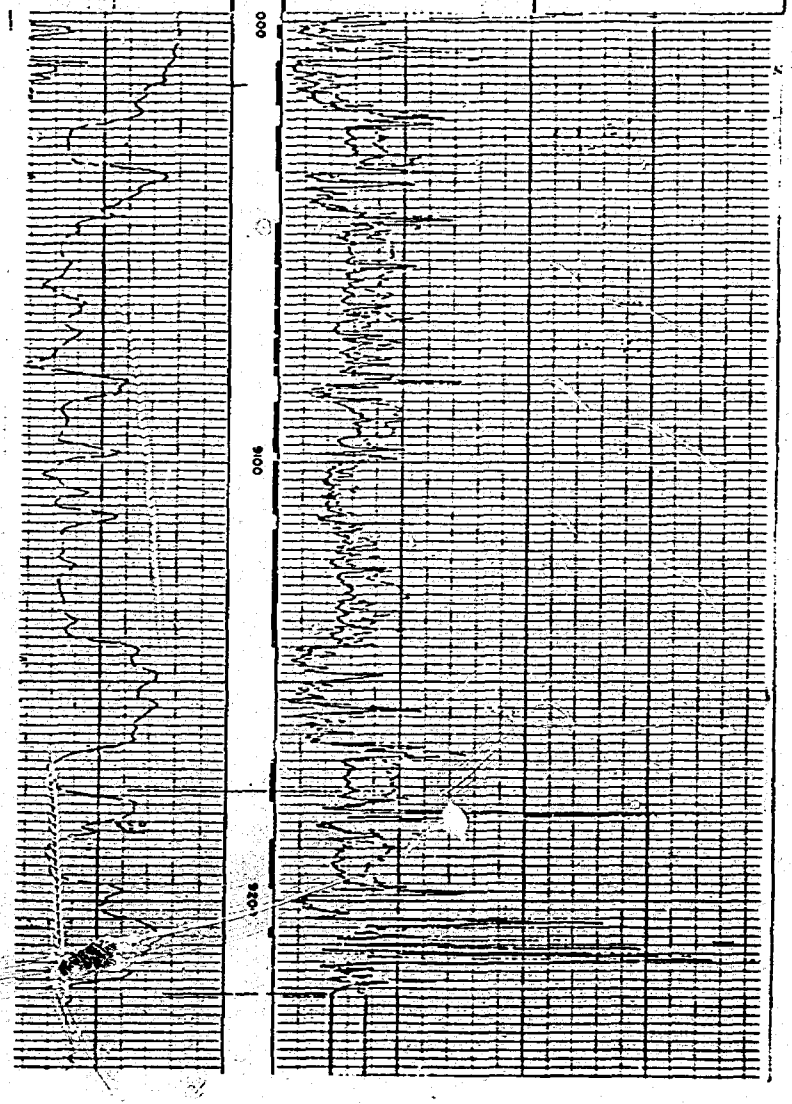


EXHIBIT 9B
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

Electrical Log

COMPANY CONTINENTAL OIL
COMPANY
WELL WARREN McKEE
UNIT 23
FIELD WARREN McKEE
LOCATION SEC. 29-20S-38E
COUNTY LEA
STATE NEW MEXICO

COUNTY Lea
FIELD or LOCATION Warren McKee
WELL Warren Unit McKee #23
COMPANY Continental Oil Co

Other Surveys
NL

Location of Well
1980' f N&E/L

Elevation: D.F. 3548
K.B.:
or G.L.:

FILING No.

SPONTANEOUS-POTENTIAL millivolts	SM-30	RESISTIVITY ohms. m²/m
20		0 Amplified Normal 50
		0 10" Normal 250
		0 2500
		0 32" LS Lateral 250

0008
0008
0008

EXHIBIT 9C
Case 6(5)

LANE-WELLS

FILE NO.

COMPANY CONTINENTAL OIL COMPANY

WELL WARREN UNIT MCKEE NO 27

FIELD WARREN MCKEE POOL

COUNTY LEA STATE NEW MEXICO

LOCATION

SEC 20 TWP RGE

Other Services

Permanent Datum

Log Measured from

Elevations

KB 3220

GL

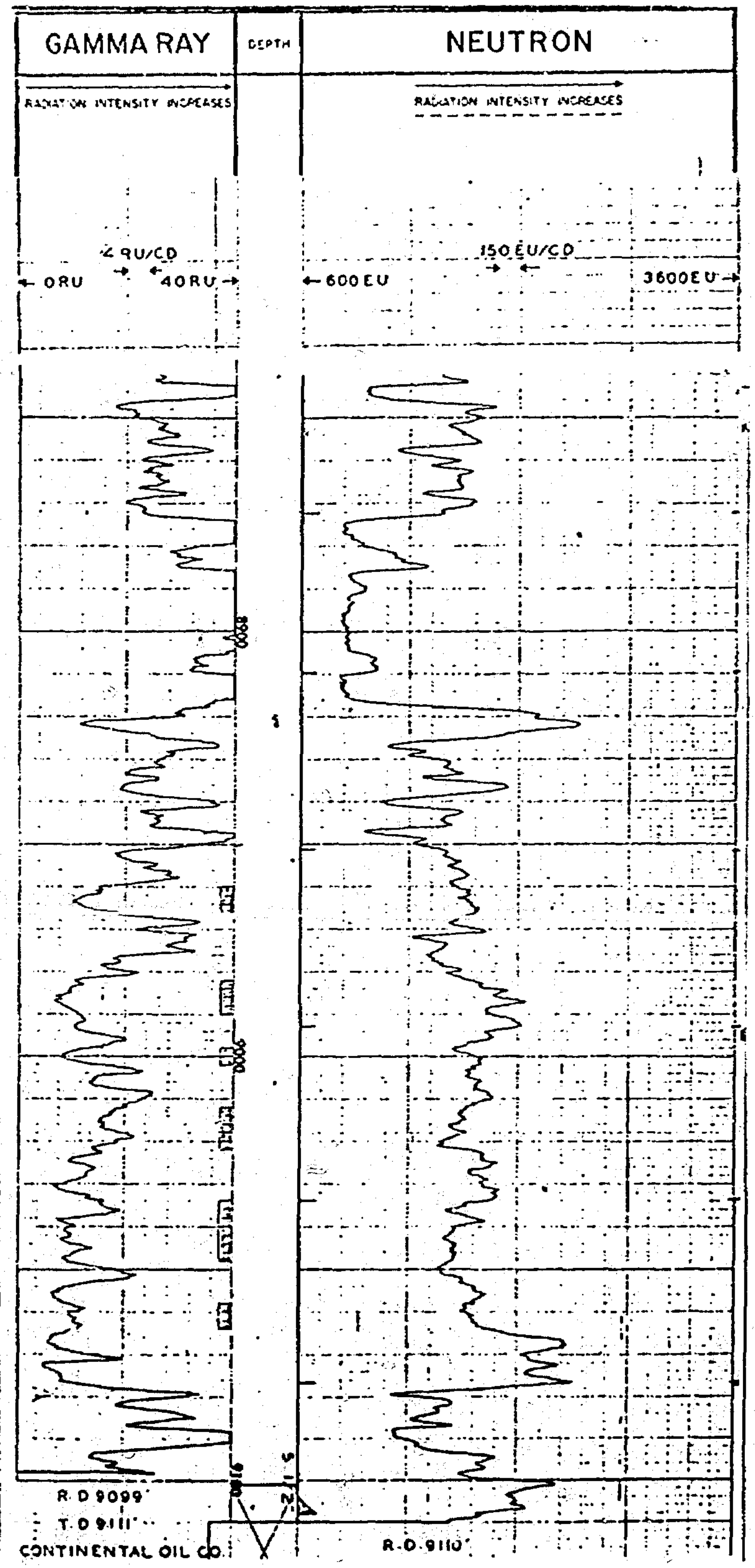


EXHIBIT 9D

Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

Electrical Log

COUNTY — Lea
FIELD or LOCATION — Warren McKee
WELL — SEMU McKee # 53
COMPANY — Continental Oil Company

COMPANY	CONTINENTAL OIL COMPANY	Other Surveys: ML
WELL	S.E.M.U. MC KEE # 53	Location of Well: 2096' F N/L, 554' F W/L
FIELD	WARREN MC KEE	
LOCATION	SEC. 20 T20S R38E	Elevation, D.F.: 3550; K.B.: 3562; or G.L.: 3549
COUNTY	LEA	
STATE	NEW MEXICO	Filing No.

DETAIL LOG

5" — 100'

SPONTANEOUS-POTENTIAL millivolts		RESISTIVITY ohms. m²/m	RESISTIVITY ohms. m²/m
120	RUN 2	0 AHP Norm. 20	0 19' Lateral 50
		0 10" Normal 100	0 500
		0 1000	0 5000
		0 32"LS Lateral 100	
		0 1000	

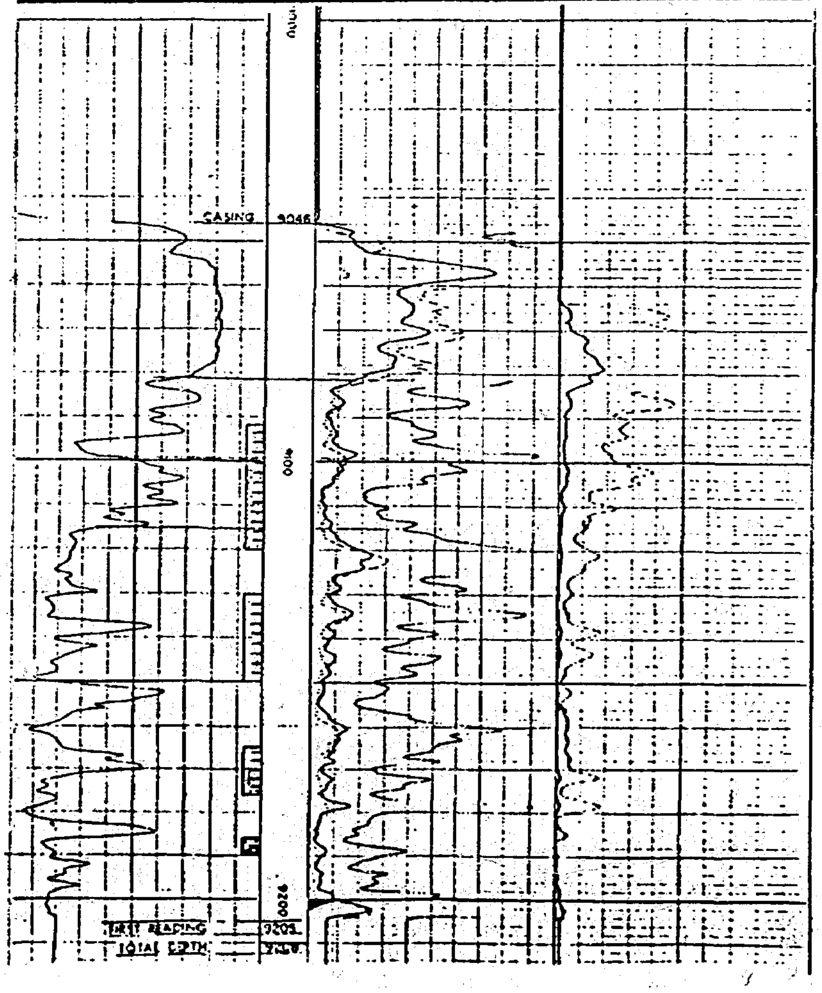


EXHIBIT 9E
Case 6131

RADIOACTIVITY LOG

WELEX JET SERVICES, Inc.

FILE NO.

Location of Well	COMPANY CONTINENTAL OIL COMPANY		COMPANY CONTINENTAL OIL COMPANY
	WELL SEMU MEYER NO. 57		WELL SEMU MEYER NO. 57
	FIELD WARREN MCKEE POOL		FIELD WARREN MCKEE POOL
	COUNTY LEA STATE NEW MEXICO		COUNTY LEA STATE NEW MEXICO
Est. DF 3551'	LOCATION 2310' FSL & 330' FEL, SEC. 19, T - 20 - S, R - 38 - E.		LOCATION 2310' FSL & 330' FEL, SEC. 19, T - 20 - S, R - 38 - E.
	LOG MEAS. FROM 10' ABOVE BRADEN HEAD FLG. ELEV. 3550'		
	DRLG. MEAS. FROM 10' ABOVE BRADEN HEAD FLG. ELEV. 3550'		
	PERM. DATUM BRADEN HEAD FLANGE ELEV. 3540'		

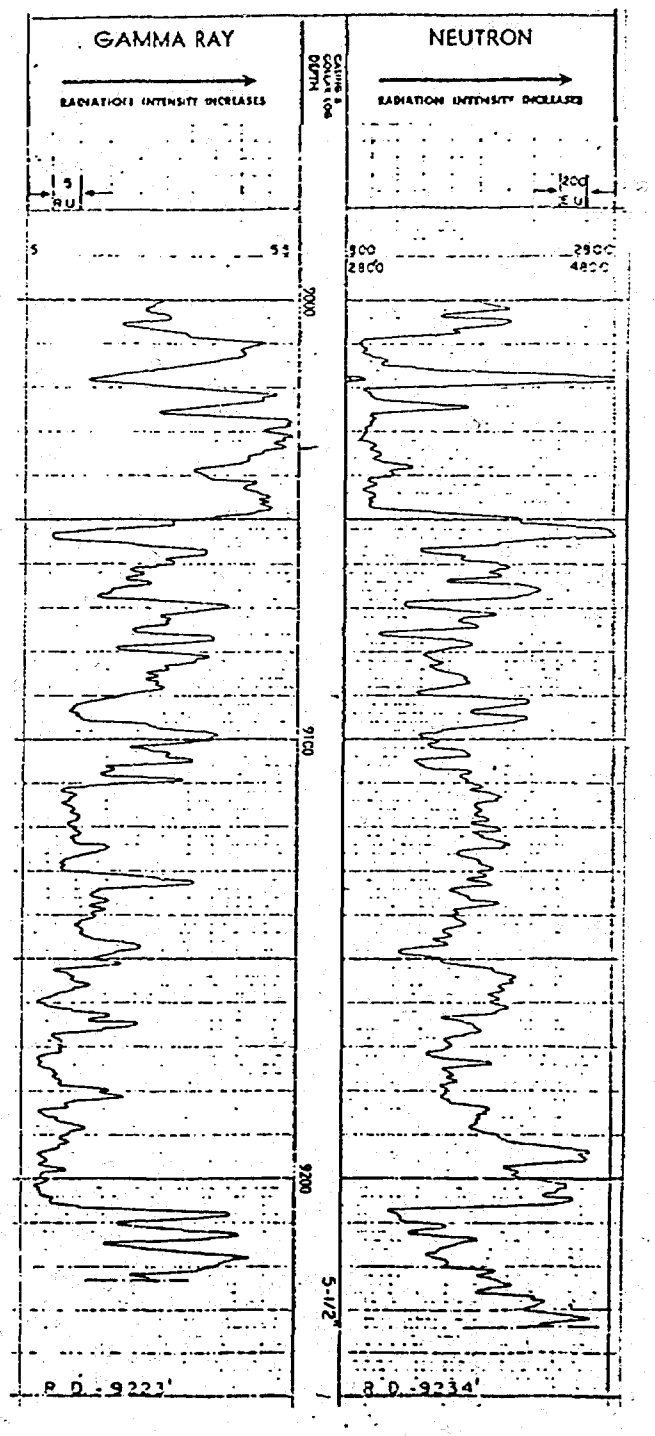


EXHIBIT 9F
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

Induction Electrical Log

COUNTY Lea FIELD or LOCATION Warren McKee WELL S.E.M.U. McKee #58 COMPANY Continental Oil Co.	COMPANY CONTINENTAL OIL COMPANY WELL ~~S.E.M.U. McKEE #58~~ SEMU BURGER B #58 FIELD WARREN McKEE LOCATION SEC. 29-20S-38E COUNTY LEA STATE NEW MEXICO	Other Surveys ML GR Location of Well 660' f N/L 1980' f W/L Elevation: DF 3547 KB 3548 or GL 3537 FILING No.

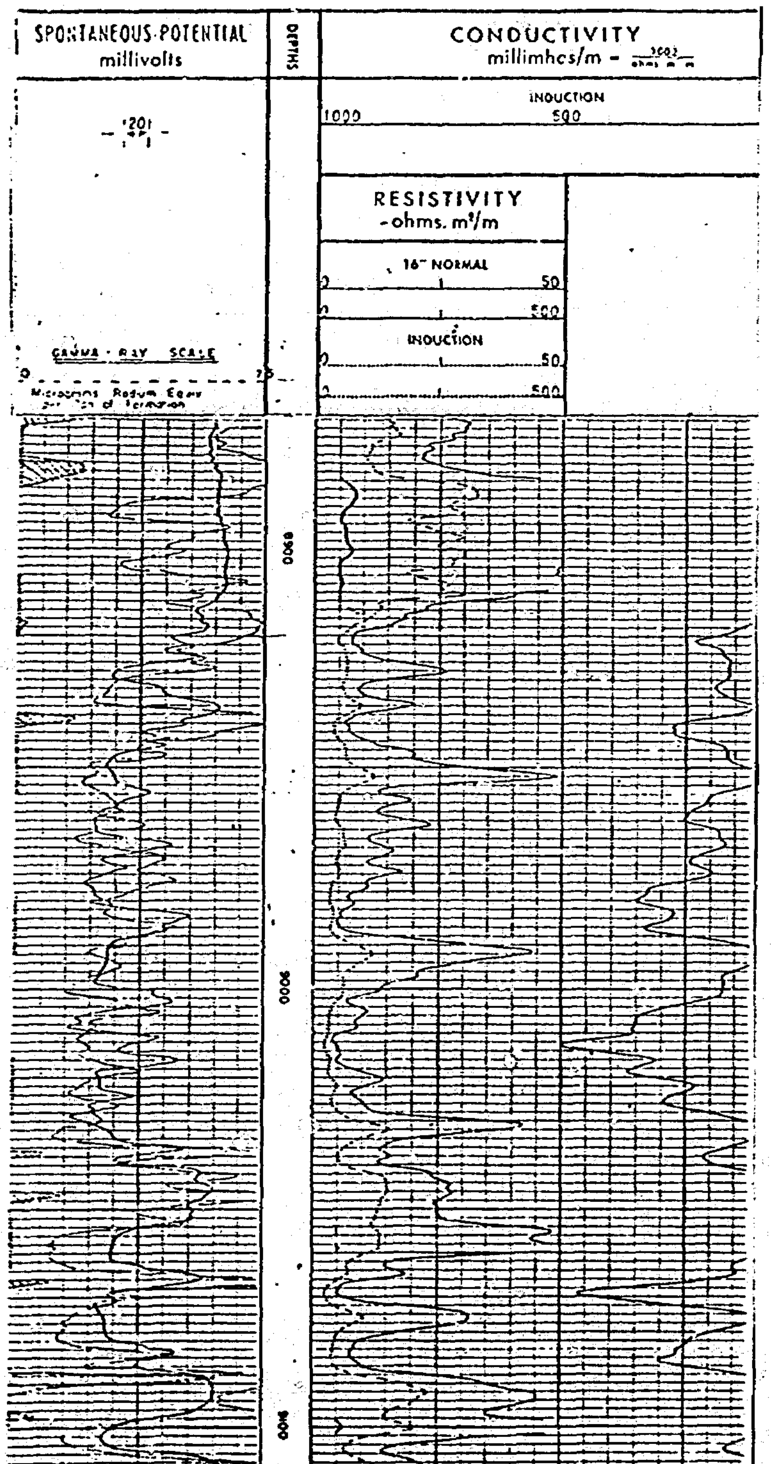


EXHIBIT 9G
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER Induction-Electrical Log

COUNTY Lea FIELD or LOCATION Warren McKee WELL S.E.M.U. McKee #56 COMPANY Continental Oil Co.	COMPANY CONTINENTAL OIL COMPANY WELL ~~S.E.M.U. McKEE #56~~ SEMU BURGER B #58 FIELD WARREN McKEE LOCATION SEC. 29-20S-38E COUNTY LEA STATE NEW MEXICO	Other Surveys ML GR Location of Well 660' f N/L 1980' f W/L Elevation: DF 3547 KB 3548 or GL 3537 FILING No.

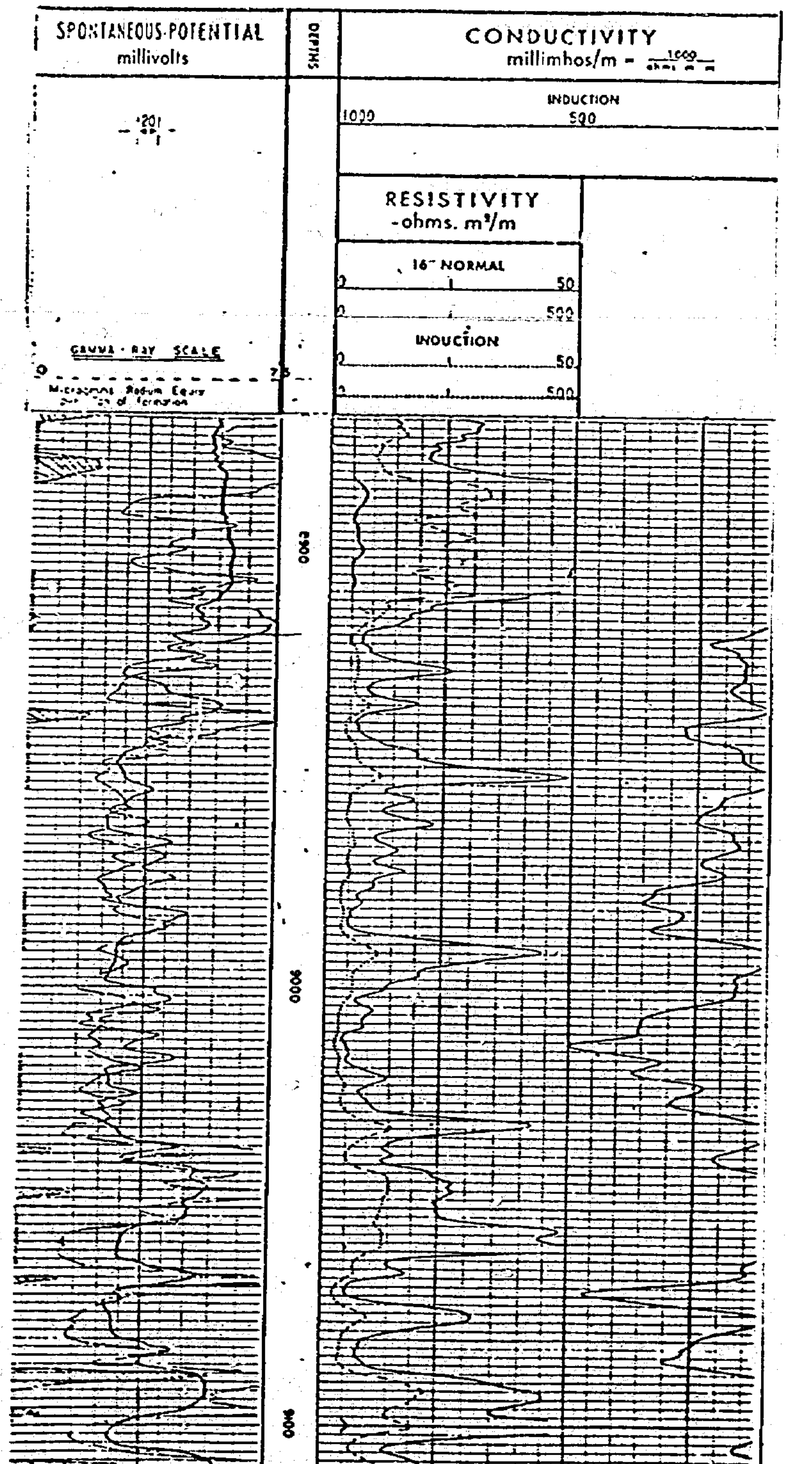


EXHIBIT 9G
Case 6131

PERFORATING GUNS ATLAS CORPORATION

Simultaneous

Radiation Log

LOG NO. 155	COMPANY	CONTINENTAL OIL COMPANY	
STATION HOBBS	WELL	SEMU MC KEE # 59	
TRUCK NO. GR-36	FIELD	WARREN MC KEE	
	COUNTY STATE	LEA, NEW MEXICO	
	LOCATION	SEC. 20 TWP. 20 S RGE. 38 E	
	LOG MEAS. FROM	10' ABOVE G.L.	ELEV. 3549
	DRLG. MEAS. FROM	SAME	ELEV. 3549
	PERMANENT DATUM G.L.		ELEV. 3539

COMPANY: CONTINENTAL OIL COMPANY
WELL: SEMU MC KEE # 59
FIELD: WARREN MC KEE
COUNTY: LEA
STATE: NEW MEXICO

CASING RECORD			BORE HOLE RECORD		
SIZE WT. #	FROM	TO	BIT SIZE	FROM	TO
10 3/4	SURF.	259	–	–	–
7 5/8	"	3032	9 7/8	–	–
5 1/2	"	7579	6 3/4	–	–
4" LIN.	7558	9304	4 3/4	–	–

GAMMA RAY — DEPTH & COLLARS — NEUTRON

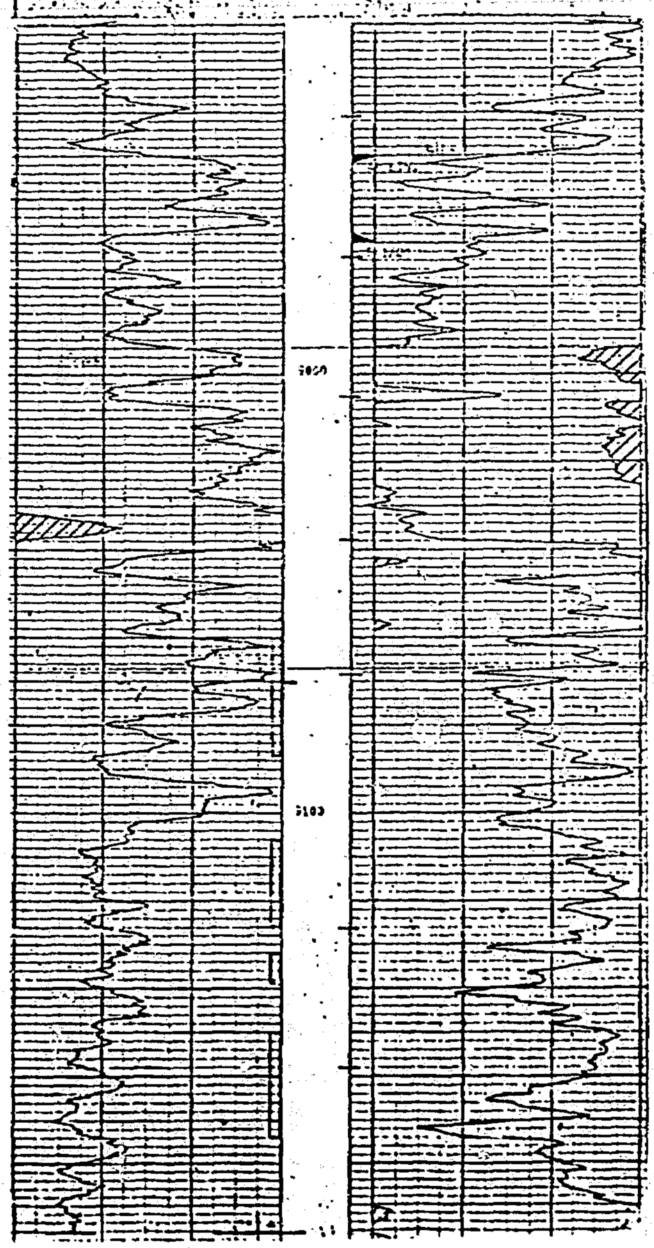


EXHIBIT 9H
Case 6731

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER — Induction Electrical Log

COMPANY	CONTINENTAL OIL COMPANY	Other Surveys ML
WELL	SEMU McKEE #60	Location of Well 1330' F N/L 0' F W/L
FIELD	WARREN McKEE	
LOCATION	SEC. 29-20S-38E	L-S
COUNTY	LEA	Elevation: DF 3540 KB 3541 or GL 3525
STATE	NEW MEXICO	FILING No

COUNTY LEA
FIELD or LOCATION WARREN McKEE SEC. 29-20S-38E
WELL SEMU McKEE #60
COMPANY CONTINENTAL OIL

SPONTANEOUS POTENTIAL millivolts	DEPTHS	CONDUCTIVITY millimhos/m = 1000/ohms m²/m
20		INDUCTION 1000 500 0
		RESISTIVITY ohms. m²/m
		16" NORMAL 0 50; 0 500
		INDUCTION 0 50; 0 500

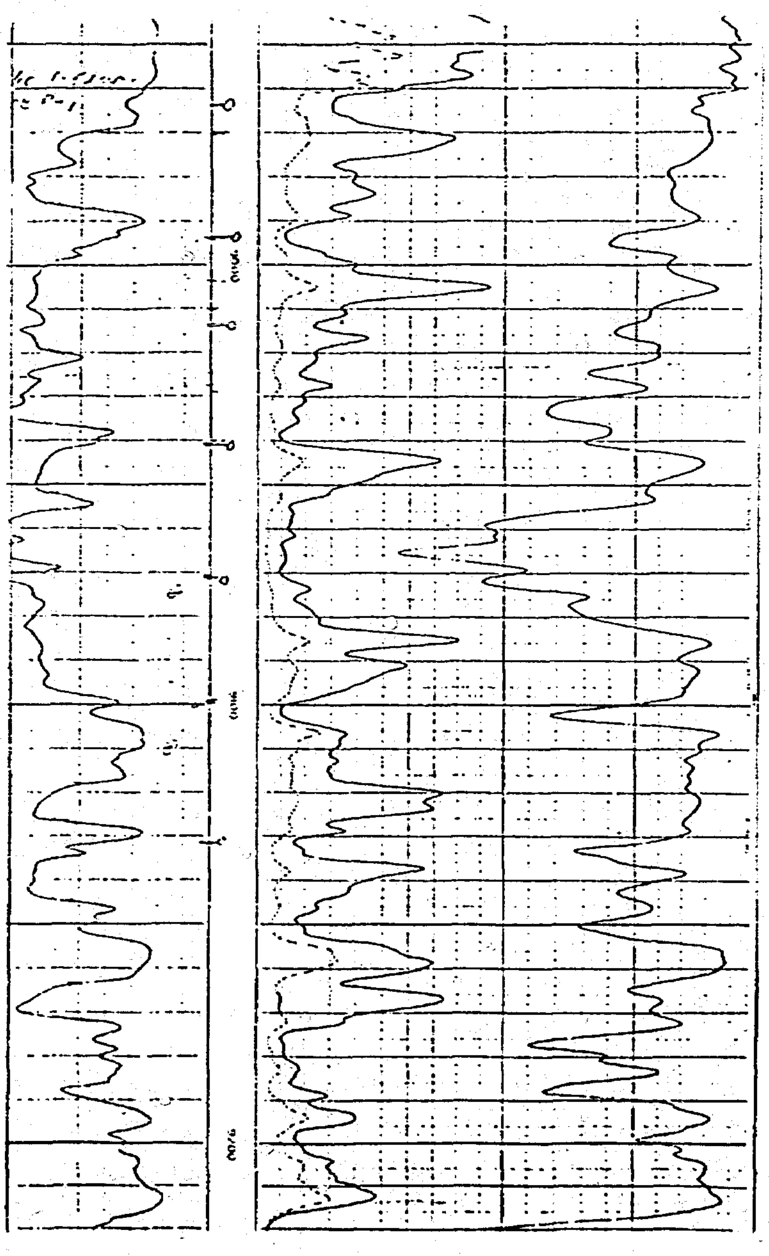


EXHIBIT 9I
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER — Electrical Log

COUNTY Lea
FIELD or LOCATION Warren McKee
WELL SEMU McKee #62
COMPANY Continental Oil Company

COMPANY CONTINENTAL OIL COMPANY
WELL SEMU McKEE # 62
FIELD WARREN McKEE
LOCATION SEC. 20-20S-38E
COUNTY LEA
STATE NEW MEXICO

Other Surveys
HL

Location of Well
1980' f S&W/L

Elevation: D.F. 3562
K.B. 3563.5
or G.L.

FILING No.

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	RESISTIVITY ohms. m²/m	RESISTIVITY ohms. m²/m
-20 +80		0 10" Normal 200	0 Lateral 500
		0 2000	0 5000
		0 32" ES Lat. 300	

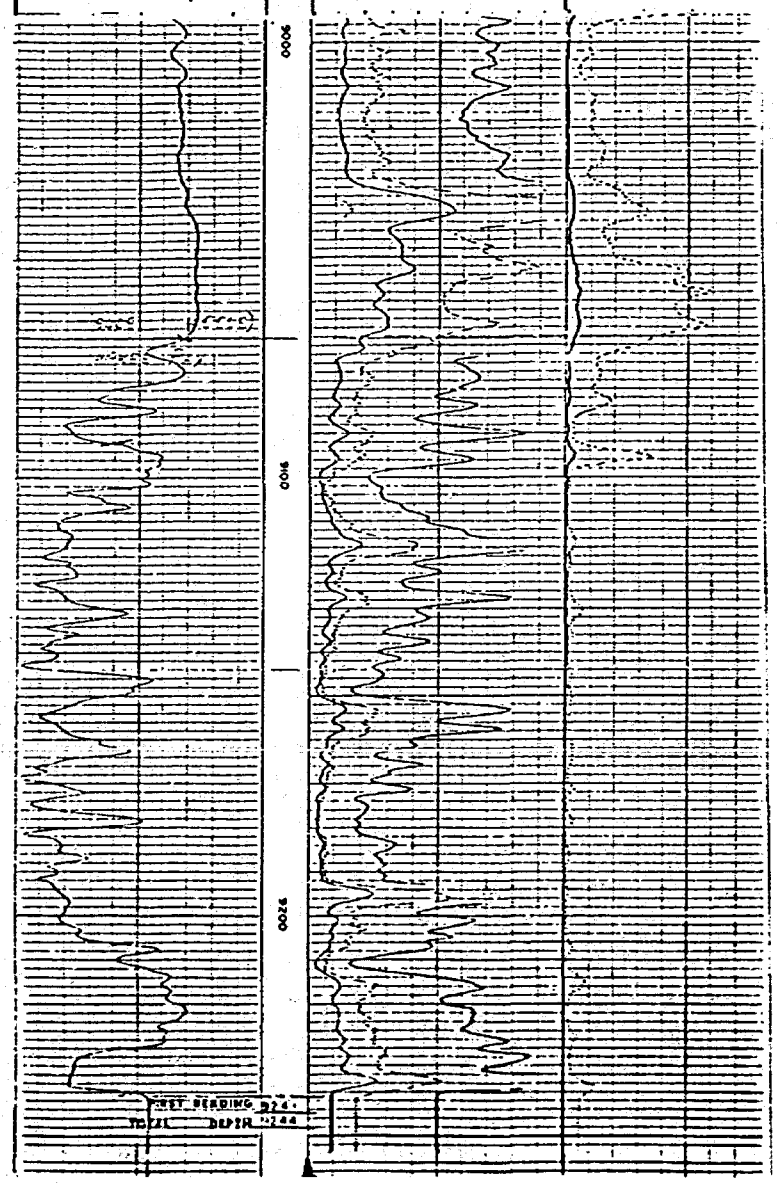


EXHIBIT 9J
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER — Electrical Log

COMPANY CONTINENTAL OIL

COMPANY

WELL SEMU McKEE 163

FIELD WARREN McKEE

LOCATION SEC. 19-20S-38E

COUNTY LEA

STATE NEW MEXICO

Other Surveys: HL

Location of Well: 1650' f N/L, 1650' f E/L

Elevation: D.F. 3556, K.B. —, or G.L. 3546

FILING No.

COUNTY Lea — FIELD or LOCATION Warren McKee — WELL Semu McKee #163 — COMPANY Continental Oil

SPONTANEOUS-POTENTIAL millivolts	SCALES	RESISTIVITY ohms. m²/m	RESISTIVITY ohms. m²/m
— 20 → +		10" NORMAL 0 — 200	19" LATERAL 0 — 500
		32" LIMESTONE 0 — 200	0 — 500

9100

9200

DRILLER DEPTH 9256

LOGGER DEPTH 9259

EXHIBIT 9K
Case 6131

SCHLUMBERGER WELL SURVEYING CORPORATION

SCHLUMBERGER

Electrical Log

COMPANY CONTINENTAL OIL

WELL SEMU MC KEE #71

FIELD N. MAHAREN MCKEE

LOCATION SEC. 18-20S-38E

COUNTY LEA

STATE NEW MEXICO

Location of Wall
1830' F EL
660' F SL
Sec. 18-20S-38E

Elevation: D.F. 3563
K.B.:
G.L.:

FILING No.

COUNTY LEA
FIELD or LOCATION N. MAHAREN MCKEE
WELL #71 SEMU
COMPANY CONTINENTAL OIL

SPONTANEOUS-POTENTIAL millivolts	SHOE	RESISTIVITY -ohms. m²/m	RESISTIVITY -ohms. m²/m
-115		0 10" Normal 100	2 16" Lateral 20
		0 1000	2 2000
		0 32"LS Lateral 50	

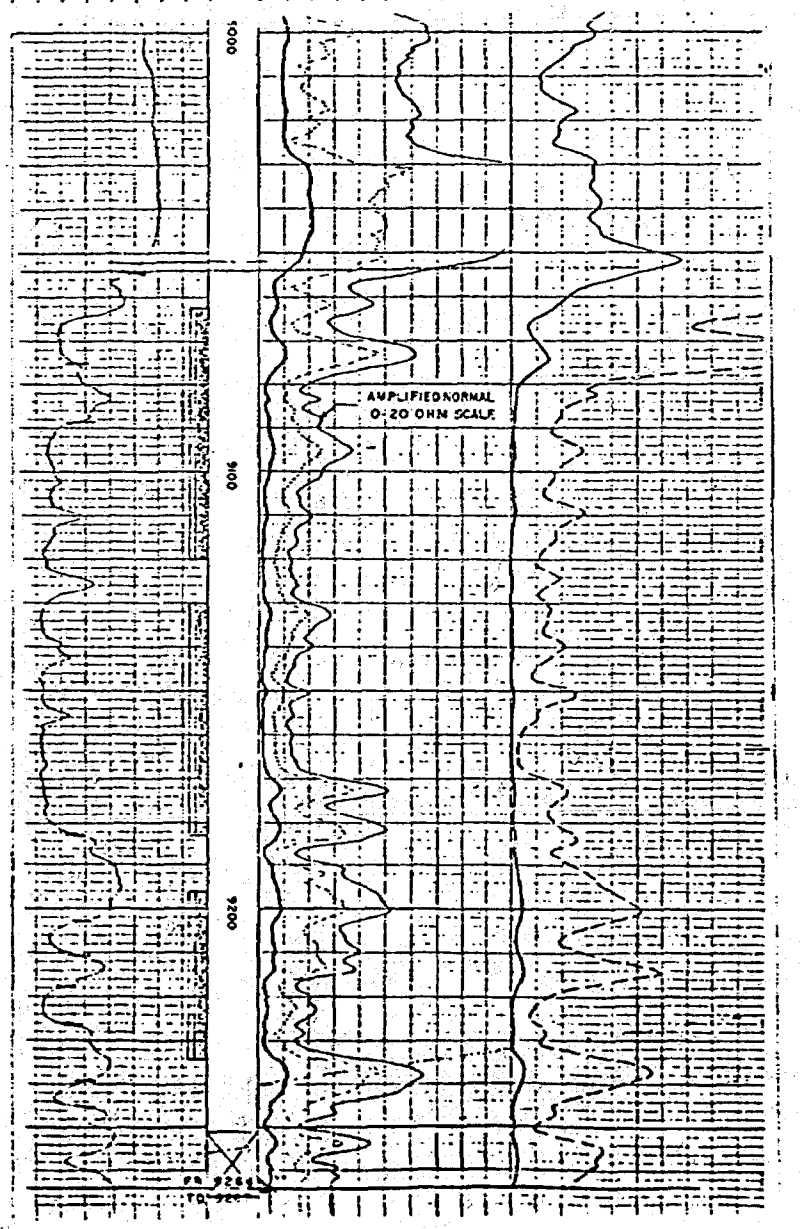
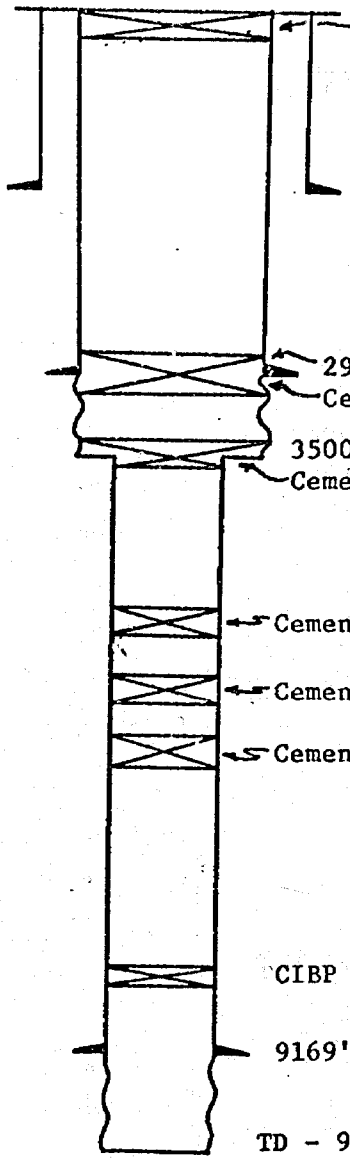


EXHIBIT 9L
Case 6181

Lea "BU" State
Elev: 3513' "0"-10' AGL

Elk 011
(drilled by Antweil)

330' FNL & 2307' FWL
Sec. 32, T20S, R38E



Cement plug: At surface, 10 sacks

307' - 13 3/8", 400 sacks circulated to surface

2991' - 8 5/8", 1800 sacks circulated to surface

Cement plug: At 2991', 20 sacks

3500' Top of pipe

Cement plug: At 3500', 20 sacks

Cement plug: 6250' - 5975', 35 sacks

Cement plug: 6450' - 6275', 20 sacks

Cement plug: 6700'-6500', 25 sacks

CIBP with 1 sack cement on top - 9088'-9102'

9169' - 5 1/2", 850 sacks TOC 4727' (Calculated)

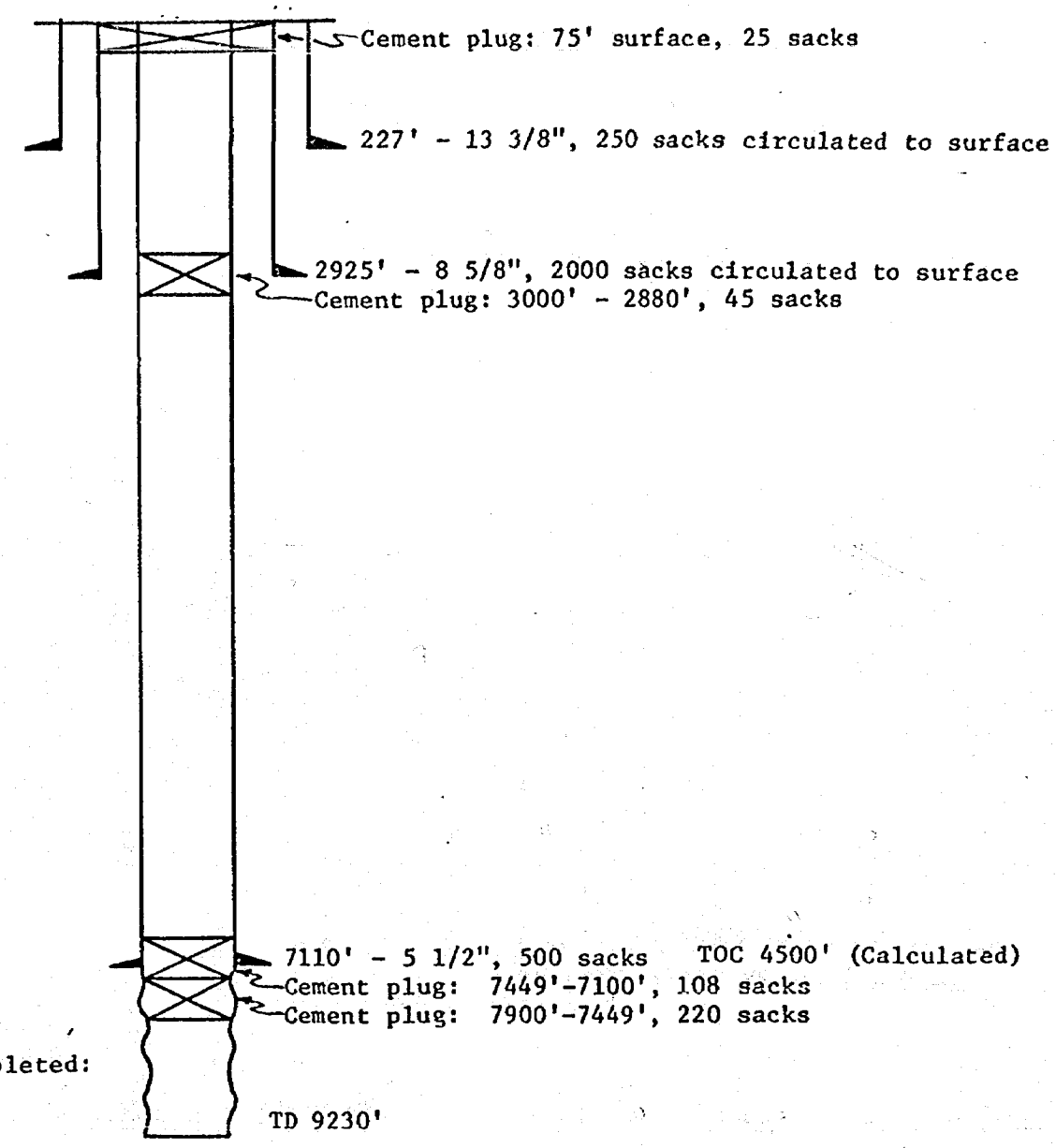
TD - 9170'

Plugging Completed:
4-4-68

EXHIBIT 10A
Case 6131

State "A" #1
330' FNL & 660' FWL, Sec 32, T20S, R38E
Elev: 3510' - "0" - 11' AGL

Elk Oil
(drilled by Shell)

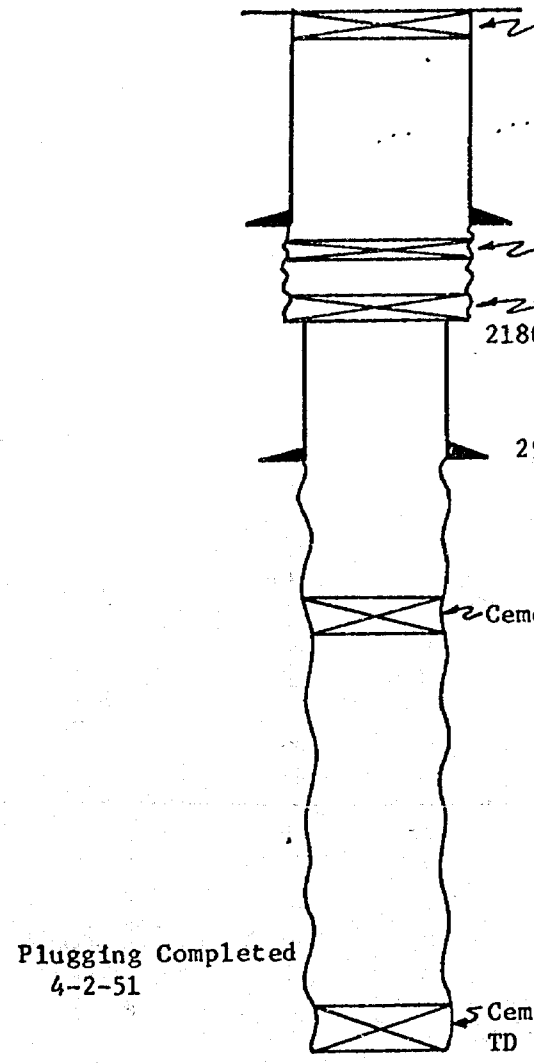


Plugging Completed:
7-5-52

EXHIBIT 10B
Case 6131

State No. 1
660' FNL & 660' FEL, Sec 32, T20S, R38E
Elev: 3510' "0" - 12' AGL

Exxon
(drilled by Tidewater)



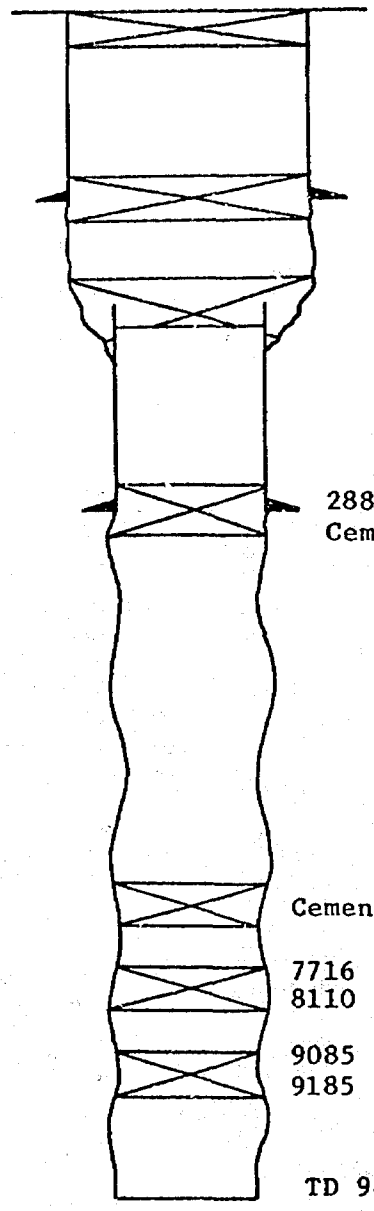
San Andres

Top Devonian	8035'
Top Fusselman	8415'
Top Montoya	8728'
Top Simpson	8950'
Top McKee	9237'

Well never shot or acidized

EXHIBIT 10C
Case 6131

Warren Unit McKee #5
1980' FNL & 660' FEL, Sec 29, T-20S, R-38E
Elev: 3548' "O" - 11' AGL



Cement plug: 65'-surface, 33 sacks

250' - 13 3/8", 250 sacks circulated to surface
Cement plug: 310'-210', 67 sacks

Cement plug: 510'-410', 77 sacks
470' - Top of pipe

2883' - 9 5/8", 500 sacks, top of cement at 776'
Cement plug: 2925'-2825', 50 sacks

Drinkard

Cement plug: 6750'-6650', 50 sacks

Devonian

7716
8110 200 sacks

McKee

9085
9185 70 sacks

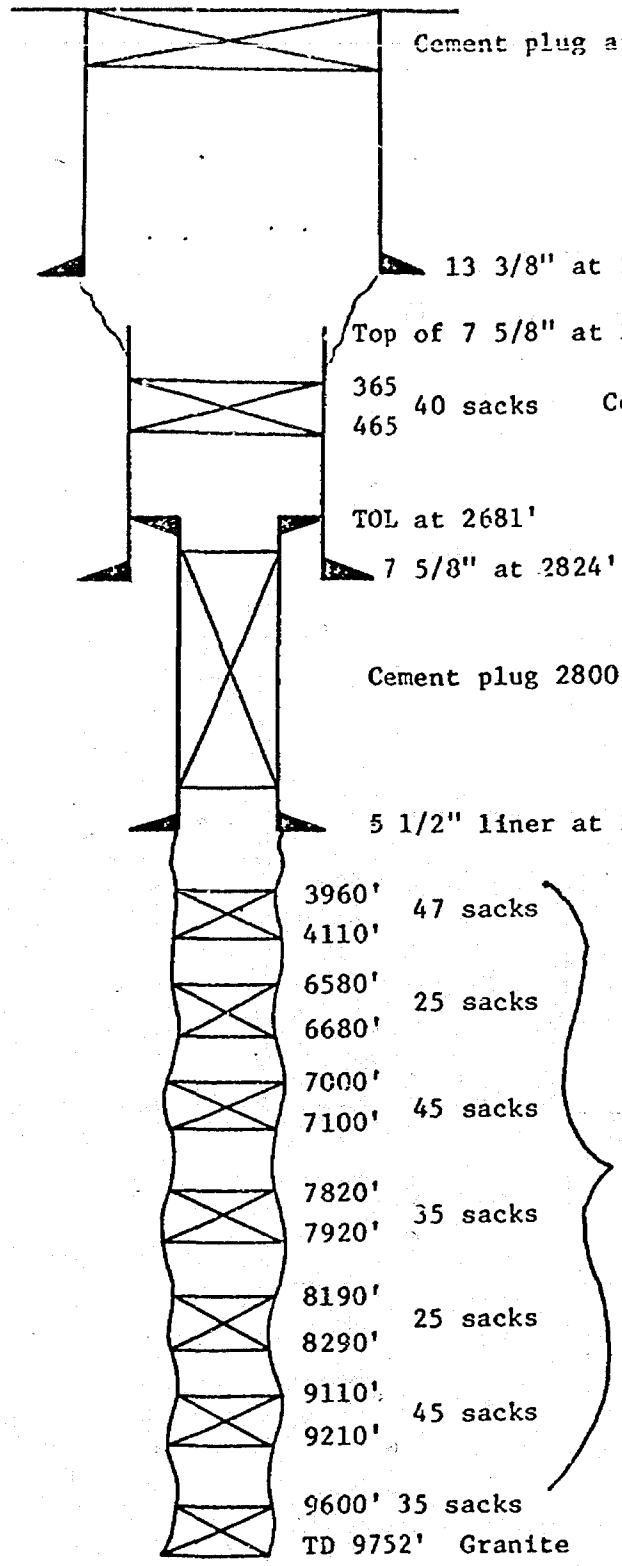
Cement Plugs

TD 9852'

Plugging Completed:
9-25-50

EXHIBIT 10D
Case 6131

SEMU McKee Well No. 12
1980' FNL & 660' FEL, Sec 30, T-20S, R-38E
Elev: 3539, "O" - 10' AGL



Cement plug at surface: 25 sacks

13 3/8" at 252', 250 sacks circ to surf

Top of 7 5/8" at 314' rest of casing junked in hole

365
465 40 sacks Cement Plug

TOL at 2681'

7 5/8" at 2824', 1044 sx, TOC 600' (temp survey)

Cement plug 2800 to 3700 (250 sacks)

5 1/2" liner at 3724 w/250 sacks

	3960'	47 sacks	Cement plugs
	4110'		
Drinkard	6580'	25 sacks	
	6680'		
	7000'		
Abo	7100'	45 sacks	
	7820'		
Devonian	7920'	35 sacks	
	8190'		
Fusselman	8290'	25 sacks	
	9110'		
Montoya	9210'	45 sacks	
McKee	9600'	35 sacks	

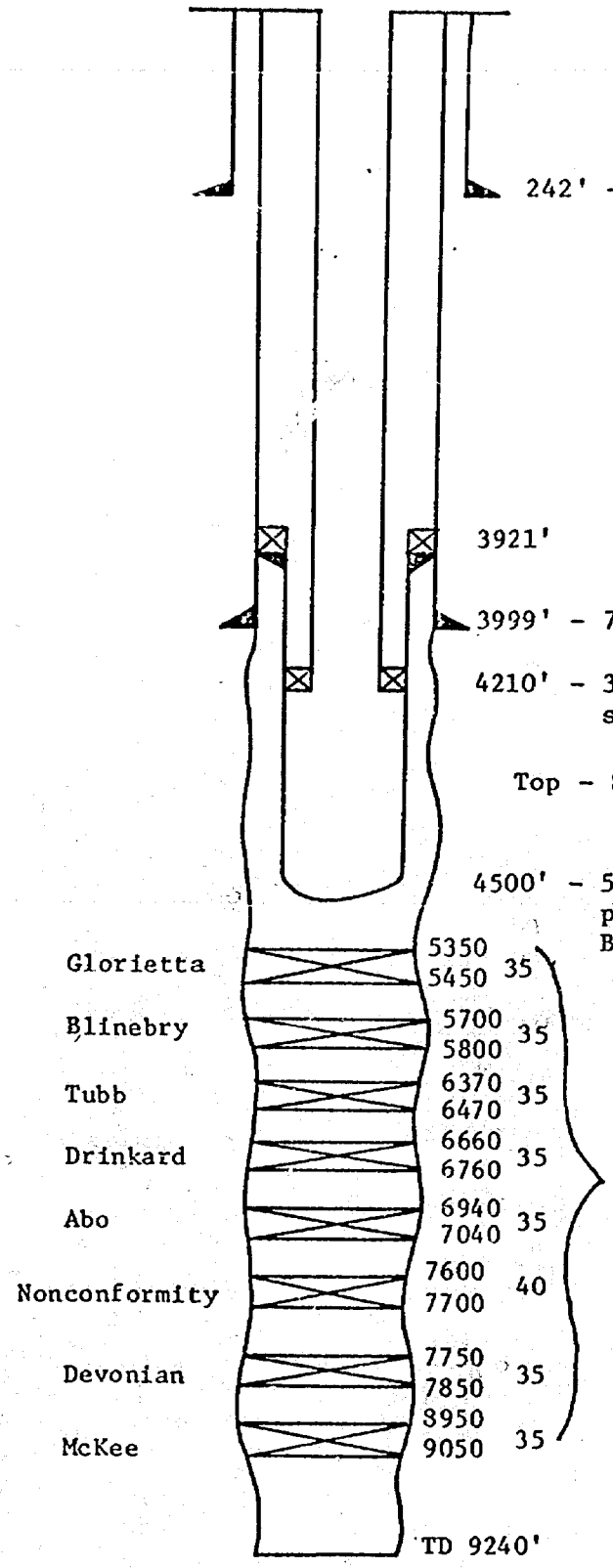
TD 9752' Granite

Well temporarily abandoned
2-8-51 as dry hole

P&A 1-22-58

EXHIBIT 10E
Case 6131

Warren Unit McKee No. 24
San Andres SWD Well
247' FSL & 3129' FWL, Sec 29, T20S, R38E
"O"-13' above BHF



242' - 10 3/4" OD, 250 sx, circ to surface

3921'

3999' - 7 5/8" OD, 2200 sx, TOC 1650'

4210' - 3 1/2" OD, 9.3# EUE plastic lined tubing w/Guiber shorty packer

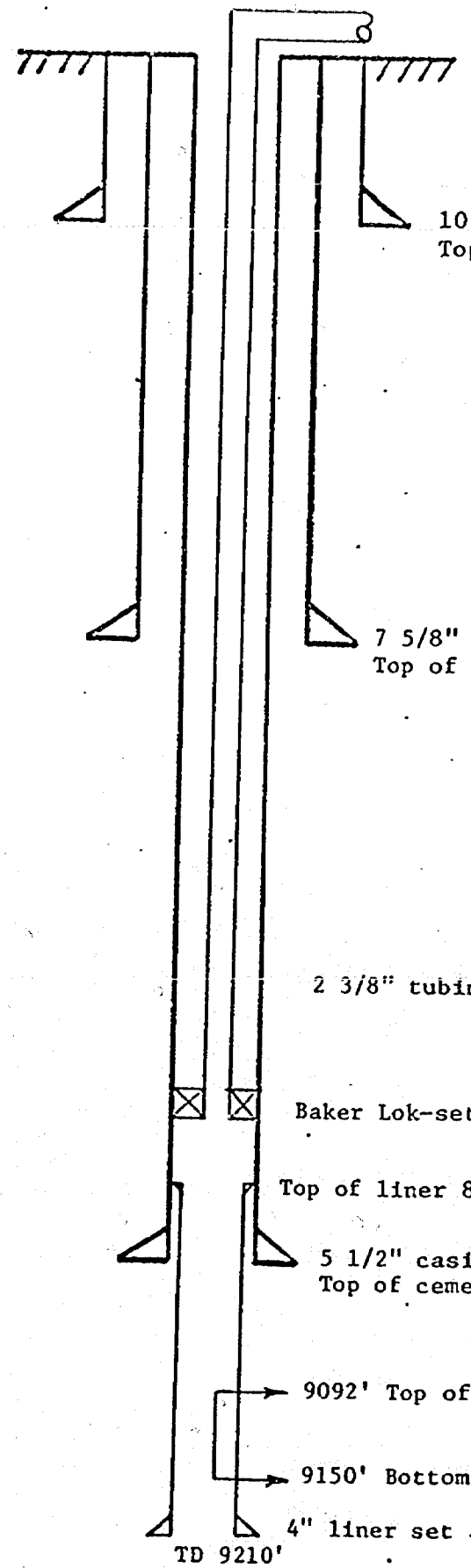
Top - San Andres - 4103'

4500' - 5 1/2" OD, 17# liner set 3921'-4500' - liner hanger & packer on top - floatshoe on bottom - liner not cmtd. Bottom liner - float shoe

Cement plugs

Well plugged, back w/8-100' plugs 9240'-5350'
April 22, 1958

EXHIBIT 11
Case 6151



10 3/4" casing set at 273' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3998' w/1875 sx of mixed cement.
Top of cement is at 1575'.

2 3/8" tubing set at 8970'

Baker Lok-set Packer set at 8970'

Top of liner 8983'

5 1/2" casing set at 9043' w/225 sx of common cement.
Top of cement is at 7850'

9092' Top of perfs

9150' Bottom of perfs

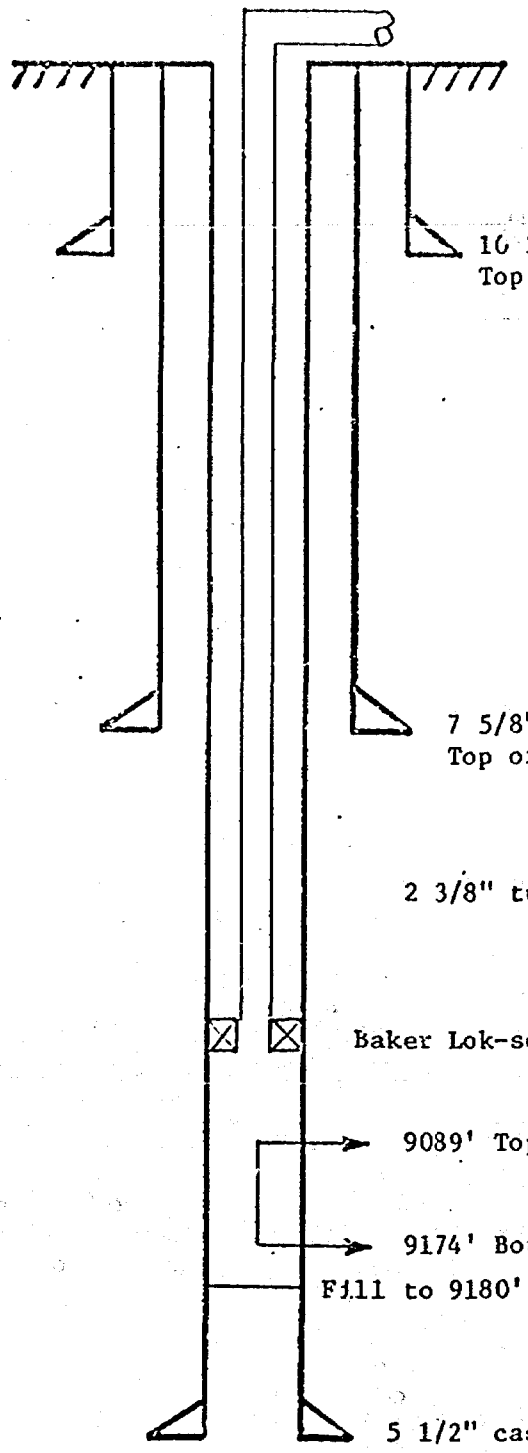
Perfs
9092'-9120', 9130'-50', 9165'-76',
9186'-90' w/4 SPF

4" liner set at 9200' w/25 sacks cement

TD 9210'

SEMU McKee No. 53
Warren McKee Simpson Pool
Unit E, Sec. 20, T20S, R38E
Elev: 3549 O/W 9149
10-3-77 MSR

EXHIBIT 12A
Case 6131



10 3/4" casing set at 260' w/250 sx of common cement.
Top of cement is at surface.

7 5/8" casing set at 4000' w/1630 sx of mixed cement.
Top of cement is at 1550'.

2 3/8" tubing set at 8980'

Baker Lok-set Packer set at 8980'

9089' Top of perfs

9174' Bottom of perfs

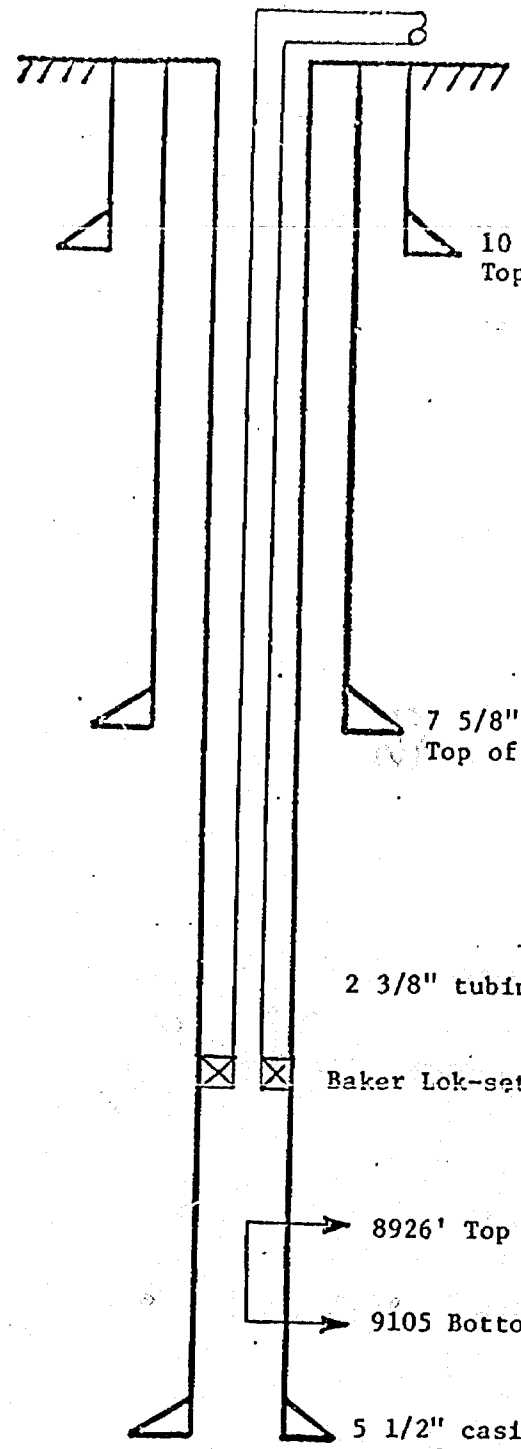
Fill to 9180'

Perfs
9089'-96', 9112'-27', 9135'-44',
9152'-58', 9166'-74' w/4 SPF

5 1/2" casing set at 9223' w/530 sx of mixed cement.
Top of cement is at 5385'. Total depth 9224'.

SEMU McKee No. 57
Warren McKee Simpson Pool
Unit I, Sec. 19, T20S, R38E
Elev: 3540 O/W 9140
10-3-77 MSR

EXHIBIT 12B
Case 6131



10 3/4" casing set at 255' w/250 sx cement.
Top of cement is at surface.

7 5/8" casing set at 4004' w/1800 sx cement.
Top of cement is at 1700'.

2 3/8" tubing set at 8820'

Baker Lok-set Packer set at 8820'

8926' Top of perfs

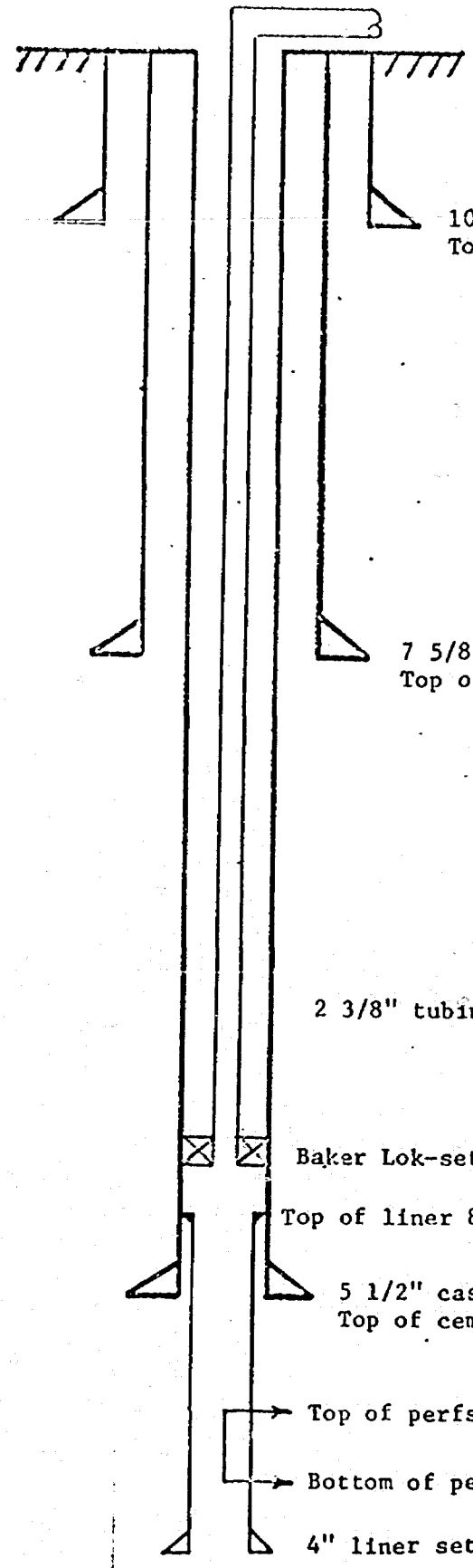
9105 Bottom of perfs

Perfs
8926'-31', 8947'-54', 8958'-65',
8970'-80', 8990'-98', 9005'-09',
9019'-33', 9055'-62', 9072'-79',
9099'-9105' w/4 SPF

5 1/2" casing set at 9119' w/525 sacks of cement.
Top of cement 4650'. Total depth 9120'.

SEMU McKee No. 58
Warren McKee Simpson Pool
Unit C, Sec. 29, T20S, R38E
Elev: 3537 O/W 9137
10-3-77 MSR

EXHIBIT 12C
Case 6131



10 3/4" casing set at 229' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3998' w/2000 sx of mixed cement.
Top of cement is at 1400'.

2 3/8" tubing set at 8900'

Baker Lok-set Packer set at 8900'

Top of liner 8960'

5 1/2" casing set at 9022' w/500 sacks of mixed cement.
Top of cement 5950'. Total depth 9210'.

Top of perfs 9060'

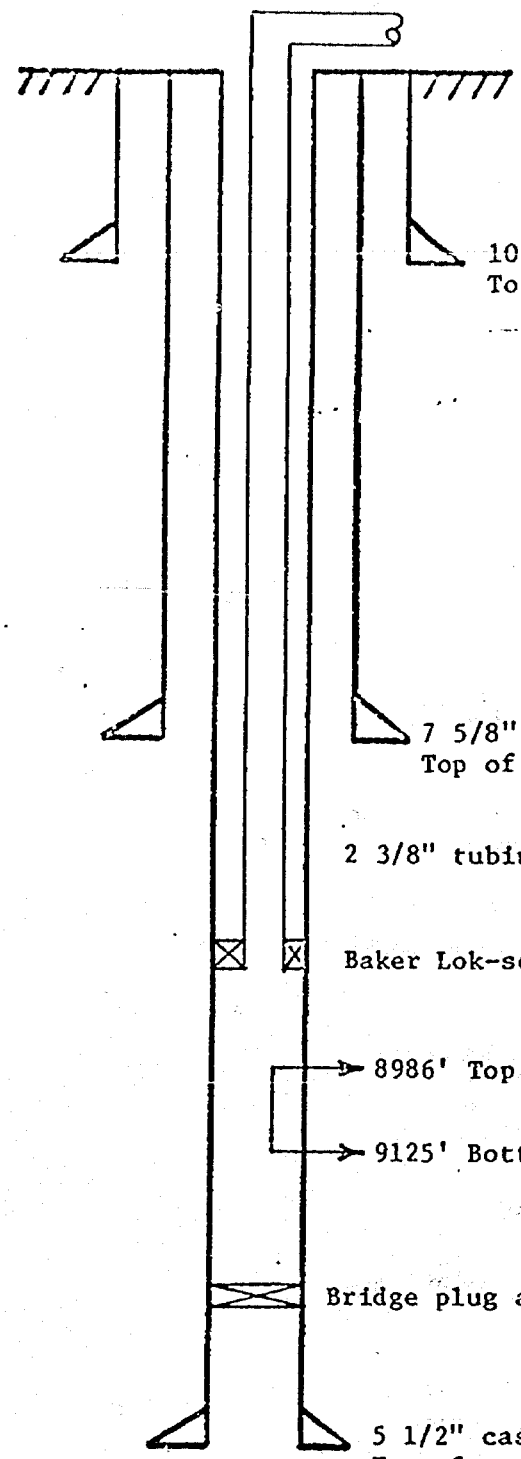
Bottom of perfs 9174'

4" liner set at 9210' w/15 sx

Perfs
9060'-87', 9106'-26',
9132'-39' & 9150'-74' w/4 SPF

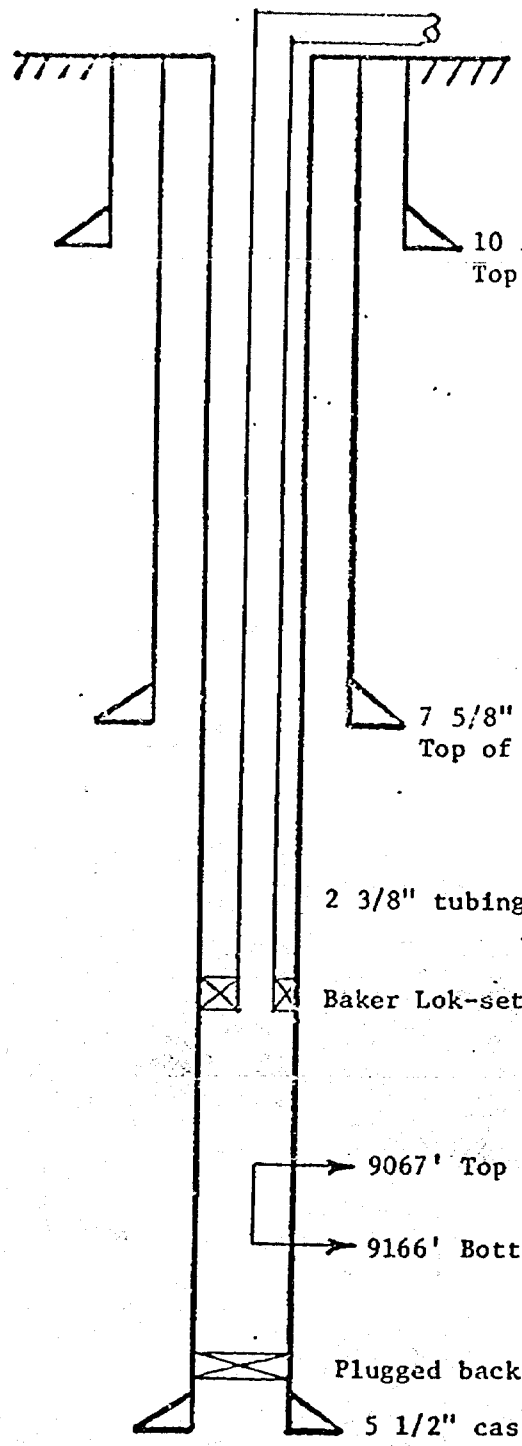
SEMU McKee No. 59
Warren McKee Simpson Pool
Unit M, Sec. 20, T20S, R38E
Elev: 3539 O/W 9139
10-3-77 MSR

EXHIBIT 12D
Case 6131



SEMU McKee No. 60
Warren McKee Simpson Pool
Unit E, Sec. 29, T20S, R38E
Elev: 3528 O/W 9128
10-3-77 MSR

EXHIBIT 12E
Case 6131



10 3/4" casing set at 255' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3999' w/1000 sx of Diacel "D" Cement.
Top of cement at 1500'.

2 3/8" tubing set at 8960'

Baker Lok-set Packer set at 8960'

9067' Top of perfs

9166' Bottom of perfs

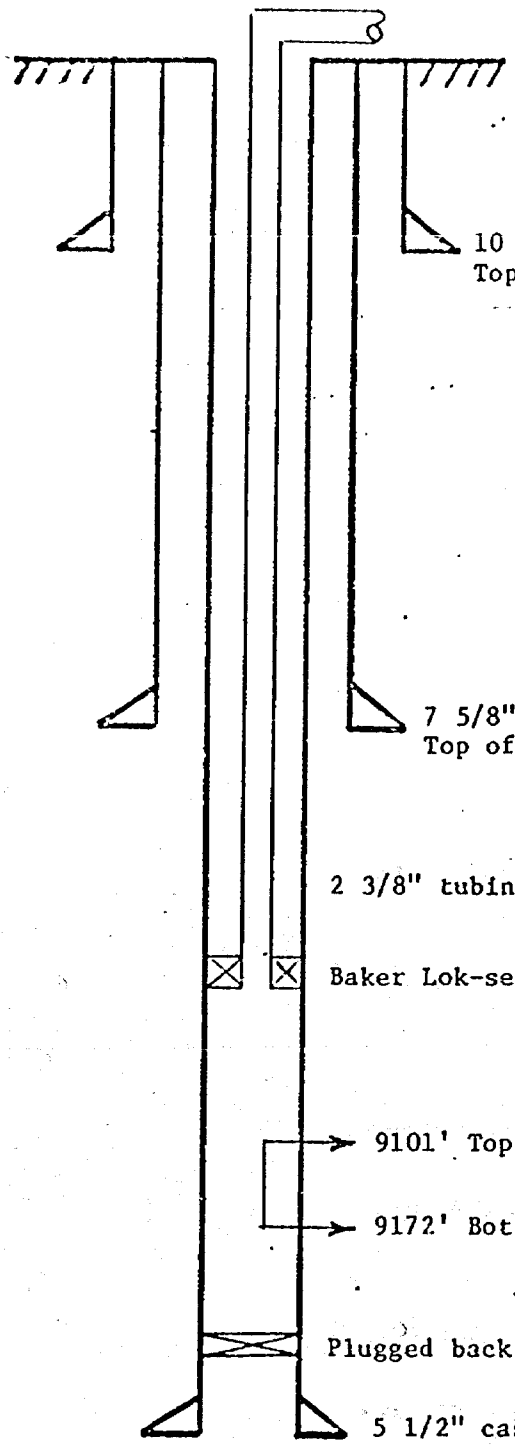
Perfs
9067'-70', 9076'-80', 9085'-91',
9103'-12, 9122'-23', 9132'-42',
9148'-56', & 9165'-66' w/4 SPF

Plugged back depth 9186'

5 1/2" casing set at 9236' w/310 sx of Diacel "D" Cement.
Top of cement at 6160'. Total depth 9250'.

SEMU McKee No. 62
Warren McKee Simpson Pool
Unit K, Sec. 20, T20S, R38E
Elev: 3552 O/W 9152
10-3-77 MSR

EXHIBIT 12F
Case 6131



10 3/4" casing set at 259 w/285 sx common cement.
Top of cement at surface.

7 5/8" casing set at 3995' w/3200 sx of Pozmix Cement.
Top of cement at 1300'.

2 3/8" tubing set at 9000'

Baker Lok-set Packer set at 9000'

9101' Top of perfs

9172' Bottom of perfs

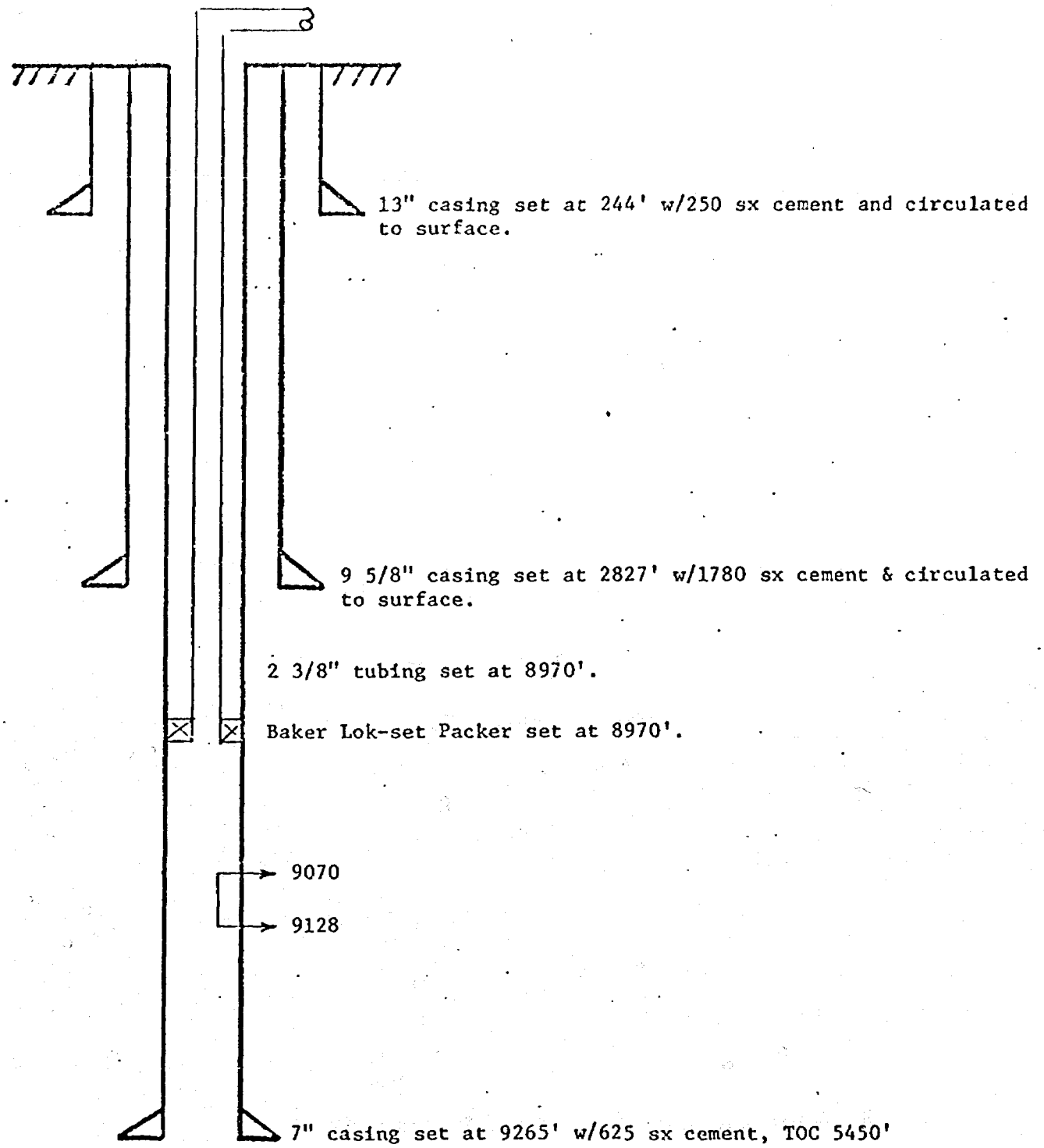
Perfs
9106', 9130', 9153', 9172' w/6 SPF

Plugged back total depth 9211'

5 1/2" casing set at 9250' w/600 sx Pozmix Cement.
Top of cement is at 5100'. Total depth is 9250'

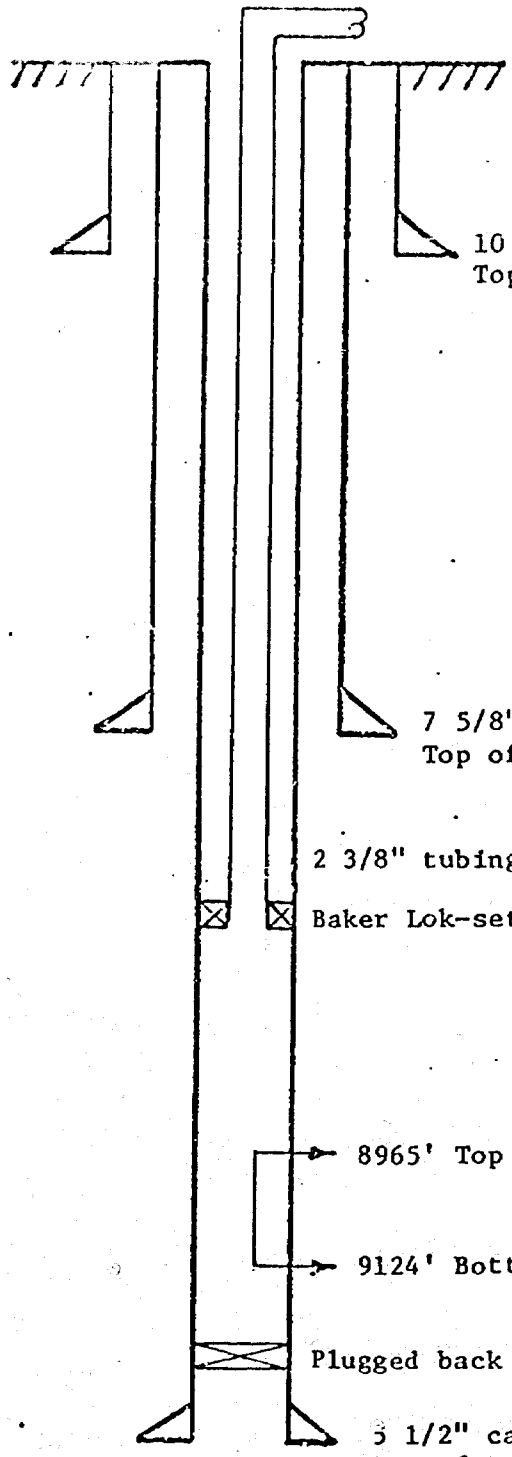
SEMU McKee No. 63
Warren McKee Simpson Pool
Unit G, Sec. 19, T20S, R33E
Elev: 3546 O/W 9146
10-3-77 MSR

EXHIBIT 12G
Case 6131



SEMU McKee No. 71
Warren McKee Simpson Pool
Unit O, Sec. 18, T20S, R38E
Elev: 3552 O/W 9152
10-3-77 MSR

EXHIBIT 12H
Case 6131



10 3/4" casing set at 256' w/250 sx of common cement.
Top of cement at surface.

7 5/8" casing set 3998' w/700 sacks of Diacel "D" cement.
Top of cement 1375'.

2 3/8" tubing set at 8860'

Baker Lok-set Packer set at 8860'

8965' Top of perfs

9124' Bottom of perfs

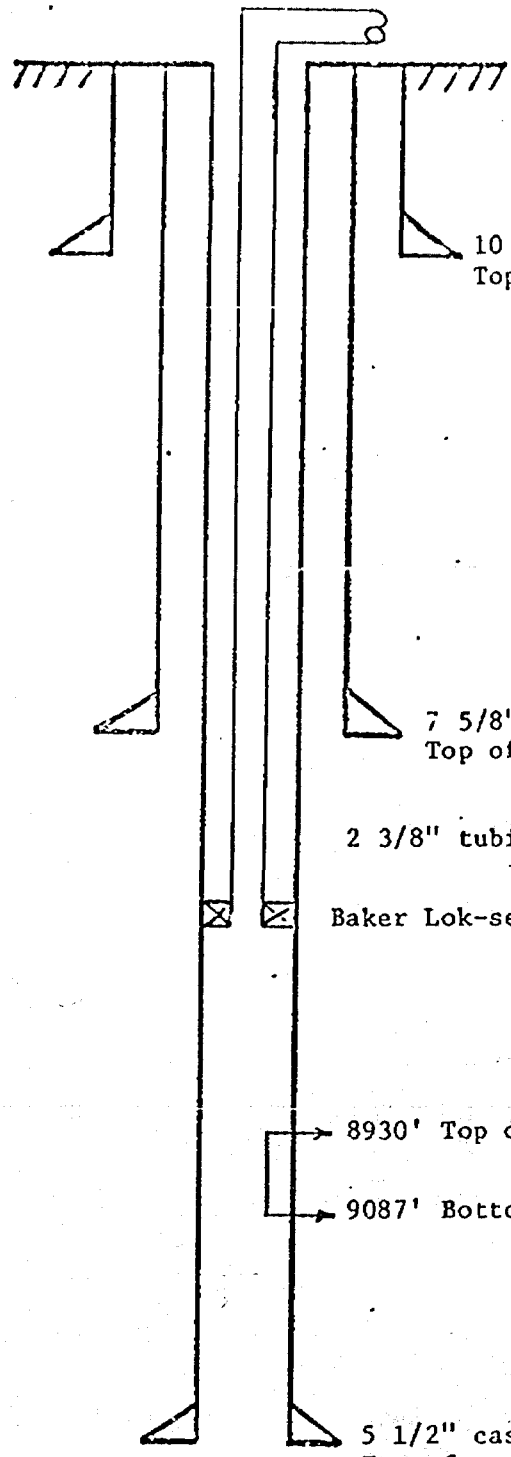
Plugged back total depth 9161'

5 1/2" casing set at 9195' w/230 sx Diacel "D" cement.
Top of cement 5450'. Total depth 9200'.

Original Perforations
8965', 8978', 8998', 9025', 9035',
9049', 9071', 9108' & 9123'
6-59 Sand fraced w/47,300 gals.
& 3700 lbs.
4-62 Cleaned out to 9161'.

WARREN UNIT No. 22
WARREN McKEE SIMPSON POOL
Unit K, Sec. 29 T20S R38E
Elev. 3532' O/W 9132'
10-3-77 MSR

EXHIBIT 12I
case 6131



10 3/4" casing set at 279' w/250 sx common cement.
Top of cement is at surface.

7 5/8" casing set at 3999' w/2660 sx Diamix Cement.
Top of cement is at 1540'.

2 3/8" tubing set at 8830'

Baker Lok-set Packer set at 8830'

8930' Top of perfs

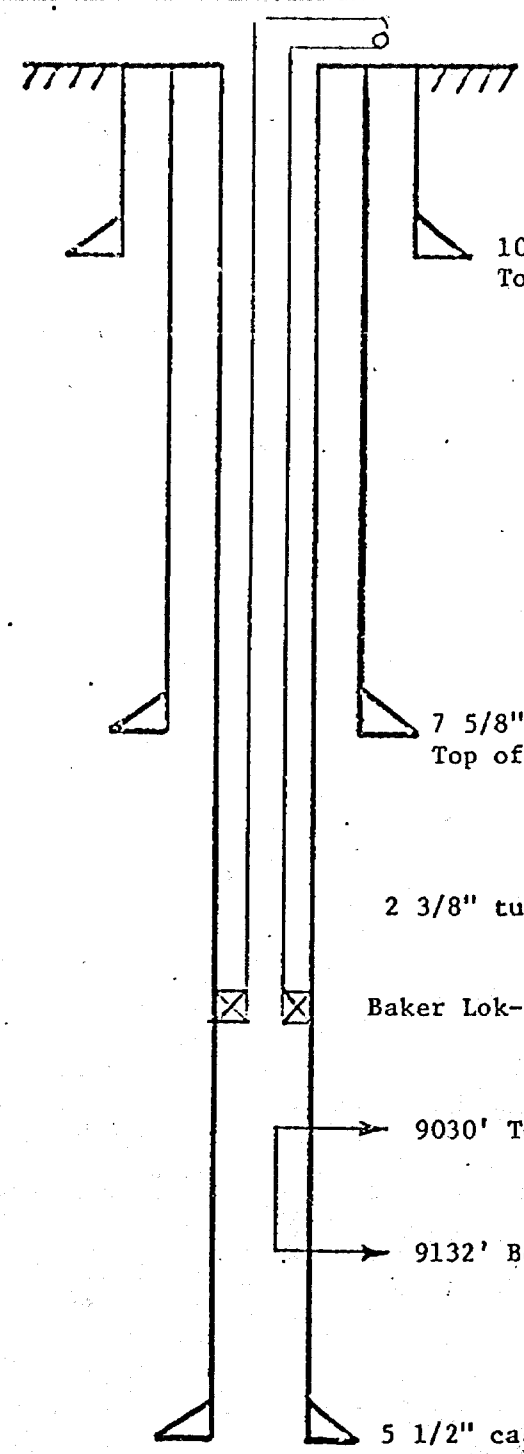
9087' Bottom of perfs

5 1/2" casing set at 9198' w/260 sx Diacel "D" Cement.
Top of cement is at 4675'.

Original Perfs
8930', 8955', 8978', 8994', 9027',
9065', 9087', w/8 shots

Warren Unit No. 23
Warren McKee Simpson Pool
Unit G, Sec. 29, T20S, R38E
Elev 3535' O/W 9135'
10-3-77 MSR

EXHIBIT 12J
Case 6131



10 3/4" casing set at 263' w/250 sx of common cement.
Top of cement is at surface.

7 5/8" casing set at 4000' w/3350 sx of cement.
Top of cement is at 1575'

2 3/8" tubing set at 8930'

Baker Lok-set Packer set at 8930'

9030' Top of perfs

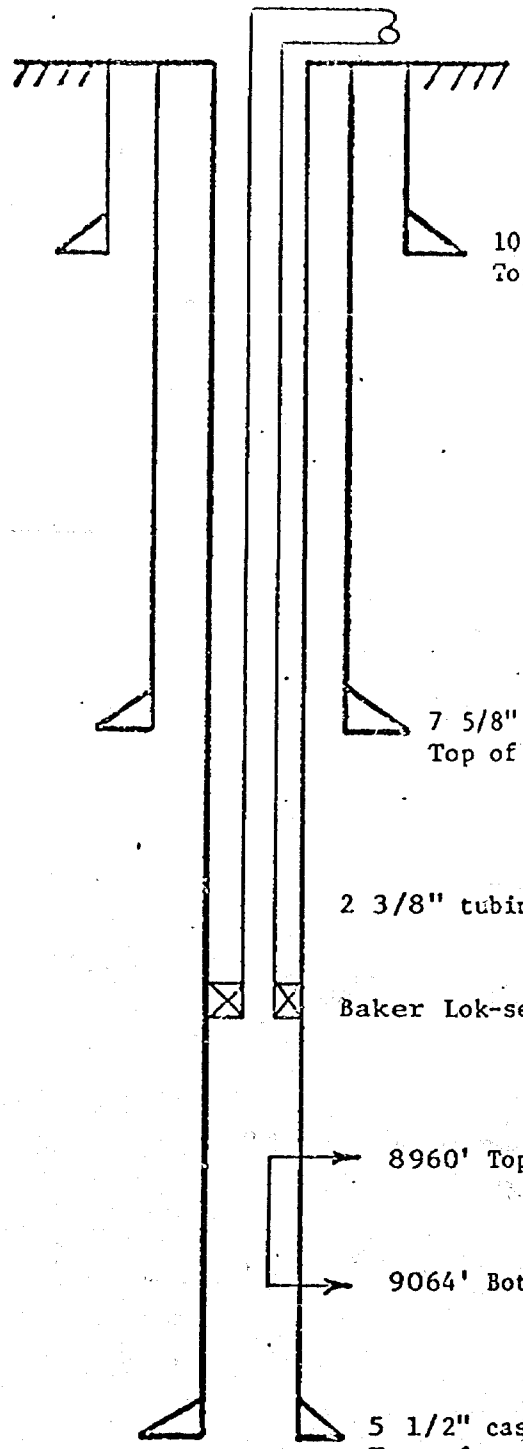
9132' Bottom of perfs

5 1/2" casing set at 9215' w/675 sx pozmix cement.
Top of cement at 5700'. Total depth 9218'.

Original Perfs
9030'-32', 9053'-55', 9070'-72',
9092'-94', 9104'-06', 9188'-20',
9130'-32'

Warren Unit No. 25
Warren McKee Simpson Pool
Unit O, Sec. 29, T20S, R38E
Elev 3515' O/W 9115
10-3-77 MSR

EXHIBIT 12K
Case 6131



10 3/4" casing set at 260 w/300 sx common cement.
Top of cement is at surface.

7 5/8" casing set at 3999' w/1550 sx pozmix cement.
Top of cement is at 1010'

2 3/8" tubing set at 8860'

Baker Lok-set Packer set at 8860'

8960' Top of perfs

9064' Bottom of perfs

Perfs
8960'-66', 8982'-90', 8998'-9002',
9012'-22', 9034'-48', 9058'-64'

5 1/2" casing set at 9108' w/475 sx mixed cement.
Top of cement is at 3885'. Total depth is 9133'.

Warren Unit No. 27
Warren McKee Simpson Pool
Unit O, Sec. 20, T20S, R38E
Elev: 3545' O/W 9145
10-3-77 MSR

EXHIBIT 12L
Case 6131

Operator	Well (McKee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Conoco	Warren Unit No. 3 (open hole)	1980' FSL & 1980' FEL Sec. 29, T-20S, R-38E	9070'	13 3/8" 9 5/8" 7"	262' 2989' 8947'	250 625 900	Surface 1600' 4330'
	Warren Unit No. 6 (9016'-9093')	660' FSL & 1980' FWL Sec. 29, T-20S, R-38E	9160'	10 3/4" 7 5/8" 5 1/2"	243' 2893' 9159'	200 1145 220	Surface 800' 4650'
	Warren Unit No. 7 (S926'-9094')	660' FNL & 1980' FEL Sec. 29, T-20S, R-38E	9145'	10 3/4" 7 5/8" 5 1/2"	286' 2859' 9144'	225 940 207	270' 850' 5975'
	Warren Unit No. 22 Injector for Warren McKee Waterflood	2090' FSL & 2090' FWL Sec. 29, T-20S, R-38E	9200'	10 3/4" 7 5/8" 5 1/2"	256' 3998' 9195'	250 700 230	Surface 1375' 5450'
OK	Warren Unit No. 24 (McKee plugged & not perforated)	24' FSL & 2145' FEL Sec. 29, T-20S, R-38E SWD	9240' PB-5350'	10 3/4" 7 5/8" 5 1/2"	242' 3999' 4500'	250 2300 70	Surface 1650' 1650'
	Warren Unit No. 28 (9020'-9138')	1980' FSL & 2310' FEL Sec. 20, T-20S, R-38E	9218' PB-9110'	13 3/8" 9 5/8" 7"	250' 3000' 9217'	300 1550 550	Surface 1100' 5950'
	SEMU Burger No. 21 (McKee plugged & not perforated)	660' FSL & 1980' FEL Sec. 19, T-20S, R-38E	9731' PB-7250'	13 3/8" 9 5/8" 7"	250' 3697' 8000'	250 940 730	Surface 1125' 3728'
	SEMU Warren No. 10 (8979'-9150')	1980' FNL & 1980' FWL Sec. 29, T-20S, R-38E	9391' PB-9150'	13 3/8" 9 5/8" 7"	226' 2906' 9145'	250 500 900	Surface 1989' 4665'
✓	Warren Unit No. 4 (9046'-9144')	1980' FSL & 660' FWL Sec. 29, T-20S, R-38E	9230' PB-9220'	13 3/8" 9 5/8" 7"	254' 2024' 286'	250 1915 286	Surface 400' 7300'

EXHIBIT 13
Case 6131

EXHIBIT 13 Contd.

Operator	Well (McKee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Amerada	Warren McKee Unit No. 110 (9054'-9160')	1980' FNL & 1880' FEL Sec. 18, T-20S, R-38E	9230'	13 3/8" 8 5/8" 5 1/2"	295' 3708' 9230'	200 1500 600	Surface 1164' 6270'
	Warren McKee Unit No. 111 (9040'-9130')	1980' FSL & 660' FEL Sec. 18, T-20S, R-38E	9228' PB-9215	13 3/8" 8 5/8" 5 1/2"	297' 3702' 9228'	150 1500 600	Surface 1180' 5893'
	Warren McKee Unit No. 112 (9095'-9165' & 9236'-9256' squeezed)	1980' FNL & 2317' FWL Sec. 18, T-20S, R-38E	9300' PB-9220	13 3/8" 8 5/8" 5 1/2"	296' 3705' 9300'	300 1500 600	Surface 840' 5575'
	Warren McKee Unit No. 113 (9045'-9135')	660' FSL & 660' FEL Sec. 18, T-20S, R-38E	9200' DOD-9196	13 3/8" 8 5/8" 5 1/2"	299' 3703' 9198'	225 1500 600	Surface 1224' 6295'
	Warren McKee Unit No. 114 (9040'-9135')	660' FNL & 660' FEL Sec. 19, T-20S, R-38E	9325'	13 3/8" 8 5/8" 5 1/2"	256' 3702' 9323'	250 1500 600	Surface 1980' 6450'
	Warren McKee Unit No. 117 (9068'-9158')	1980' FNL & 660' FEL Sec. 18, T-20S, R-33E	9475' DOD-9312	13 3/8" 8 5/8" 5 1/2"	258' 3703' 9368'	200 1700 600	Surface 1192' 4422'
	Warren McKee Unit No. 119 (9080'-9160')	1980' FSL & 1880' FEL Sec. 18, T-20S, R-38E	9240' DOD-9235 PB-9143	13 3/8" 8 5/8" 5 1/2"	285' 3702' 9240'	200 1700 600	Surface 1285' 5826'
	Warren McKee Unit No. 132 (9040'-9131')	560' FNL & 560' FWL Sec. 20, T-20S, R-38E	9206'	13 3/8" 8 5/8" 5 1/2"	258' 3703' 9204'	275 1500 600	Surface 2026' 4725'
	Warren McKee Unit No. 141 (9012'-9048')	660' FSL & 660' FWL Sec. 17, T-20S, R-38E	9429'	13 3/8" 8 5/8" 5 1/2"	258' 3830' 9300'	275 1500 500	Surface 1200' 5081'

EXHIBIT 13 Concl.

Operator	Well (Mckee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Amerada	Warren McKee Unit No. 142 (8996'-9085')	1980' FSL & 660' FWL Sec. 17, T-20S, R-38E	9270'	13 3/8"	296'	250	Surface
				8 5/8"	3710'	1500	1050'
				5 1/2"	9270'	1000	3727'
Elk Oil	Lea B. U. State No. 1* (Shown on Schematic)	330' FNL & 2307' FWL Sec. 32, T-20S, R-38E	9170'	13 3/8"	307'	400	Surface
				8 5/8"	2991'	1800	Surface
				5 1/2"	9159'	850	2669'
	State "A" No. 1* (Shown on Schematic)	330' FNL & 660' FWL Sec. 32, T-20S, R-38E	9230'	13 3/8"	227'	250	Surface
				8 5/8"	2925'	2000	Surface
				5 1/2"	7110'	500	3302'
Exxon	State No. 1* (Shown on Schematic)	660' FNL & 660' FEL Sec. 32, T-20S, R-38E	9355'	13 3/4"	262'	200	Surface
				8 5/8"	2931'	100	400'
Conoco	Warren McKee Unit No. 5* (Shown on Schematic)	1980' FNL & 660' FEL Sec. 29, T-20S, R-38E	9852'	13 3/8"	250'	250	Surface
				9 5/8"	2883'	500	776'
	SEMU McKee No. 11 (9110'-9148')	660' FNL & 660' FWL Sec. 29, T-20S, R-38E	9235' PB-9150'	13 3/8"	252'	250	Surface
				9 5/8"	2834'	1750	405'
				7"	9320'	830	5200'
	SEMU Burger No. 13 (8992'-9142') Bridge plug at 7000'	660' FSL & 1980' FWL Sec. 20, T-20S, R-38E	9197' PB-9042'	10 3/4"	264'	250	Surface
				7 5/8"	2849'	1420	635'
				5 1/2"	9197'	260	5100'
	SEMU McKee No. 50 (9072'-9179')	1980' FSL & 660' FWL Sec. 20, T-20S, R-38E	9232'	10 3/4"	272'	250	Surface
				7 5/8"	4039'	2100	1567'
				5 1/2"	9232'	770	5150'
	SEMU McKee No. 51 (9022'-9110')	1650' FNL & 330' FEL Sec. 19, T-20S, R-38E	9220' PB-9218'	10 3/4"	258'	250	Surface
				7 5/8"	3998'	2500	1555'
				5 1/2"	9218'	440	5600'
	SEMU McKee No. 72 (9093'-9144')	330' FNL & 1650' FEL Sec. 19, T-20S, R-38E	9250' PB-9155'	10 3/4"	250'	250	Surface
				7 5/8"	3009'	887	1525'
				5 1/2"	9249'	370	5185'

*Plugged and abandoned, see attached wellbore schematics

Operator	Well (McKee Production Interval)	Location	T.D.	Casing		Cement	
				Size	Depth	Sacks	Top
Conoco	SEMU McKee No. 12* (9160' - 9228')	1980' FNL & 660' FEL Sec 30, T-20S, R-38E	9752'	13 3/8"	252'	250	Surface
				7 5/8"	2824'	1044	600'
				5 1/2"Liner	3724'	250	

*Plugged and Abandoned

3.

CONOCO ANALYSIS FORM

CONOCO

HOBBS PRODUCTION DIVISION
WATER ANALYSIS REPORT FORM

LABORATORY United Chemical Corporation

FIELD Warren McKee LEASE Prod. Treater Water Dump WELL NO. _____

DATE SAMPLED 9-16-76 DATE ANALYZED 9-22-76

	meq/L	mg/L
CATIONS		
CALCIUM (Ca++)	770.00	15,400
MAGNESIUM (Mg++)	342.00	4,104
SODIUM (Na+)	1,856.51	42,681
R° - 0.06 @ 76°F	Fe -	63
ANIONS		
BICARBONATE (HCO_3^-)	.70	43
SULFATE ($SO_4^=$)	6.81	327
CHLORIDE (Cl-)	2,961.00	105,000
TOTAL DISSOLVED SOLIDS		167,555

OTHERS

pH 5.6 SP GR 1.115

TEMP 30 °C SUSP SOLIDS _____

SCALING INDEX (CIRCLE ONE)

CALCIUM CARBONATE POSITIVE (NEGATIVE) (-1.02)

CALCIUM SULFATE POSITIVE (NEGATIVE) (-1.95)

cc: Paul Adams ✓
Dave Edmonds
Jim Sealy
Pacho Jara
Cy Foster

Elizabeth Wesley
SIGNATURE ANALYST

EXHIBIT 14 case 6131

CONOCO ANALYSIS FORM

CONOCO

HOBBS PRODUCTION DIVISION
WATER ANALYSIS REPORT FORM

Bacteria ?

LABORATORY United Chemical Corporation

FIELD ____ LEASE City of Hobbs water (Taken from filters) WELL NO. ____

DATE SAMPLED 12-2-76 DATE ANALYZED 12-3-76

	meq/L	mg/L
CATIONS		
CALCIUM (Ca++)	3.40	68
MAGNESIUM (Mg++)	3.00	36
SODIUM (Na+)	7.05	162
Iron		0.38
ANIONS		
BICARBONATE (HCO_3^-)	6.60	403
SULFATE ($SO_4^=$)	3.41	164
CHLORIDE (Cl^-)	3.44	122
TOTAL DISSOLVED SOLIDS		955

OTHERS

pH 7.7 SP GR 1.000

TEMP 30 °C SUSP SOLIDS ____

SCALING INDEX (CIRCLE ONE)

CALCIUM CARBONATE (POSITIVE) 0.80 NEGATIVE

CALCIUM SULFATE POSITIVE (NEGATIVE)

cc: B. Branch
Paul Adams
Dave Edmonds
Pacho Jara

Lucille Little
SIGNATURE ANALYST

U-LAB-14

EXHIBIT 15
Case 6131

DISCUSSION

Water Compatibility

When serious plans for this waterflood project began some four years ago compatibility tests were run on McKee water and various produced waters which were available. When McKee water is mixed with any of the produced waters an instantaneous reaction occurs with the water turning black due to the formation of iron sulfide. This reaction is the result of iron ions in the McKee water and the sulfide ions in any produced water in the nearby area.

It became necessary, therefore, to find a sulfide-free water for injection. Fresh water sources were not readily available but we found that sewage effluent from the Hobbs water treatment plan was available in the required quantities and satisfied our requirement of an absence of the sulfide ion.

The next problem was to find a satisfactory method of treating the sewage water for removal of solids and other contaminants which might plug the formation. After about three years of working with our production research group in Ponca City and with various commercial laboratories and manufacturers we have found methods and equipment to treat the water to our specifications.

Water analysis of the McKee produced water and the City of Hobbs secondary treatment plant effluent have been obtained periodically from early 1976. Almost all of these samples have shown the scaling index to be nearly negative or less than 0.5. Even after mixing the waters at various ratios the scaling indices still indicate less than 0.6. For example, a 50/50 mixture has a scaling index of 0.05 at 122°F.

Although these tests indicate the probability that scaling will not occur, a scale inhibition program will be developed to prohibit any possibility of Ca SO_4 (calcium sulfate) or Mg SO_4 (magnesium sulfate) formation either in flow lines or in the reservoir. Poly phosphonate compounds will be the method of protection and will be added to the fresh water inlet at the brine mixing tank near the water supply transfer point located in the NW/4 SW/4 of Section 2, T-20S, R-38E. The amount of chemical needed will be very low considering the very low scaling index of the mixed waters.

Further piping system protection and ultimate reservoir protection will be provided by the addition at the injection station of a chemical oxygen stripper compatible with the reservoir characteristics or any chemicals injected upstream of the Injection Station located in the SW/4 SW/4 of Section 20, T-20S, R-38E. The positive pressure protection provided by gas blankets will be utilized in the surge and pump suction tanks at the injection station to further prevent oxygen absorption in the injection waters.

The City of Hobbs sewage effluent water supply will not be injected in the McKee reservoir as fresh water. A well is proposed for the Salado salt zone that will be used as a brine generation facility. A saturated salt brine will be produced by circulating approximately 1/8 to 1/5 of the daily flood injection volume through the Salado well (known as Warren McKee Brine Lease, Well No. 1 located in the SW/4 SW/4 of Section 2, T-20S, R-38E), this brine will then be mixed with the remaining supply water and pumped to the Warren-McKee Waterflood Injection Station. The brine well will be located 1800' south of the City of Hobbs effluent transfer point.

The resulting injection quality brine will be maintained at no less than 25,000 parts per million chloride ions by means of control valves operating on signals sent by a continuous operating salinity monitor. The resolution of the instrument is approximately 1000 ppm and should be able to provide a brine of sufficient quality to curtail any fresh water sensitivity of the clay fines in the McKee sand.

Suspended solids will be removed down to 5-10 microns by a bank of automatically backwashable filters. These filters are in a parallel configuration and are therefore backwashed one at a time on a cyclic process initiated by a preset pressure differential between inlet and outlet filter bank flows. Coagulation or floculation of any particulate matter is enhanced by the addition of salt brine, an already inherent part of the supply system. Any additional chemical or physical floculation aids will not be necessary.

Sand Control

The producing wells will undergo sand consolidation treatment after initial injection has begun. It is not absolutely essential that BHP be increased before consolidation workovers can begin, since tools are now available that can provide circulation during mechanical sand consolidation processes. A gravel packing operation using perforated screens and graded mesh sands will be used to curtail and control potential sand production in the McKee producing wells.

Sand consolidation will also be considered for the injectors if backwashing is necessary for wellbore cleanup.

PLAN OF OPERATIONS

Injection

Injection rates for each well will be continuously monitored by computer interlock, gathered data will be used to detect any decrease or increase in the planned 2000 BPD rate per well. Wellhead tubing and annular pressures will be checked by field personnel on a daily basis during a proposed period of pilot operation. Annular space will be protected to the surface with a conventional pre-mixed packer fluid consisting of a biocide, a corrosion inhibitor, an oxygen scavenger, a pH adjustment chemical, and a non-reactive Kcl water.

All buried lines will be plastic lined and externally wrapped as well as cathodically protected. All tubing will be plastic lined. All other lines not protected in the aforementioned manner will be glass reinforced plastic (fiberglass). The wetted surfaces of all valves, pumps, or non-coated piping system components will be manufactured from corrosion and erosion resistant materials such as 316 stainless steels, aluminum bronzes or ceramics. All tanks will be cathodically protected and internally coated.

Initial injection water will be preceded by an acid and scale inhibition treatment to further prevent the formation of carbonate or sulfate compounds.

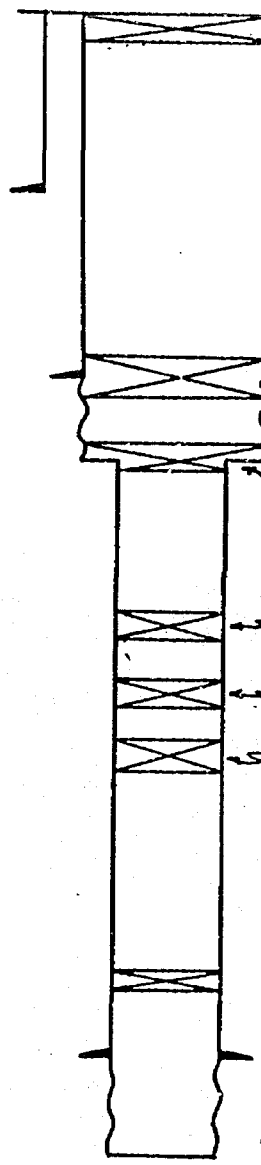
Artificial Lift

Artificial lift will be provided by the existing gas lift system with gas pressure supplied from Warren Unit No. 35. However, the old compressor gas lift system will be redesigned for closed system operation. Once effective sand consolidation has been achieved conventional beam pumping units will be installed if the economic feasibility has been established.

Lea "BU" State
Elev: 3513' "0"-10' AGL

Elk Oil
(drilled by Antweil)

330' FNL & 2307' FWL
Sec. 32, T20S, R38E

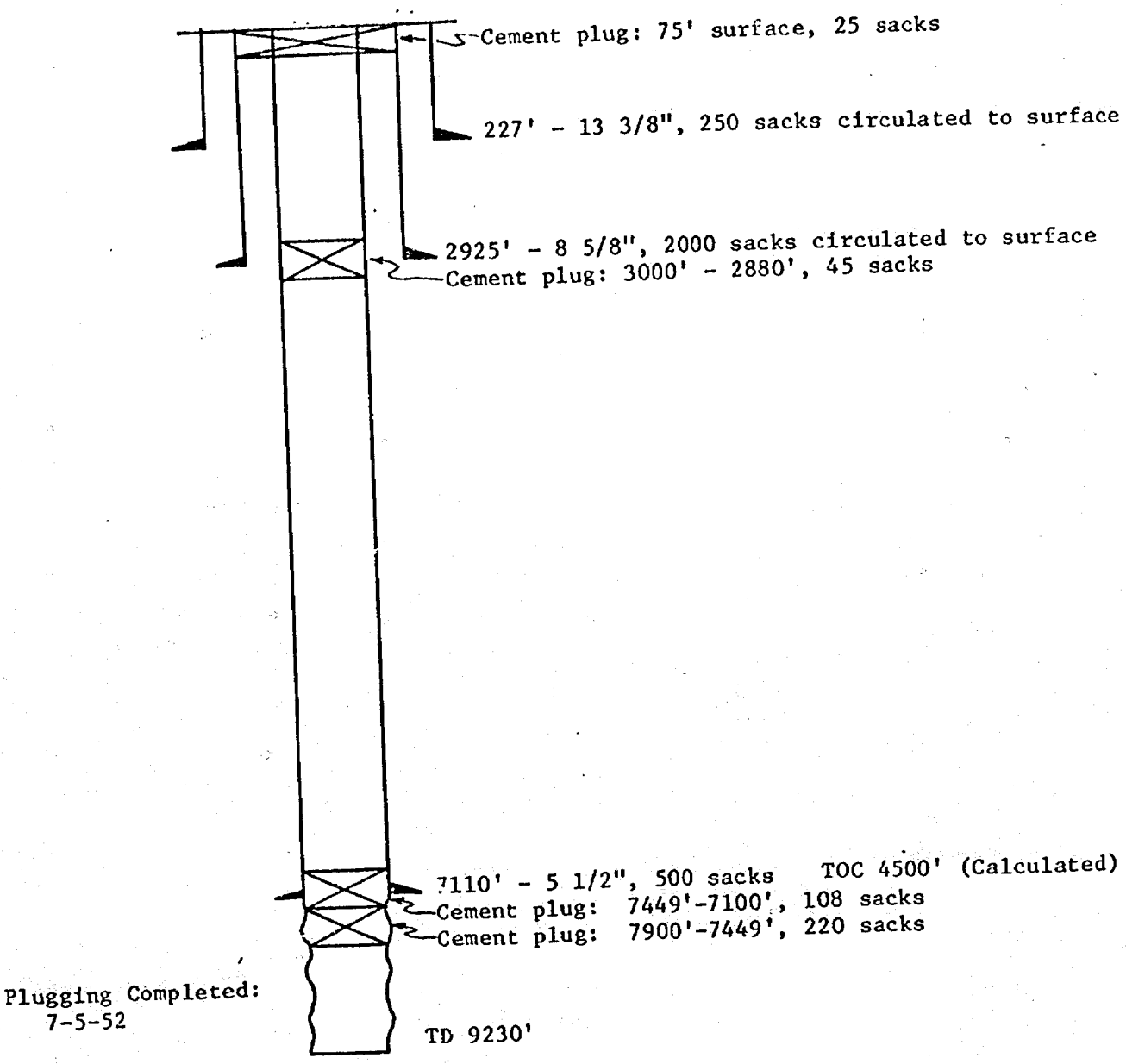


Plugging Completed:
4-4-68

EXHIBIT 10A

State "A" #1
330' FNL & 660' FWL, Sec 32, T20S, R38E
Elev: 3510' - "O" - 11' AGL

Elk Oil
(drilled by Shell)

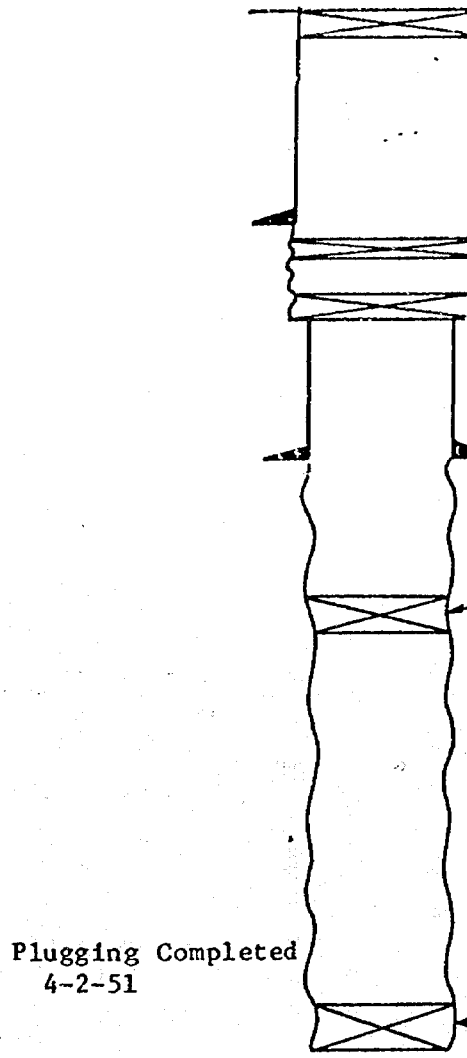


Plugging Completed:
7-5-52

EXHIBIT 10B

State No. 1
660' FNL & 660' FEL, Sec 32, T20S, R38E
Elev: 3510' "0" - 12' AGL

Exxon
(drilled by Tidewater)



Cement plug: @ surface, 15 sacks

262' - 13 3/8", 200 sacks circulated to surface

Cement plug: 1450'-1350', 25 sacks

Cement plug: 2180'-2130', 25 sacks
2180' top of pipe

2931' - 8 5/8", 1000 sacks

Cement plug: 4150'-3900', 75 sacks

San Andres

Top Devonian	8035'
Top Fusselman	8415'
Top Montoya	8728'
Top Simpson	8950'
Top McKee	9237'

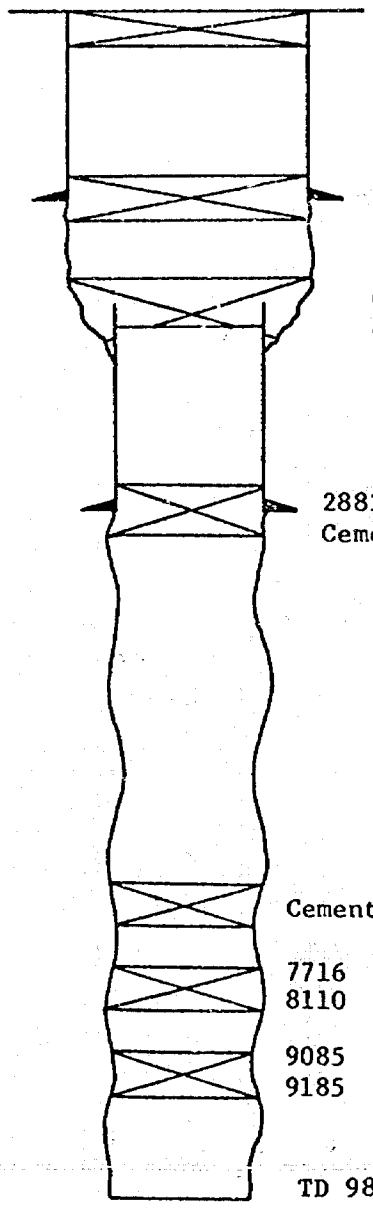
Well never shot or acidized

Plugging Completed
4-2-51

Cement plug: 9355'-9150', 50 sacks
TD 9355'

EXHIBIT 10C

Warren Unit McKee #5
1980' FNL & 660' FEL, Sec 29, T-20S, R-38E
Elev: 3548' "O" - 11' AGL



Cement plug: 65'-surface, 33 sacks

250' - 13 3/8", 250 sacks circulated to surface
Cement plug: 310'-210', 67 sacks

Cement plug: 510'-410', 77 sacks
470' - Top of pipe

2883' - 9 5/8", 500 sacks, top of cement at 776'
Cement plug: 2925'-2825', 50 sacks

Drinkard — Cement plug: 6750'-6650', 50 sacks

Devonian — 7716 / 8110 — 200 sacks

McKee — 9085 / 9185 — 70 sacks

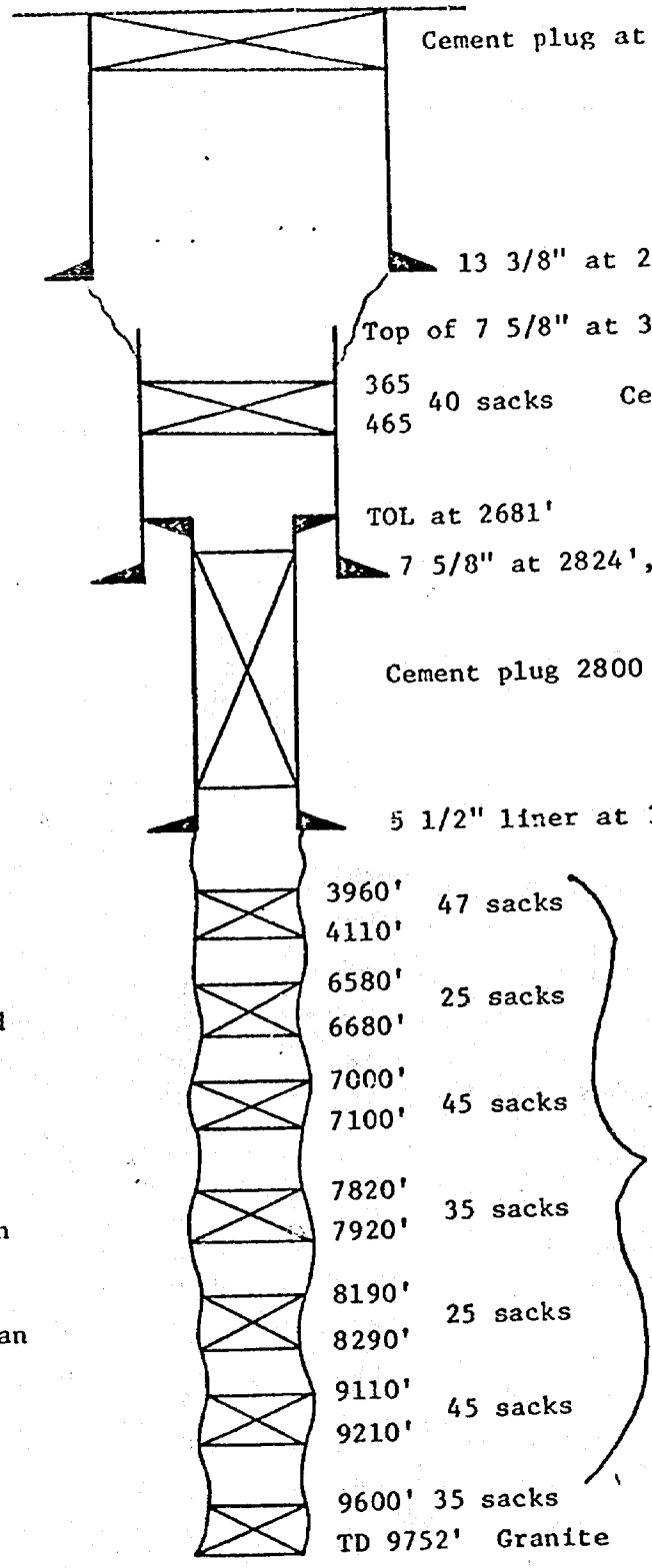
Cement Plugs

TD 9852'

Plugging Completed:
9-25-50

EXHIBIT 10D

SEMU McKee Well No. 12
1980' FNL & 660' FEL, Sec 30, T-20S, R-38E
Elev: 3539, "O" - 10' AGL



Cement plug at surface: 25 sacks

13 3/8" at 252', 250 sacks circ to surf

Top of 7 5/8" at 314' rest of casing junked in hole

365
465 40 sacks Cement Plug

TOL at 2681'

7 5/8" at 2824', 1044 sx, TOC 600' (temp survey)

Cement plug 2800 to 3700 (250 sacks)

5 1/2" liner at 3724 w/250 sacks

3960'
4110' 47 sacks

Drinkard 6580'
6680' 25 sacks

Abo 7000'
7100' 45 sacks

Devonian 7820'
7920' 35 sacks

Fusselman 8190'
8290' 25 sacks

Montoya 9110'
9210' 45 sacks

McKee 9600' 35 sacks
TD 9752' Granite

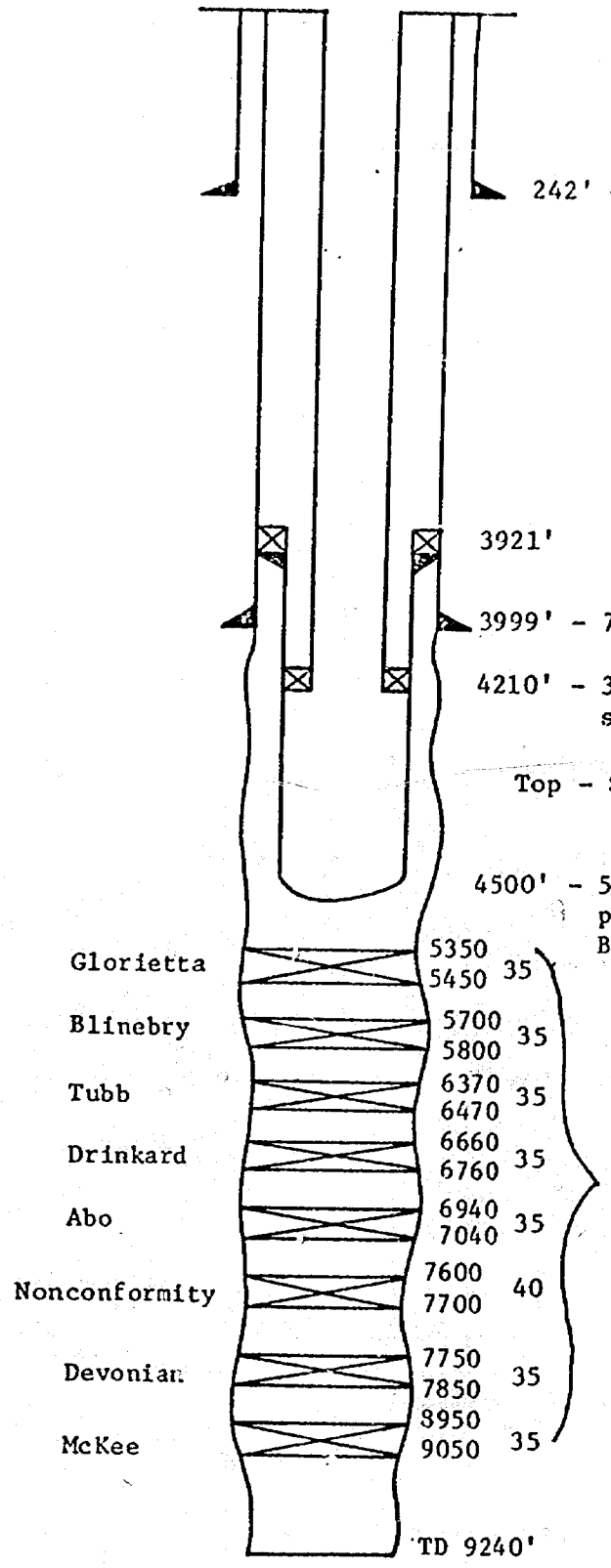
Cement plugs

Well temporarily abandoned
2-8-51 as dry hole

P&A 1-22-58

EXHIBIT 10E

Warren Unit McKee No. 24
San Andres SWD Well
247' FSL & 3129' FWL, Sec 29, T20S, R38E
"O"-13' above BHF



242' - 10 3/4" OD, 250 sx, circ to surface

3921'

3999' - 7 5/8" OD, 2200 sx, TOC 1650'

4210' - 3 1/2" OD, 9.3# EUE plastic lined tubing w/Guiber shorty packer

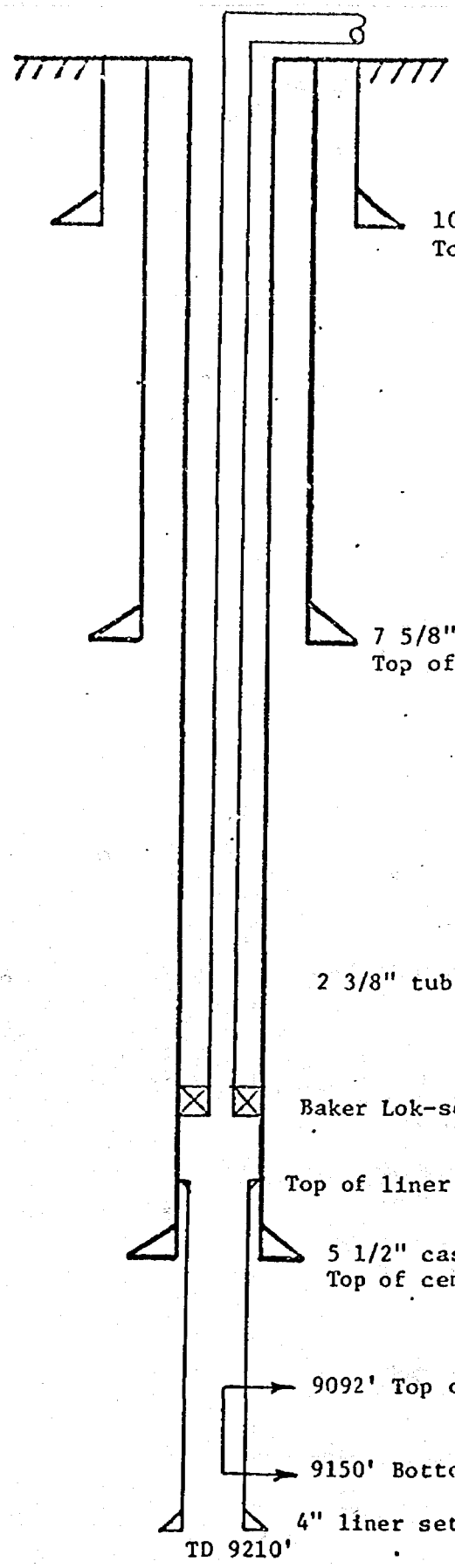
Top - San Andres - 4103'

4500' - 5 1/2" OD, 17# liner set 3921'-4500' - liner hanger & packer on top - floatshoe on bottom - liner not cmtd. Bottom liner - float shoe

Cement plugs

Well plugged, back w/8-100'
plugs 9240'-5350'
April 22, 1958

EXHIBIT 11



10 3/4" casing set at 273' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3998' w/1875 sx of mixed cement.
Top of cement is at 1575'.

2 3/8" tubing set at 8970'

Baker Lok-set Packer set at 8970'

Top of liner 8983'

5 1/2" casing set at 9043' w/225 sx of common cement.
Top of cement is at 7850'

9092' Top of perfs

9150' Bottom of perfs

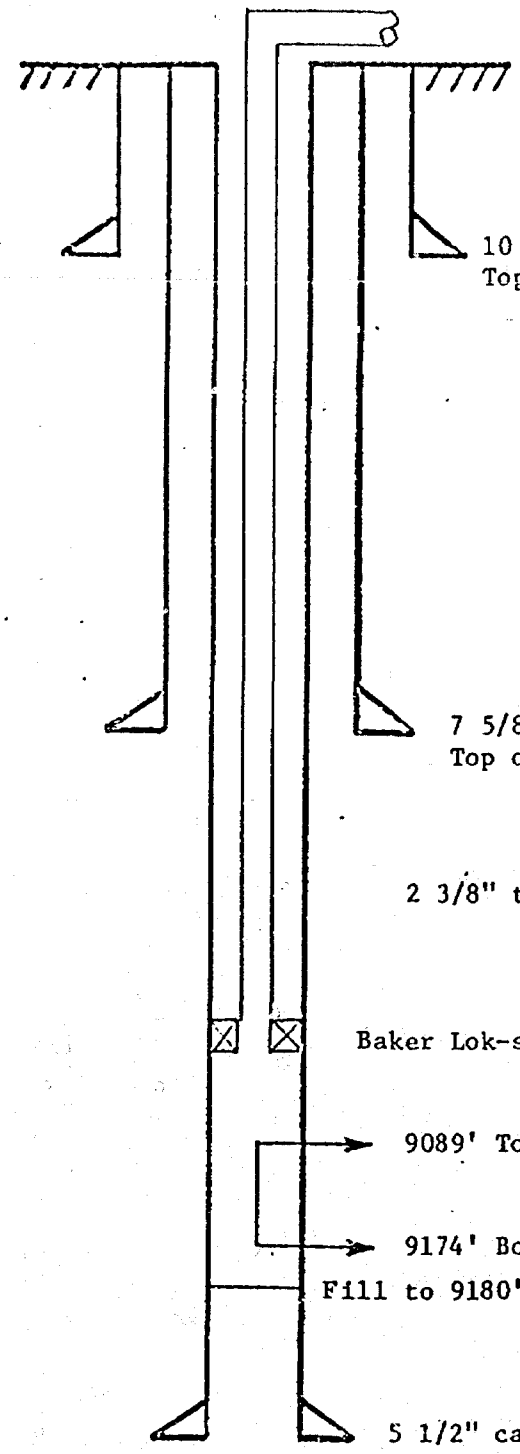
Perfs
9092'-9120', 9130'-50', 9165'-76',
9186'-90' w/4 SPF

4" liner set at 9200' w/25 sacks cement

TD 9210'

SEMU McKee No. 53
Warren McKee Simpson Pool
Unit E, Sec. 20, T20S, R38E
Elev: 3549 O/W 9149
10-3-77 MSR

EXHIBIT 12A



10 3/4" casing set at 260' w/250 sx of common cement.
Top of cement is at surface.

7 5/8" casing set at 4000' w/1630 sx of mixed cement.
Top of cement is at 1550'.

2 3/8" tubing set at 8980'

Baker Lok-set Packer set at 8980'

9089' Top of perfs

9174' Bottom of perfs

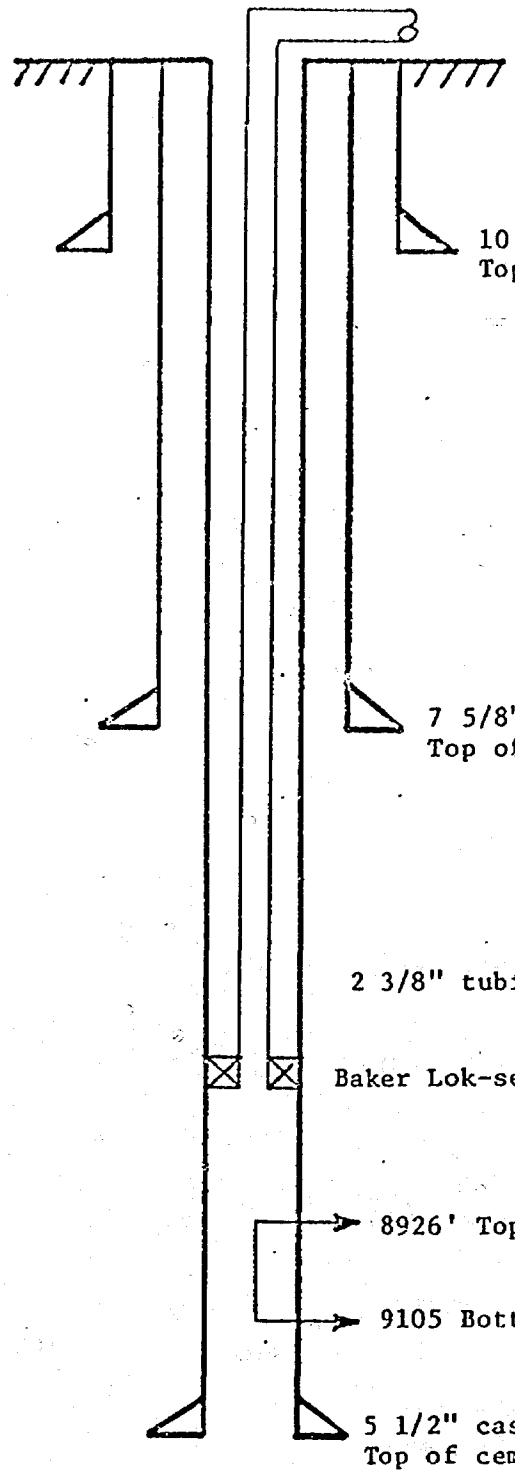
Fill to 9180'

Perfs
9089'-96', 9112'-27', 9135'-44',
9152'-58', 9166'-74' w/4 SPF

5 1/2" casing set at 9223' w/530 sx of mixed cement.
Top of cement is at 5385'. Total depth 9224'.

SEMU McKee No. 57
Warren McKee Simpson Pool
Unit I, Sec. 19, T20S, R38E
Elev: 3540 O/W 9140
10-3-77 MSR

EXHIBIT 12B



10 3/4" casing set at 255' w/250 sx cement.
Top of cement is at surface.

7 5/8" casing set at 4004' w/1800 sx cement.
Top of cement is at 1700'.

2 3/8" tubing set at 8820'

Baker Lok-set Packer set at 8820'

8926' Top of perfs

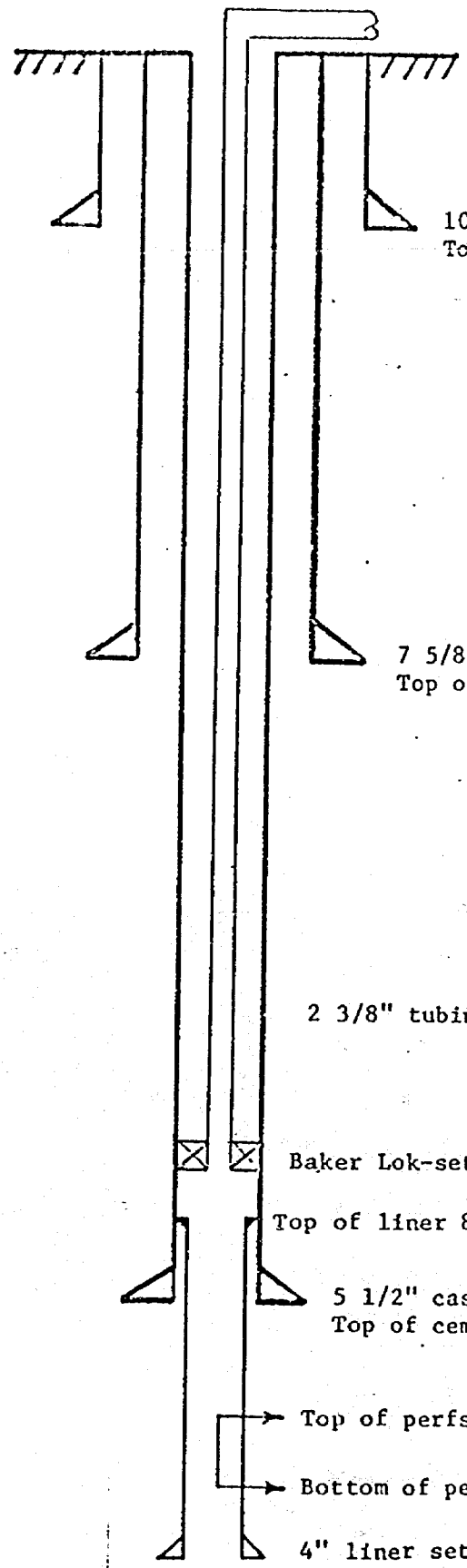
9105 Bottom of perfs

Perfs
8926'-31', 8947'-54', 8958'-65',
8970'-80', 8990'-98', 9005'-09',
9019'-33', 9055'-62', 9072'-79',
9099'-9105' w/4 SPF

5 1/2" casing set at 9119' w/525 sacks of cement.
Top of cement 4650'. Total depth 9120'.

SEMU McKee No. 58
Warren McKee Simpson Pool
Unit C, Sec. 29, T20S, R38E
Elev: 3537 O/W 9137
10-3-77 MSR

EXHIBIT 12C



10 3/4" casing set at 229' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3998' w/2000 sx of mixed cement.
Top of cement is at 1400'.

2 3/8" tubing set at 8900'

Baker Lok-set Packer set at 8900'

Top of liner 8960'

5 1/2" casing set at 9022' w/500 sacks of mixed cement.
Top of cement 5950'. Total depth 9210'.

Top of perfs 9060'

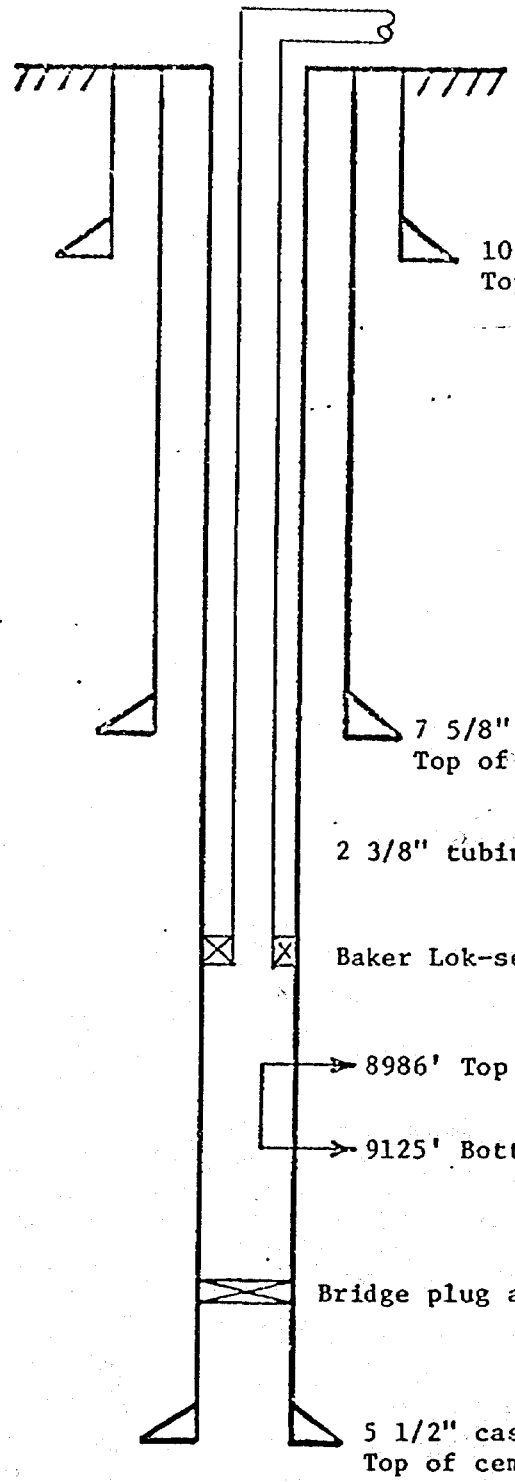
Bottom of perfs 9174'

4" liner set at 9210' w/15 sx

Perfs
9060'-87', 9106'-26',
9132'-39' & 9150'-74' w/4 SPF

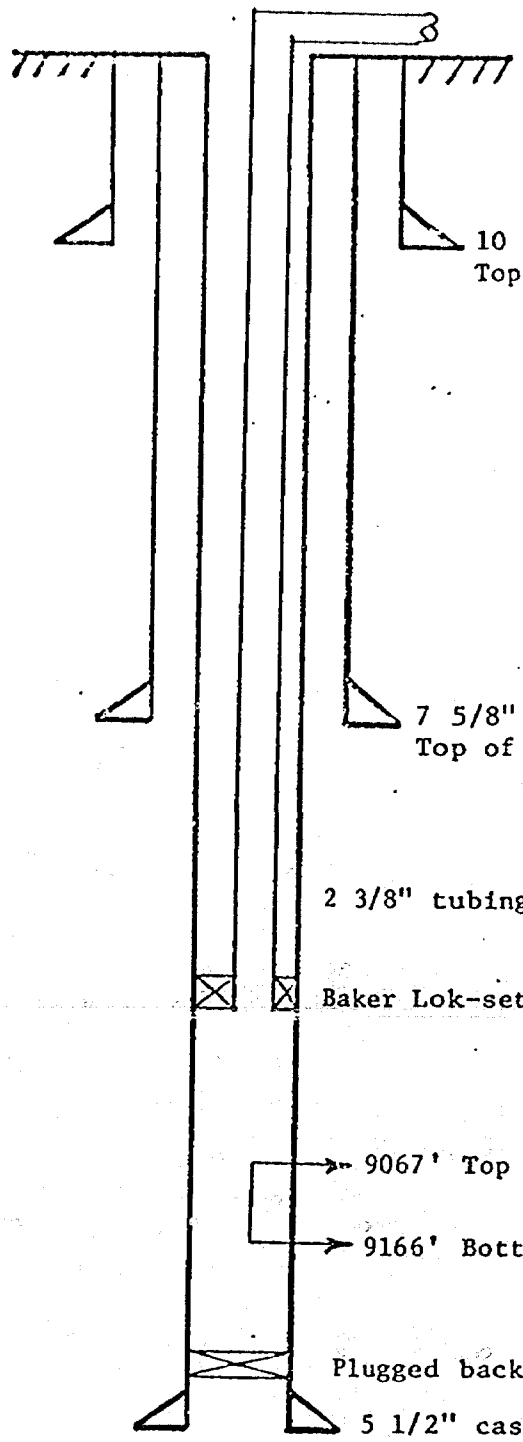
SEMU McKee No. 59
Warren McKee Simpson Pool
Unit M, Sec. 20, T20S, R38E
Elev: 3539 O/W 9139
10-3-77 MSR

EXHIBIT 12D



SEMU McKee No. 60
Warren McKee Simpson Pool
Unit E, Sec. 29, T20S, R38E
Elev: 3528 O/W 9128
10-3-77 MSR

EXHIBIT 12E



10 3/4" casing set at 255' w/250 sx of common cement.
Top of cement is at the surface.

7 5/8" casing set at 3999' w/1000 sx of Diacel "D" Cement.
Top of cement at 1500'.

2 3/8" tubing set at 8960'

Baker Lok-set Packer set at 8960'

9067' Top of perfs

9166' Bottom of perfs

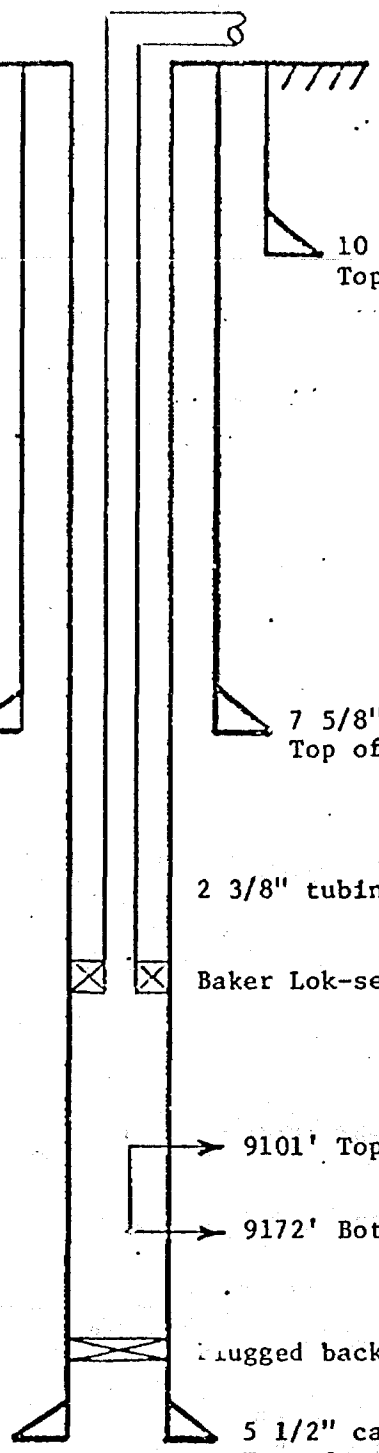
Perfs
9067'-70', 9073'-80', 9085'-91',
9103'-12, 9122'-23', 9132'-42',
9148'-56', & 9165'-66' w/4 SPF

Plugged back depth 9186'

5 1/2" casing set at 9236' w/310 sx of Diacel "D" Cement.
Top of cement at 6160'. Total depth 9250'.

SEMU McKee No. 62
Warren McKee Simpson Pool
Unit K, Sec. 20, T20S, R38E
Elev: 3552 O/W 9152
10-3-77 MSK

EXHIBIT 12F



10 3/4" casing set at 259 w/285 sx common cement.
Top of cement at surface.

7 5/8" casing set at 3995' w/3200 sx of Pozmix
Top of cement at 1300'.

2 3/8" tubing set at 9000'

Baker Lok-set Packer set at 9000'

9101' Top of perfs

9172' Bottom of perfs

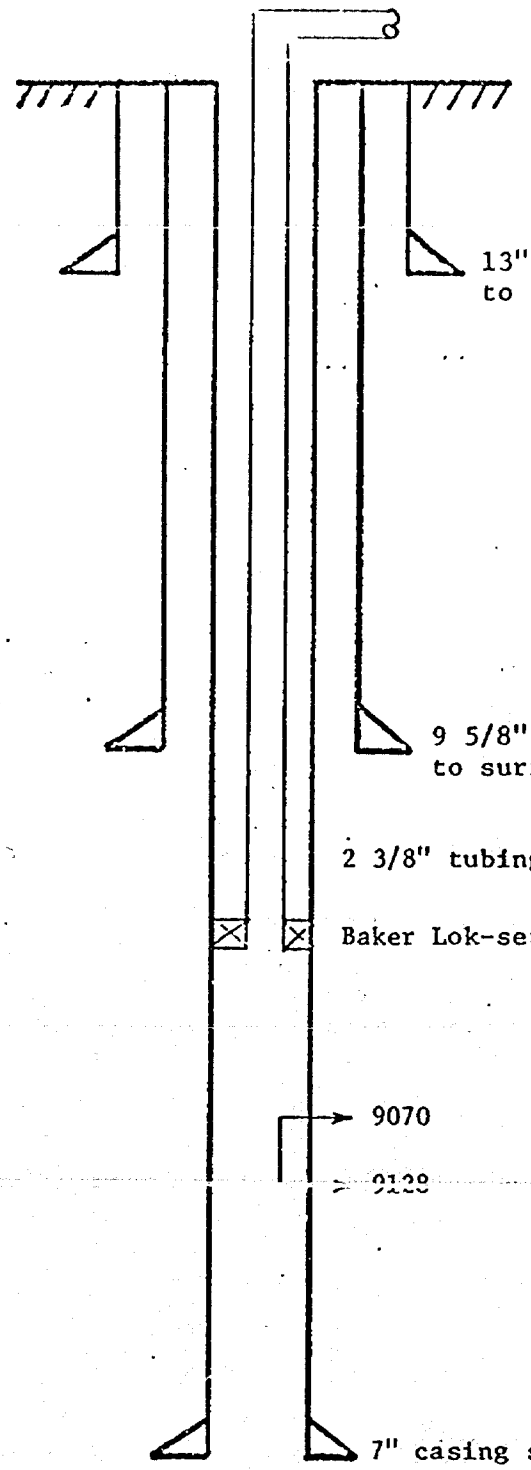
Perfs
9106', 9130', 9153', 9172' w/6 SPF

Plugged back total depth 9211'

5 1/2" casing set at 9250' w/600 sx Pozmix Cement.
Top of cement is at 5100'. Total depth is 9250'

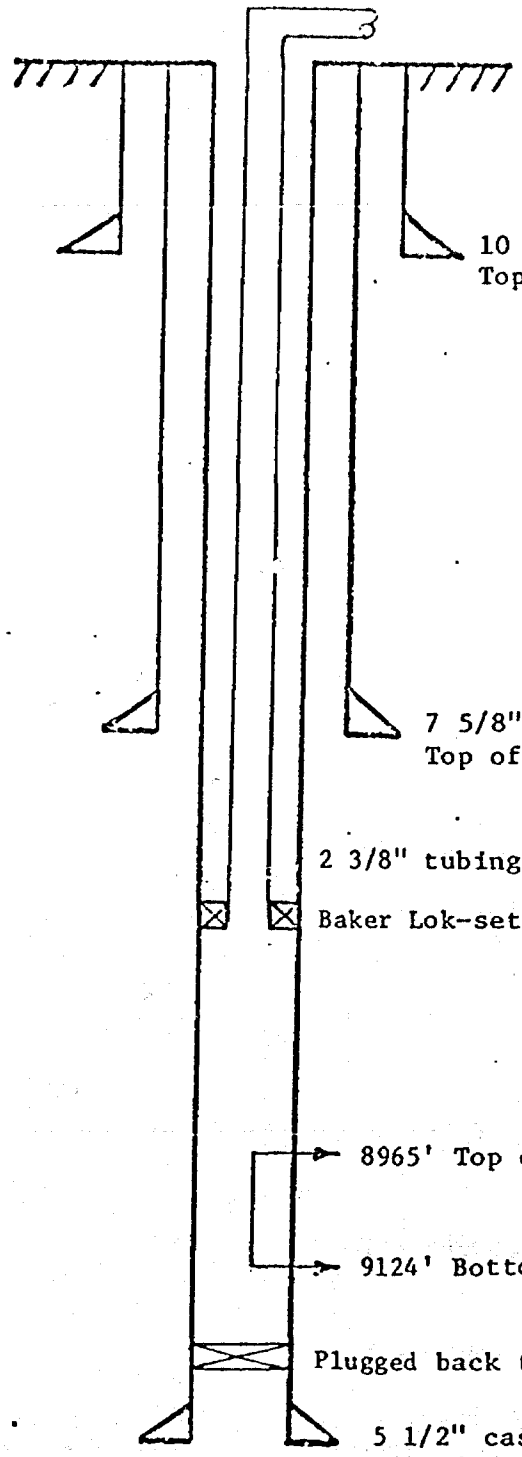
SEMU McKee No. 63
Warren McKee Simpson Pool
Unit G, Sec. 19, T20S, R38E
Elev: 3546 O/W 9146
10-3-77 MSR

EXHIBIT 12G



SEMU McKee No. 71
Warren McKee Simpson Pool
Unit O, Sec. 18, T20S, R38E
Elev: 3552 O/W 9152
10-3-77 MSR

EXHIBIT 12H



10 3/4" casing set at 256' w/250 sx of common cement.
Top of cement at surface.

7 5/8" casing set 3998' w/700 sacks of Diacel "D" cement.
Top of cement 1375'.

2 3/8" tubing set at 8860'

Baker Lok-set Packer set at 8860'

8965' Top of perfs

9124' Bottom of perfs

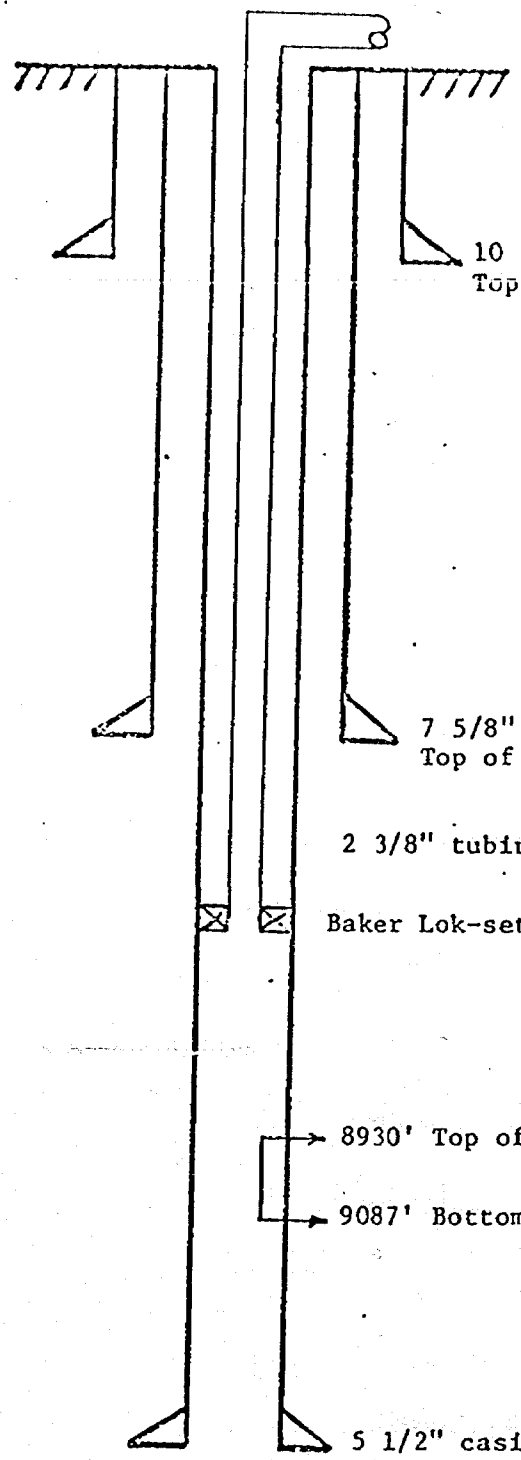
Plugged back total depth 9161'

5 1/2" casing set at 9195' w/230 sx Diacel "D" cement.
Top of cement 5450'. Total depth 9200'.

Original Perforations
8965', 8978', 8998', 9025', 9035',
9049', 9071', 9108' & 9123'
6-59 Sand fraced w/47,300 gals.
& 3700 lbs.
4-62 Cleaned out to 9161'.

WARREN UNIT No. 22
WARREN McKEE SIMPSON POOL
Unit K, Sec. 29 T20S R38E
Elev. 3532' O/W 9132'
10-3-77 MSR

EXHIBIT 12I



10 3/4" casing set at 279' w/250 sx common cement.
Top of cement is at surface.

7 5/8" casing set at 3999' w/2660 sx Diamix Cement.
Top of cement is at 1540'.

2 3/8" tubing set at 8830'

Baker Lok-set Packer set at 8830'

8930' Top of perfs

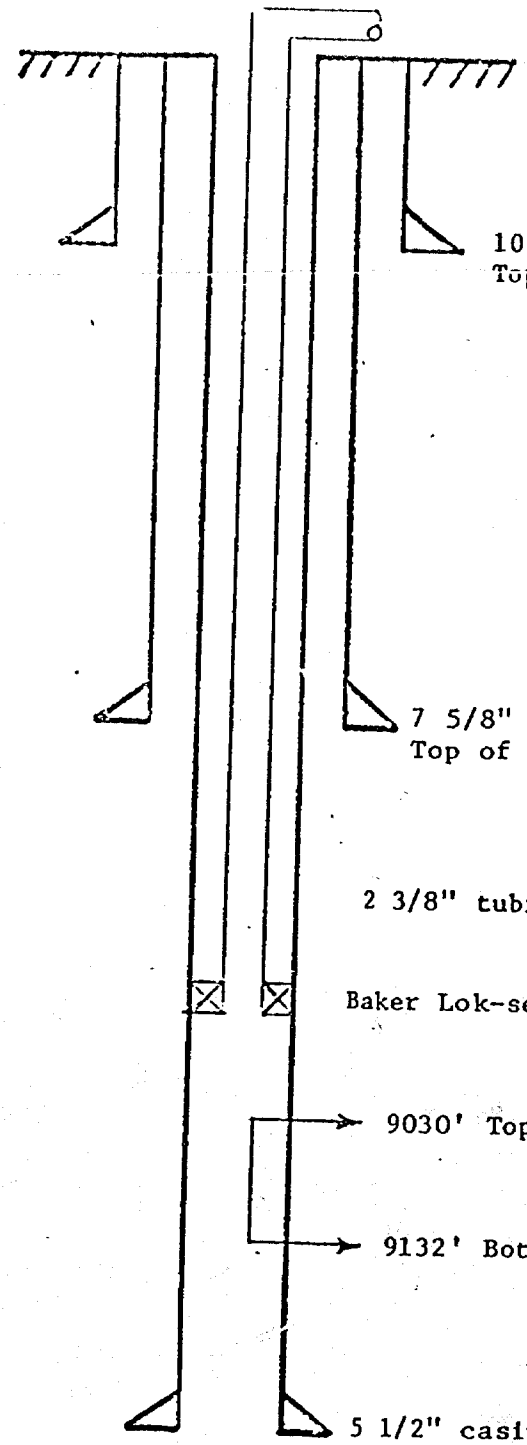
9087' Bottom of perfs

Original Perfs
8930', 8955', 8978', 8994', 9027',
9065', 9087', w/8 shots

5 1/2" casing set at 9198' w/260 sx Diacel "D" Cement.
Top of cement is at 4675'.

Warren Unit No. 23
Warren McKee Simpson Pool
Unit G, Sec. 29, T20S, R38E
Elev 3535', O/W 9135'
10-3-77 MSR

EXHIBIT 12J



10 3/4" casing set at 263' w/250 sx of common cement.
Top of cement is at surface.

7 5/8" casing set at 4000' w/3350 sx of cement.
Top of cement is at 1575'

2 3/8" tubing set at 8930'

Baker Lok-set Packer set at 8930'

9030' Top of perfs

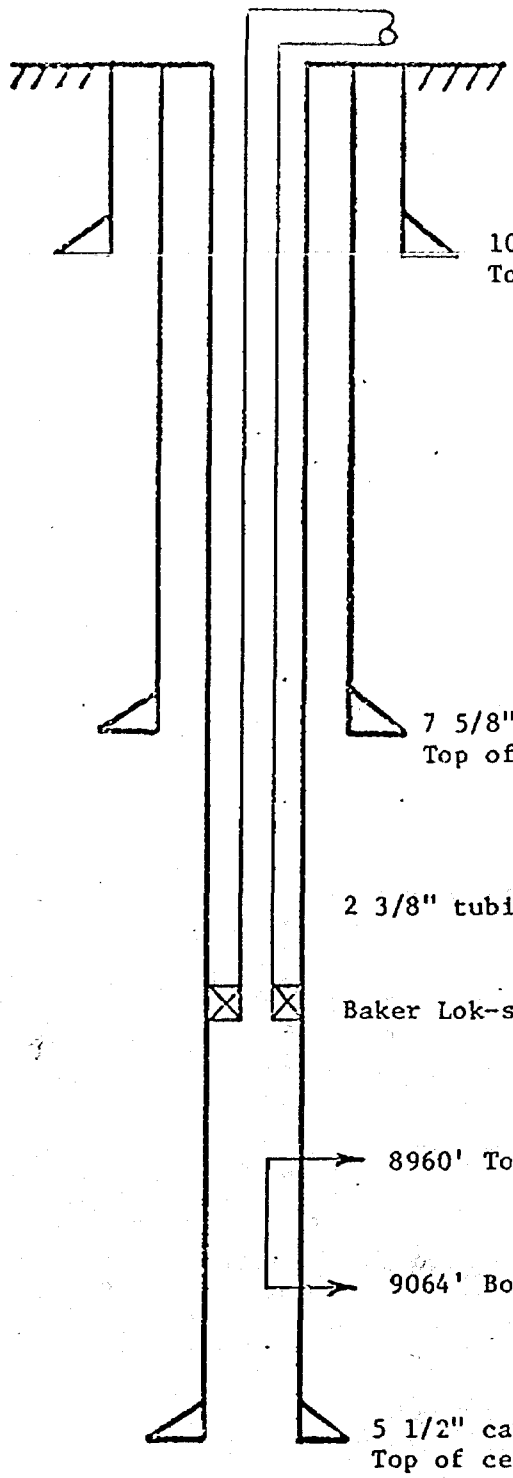
9132' Bottom of perfs

5 1/2" casing set at 9215' w/675 sx pozmix cement.
Top of cement at 5700'. Total depth 9218'.

Original Perfs
9030'-32', 9053'-55', 9070'-72',
9092'-94', 9104'-06', 9188'-20',
9130'-32'

Warren Unit No. 25
Warren McKee Simpson Pool
Unit O, Sec. 29, T20S, R38E
Elev 3515' O/W 9115
10-3-77 MSR

EXHIBIT 12K



10 3/4" casing set at 260 w/300 sx common cement.
Top of cement is at surface.

7 5/8" casing set at 3999' w/1550 sx pozmix cement.
Top of cement is at 1010'

2 3/8" tubing set at 8860'

Baker Lok-set Packer set at 8860'

8960' Top of perfs

9064' Bottom of perfs

Perfs
8960'-66', 8982'-90', 8998'-9002',
9012'-22', 9034'-48', 9058'-64'

5 1/2" casing set at 9108' w/475 sx mixed cement.
Top of cement is at 3885'. Total depth is 9133'.

Warren Unit No. 27
Warren McKee Simpson Pool
Unit O, Sec. 20, T20S, R38E
Elev: 3545' O/W 9145
10-3-77 MSR

EXHIBIT 12L

Operator	Well (McKee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Conoco	Warren Unit No. 3 (open hole)	1980' FSL & 1980' FEL Sec. 29, T-20S, R-38E	9070'	13 3/8" 9 5/8" 7"	262' 2989' 8947'	250 625 900	Surface 1600' 4330'
	Warren Unit No. 6 (9016'-9093')	660' FSL & 1980' FWL Sec. 29, T-20S, R-38E	9160'	10 3/4" 7 5/8" 5 1/2"	243' 2893' 9159'	200 1145 220	Surface 800' 4650'
	Warren Unit No. 7 (8926'-9094')	660' FNL & 1980' FEL Sec. 29, T-20S, R-38E	9145'	10 3/4" 7 5/8" 5 1/2"	286' 2859' 9144'	225 940 207	270' 850' 5975'
	Warren Unit No. 22 Injector for Warren McKee Waterflood	2090' FSL & 2090' FWL Sec. 29, T-20S, R-38E	9200'	10 3/4" 7 5/8" 5 1/2"	256' 3998' 9195'	250 700 230	Surface 1375' 5450'
	Warren Unit No. 24 (McKee plugged & not perforated)	24' FSL & 2145' FEL Sec. 29, T-20S, R-38E SWD	9240' PB-5350'	10 3/4" 7 5/8" 5 1/2"	242' 3999' 4500'	250 2300 70	Surface 1650' 1650'
	Warren Unit No. 28 (9020'-9138')	1980' FSL & 2310' FEL Sec. 20, T-20S, R-38E	9218' PB-9110'	13 3/8" 9 5/8" 7"	250' 3000' 9217'	300 1550 550	Surface 1100' 5950'
	SEMU Burger No. 21 (McKee plugged & not perforated)	660' FSL & 1980' FEL Sec. 19, T-20S, R-38E	9731' PB-7250'	13 3/8" 9 5/8" 7"	250' 3697' 8000'	250 340 730'	Surface 1125' 3728'
	SEMU Warren No. 10 (8979'-9150')	1980' FNL & 1980' FWL Sec. 29, T-20S, R-38E	9391' PB-9150'	13 3/3" 9 5/8" 7"	226' 2906' 9145'	250 500 900	Surface 1989' 4665'
	Warren Unit No. 4 (9046'-9144')	1980' FSL & 660' FWL Sec. 29, T-20S, R-38E	9230' PB-9220'	13 3/8" 9 5/8" 7"	254' 2024' 286'	250 1915 286	Surface 400' 7300'

EXHIBIT 13

EXHIBIT 13 Contd.

Operator	Well (McKee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Amerada	Warren McKee Unit No. 110 (9054'-9160')	1980' FNL & 1880' FEL Sec. 18, T-20S, R-38E	9230'	13 3/8" 8 5/8" 5 1/2"	295' 3708' 9230'	200 1500 600	Surface 1164' 6270'
	Warren McKee Unit No. 111 (9040'-9130')	1980' FSL & 660' FEL Sec. 18, T-20S, R-38E	9228' PB-9215	13 3/8" 8 5/8" 5 1/2"	297' 3702' 9228'	150 1500 600	Surface 1180' 5893'
	Warren McKee Unit No. 112 (9095'-9165' & 9236'-9256' squeezed)	1980' FNL & 2317' FWL Sec. 18, T-20S, R-38E	9300' PB-9220	13 3/8" 8 5/8" 5 1/2"	296' 3705' 9300'	300 1500 600	Surface 840' 5575'
	Warren McKee Unit No. 113 (9045'-9135')	660' FSL & 660' FEL Sec. 18, T-20S, R-38E	9200' DOD-9196	13 3/8" 8 5/8" 5 1/2"	299' 3703' 9198'	225 1500 600	Surface 1224' 6295'
	Warren McKee Unit No. 114 (9040'-9135')	660' FNL & 660' FEL Sec. 19, T-20S, R-38E	9325'	13 3/8" 8 5/8" 5 1/2"	256' 3702' 9323'	250 1500 600	Surface 1980' 6450'
	Warren McKee Unit No. 117 (9068'-9158')	1980' FNL & 660' FEL Sec. 18, T-20S, R-38E	9475' DOD-9312	13 3/8" 8 5/8" 5 1/2"	258' 3703' 9368'	200 1700 600	Surface 1192' 4422'
	Warren McKee Unit No. 119 (9080'-9160')	1980' FSL & 1880' FEL Sec. 18, T-20S, R-38E	9240' DOD-9235 PB-9143	13 3/8" 8 5/8" 5 1/2"	285' 3702' 9240'	200 1700 600	Surface 1285' 5826'
	Warren McKee Unit No. 132 (9040'-9131')	560' FNL & 560' FWL Sec. 20, T-20S, R-38E	9206'	13 3/8" 8 5/8" 5 1/2"	258' 3703' 9204'	275 1500 600	Surface 2026' 4725'
	Warren McKee Unit No. 141 (9012'-9048')	660' FSL & 660' FWL Sec. 17, T-20S, R-38E	9429'	13 3/8" 8 5/8" 5 1/2"	258' 3830' 9300'	275 1500 500	Surface 1200' 5081'

Operator	Well (McKee Production Interval)	Location	T.D.	Casing		Cement	
				Size	Depth	Sacks	Top
Conoco	SEMU McKee No. 12* (9160' - 9228')	1980' FNL & 660' FEL Sec 30, T-20S, R-38E	9752'	13 3/8" 7 5/8" 5 1/2"Liner	252' 2824' 3724'	250 1044 250	Surface 600'

*Plugged and Abandoned

EXHIBIT 13 Concl.

Operator	Well (Mckee Production Interval)	Location	T.D.	Casing Size	Casing Depth	Cement Sacks	Cement Top
Amerada	Warren McKee Unit No. 142 (8996'-9085')	1980' FSL & 660' FWL Sec. 17, T-20S, R-38E	9270'	13 3/8"	296'	250	Surface
				8 5/8"	3710'	1500	1050'
				5 1/2"	9270'	1000	3727'
Elk Oil	Lea B. U. State No. 1* (Shown on Schematic)	330' FNL & 2307' FWL Sec. 32, T-20S, R-38E	9170'	13 3/8"	307'	400	Surface
				8 5/8"	2991'	1800	Surface
				5 1/2"	9159'	850	2669'
	State "A" No. 1* (Shown on Schematic)	330' FNL & 660' FWL Sec. 32, T-20S, R-38E	9230'	13 3/8"	227'	250	Surface
				8 5/8"	2925'	2000	Surface
				5 1/2"	7110'	500	3302'
Exxon	State No. 1* (Shown on Schematic)	660' FNL & 660' FEL Sec. 32, T-20S, R-38E	9355'	13 3/4"	262'	200	Surface
				8 5/8"	2931'	100	400'
Conoco	Warren McKee Unit No. 5* (Shown on Schematic)	1980' FNL & 660' FEL Sec. 29, T-20S, R-38E	9852'	13 3/8"	250'	250	Surface
				9 5/8"	2883'	500	776'
	SEMU McKee No. 11 (9110'-9148')	660' FNL & 660' FWL Sec. 29, T-20S, R-38E	9235' PB-9150'	13 3/8"	252'	250	Surface
				9 5/8"	2834'	1750	405'
				7"	9320'	830	5200'
	SEMU Burger No. 13 (8992'-9142') Bridge plug at 7000'	660' FSL & 1980' FWL Sec. 20, T-20S, R-38E	9197' PB-9042'	10 3/4"	264'	250	Surface
				7 5/8"	2849'	1420	635'
				5 1/2"	9197'	260	5100'
	SEMU McKee No. 50 (9072'-9179')	1980' FSL & 660' FWL Sec. 20, T-20S, R-38E	9232'	10 3/4"	272'	250	Surface
				7 5/8"	4039'	2100	1567'
				5 1/2"	9232'	770	5150'
	SEMU McKee No. 51 (9022'-9110')	1650' FNL & 330' FEL Sec. 19, T-20S, R-38E	9220' PB-9218'	10 3/4"	258'	250	Surface
				7 5/8"	3998'	2500	1555'
				5 1/2"	9218'	440	5600'
	SEMU McKee No. 72 (9093'-9144')	330' FNL & 1650' FEL Sec. 19, T-20S, R-38E	9250' PB-9155'	10 3/4"	250'	250	Surface
				7 5/8"	3009'	887	1525'
				5 1/2"	9249'	370	5185'

*Plugged and abandoned, see attached wellbore schematics

CONOCO ANALYSIS FORM

CONOCO

HOBBS PRODUCTION DIVISION
WATER ANALYSIS REPORT FORM

LABORATORY United Chemical Corporation

FIELD Warren McKee LEASE Prod. Treater Water Dump WELL NO. _____

DATE SAMPLED 9-16-76 DATE ANALYZED 9-22-76

	meq/L	mg/L
CATIONS		
CALCIUM (Ca++)	770.00	15,400
MAGNESIUM (Mg++)	342.00	4,104
SODIUM (Na+)	1,856.51	42,681
R°- 0.06 @ 76°F	Fe -	63
ANIONS		
BICARBONATE (HCO_3^-)	.70	43
SULFATE ($SO_4^=$)	6.81	327
CHLORIDE (Cl^-)	2,961.00	105,000
TOTAL DISSOLVED SOLIDS		167,555

OTHERS

pH 5.6 SP GR 1.115

TEMP 30 °C SUSP SOLIDS _____

SCALING INDEX (CIRCLE ONE)

CALCIUM CARBONATE POSITIVE (NEGATIVE) (-1.02)

CALCIUM SULFATE POSITIVE (NEGATIVE) (-1.95)

cc: Paul Adams ✓
Dave Edmonds
Jim Sealy
Pacho Jara
Cy Foster

U-LAB-13 LA

Elizabeth Wesley
SIGNATURE ANALYST

EXHIBIT 14

CONOCO ANALYSIS FORM

CONOCO

HOBBS PRODUCTION DIVISION
WATER ANALYSIS REPORT FORM

LABORATORY United Chemical Corporation

FIELD _____ LEASE City of Hobbs water (Taken from filters) WELL NO. _____

DATE SAMPLED 12-2-76 DATE ANALYZED 12-3-76

	meq/l	mg/L
CATIONS		
CALCIUM (Ca++)	3.40	68
MAGNESIUM (Mg++)	3.00	36
SODIUM (Na+)	7.05	162
Iron		0.38
ANIONS		
BICARBONATE (HCO_3^-)	6.60	403
SULFATE ($SO_4^=$)	3.41	164
CHLORIDE (Cl^-)	3.44	122
TOTAL DISSOLVED SOLIDS		955

OTHERS

pH 7.7 SP GR 1.000

TEMP 30 °C SUSP SOLIDS _____

SCALING INDEX (CIRCLE ONE)

CALCIUM CARBONATE (POSITIVE) 0.80 NEGATIVE

CALCIUM SULFATE POSITIVE (NEGATIVE)

cc: B. Branch
Paul Adams
Dave Edmonds
Pacho Jara

U-LAB-74

Lucille Little
SIGNATURE ANALYST

EXHIBIT 15

, including limiting injection pressure,

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

(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, Continental Oil Company, is hereby authorized to institute a waterflood project on its Southeast Monument Unit ~~Lease~~ area, Warren-McKee Pool, by the injection of water into the McKee formation through the following-described wells in Township 20 South, Range 38 East, NMPM, LEA County, New Mexico:

Southeast Monument Unit Well No	Unit Letter	Section
53 ✓	E ✓	20 ✓
59 ✓	I ✓	19 ✓
58 ✓	C ✓	29 ✓
57 ✓	M ✓	20 ✓
60 ✓	C ✓	29 ✓
62 ✓	K ✓	20 ✓
63 ✓	G ✓	19 ✓
71 ✓	O ✓	18 ✓

(2) That injection into each of said wells ~~should~~ be through internally coated tubing, set in a packer which shall be located as near as practicable to the uppermost perforation; that the casing-tubing annulus of each injection well shall be tested for leaks, be loaded with an inert fluid and ~~equipped~~ fitted with an approved pressure gauge or attention-attracting leak detection device, and that the injection wells or system shall be equipped in such a manner as to limit wellhead injection pressure to no more than ~~1140~~ 1800 psi.

shall be allowed to remain open or be equipped

(3) That the Secretary-Director of the Commission may administratively authorize a pressure limitation in excess of ~~1140~~ 1800 psi upon a showing by the operator that such higher pressure will not result in fracturing of the confining strata.

(4) That the wells within the project area shall be equipped with risers or in another acceptable manner such as to facilitate the periodic testing of the bradenhead for pressure or fluid production.

See under

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

(6) That the subject waterflood project is hereby designated the Southeast Monument Unit Area Waterflood Project and shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

(7) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Commission in accordance with Rules 704 and ~~1120~~ 1115 of the Commission Rules and Regulations.

(8) 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.