CASE 3305: Application of AMERADA for a waterflood project, Lea County, N.M.

CASE NO. 3305

Application,
Transcripts,
Small Exhibits
ETC.

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 22, 1965

EXAMINER HEARING

IN THE MATTER OF:

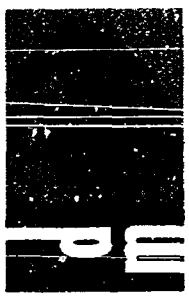
Application of Amerada Petroleum Corporation for a unit agreement, Lea County, New Mexico.

Application of Amerada Petroleum Corporation for a waterflood project, Lea County, New Mexico.

Case No. 3304
and
Case No. 3305
CONSOLIDATED

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING



MR. NUTTER: We'll call Case 3304.

MR. DURRETT: Application of Amerada Petroleum Corporation for a unit agreement, Lea County, New Mexico.

MR. NUTTER: Do you want to consolidate Cases 3304 and 3305?

MR. KELLAHIN: Yes, we would like to ask that Cases 3304 and 3305 be consolidated for the purposes of the record.

MR. NUTTER: We'll call next Case 3305.

MR. DURRETT: Application of Amerada Petroleum Corporation for a waterflood project, Lea County, New Mexico.

MR. NUTTER: Is there any objection to the consolidation of the cases? For the purposes of testimony, the cases will be consolidated.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, New Mexico; appearing in association, Mr. Thomas W. Lynch, a member of the Oklahoma Bar, who will present the two cases.

MR. LYNCH: We would like to call two witnesses in these consolidated cases, Mr. Andrew E. Snyder, Mr. Joe B. Denton. The first witness will be Mr. Snyder.

* * * *

ANDREW E. SNYDER

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

DIRECT EXAMINATION

BY MR. LYNCH:

Q Will you state your name and your occupation and by whom you are employed, for the record?

A My name is Andrew E. Snyder and I am employed by Amerada Petroleum Corporation in Tulsa, Oklahoma, as a Petroleum Engineer.

Q And have you testified previously before the Oil Conservation Commission as a Petroleum Engineer?

A Yes, sir.

Q Are you familiar with the area which is the subject of Amerada's application in this consolidated proceeding?

A Yes, sir.

Q Mr. Snyder, would you examine first what should be marked as Exhibit 1?

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

MR. LYNCH: Mr. Examiner, I might state that this Exhibit 1 is precisely the same as one of the Exhibits attached to the application except for what Mr. Snyder will point out.

Q (By Mr. Lynch) Mr. Snyder, will you examine this Exhibit and tell us what it shows?

A This Exhibit is a location plat, lease plat, showing all of the wells in the leasehold of record surrounding the

proposed Warren McKee Unit in portions of Township 20 South, Range 30 East, Lea County, New Mexico. This map shows the unit outline in a dark dashed outline, the four proposed water injection wells outlined in red, and the zone of completion of all the wells in this area.

Q Does this unit consist of all of the Warren McKee Pool?

A No, sir.

Q What portion of the Warren McKee Pool does this unit consist of?

A This unit is essentially the North Half of the Warren McKee Pool.

Q When was the Warren McKee Pool discovered, Mr. Snyder?

A The first well was drilled in 1948. It was Continental's Warren Unit McKee No. 3. Actually it doesn't show up on this map, it's south.

Q It is in the South Half?

A Yes.

Q As shown by the current proration schedule, how many wells are there in the entire pool?

A Forty-two.

Q How many wells completed in the Warren McKee are there within the unit area?

A There are twenty-three wells, of which four are temporarily abandoned and nineteen are producing.

Q Those four temporarily abandoned wells are --

A Are the four wells that are proposed for salt water injection.

Q What spacing is in effect for this pool?

A Forty-acre Statewide.

Q What is the top allowable for the pool?

A 140 barrels per day.

Q Are any of the wells in the pool, not just those in the unit, but any wells in the entire pool capable of making top allowable at the present time?

A No, sir.

Q Of those wells within the unit area, what is the average production in some recent month?

A In June, the last month that we had a record of all of the wells, the average production was twenty-three barrels per well per day for the nineteen producing wells in the unit.

Q On this basis and on the basis of facts which you'll testify about later concerning the reservoir characteristics and performance, are you of the opinion that this reservoir is at the present time in an advanced stage of depletion?

A Yes, sir.

Q Would you call it a stripper stage?

A Yes, sir.

Q Would you now examine what the reporter is marking as Exhibit No. 2?

(Whereupon, Applicant's Exhibit No. 2 marked for identification.)

Q What does Exhibit 2 show, Mr. Snyder?

A Exhibit 2 is a structure map primarily of the entire Warren McKee reservoir showing the two distinct highs in the field, a high in the north portion of the field and another high in the south portion. The reservoir itself is anticlinal in nature with a fault along the east side. Again the unit outline is shown in red, and the four proposed injection wells also shown in red.

Q What sort of entrapment, how would you characterize the entrapment of hydrocarbon in the reservoir?

A That's an anticlinal structure. The oil is underlain by water.

Q You classify it as a structural trap?

A Yes, sir.

Q What sort of drive mechanism prevails in the field?

A The drive predominantly is solution gas drive. There may be some very small minor amount of water drive, but it's very negligible, if any at all.

Q Would you now examine what should be marked as Exhibit 3?

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

Q Tell us what that shows.

A Exhibit 3 is a type log in the Warren McKee Unit. It is the particular log of Amerada's Turner No. 2. We have the normal electric S-P and Resistivity logs, and in addition to that a microlog showing zones of porosity. On the extreme right-hand boundary of the exhibit you'll notice a line drawn at a depth of 8961, which is the top of the McKee in this particular well, another line at 9194 which is the base of the McKee and the top of the Waddell Sand. This is to be the unitized interval of the Warren McKee Unit.

Q This unitized interval as you have shown on Exhibit 3 is as described in the unit agreement?

A Yes, sir.

Q Is this entire interval treated as a single pool or a common source of supply by the Commission?

A Yes, sir.

Q All right. Would you now examine what should be marked as Exhibit 4?

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

Q What does this exhibit show, Mr. Snyder?

A Exhibit 4 is a tabulation or a data sheet concerning this reservoir. In the column of "General", most of that we

have primarily talked about, the current capacity and the number of wells and so on. It also shows the cumulative production to July 1st, 1965, 8,193,000 barrels.

Q Looking down at "Reservoir Properties", what is a representative porosity for that portion of the reservoir included in the unit?

A Average porosity from core analysis, I figure to be 16.4 percent.

Q What would be the representative water saturation figure?

A About forty-two percent.

Q And a representative permeability?

A 99.8 millidarcies.

Q What is the oil gravity?

A About forty-five degrees.

Q Some of these other items of information shown on this exhibit will be covered in later testimony, is that correct?

A Yes.

Q Would you now examine what should be marked as Exhibit 5 and Exhibit 6?

(Whereupon, Applicant's Exhibits Nos. 5 and 6 marked for identification.)

Q Would you just briefly describe what Exhibit 5 and

Exhibit 6 are?

A These exhibits show the same thing. One, Exhibit 5, is in tabular form showing the monthly history of this field from the time it was discovered up until the current time, showing barrels of oil produced, barrels of water, average gas-oil ratio, and average bottom hole pressure.

Looking at Exhibit 6, this shows up better as a picture showing that it is a normal type of solution gas drive field. The bottom hole pressure, the top curve on the exhibit, the pressure decline from an initial of 3486 pounds per square inch down to the last pressure measured in April of 1962 was 499 pounds. This pressure undoubtedly has continued to decline and we expect that currently it's somewhere between 400 pounds.

Q Are the figures shown on Exhibits 5 and 6 for all of the wells in the pool, or those wells within the Unit Area?

A Only those within the Unit Area.

Q What has happened to the gas-oil ratio during this same period of time?

A The gas-oil ratio again has occurred like we would expect, starting from an initial of about 600 cubic feet per barrel to the last gas-oil ratio we had, about 3820 cubic feet per barrel in June of 1965.

Q Mr. Snyder, you stated that the cumulative production to July 1st, 1965, was slightly over 8,000,000 barrels?

A Yes, sir.

Q What would be a reasonable estimate of the primary recovery, total ultimate primary recovery?

A 9,232,928 barrels.

Q Based on what you've said so far in connection with Exhibits 5 and 6 concerning the reservoir performance, what would you say would be the stage of primary depletion at the present time?

A The reservoir is in an advanced stage of depletion. It figures out to be about 89 percent depleted.

Q So this substantiates your conclusions that you arrived at on the basis of the decline in the productivity of the wells?

A Yes.

Q Mr. Snyder, what would you expect to be the volume of secondary oil recovered if secondary recovery operations were instigated in this field?

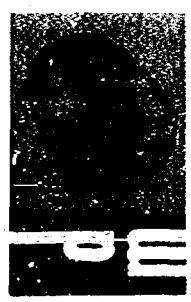
A The estimate that we had made was for an additional 2,385,000 barrels of secondary oil to be recovered.

Q This is over and above the total primary?

A Yes, sir.

Q Have you made a study of the economics of conducting the secondary recovery program in this unit?

A Yes, sir.



Q Would the value of the additional recovery exceed the cost of producing that oil?

A Yes, it would.

Q Mr. Snyder, would you now refer back to the structure map, Exhibit 2, and very briefly explain the proposed waterflood program with respect to the location of the wells and the structure and so forth?

A Initially, to start out this waterflood program we anticipate injecting water into the north end of the field as shown by the four injection wells. As response occurs, when and if it does, we would expect that water will be injected in the south end of the unit also, and that we would in effect have an end-to-end flood in this reservoir.

Q Would you now examine what should be marked as Exhibits 7 through 10?

(Whereupon, Applicant's Exhibits Nos. 7 through 10, both inclusive, marked for identification.)

Q What are Exhibits 7 through 10?

A Exhibit 7 is a log of one of the injection wells, Unit Well No. 102, which shows the top of the McKee at 9140 feet. The Exhibit No. 8 is the log of injection Well No. 201, shows the estimated top of the McKee at 9151. This well bottomed up what appeared to be right in the very top of the McKee is the reason we called it an estimate. It was very

difficult to tell, but it appeared to be in the top and it did produce, so we're pretty sure that's a good figure.

Exhibit 9 is a log of Injection Well No. 202 showing the top of the McKee at 9160 feet. Exhibit 10 is a log of Unit Injection Well No. 203, shows the top of the McKee at 9138 feet.

Q Now the injection well numbers that you just gave me are numbers that will be assigned in the event of unitization?

A Yes, sir.

Q These wells are also identified by the lease names and therefore can be related to previous exhibits such as Exhibit 2, the structure map?

A Yes, sir.

Q Would you now examine what the reporter is marking as Exhibits 11 through 14?

(Whereupon, Applicant's Exhibits Nos. 11 through 14, both inclusive, marked for identification.)

Q Tell us what those show.

A These four exhibits are schematic diagrams of the four injection wells. We might look at two of these in detail. Well No. 102 is Exhibit No. 11. This shows the current condition of this well, the depth and cementing practices of the casing strings, the anticipated packer setting depth, and the tube string where the perforations are, from 9145 to 9214,

and open hole interval from 9225 to 9250. We anticipate no changes in this well in putting it on injection.

Exhibit No. 12 is very similar to No. 13 and 14. It also shows the schematic diagram of the equipment in the well and the anticipated packer setting depth, the tubing string, but this well will be deepened from the current depth of 9165 to about 9310 and a liner set and cemented, and perforations made from 9152 to 9305.

The other two wells, as I mentioned, on Exhibits 13 and 14, are similar to this in that they will be deepened and liner set and selectively perforated for completion.

Q Will the completions that you have outlined on Exhibits 11 through 14 prevent contamination to fresh water and damage from any other oil or gas zones that might be found in the area?

A Yes.

MR. LYNCH: I might point out at this time, also, Mr. Examiner, that the Exhibits 11 through 14 are identical to the exhibits that were attached to the application.

Q (By Mr. Lynch) Mr. Snyder, what is the anticipated daily volume of water to be injected per injection well per day?

A We think we'll be able to get 3,000 barrels a well per day into the reservoir.

Q All right. Are you going to use any surface pressure in injecting this water?

A No, sir, we anticipate that it will go by gravity.

Q What is the source of the water that you intend to inject?

A It will be San Andres water.

Q This is not fresh water, this is salty water?

A Yes, sir.

Q Would you now examine, Mr. Snyder, what the reporter is marking as Exhibit 15?

(Whereupon, Applicant's Exhibit No. 15 marked for identification.)

Q Tell us what Exhibit 15 shows.

A Exhibit 15 is a tabulation by leases of all of the tracts in this proposed unit, showing the participation parameters that were used in the derivation of interest within the unit. The four parameters were current rate of production based on a period from December 1st, 1963 to June 1st, 1964. We had a remaining primary factor and an adjusted acre-feet factor and ultimate primary factor. These were combined into a split phase formula, a phase one formula, as shown at the bottom of the exhibit, until 1,253,100 barrels of oil had been produced after June the 1st, 1964. Participation from this phase was to be forty-five percent current production plus forty-five percent remaining primary and ten percent adjusted

acre-feet. After this primary is recovered, then phase two formula for the remaining secondary oil was to be distributed on the basis of one-third adjusted acre-feet and two-thirds of the ultimate primary.

Q And the upper portion of the exhibit shows, sets out for each tract those parameters?

A Yes, sir.

Q Mr. Snyder, in conclusion, is it your opinion that the proposed waterflood program is in the interest of conservation and will increase the ultimate recovery of oil and protect correlative rights?

A Yes, I believe it will.

Q Will a waterflood program conducted on a unit basis as you have presented here today be more efficient than on a lease basis?

A Yes.

Q So in your opinion the unitization of the various leases in the area is necessary?

A Yes.

Q Will that portion of the Warren McKee Pool outside the unit area be adversely affected by this operation?

A No.

Q Should the injection program be classified as a waterflood project under Statewide Rule 701-E?

A Yes, sir.

Q Why is that?

A Due to the advanced stage of depletion, the low bottom hole pressure, the general performance characteristics of the reservoir.

Q Are you asking for any special allowable rules or any other rules at the present time?

A No, sir.

MR. LYNCH: That's all we have of this witness.

MR. NUTTER: Are there any questions of Mr. Snyder? Mr. Durrett.

CROSS EXAMINATION

BY MR. DURRETT:

Q Mr. Snyder, would you please give us your complete name?

A Andrew E. Snyder.

Q What does the initial "E" stand for?

MR. NUTTER: You are under oath, Mr. Snyder.

A Yes, sir.

MR. LYNCH: I might interject at this point, we had this same problem in Kansas and Mr. Snyder got up to leave the stand. He wasn't going to proceed with his testimony. I was the most concerned person in the room.

MR. DURRETT: I might state to the Examiner that Mr.

Snyder is in contempt of the Kansas Commission. That is the reason for my asking the question.

MR. NUTTER: You object to the question, Mr. Snyder?

A Yes, sir.

MR. NUTTER: Objection sustained this time. Did you have any further questions, Mr. Durrett?

MR. DURRETT: No, that's all at this time.

MR. NUTTER: Very pertinent to this testimony. Mr. Irby, did you have a question?

BY MR. IRBY:

Q Mr. Snyder, with regard to your Exhibit 1 and the larger scale map that came out with the application, is the red circle, the coloring on the proposed injection wells, and the scale the only difference in these two maps?

A Yes, sir.

Q Now with regard to your Exhibit 2, I note that your contours are labeled "minus". Is that minus sea level datum or land surface?

A It's minus sea level.

Q Do you propose to reinject the produced water?

A Not at the present time. The produced water volume is small and we're disposing of it in other methods and we would prefer not to inject it at the present time.

Q What is the daily average of water production from

the wells now producing?

A Eighty-six barrels per day.

MR. NUTTER: That's for all of the wells?

A Yes, sir.

Q (By Mr. Irby) How many wells?

A Nineteen wells.

MR. LYNCH: That figure is shown on a monthly basis on Exhibit 4, is that correct?

A Yes, that's right.

Q (By Mr. Irby) How is this water presently disposed of?

A I believe probably the water is presently left in the pit, I'm not real sure about it.

Q An unlined pit?

A Probably so. It actually would be in several different pits, since there are a number of different leases in the field.

Q Do you intend to put additional wells on injection at a later date in this pool?

A Yes, sir.

Q And are you seeking here today a method by which they can be approved administratively rather than coming in for another hearing?

A I don't believe so. There are some other things that

would probably be involved that would probably include a hearing at the time that those are put on.

Q You don't have an estimate of when those other wells would go on?

A No, sir, it depends a great deal on what happens to these north wells, the results, the response that we get from them.

Q Is this going to be a closed system?

A Yes, sir.

Q Now on these three wells that you are going to deepen and put the liner in,--

A Yes.

Q -- will the seal between the liner and the casing that is already there be tested?

A Between the liner and the casing that's there?

Q Yes.

A In other words, when we cement --

Q Yes.

A Yes, it will be.

Q To pressure in excess of your injection pressure?

A Yes, sir. That's a normal practice whenever we set a liner.

Q Now will you notify me of these results?

A Yes, sir, make a note to do so.

Q Thank you.

MR. IRBY: I don't have any further questions. The State Engineer would recommend that the disposal of produced water in excess of a half-barrel per pit per day be disposed of in some manner other than in unlined pits. That's all I have.

BY MR. NUTTER:

Q Mr. Snyder, what is the current depth of Wells Numbers 201, 202, and 203?

A Number 201, current depth is 9165; Number 202 is 9210; and Number 203, 9143.

Q And each of these will be deepened and a liner set, is that correct?

A Yes, sir.

Q Now the ultimate depth of each of these wells will be in the McKee formation?

A Yes, sir.

Q Now I noted from one of the logs that we had -- let's see, it's Exhibit No. 3, that this Turner No. 2 Well has perforations in the Waddell and Connell formations as well as the McKee?

A No, sir, those are not perforations. I should have pointed out that those blocked-in intervals are porosity intervals on the microlog.

Q Those aren't the perforations in the well, then?

A No.

Q Is the Waddell or the Connell formation open with the McKee in any well in this unit area?

A Not at this time.

Q It was at one time?

A It was at one time in this particular well, the Turner No. 2, I believe. We had a dual completion for a number of years, and at a later date then, about 1961, I believe, the Commission granted us permission to bore-hole, commingle these two until we had depleted the Connell. It was depleted about two years ago and made roughly 18,000 barrels after we did that, and we have since plugged it off.

Q So the Connell is plugged off, then?

A Yes.

Q So in none of your injection wells or in none of your production wells will any other formation be open except the McKee?

A That's right.

Q Now this San Andres water that you are going to be using for injection, is that produced water from an oil operation in some other pool or will this be produced for the purpose of water injection?

A It will be produced for the purpose of injection.

Q What will be your source well?

A We anticipate that, if you'll refer back to Exhibit No. 2, on the Cities Service Byers Lease just north of the four injection wells, there's a dry hole.

Q Is that Number 4?

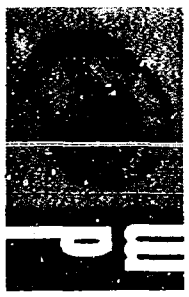
A The Number 4. We are anticipating we will make a supply well from that well, if it has no bad pipe in it or anything.

Q Is there any San Andres production in this immediate area?

A No, sir. The nearest San Andres production, I believe, is off to the west in the Monument Field, several miles.

Q You expect to inject 3,000 barrels per day per well, so that will be 12,000 barrels you are going to need initially?

A Initially, we will not need that much. In our committee work, working on this, we actually intend to inject into only one well to start with as a one-well pilot. If there are no problems entailed in this, in a very short time we will go to the other three wells also. At that time we probably will have to have another well for water supply. We anticipate that the one supply well might give up eight or possibly ten thousand barrels a day, but not enough for the four wells.



Q Your current thinking is that if these four wells show some sort of a response, you would come to the south end of the unit and start an end drive type of flood on the south half of the dome?

A Yes.

Q And the results that are expected is that the oil will move upstructure as the water is injected at the lower points?

A That's right.

Q Now I noted on your Exhibits 11 through 14, you made the statement that the tubing would be internally coated. Is this plastic coating of the tubing or just what?

A At this time I couldn't tell you what type of coating it is, but the San Andres water is corrosive so we will take every precaution necessary to protect everything from the corrosive properties of the water.

Q And in each instance the injection would be through some kind of coated tubing and under a packer?

A Yes, sir.

MR. NUTTER: Are there any further questions of Mr. Snyder?

MR. IRBY: I have one more.

BY MR. IRBY:

Q For the record, Mr. Snyder, would you state whether

or not this water supply well in the San Andres formation will be outside the Lea County underground water basin as declared by the State Engineer?

A If the water supply well --

Q -- is outside the basin?

A I believe, sir, that it is included in the basin.

Q Then have you made application to the State Engineer to withdraw this water?

A No. We will not be able to do that until the unit has been approved and several other things are settled, but we will make that application.

MR. IRBY: Thank you.

MR. NUTTER: Are there other questions of Mr. Snyder? He may be excused.

(Witness excused.)

MR. LYNCH: We would like to call as our next witness Mr. Joe B. Denton.

* * * *

JOE B. DENTON

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

DIRECT EXAMINATION

BY MR. LYNCH:

Q Mr. Denton, would you state your name and occupation

and by whom you are employed, for the record?

A Joe B. Denton. I am Assistant District Landman, Amerada Petroleum Corporation, Midland, Texas.

Q Mr. Denton, have you testified previously before this Commission?

A Yes.

Q Are you familiar with the application in this proceeding, the application of Amerada?

A Yes.

Q Are you familiar with the Warren McKee, the proposed Warren McKee Unit and the unit agreement?

A Yes.

Q I would like to hand you first, Mr. Denton, what should be marked as Exhibit 16.

(Whereupon, Applicant's Exhibit No. 16 marked for identification.)

Q Mr. Denton, this Exhibit 16 is entitled Unit Agreement, Warren McKee Unit, Lea County, New Mexico. Is this agreement closely patterned after the A.P.I. model form?

A It is essentially the model form.

Q Is the unit area defined and described in this agreement?

A It is.

Q Where is it described, is it described in Exhibits "A" and "B" of the Unit Agreement?

A "A" and "B" of the Unit Agreement.

Q By tract?

A By tract.

Q Are all of the tracts that are included in the Unit Area privately owned fee lands?

A Yes.

Q There are no Federal or State lands involved?

A There are no Federal or State lands involved in this unit, they're all fee.

Q Under the Unit Agreement, who is to be the operator, at least initially?

A Amerada will be.

Q That's covered in Section 4.1?

A Right.

Q And are there various methods for qualifying tracts for inclusion within the unit?

A There's three different methods for qualifying the different tracts.

Q How many of the fifteen tracts shown on Exhibit "B" to the Unit Agreement have qualified for inclusion in the unit?

A All of the tracts have qualified except Tract 15. The working interest owner has not executed the agreement but we expect him to within the next few days.

Q Does the Unit Agreement expressly provide that it is

subject to the conservation laws of the State and the Rules of the Commission, and other applicable State and Federal laws and regulations.

A Yes, it does.

Q What is to be the effective date of the unit?

A The effective date will be on the filing of the certificate and after all the tracts have qualified, when that has been done.

Q So the certificate will be filed after the tracts have qualified?

A Right.

Q And after the Unit Agreement has been filed of record?

A Correct.

Q And after this Commission has approved the Unit Agreement?

A Yes, sir.

Q Would you now examine, Mr. Denton, what should be marked as Exhibit 17?

(Whereupon, Applicant's Exhibit No. 17 marked for identification.)

Q Mr. Denton, Exhibit 17 is entitled Ownership List, Warren McKee Unit, Lea County, New Mexico. I note that the exhibit is in two parts. Does one part deal with the working interest and the other part deal with the royalty interest?

A Yes, they do.

Q Looking at the first part first, dealing with working interest owners, how many working interest owners are there within the unit area?

A There's twenty-three working interest owners.

Q How many have executed the Unit Agreement?

A Twenty-two.

Q And the one that has not executed the Unit Agreement owns the working interest in Tract 15, as you previously stated?

A That's correct.

Q What is the percent of the total working interest that has been committed to the unit at the present time?

A We have 99.86993 percent.

Q And that is shown on the second page?

A That is shown on the second page, yes, the outstanding interest, interest of the one Tract 15.

Q Turning now to the second part of the exhibit which deals with royalty interest owners, how many royalty owners are there within the unit area?

A One hundred forty.

Q How many have executed the Unit Agreement?

A One hundred thirty-one.

Q And how about those that haven't executed the Unit Agreement; why haven't they executed?

A The parties who have not executed are involved in estates of deceased parties and so forth. We are in contact with all of the royalty owners except one whom we have been unable to locate.

Q You don't know his address?

A No, not been able to find it.

Q What percentage of the total royalty interest in the unit area has been committed to the unit?

A I have been advised this morning by the Midland Office that we have secured one other one. We now have 99.6327 percent.

Q Mr. Denton, has anyone at all objected to the creation of this unit?

A No, no party has.

MR. LYNCH: That's all we have of this witness.

CROSS EXAMINATION

BY MR. NUTTER:

Q What is the actual acreage in this unit?

A 1785 acres.

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

(Witness excused.)

MR. LYNCH: Mr. Examiner, that's all the testimony we have. We would like to offer in evidence Exhibits 1 through

17.

MR. NUTTER: Amerada's Exhibits 1 through 17 will be admitted in evidence.

(Whereupon, Applicant's Exhibits Nos. 1 through 17, both inclusive, offered and admitted in evidence.)

MR. NUTTER: Does anyone have anything they wish to offer in Cases 3304, 3305, consolidated? If not, we will take the case under advisement.

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I N D E X

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EXHIBITS

NUMBER	MARKED FOR IDENTIFICATION	OFFERED AND ADMITTED
Applicant's 1 - Lease Plat	3	30
Applicant's 2 - Structure Map	6	30
Applicant's 3 - Type Log	7	30
Applicant's 4 - Data Sheet	7	30
Applicant's 5 - Tabulation	8	30
Applicant's 6 - Graph	8	30
Applicant's 7 through 10 - Logs	11	30
Applicant's 11 through 14 - Diagrams	12	30
Applicant's 15 - Unit Participation	14	30
Applicant's 16 - Unit Agreement	25	30
Applicant's 17 - Ownership List	27	30

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter - Notary Public, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 13th day of October, 1965.

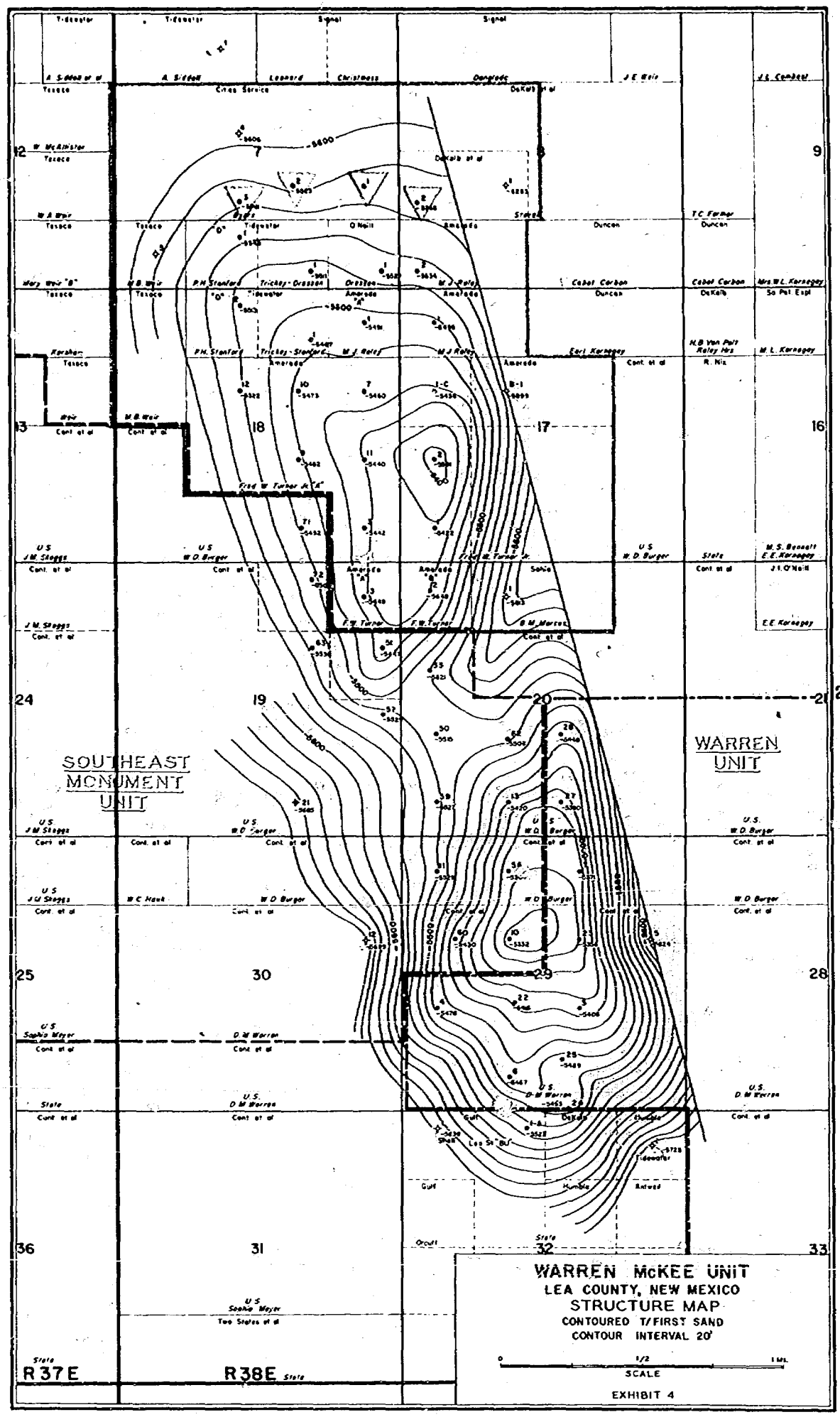
Ada Dearnley
Court Reporter - Notary Public

My Commission Expires:

June 19, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3304-3305 heard by me on 9/22, 1965.

....., Examiner
New Mexico Oil Conservation Commission



AMERADA PETROLEUM CORP.

EXHIBIT 2

CASE NO. 3305

DATE 9-22-65

DRAFT
JMD/esr

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. 3305

Order No. R-2972

APPLICATION OF AMERADA PETROLEUM CORPORATION FOR A WATERFLOOD PROJECT, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on September 22, 1965, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this _____ day of ~~September~~ October, 1965, 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, Amerada Petroleum Corporation, seeks permission to institute a waterflood project ~~in the xxxxxxxxxx~~ in the Warren-McKee Unit Area, Warren-McKee Pool, by the injection of water into the McKee formation through four injection wells in Sections 7 and 8, Township 20 ~~North~~ South, Range 38 ~~West~~ 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 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, Amerada Petroleum Corporation, is hereby authorized to institute a waterflood project, ~~in the~~ in the Warren-McKee Unit Area, Warren-McKee Pool, by the injection of water into the McKee formation through the following-described wells in Township 20 ~~North~~ South, Range 38 ~~West~~ East, NMPM, Lea County, New Mexico:

Section 7

Warren McKee Unit Well No. 201, Unit I
Warren McKee Unit Well No. 202, Unit J
Warren McKee Unit Well No. 203, Unit K

Section 8

Warren McKee Unit Well No. 102, Unit L

(2) That the subject waterflood project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

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

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

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

'65 SEP 2 AM 7

MAIN OFFICE

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

APPLICATION OF AMERADA PETROLEUM CORPORATION)
FOR AUTHORITY TO INSTITUTE A WATERFLOOD PROJ-)
ECT IN THE WARREN-McKEE POOL BY THE INJECTION) CASE NO. 3305
OF WATER THROUGH FOUR WELLS LOCATED IN SECTIONS)
7 AND 8, TOWNSHIP 20 SOUTH, RANGE 38 EAST, LEA)
COUNTY, NEW MEXICO.)

APPLICATION

Applicant Amerada Petroleum Corporation states that:

1. By a separate application, Applicant is seeking approval of the Warren-McKee Unit Agreement for the purpose of conducting secondary recovery operations in the Warren-McKee Pool underlying portions of Sections 7, 8, 17, 18, 19 and 20, Township 20 South, Range 38 East, Lea County, New Mexico.

2. Applicant, as operator of the Warren-McKee Unit seeks authority to institute a waterflood project pursuant to Rule 701 of the Commission Rules and Regulations by injecting salt water into the Warren-McKee Pool, found at an approximate depth of 9200 feet, through the following wells in Township 20 South, Range 38 East, Lea County, New Mexico:

- Cities Service No. 1 Byers, located in the NE/4 SE/4 Section 7;

- Cities Service No. 2 Byers, located in the NW/4 SE/4 Section 7;

- Cities Service No. 3 Byers, located in the NE/4 SW/4 Section 7;

- Dekalb et al. No. 2 Stovall, located in the NW/4 SW/4 Section 8.

3. Attached hereto and made a part hereof are a plat showing the location of the proposed injection wells, and a diagrammatic sketch of each such injection well.

4. Applicant proposes to inject approximately 3000 barrels of salt water per day into each injection well. The source of the water for injection is the San Andres formation.

5. The proposed waterflood project is in the interest of conservation and should result in recovery of otherwise unrecoverable oil, thereby preventing waste.

Applicant therefore requests that this matter be set for hearing before an Examiner, that notice of hearing be given as required by law, and that this Commission thereupon enter its order authorizing the waterflood project herein proposed.

AMERADA PETROLEUM CORPORATION

By Thomas W. Lynch
Thomas W. Lynch, Attorney
August 30, 1965

Local Counsel:
Jason W. Kellahin
Kellahin & Fox
P. O. Box 1769
Santa Fe, New Mexico 87501

CERTIFICATE OF MAILING

I, Thomas W. Lynch, hereby certify that a copy of the foregoing application has been sent by first class mail to:

State Engineer Office
Capitol Building
Santa Fe, New Mexico

on this 30th day of August, 1965.

Thomas W. Lynch

Thomas W. Lynch

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

Date 9/23/65

CASE NO. 5305 HEARING DATE 9 am 9/22/65
DSN & SF

My recommendations for an order in the above numbered case(s) are as follows:

Enter an order approving Amerada proposed water flood project on its Warren McKee Unit Area, Warren McKee Pool Lea Co N Mex.

authorize the injection of water into four wells:

Warren McKee Unit Well No 102, L 8-20-38
" " " " " 201, I 18-20-38
" " " " " 202 J 18-20-38
" " " " " 203 K 18-20-38

Staff Member

AMERADA PETROLEUM CORPORATION
P. O. BOX 2040
TULSA, OKLAHOMA 74102
LEGAL DEPARTMENT

August 30, 1965

Case 3305

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

Re: Applications for Hearing

Gentlemen:

Enclosed are the original and two copies of each of Amerada's applications for (1) approval of the Warren-McKee Unit Agreement, and (2) authority to initiate a waterflood project in such unit.

Please set these matters for hearing before an Examiner on September 22, 1965. Thank you.

Very truly yours,

Thomas W. Lynch

THOMAS W. LYNCH

TWL:ac
Enclosures

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. 3305
Order No. R-2972

APPLICATION OF AMERADA PETROLEUM CORPORATION
FOR A WATERFLOOD PROJECT, LEA COUNTY, NEW
MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on September 22, 1965, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 4th day of October, 1965, 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, Amerada Petroleum Corporation, seeks permission to institute a waterflood project in the Warren-McKee Unit Area, Warren-McKee Pool, by the injection of water into the McKee formation through four injection wells in Sections 7 and 8, 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 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, Amerada Petroleum Corporation, is hereby authorized to institute a waterflood project in the Warren-McKee 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:

Section 7

Warren McKee Unit Well No. 201, Unit I
Warren McKee Unit Well No. 202, Unit J
Warren McKee Unit Well No. 203, Unit K

Section 8

Warren McKee Unit Well No. 102, Unit L

(2) That the subject waterflood project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

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

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JACK M. CAMPBELL, Chairman

GUYTON B. HAYS, Member

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

esr/

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

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

October 4, 1965

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

Re: Case No. 3304 (3305)
Order No. R-2971 & R-2972
Applicant:
Amerada

Dear Sir:

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

Very truly yours,

A. L. Porter, Jr.
A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC
OTHER Mr. Tom W. Lynch

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

October 19, 1965

COPY

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

Dear Sir:

Reference is made to Commission Order No. R-2972, recently entered in Case No. 3305, approving the Amerada Warren McKee Waterflood Project.

Injection is to be through the four authorized water injection wells which shall be equipped with internally coated tubing and packers, said packers being set as near as is practicable to the uppermost perforation in the McKee formation.

As to allowable, our calculations indicate that when all of the authorized injection wells have been placed on active injection, the maximum allowable which this project will be eligible to receive under the provisions of Rule 701-E-3 is 1272 barrels per day.

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

In order that the allowable assigned to the project may be kept current, and in order that the operator may fully benefit from the allowable provisions of Rule 701, it behooves him to promptly notify both of the aforementioned commission offices by letter of any change

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

in the status of wells in the project area, i.e., when active injection commences, when additional injection or producing wells are drilled, when additional wells are acquired through purchase or unitization, when wells have received a response to water injection, etc.

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

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/DSN/ir

cc: Mr. Frank Irby
Mr. Tom Lynch
Oil Conservation Commission - Hobbs, New Mexico

GOVERNOR
EDWIN L. MECHEM
CHAIRMAN

State of New Mexico

Oil Conservation Commission

LAND COMMISSIONER
E. S. JOHNNY WALKER
MEMBER

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

P. O. BOX 2088
SANTA FE
87501

Injection is to be through the four authorized main injection wells which shall be equipped with internally coated tubing and packers, said packers being set as near as is practicable to the uppermost perforation in the McKee formation.

_____, 19___

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

Gentlemen:

Reference is made to ~~Enclosed herewith is~~ Commission Order No. R-2972, recently entered in Case No. 3305, approving the Amerada Warren - McKee Water Flood Project.

~~According to~~ As to allowable, our calculations indicate that when all of the authorized injection wells have been placed on active injection, the maximum allowable which this project will be eligible to receive under the provisions of Rule 701-E-3 is 1272 barrels per day.

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

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

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

Very truly yours,

cc: OCC Hobbs
Mr. Frank Irby
Mr. Tom Lynch

A. L. PORTER, Jr.
Secretary-Director

AMERADA PETROLEUM CORPORATION
P. O. BOX 312
MIDLAND, TEXAS

PHONE MU 4-5533

April 15, 1966

File Cor 3302

State Engineer Office
Santa Fe, New Mexico

Attention: Mr. Frank E. Irby

Dear Sir:

Your letter of April 12, 1966, advises that Amerada Petroleum Corporation should have secured a permit from the State Engineer for converting a well located in Unit F, 2310' from the north line and 2331.1' from the west line of Section 7, T-20-S, R-38-E, Lea County, New Mexico, to a water supply well in the San Andres formation.

This was an oversight on our part and proper action is being taken to comply with the rules and regulations of the State Engineer.

As a matter of information Amerada completed conversion of this well from an abandoned oil well February 20, 1966. A pump was run in the well March 11, 1966. A total of 31,341 barrels of water has been produced in cleaning up the well, testing its productive capacity, and determining the characteristics of the pilot waterflood injection well. The well is now closed in. No water has been appropriated except for the testing indicated above and no water will be appropriated until approved by the State Engineer.

Thank you for your assistance in this matter.

Yours very truly,

AMERADA PETROLEUM CORPORATION

J. R. Enloe

JRE/ah
cc: A. L. Porter, Jr.
F. M. Hennighausen
Jason Kellahin

APR 13 AM 14

April 12, 1966

Amerada Petroleum Corporation
Box 312
Midland, Texas

Attn. Mr. J. R. Enloe

Gentlemen:

My attention has been directed to information indicating that you have converted your well No. 1 in the Warren McKee Pool located as follows:

> Unit F 2310' from the north line and 2310' from the west line of Sec. 7, T. 20 S., R. 38 E.

to a water injection well. This well is in the Lea County Underground Water Basin declared by the State Engineer and comes under the administrative authority of the State Engineer's Office. Drilling a well in this declared basin, or converting an oil well to a water well within the limits of this basin requires application to and approval by the State Engineer.

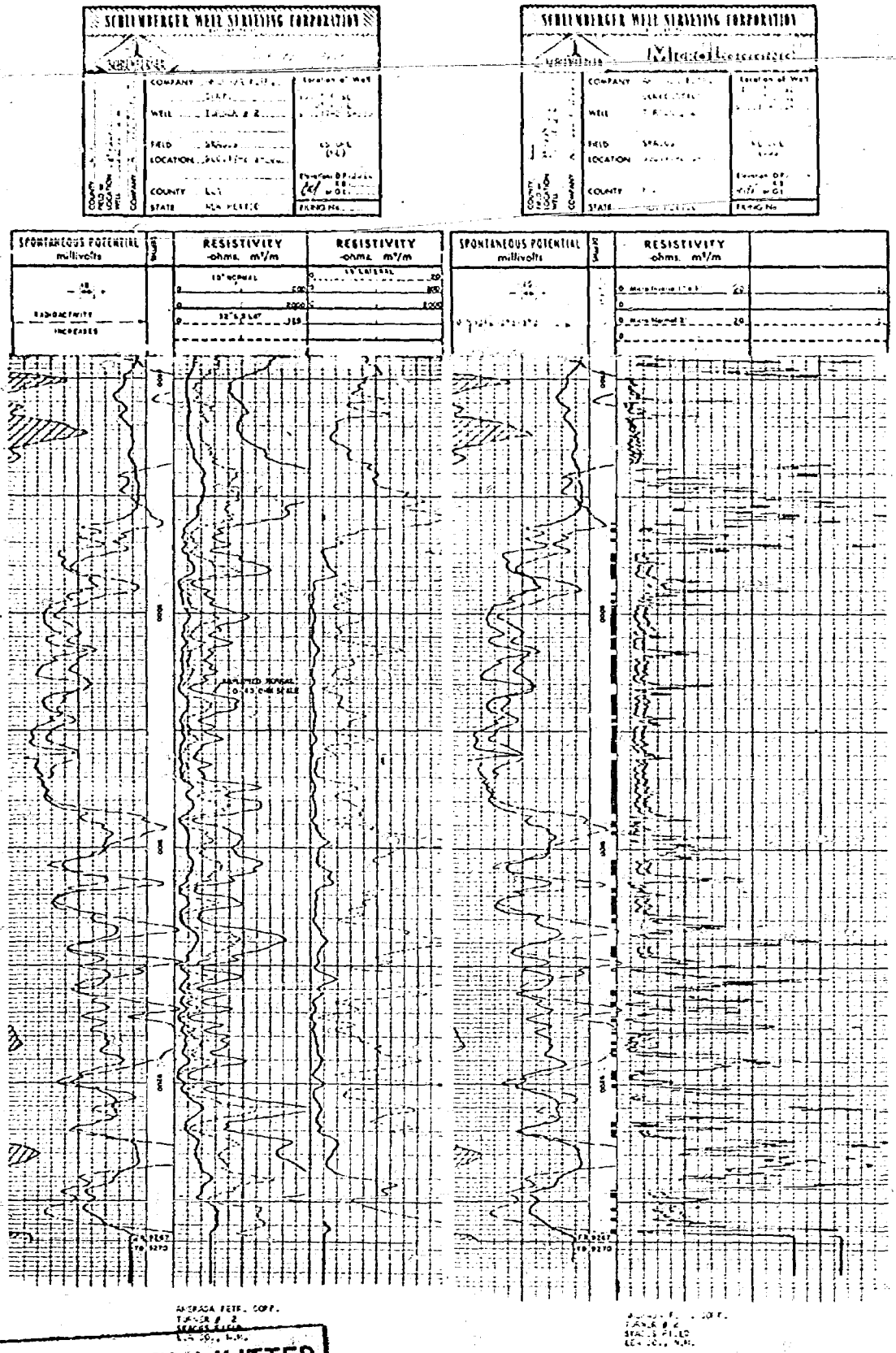
If my information is correct, you have illegally tapped the waters of the Lea County Basin. Unless proper steps are taken forthwith on this matter, it will be necessary for me to turn the matter over to the Attorney General's Office for his action.

FEI/ma
cc-Jason Kellahin
A. L. Porter, Jr.
F. H. Hennighausen

Yours truly,

S. E. Reynolds
State Engineer

By:
Frank E. Irby
Chief
Water Rights Div.



BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
EXHIBIT NO. 3
CASE NO. 3304 - 3305

EXHIBIT 5

TYPE LOGS SHOWING VARIOUS ZONES

AMERADA PETROLEUM CORP.
EXHIBIT 3
Case NO. 3305
DATE 9-22-65

AMERADA PETROLEUM CORPORATION
WARREN McKEE UNIT
LEA COUNTY, NEW MEXICO
PRODUCTION DATA

Date	Barrels Oil	Barrels Water	Average GOR	Average BHP
1952				
Jan.	5,517	-		3486
Feb.	7,983	-		
March	13,723	-		
April	18,022	-		
May	8,177	-		
June	18,094	-		
July	27,557	-		
Aug.	31,396	-		3228
Sept.	33,983	-		
Oct.	42,708	-		
Nov.	40,692	-		2974
Dec.	47,216	186		
Total	295,068	186	605	
Cum.	295,068	186		
1953				
Jan.	58,604	186		
Feb.	59,933	168		
March	67,936	186		
April	74,921	180		
May	78,971	186		2494
June	84,421	246		
July	86,823	254		
Aug.	100,510	254		
Sept.	93,523	246		
Oct.	97,890	254		
Nov.	84,941	246		1961
Dec.	87,089	254		
Total	975,562	2,660	590	
Cum.	1,270,630	2,846		
1954				
Jan.	91,216	350		
Feb.	78,578	316		
March	90,931	500		
April	89,110	523		
May	93,139	500		1933
June	90,357	1,508		
July	92,674	1,516		
Aug.	89,849	1,905		
Sept.	84,184	1,962		
Oct.	86,961	2,049		
Nov.	86,544	1,998		1832
Dec.	90,728	2,065		
Total	1,064,271	15,192	605	
Cum.	2,334,901	18,038		

Date	Barrels Oil	Barrels Water	Average GOR	Average BHP
1955				
Jan.	92,505	2,715		
Feb.	79,094	1,878		
March	87,972	1,990		
April	85,657	1,824		
May	85,712	1,957		1729
June	83,635	1,893		
July	87,112	2,258		
Aug.	86,421	2,261		
Sept.	81,783	2,185		
Oct.	84,669	2,521		
Nov.	85,074	2,452		1658
Dec.	83,918	2,114		
Total	1,023,552	26,048	800	
Cum.	3,358,453	44,086		
1956				
Jan.	85,388	2,543		
Feb.	77,838	916		
March	83,913	628		
April	76,924	1,321		
May	77,459	1,453		1521
June	76,902	2,087		
July	79,623	1,662		
Aug.	80,988	323		
Sept.	79,160	591		
Oct.	84,503	823		
Nov.	83,007	675		1386
Dec.	91,868	841		
Total	987,573	13,863	1180	
Cum.	4,346,026	57,949		
1957				
Jan.	93,438	890		
Feb.	85,645	822		
March	94,913	953		
April	86,005	880		
May	86,557	1,180		
June	79,661	1,082		1177
July	82,668	1,132		
Aug.	76,093	1,127		
Sept.	70,947	1,058		
Oct.	72,343	1,512		
Nov.	68,691	2,142		1070
Dec.	70,335	2,146		
Total	967,296	14,924	1580	
Cum.	5,313,322	72,873		

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
Amerada EXHIBIT NO. 5
CASE NO 3304/3305

AMERADA PETROLEUM CORP.
EXHIBIT
Case NO. 3305
DATE 9-22-65

Date	Barrels Oil	Barrels Water	Average GOR	Average BHP
1958				
Jan.	69,725	5,878		
Feb.	60,534	4,864		
March	65,327	3,138		
April	58,602	3,227		
May	62,416	1,825		
June	60,271	5,070		964
July	59,660	3,653		
Aug.	52,235	2,974		
Sept.	50,349	4,926		
Oct.	52,039	4,453		
Nov.	49,927	4,365		864
Dec.	50,337	4,288		
Total	691,422	48,661	2010	
Cum.	6,004,744	121,534		
1959				
Jan.	48,645	2,588		
Feb.	40,799	1,524		
March	45,870	1,335		
April	46,697	863		
May	44,524	865		
June	42,560	501		788
July	39,374	1,551		
Aug.	38,630	1,430		
Sept.	34,829	3,617		
Oct.	34,203	2,786		
Nov.	31,776	2,523		
Dec.	35,140	4,022		
Total	483,047	23,605	2640	
Cum.	6,487,791	145,139		
1960				
Jan.	34,708	2,287		
Feb.	31,417	1,805		
March	33,618	2,057		
April	33,919	2,658		
May	41,958	2,898		
June	37,735	2,273		752
July	40,617	3,071		
Aug.	41,047	2,879		
Sept.	40,180	5,180		
Oct.	42,297	5,639		
Nov.	39,292	5,347		
Dec.	35,906	5,804		
Total	452,694	41,898	2450	
Cum.	6,940,485	187,037		

Date	Barrels Oil	Barrels Water	Average GOR	Average BHP
1961				
Jan.	34,963	6,281		
Feb.	30,211	5,532		
March	34,394	4,982		
April	34,327	5,375		685
May	33,671	4,151		
June	30,462	6,098		
July	30,387	4,543		
Aug.	27,422	4,176		
Sept.	28,384	6,719		
Oct.	29,361	5,130		
Nov.	28,717	5,078		
Dec.	29,592	5,395		
Total	371,891	63,460	2450	
Cum.	7,312,376	250,497		
1962				
Jan.	28,882	6,569		
Feb.	26,443	4,232		
March	29,595	5,902		
April	30,416	5,601		499
May	32,540	7,322		
June	29,144	6,577		
July	28,640	6,939		
Aug.	27,019	6,375		
Sept.	26,001	5,769		
Oct.	26,544	6,040		
Nov.	25,305	5,963		
Dec.	24,560	5,331		
Total	335,089	72,620	2020	
Cum.	7,647,465	323,117		
1963				
Jan.	25,136	6,173		
Feb.	22,265	5,810		
March	22,910	5,413		
April	21,529	5,224		
May	20,728	4,767		
June	17,346	3,628		
July	18,440	3,998		
Aug.	18,819	3,657		
Sept.	18,118	5,467		
Oct.	18,779	4,639		
Nov.	18,925	4,551		
Dec.	19,830	4,500		
Total	242,825	57,827	2340	
Cum.	7,890,290	380,944		

WARREN McKEE UNIT

Date	Barrels Oil	Barrels Water	Average GOR	Average BHP
1964				
Jan.	20,094	4,295		
Feb.	17,671	3,871		
March	19,583	3,879		
April	18,635	3,687		
May	17,673	3,432		
June	15,407	2,844		
July	16,412	2,789		
Aug.	14,786	2,410		
Sept.	17,384	2,811		
Oct.	17,159	2,721		
Nov.	16,676	2,862		
Dec.	17,380	3,319		
Total	208,860	38,920	2660	—
Cum.	8,099,150	419,864		
1965				
Jan.	16,707	1,876	3370	
Feb.	14,764	2,428	3100	
March	17,182	2,570	2900	
April	16,428	2,284	3330	
May	15,427	2,666	3430	
June	13,346	2,585	3820	
Cum.	8,193,004	434,273		

DATA SHEET
WARREN McKEE UNIT
LEA COUNTY, NEW MEXICO

GENERAL

Discovery Date - Field		December, 1948
First Well Within Unit Area - (Amerada Fred Turner No. 1)		January, 1952
Number of Wells Drilled Within the Unit Area		28
Dry Holes		5
Producers		23
Wells Currently Producing, June, 1965		19
Cumulative Oil Production to July 1, 1965		8,193,004 Bbls
Current Rate Oil Production, June, 1965		13,346 B/M
Average Daily Oil Production Per Well, June 1965		23 B/W/D
Current Rate Water Production, June, 1965	22.5%	2,585 B/M
Current Average Gas Oil Ratio, June, 1965		3,820 CF/B
Acreage Within Unit		1,785 Ac

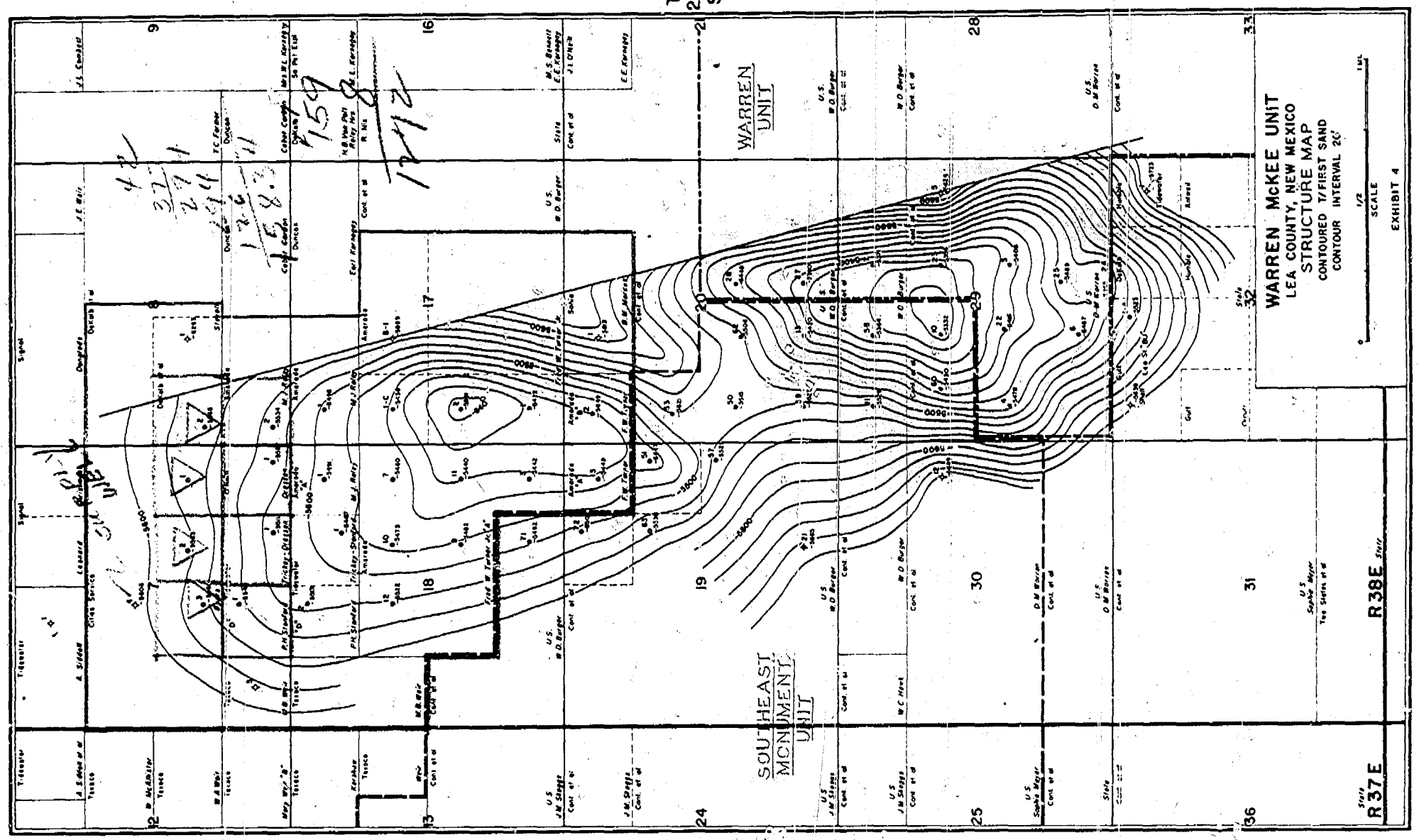
GEOLOGICAL DATA

Producing Formation	McKee Sandstone
Average Depth	9050 Ft
Type Structure	Anticline
Initial Water Oil Contact	-5650 Ft

RESERVOIR PROPERTIES

Initial Reservoir Pressure at -5500 Ft	3486 psi
Average Porosity	16.4%
Average Permeability	99.8 md
Water Saturation	42%
Reservoir Temperature	123° F
Reservoir Volume Factor at Initial Conditions	1.335
Solution GOR at Initial Conditions	670 CF/B
Saturation Pressure	2156 psi
Reservoir Volume Factor at Saturation Pressure	1.359
Reservoir Oil Viscosity at Saturation Pressure	0.589 CP
Gravity of Stock Tank Oil at 60° F	45° API
Current Reservoir Pressure	Less Than 400 psi

AMERADA PETROLEUM CORP.
EXHIBIT 4
Case NO. 3305
DATE 9-22-65



BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
EXHIBIT NO. 2
CASE NO. 3304 - 3305

AMERADA PETROLEUM CORP.
EXHIBIT 2
CASE NO. 3305
DATE 9-22-65

DATA SHEET
WARREN McKEE UNIT
LEA COUNTY, NEW MEXICO

GENERAL

Discovery Date - Field	December, 1948
First Well Within Unit Area - (Amerada Fred Turner No. 1)	January, 1952
Number of Wells Drilled Within the Unit Area	28
Dry Holes	5
Producers	23
Wells Currently Producing, June, 1965	19
Cumulative Oil Production to July 1, 1965	8,193,004 Bbls
Current Rate Oil Production, June, 1965	13,346 B/M
Average Daily Oil Production Per Well, June 1965	23 B/W/D
Current Rate Water Production, June, 1965 22.5%	2,585 B/M
Current Average Gas Oil Ratio, June, 1965	3,820 CF/B
Acreage Within Unit	1,785 Ac

GEOLOGICAL DATA

Producing Formation	McKee Sandstone
Average Depth	9050 Ft
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BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
Amerada EXHIBIT NO. 4
CASE NO. 3304 - 3305

AMERADA PETROLEUM CORP.
EXHIBIT
Case NO. 3305
DATE 9-22-65

WARREN McKEE UNIT
BASIC PARAMETERS FOR UNIT PARTICIPATION

Tract No.	Lease	Current Production*	Remaining Primary	Adjusted Acre-Feet	Ultimate Primary
1	Stoval	-	-	1,035.24	144,163
2	Byers	-	-	4,396.59	477,540
3	M. B. Weir "B"	-	-	691.42	-
3A	M. B. Weir "A"	-	-	483.57	-
4	P. H. Stanford "D"	8,490	57,900	5,513.46	584,573
5	Trickey-Dreessen Unit	4,279	55,500	2,931.05	446,956
6	Dreessen	2,309	18,600	2,811.56	395,770
7	Mary J. Raley	12,678	126,400	6,251.07	1,051,410
8	Mary J. Raley "B"	-	-	565.04	-
9	Mary J. Raley "A"	4,649	43,900	3,841.37	453,042
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11	Fred Turner, Jr. "A"	54,584	564,200	27,422.42	3,502,283
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13	Fred Turner, Jr. "B"	6,589	89,700	8,619.25	277,235
14	Fred Turner, Jr.	14,996	214,900	7,645.49	1,045,051
15	B. M. Marcus	-	-	1,047.31	-
	TOTALS	115,625	1,253,100	80,520.68	9,232,928

*Current Production: Oil Production for the period from December 1, 1963 to June 1, 1964.

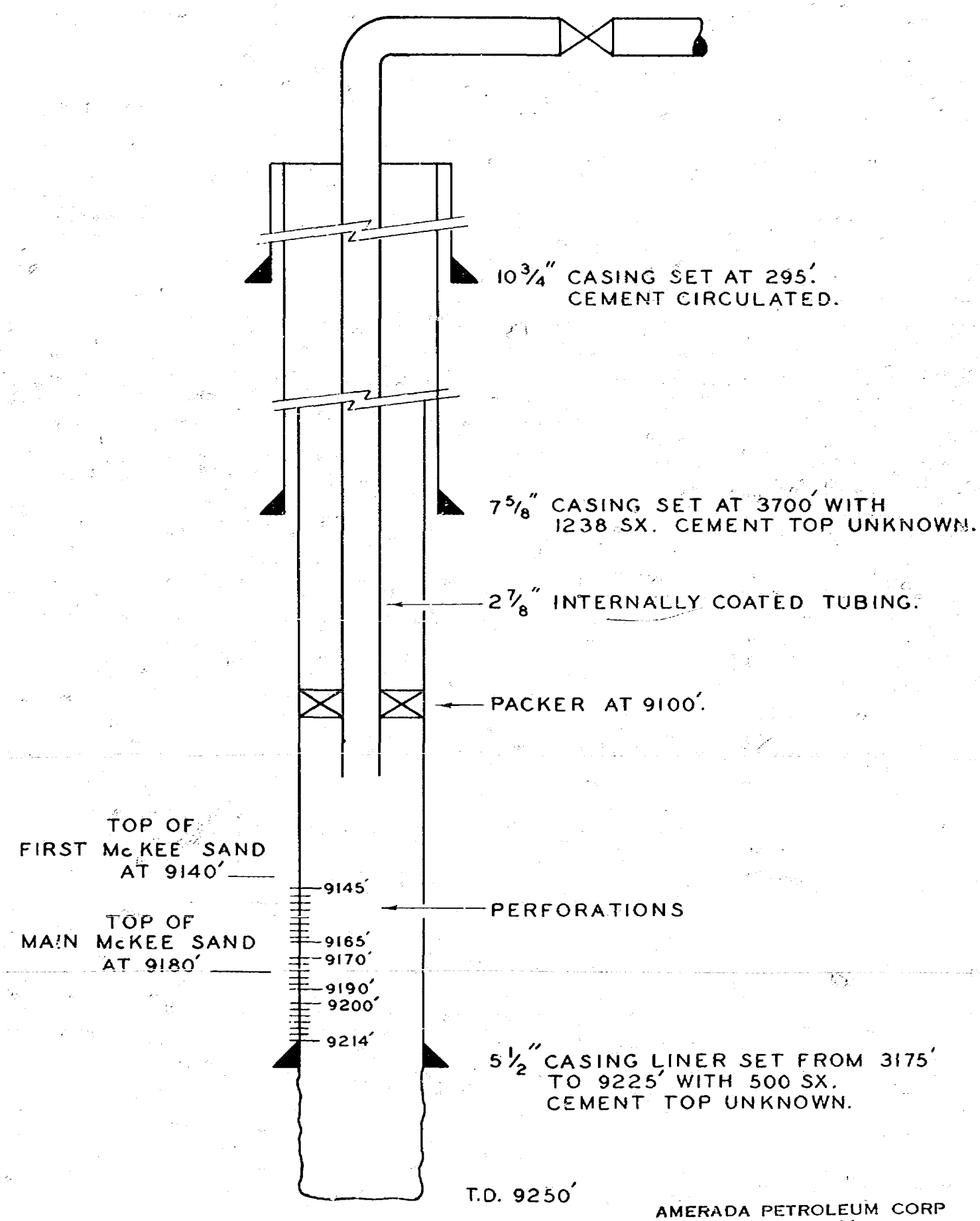
PHASE I = Until 1,253,100 barrels of oil have been produced after June 1, 1964. Participation to be 45 percent Current Production plus 45 percent Remaining Primary as of June 1, 1964 plus 10 percent Adjusted Acre-Feet.

PHASE II = Remaining Oil. Participation to be one-third Adjusted Acre-Feet plus two-thirds Ultimate Primary.

AMERADA PETROLEUM CORP.
EXHIBIT 15
NO. 3305
DATE 9-22-65

WARREN McKEE UNIT
LEA CO., NEW MEXICO

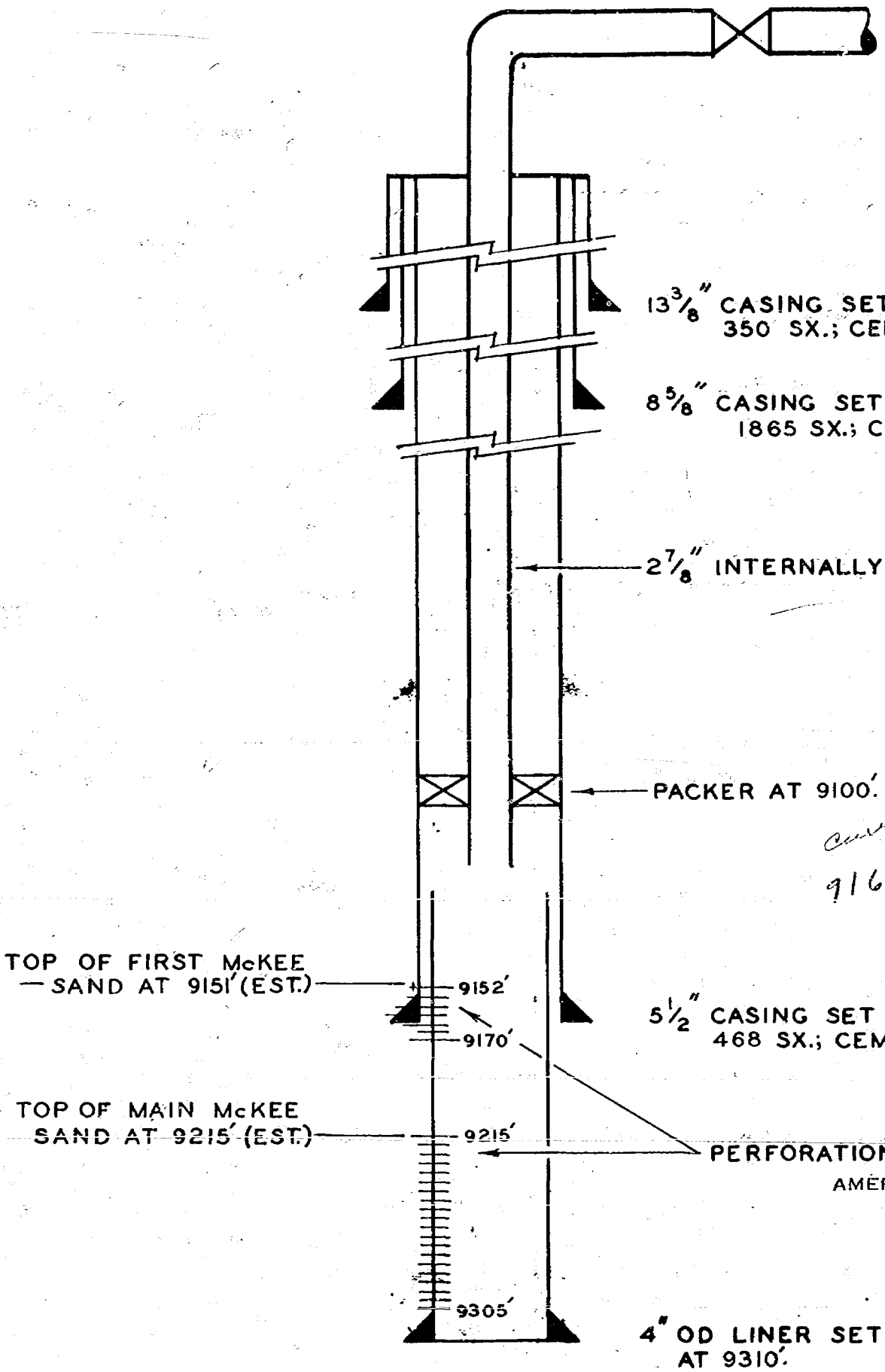
DIAGRAMATIC SKETCH OF INJECTION WELL NO. 102



AMERADA PETROLEUM CORP
EXHIBIT 11
NO. 3305
DATE 9-22-65

WARREN McKEE UNIT
LEA CO., NEW MEXICO

DIAGRAMATIC SKETCH OF INJECTION WELL NO. 201



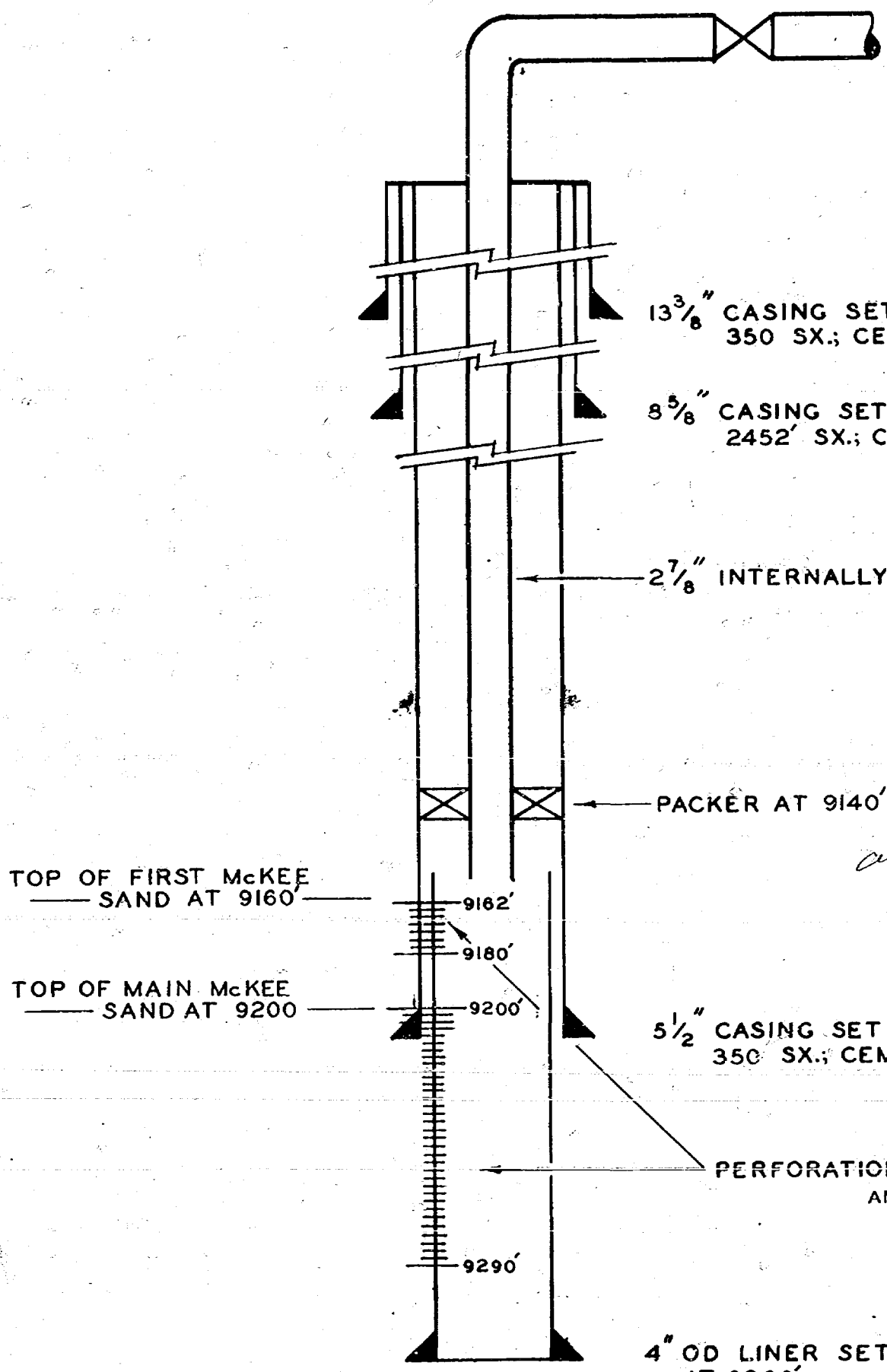
AMERADA PETROLEUM CORP
EXHIBIT 12
NO. 3305
DATE 9-22-65

THIS WELL CURRENTLY HAS 5½" CASING SET AT 9165'. IT IS COMPLETED THROUGH OPEN HOLE TO TOTAL DEPTH OF 9220'.

IT IS ANTICIPATED THAT IT WILL BE DEEPENED AND COMPLETED AS SHOWN ABOVE.

WARREN McKEE UNIT
LEA CO., NEW MEXICO

DIAGRAMATIC SKETCH OF INJECTION WELL NO. 202



AMERADA PETROLEUM CORP
EXHIBIT 13
NO. 3305
DATE 9-22-65

THIS WELL CURRENTLY HAS 5½" CASING SET AT 9210'. IT IS COMPLETED THROUGH PERFORATIONS 9160-9175' AND 9185-9201'.

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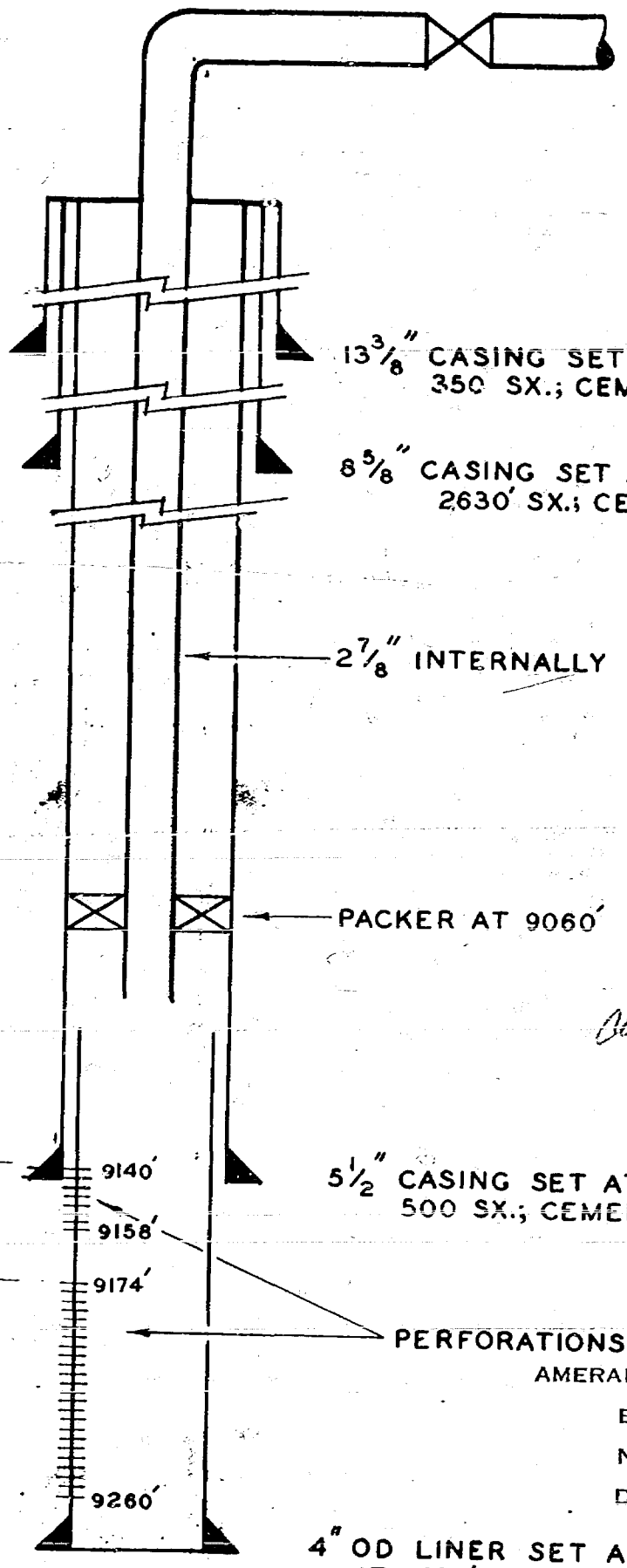
WARREN McKEE UNIT
LEA CO., NEW MEXICO

DIAGRAMATIC SKETCH OF INJECTION WELL NO. 203



Amended 9143

AMERADA PETROLEUM CORP.
EXHIBIT 14
NO. 3305
DATE 9-22-65

THIS WELL CURRENTLY HAS 5½" CASING SET AT 9143'. IT IS COMPLETED THROUGH OPEN HOLE 9143-9174'.

IT IS ANTICIPATED THAT IT WILL BE DEEPENED AND COMPLETED AS SHOWN ABOVE.

SIMULTANEOUS RADIATION LOG

NATURAL GAMMA RADIATION — NEUTRON RADIATION

LOCATION		
1650' FSL	COMPANY	CLARK & AGRICULTURAL ASSN., INC.
330' FWL	WELL	STOVALL #2 Unit Well No. 102
SEC. 8	FIELD	NORTH WARREN McKEE
T20S, R38E	COUNTY	LEA — STATE NEW MEXICO
LOG NO. 1223	SECTION	8 — TOWNSHIP 20-S — RANGE 38-E

LOG MEASURED FROM: 1' ABOVE ROTARY TABLE

DRILLING MEASURED FROM: SAME

PERMANENT DATUM: 9.20' ABOVE GROUND LEVEL

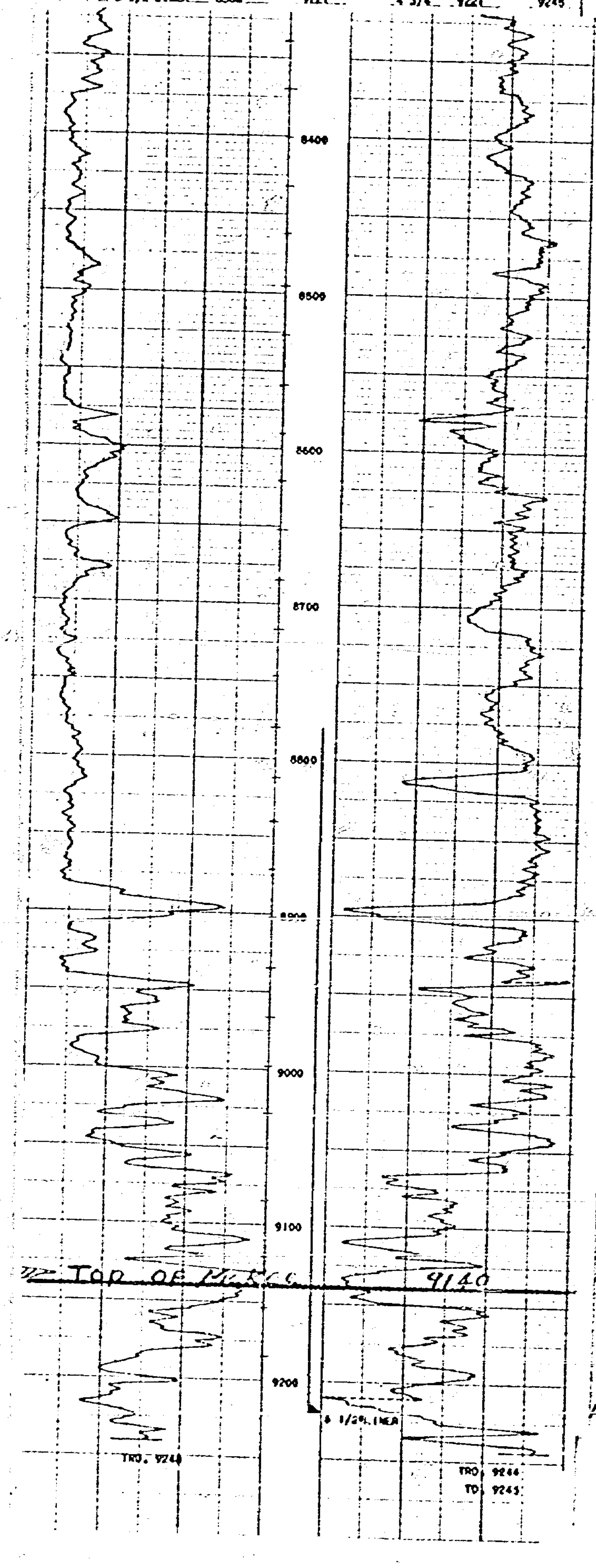
TYPE OF LOG	GAMMA RAY	NEUTRON
RUN NUMBER	ONE	ONE
DATE		
TOTAL DEPTH (DRILLER)	9245	9245
EFFECTIVE DEPTH P.B.R.C.	9245	9248
TOP OF LOGGED INTERVAL	100	100
BOTTOM OF LOGGED INTERVAL	9240	9248
TYPE FLUID IN HOLE	WATER	WATER
FLUID LEVEL	280	280
MAXIMUM RECORDED TEMP.		
O.D. OF INSTRUMENT — INCHES	3 5/8	3 5/8
TIME CONSTANT — SECONDS	6	6
LOGGING SPEED — FEET/MINUTE	15-60	15-60
STATISTICAL VARIATION — INCHES		
RECORDED BY	YOUNG	
WITNESSED BY	BROWN	

CASING RECORD

RUN NO.	SIZE, IN.	WEIGHT, LB.	INTERVAL		
ONE	10 3/4		SURFACE	TO	235
ONE	7 5/8		SURFACE		3700
ONE	5 1/2 LINER		3586		9221

OPEN HOLE RECORD

BIT SIZE, IN.	INTERVAL		
4 3/4	9221	TO	9245



AMERADA PETROLEUM CORP.

EXHIBIT 7

NO. 3305

DATE 9-22-65

LANE RADIOACTIVITY LOG WELLS

COMPANY

FILE NO.

Location of Well

3560' D.F.

COMPANY: CITIES SERVICE OIL COMPANY
WELL: HARRIS NO. 1 Unit Well
FIELD: WARREN-McKEE No. 201
COUNTY: LEA STATE N. M.
LOCATION: CENTER OF NE-SE - OF
SECTION 7 - 20S - 38E

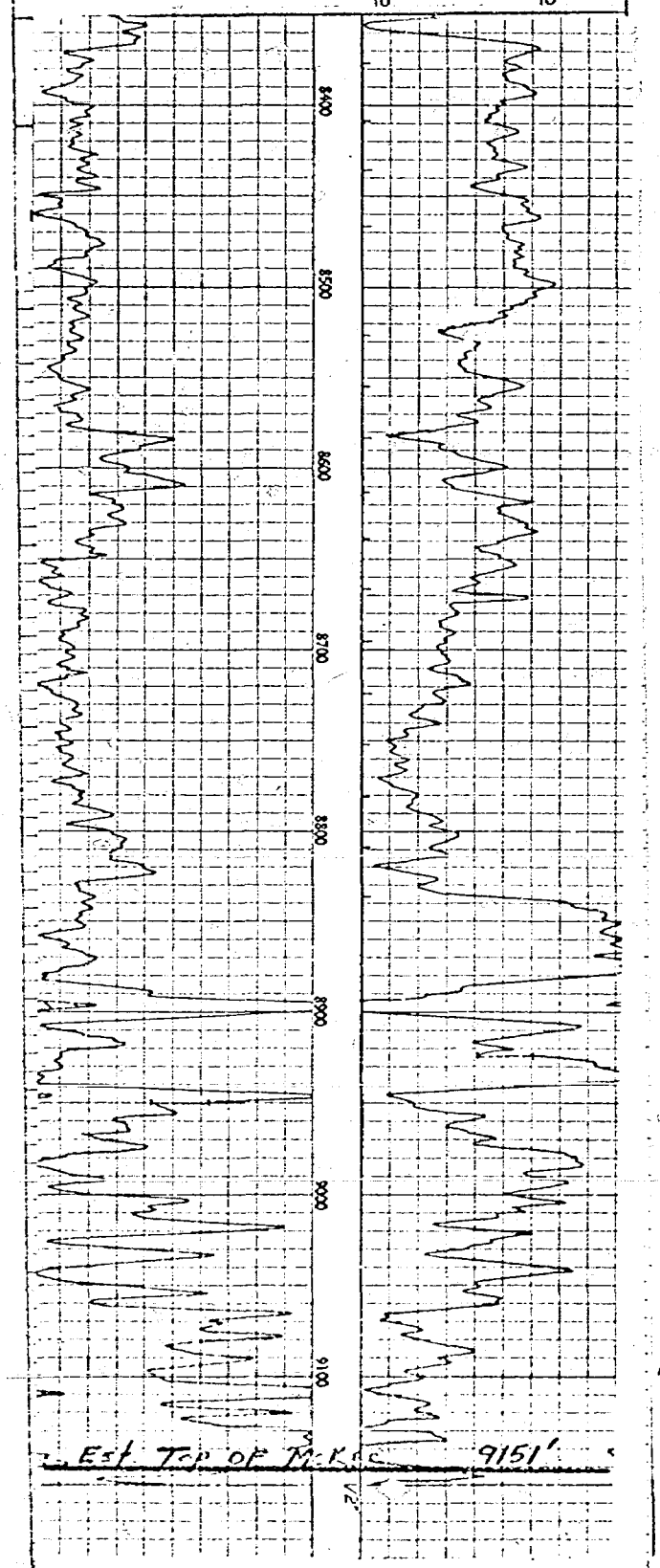
COMPANY CITIES SERVICE OIL
WELL HARRIS NO. 1
FIELD WARREN McKEE
COUNTY LEA
LOCATION STATE N. M.

LOG MEAS FROM KELLY DRIVE BUSHING ELEV. 3602'
DRLG. MEAS FROM KELLY DRIVE BUSHING ELEV. 3602'
PERM. DATUM GROUND LEVEL ELEV. 3560.7'

	GAMMA RAY	NEUTRON		
TYPE OF LOG				
RUN NO.	1-NW	1-NW		
DATE	8-27-52	8-27-52		
TOTAL DEPTH (DRILLER) STRAIN	9165'	9165'		
EFFECTIVE DEPTH (DRILLER)	9165'	9165'		
TOP OF LOGGED INTERVAL	SURFACE	SURFACE		
BOTTOM OF LOGGED INTERVAL	9160'	9160'		
TYPE OF FLUID IN HOLE	MUD	MUD		
FLUID LEVEL		464'		
MAXIMUM RECORDED TEMP.				
NEUTRON SOURCE STRENGTH & TYPE		600M		
SOURCE SPACING — IN.		8.25		
LENGTH OF MEASURING DEVICE — IN.	36	9		
O.D. OF INSTRUMENT — IN.	3 5/8	3 5/8		
TIME CONSTANT — SECONDS	4.0	2.5		
LOGGING SPEED FT./MIN.	30-70	30-70		
STATISTICAL VARIATION — IN.				
SENSITIVITY REFERENCE	274	275		
RECORDED BY	SCHLOTTER	BLACK		
WITNESSED BY	DICKEY	DICKEY		

CASING RECORD

RUN NO.	BIT SIZE	CASING	WT.—LB.	FROM WELL RECORD	FROM R/A LOG
1	17	13 3/8		SURF. TO 345'	SURF. TO 342'
1	11	8 5/8		SURF. TO 3700'	SURF. TO 3699'
1	7 7/8	5 1/2		SURF. TO 9164'	SURF. TO 9162'
				TO	TO
				TO	TO



AMERADA PETROLEUM CORP.
EXHIBIT 8
NO. 3305
DATE 9-22-65

SCHLUMBERGER

COMPANY GETTIES SERV. OIL
COMPANY
WELL BIERS # 2
Unit Well No. 202
FIELD HARREM-McKEE
LOCATION SEC. 7-20S-38E
COUNTY LEA
STATE NEW MEXICO

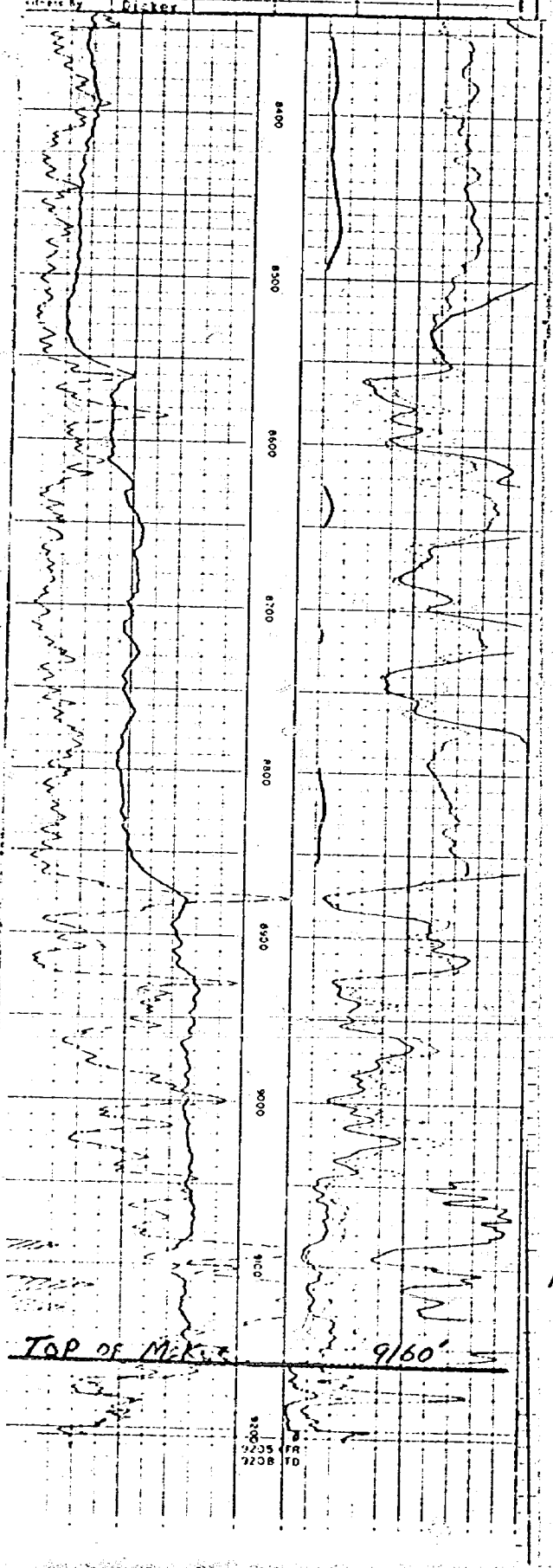
Location of Well
1980' f S&E/L
Sec. 7-20S-38E

ES-GRL
Elevation: D.F. 3577
K.B.
or G.L.

FILING No.

COUNTY Lea
FIELD or LOCATION Harren-McKee
WELL Byers # 2
COMPANY Getties Serv. Oil Co.

RUN No.	1				
Date	12-22-52				
First Reading	9205				
Last Reading	3764				
Feet Measured	5441				
Log. Schlum.	3764				
Log. Driller	3764				
Depth Reached	9208				
Bottom Driller	9210				
Depth Datum	1' Abv. RT-13.3' Abv. GL				
Mud Not.	Caustic-Obr.				
" Density	8.8				
" Viscosity	55				
" Resist.	1.8@60 °F	@ °F	@ °F	@ °F	@ °F
" Res. BHT	.856@144 °F	@ °F	@ °F	@ °F	@ °F
" pH	9 @ °F	@ °F	@ °F	@ °F	@ °F
" Wtr. Loss	8 CC 30 min.	CC 30 min.	CC 30 min.	CC 30 min.	CC 30 min.
Max. Temp. °F	144				
Csg. Size	7 7/8"				
Depth—AM	10"				
A	32" LS				
AO	18'				
Opr. Rig Time	5 Hrs.				
Truck No.	1760-Hobbs				
Recorded By	Scott				
Witnessed By	Dicker				



AMERADA PETROLEUM CORP.
EXHIBIT 9
NO. 3305
DATE 9-22-65

SCHLUMBERGER

COMPANY CITIES SERV. OIL COMPANY

WELL BYERS B. 3 UNIT Well No 203

FIELD WARREN-McKEE

LOCATION SEC. 7-20S-38E

COUNTY LEA

STATE NEW MEXICO

Location of Well
3630' f NL
2910' f EL
Sec. 7-20S-38E
ES

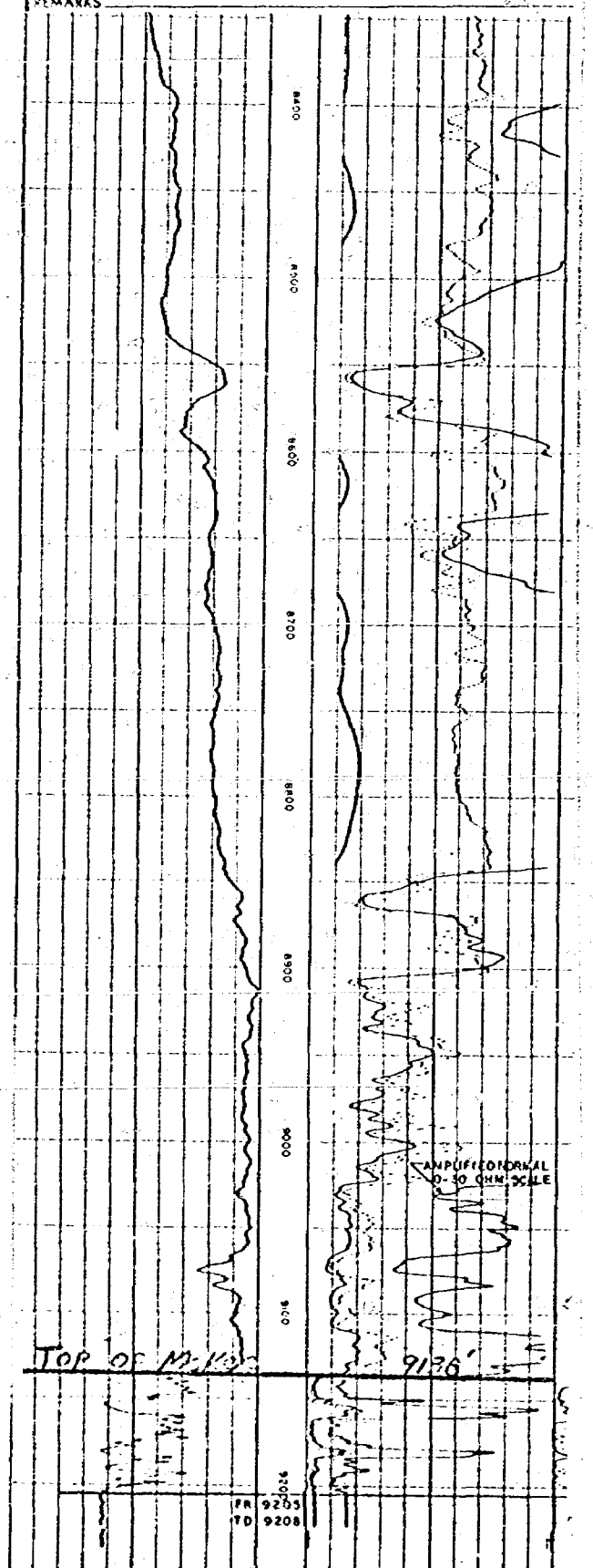
Elevation: D.F. 3577
K.B.
G.L.

FILING No.

COUNTY LEA
FIELD or LOCATION WARREN-McKEE
WELL BYERS B. 3
COMPANY CITIES SERV. OIL

RUN No.	1					
Date	4-8-65					
First Reading	9205					
Last Reading	3735					
Feet Measured	5470					
Csg. Schlum.	3735					
Csg. Driller	3734					
Depth Reached	9208					
Bottom Driller	9210					
Depth Datum	RUB-1 ABV. RT					
Mud Nat.	Gel-Chemicals					
" Density	8.6					
" Viscosity	52					
" Resist.	1.46 @ 70 °F	@ °F	@ °F	@ °F	@ °F	@ °F
" Res. BHT	0.68 @ 145 °F	@ °F	@ °F	@ °F	@ °F	@ °F
" pH	11.0 °F	@ °F	@ °F	@ °F	@ °F	@ °F
" Wtr. Loss	7.4 CC 30 min.	CC 30 min.	CC 30 min.	CC 30 min.	CC 30 min.	CC 30 min.
Max. Temp. °F	145					
Bit Size	7 7/8" - 9145 - 4 3/4" - TD					
Spcgs. — AM	10'					
A	32' LS					
AO	19'					
Opr. Rig Time	2 Hrs.					
Truck No.	1162 - Hobbs					
Recorded By	Reinder					
Witness By						

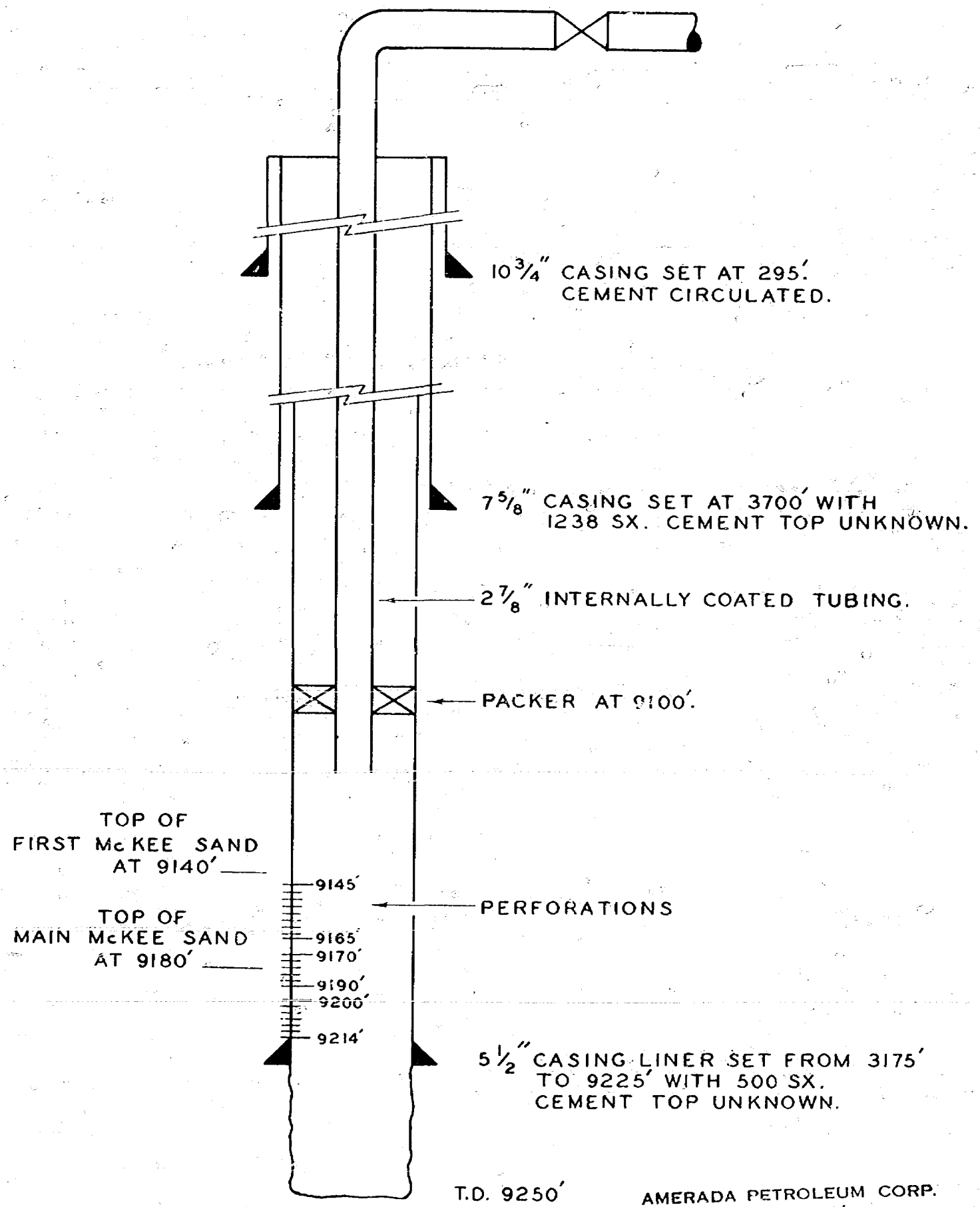
REMARKS



AMERADA PETROLEUM CORP.
EXHIBIT 10
NO. 3305
DATE 9-22-65

WARREN McKEE UNIT
LEA CO., NEW MEXICO

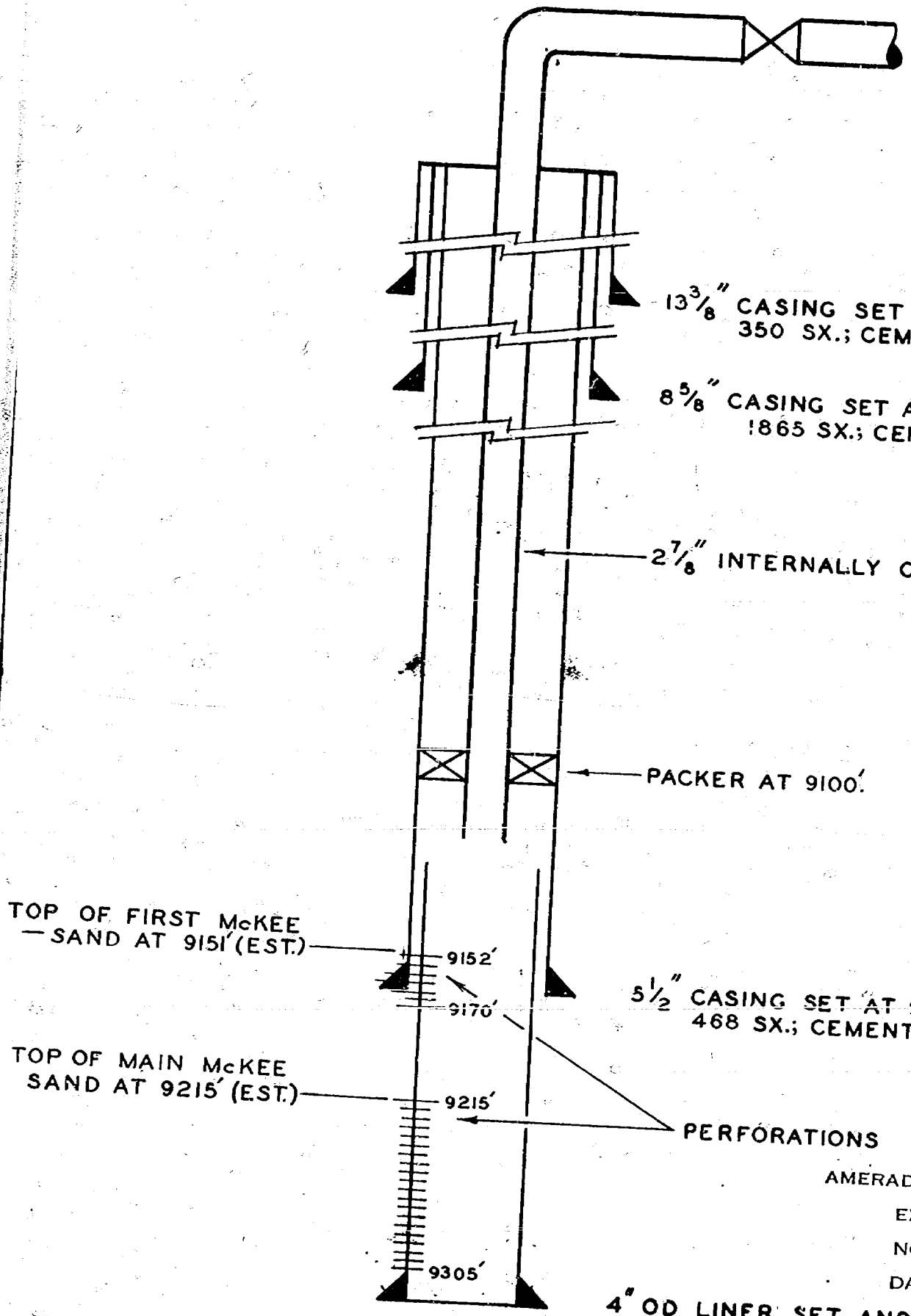
DIAGRAMATIC SKETCH OF INJECTION
WELL NO. 102



AMERADA PETROLEUM CORP.
EXHIBIT 11
NO. 3305
DATE 9-22-65

WARREN McKEE UNIT
LEA CO., NEW MEXICO

DIAGRAMATIC SKETCH OF INJECTION WELL NO. 201



AMERADA PETROLEUM CORP
EXHIBIT 12
NO. 3305
DATE 9-22-65

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WARREN McKEE UNIT
LEA CO., NEW MEXICO

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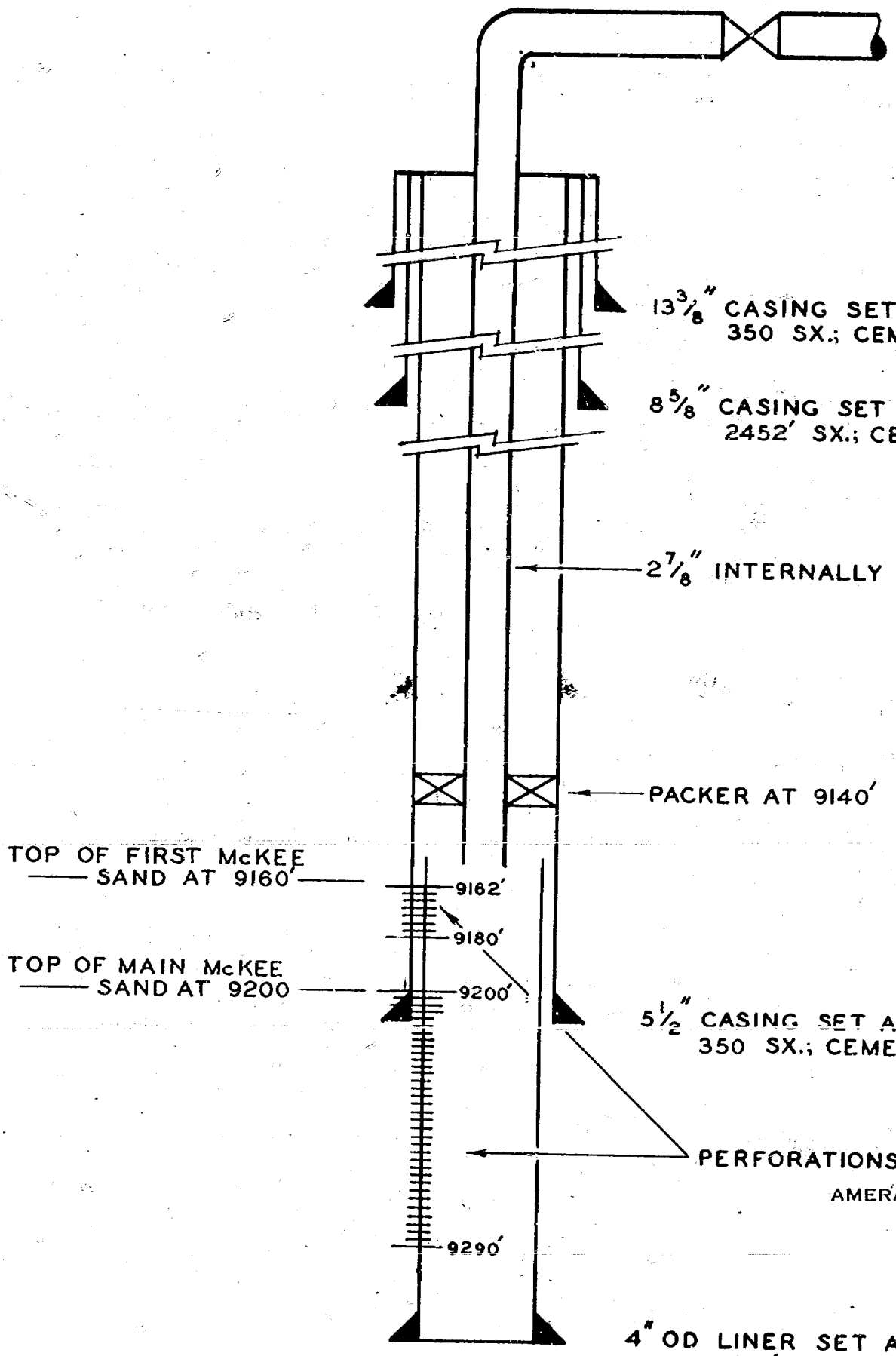

AMERADA PETROLEUM CORP.
EXHIBIT 13
NO. 3305
DATE 9-22-65

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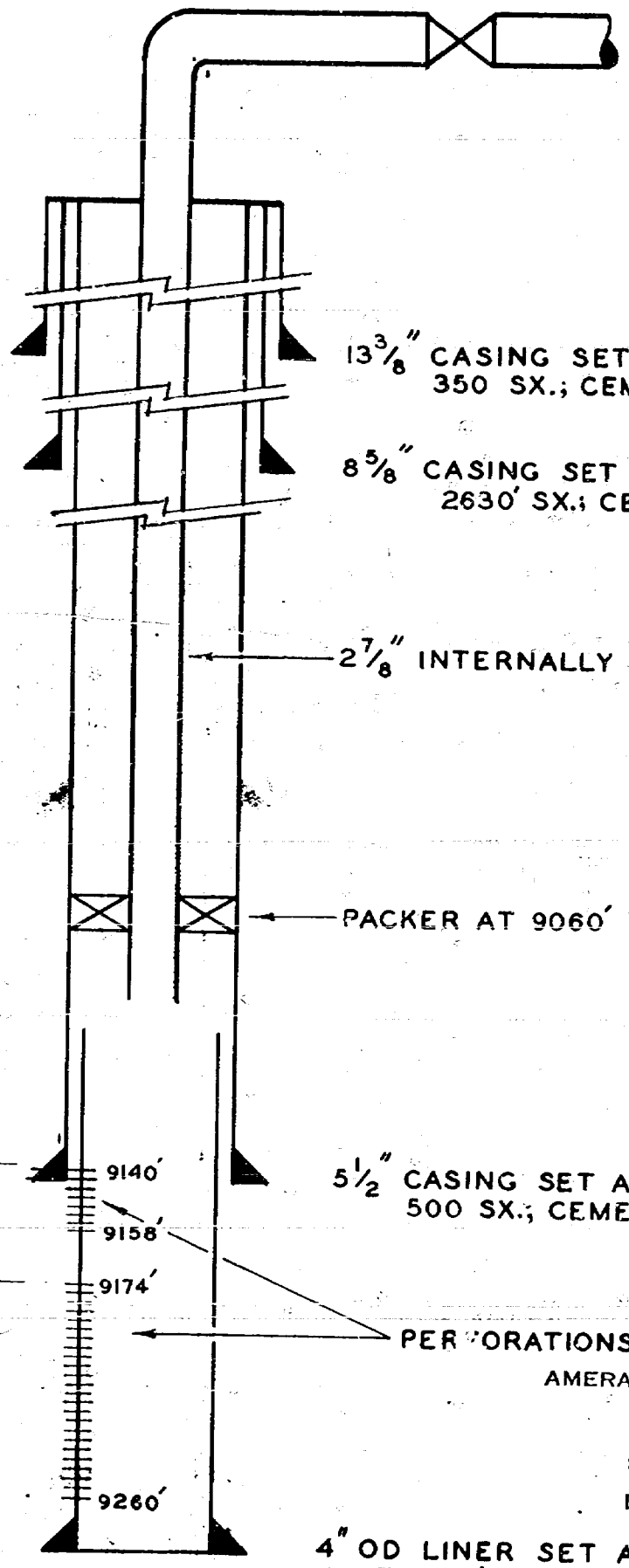
WARREN McKEE UNIT
LEA CO., NEW MEXICO

DIAGRAMATIC SKETCH OF INJECTION WELL NO. 203



AMERADA PETROLEUM CORP
EXHIBIT 14
NO. 3305
DATE 9-22-65

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WARREN McKEE UNIT
BASIC PARAMETERS FOR UNIT PARTICIPATION

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AMERADA PETROLEUM CORP.
EXHIBIT 15
NO. 3305
DATE 9-22-65