BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 26, 1966

EXAMINER HEARING

IN THE MATTER OF:

Application of Standard Oil Company of Texas for a waterflood expansion, Lea County, New Mexico.

Case No. **3368**

BEFORE:

Elvis A. Utz, Gas Engineer

TRANSCRIPT OF HEARING

MR. UTZ: Call Case 3368.

MR. KELLAHIN: If the Examiner, please, Jason Kellahin, of Kellahin and Fox. We have one witness I would like to have sworn.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1-5 marked for identification.)

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

MR. HAL PORTER: Mr. Examiner, I might want to say a few words at the end.

MR. KELLAHIN: If the Examiner please, this is an application to expand the waterflood project which was originally started by the Boler Nichols group, and Leonard Nichols Maljamar waterflood project, which was approved by the Commission Order R-1358, entered in Case 1730, and R-2777, entered in Case 3100.

Basically, the expansion will be substantially the same as the waterflood project heretofore approved by the Commission. There were, however, some wells being utilized for water injection at the time the present applicant acquired these properties, of which they find no record for approval of that purpose, and the approval of these wells for this injection is included in this compilation.

J O H N C. C A M E R O N, 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 John T. Cameron.

Q By whom are you employed?

A Standard Oil Company of Texas as Proration Engineer.

Q Have you ever testified before the Commission and made your qualifications a matter of record?

A Yes, I have.

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

MR. UTZ: Yes, sir, they are.

Q (By Mr. Kellahin) Mr. Cameron, you heard my statement of the purpose of this present case. Is that a correct statement as what is proposed by the Standard Oil Company of Texas?

A Yes, sir, we want to expand the waterflood by the addition of five injection wells and also to obtain formal authority to inject water in four wells already being used for that purpose.

MR. UTZ: Would you state at this time which of the four wells have already been used?

MR. KELLAHIN: I think it would be easier if he pointed those out on the plats.

Q (By Mr. Kellahin) Referring to what has been marked as Exhibit 1, Mr. Cameron, would you state what that shows?

A Exhibit 1 is a plat of a portion of the Maljamar Grayburg San Andres Field showing in particular the area of the Standard of Texas Maljamar Grayburg waterflood. Outlined in gray on Exhibit 1 is the proposed unit area. I want to point out that this is not a unitized area as yet. The unit has not been finalized. This is proposed and has been agreed to by the U.S.G.S.

Unitization is underway at this time but as of now it's still a co-operative waterflood.

Q The blue circles represent the water injection wells?

A That's correct.

Q And the red triangles are proposed wells?

A Correct.

Q The four existing wells which are presently utilized for injection?

A That's correct.

Q State which wells?

A Indicated on the existing symbols, that is the red triangles and the circles, in Section 3, Iles Federal Number 32; in Section 10, the Iles Federal Number 26 and 28; and in Section 11, the Taylor "E" Number 3 are water injection

wells not formally authorized.

Q These were being utilized when Standard acquired the property?

A That's right.

Q Did you find any record that the Oil Conservation Commission was notified of the conversion of these wells?

A They have been notified. The wells are listed and the completion forms, C-103, were filed and approved by the Commission.

Q But at this time you're asking for formal approval of these wells as injection wells?

A Yes.

Q Who originally operated this unit?

A The original waterflood was started by Boler Nichols.

Q And when did Standard acquire them?

A March of 1965.

Q Now, in addition to the approval of the four wells, you're asking for the approval of five additional injection wells?

A Yes, that's correct.

Q Now, referring to what has been marked as Exhibit Number 2, would you state what that is?

A Exhibit 2 is a packet of 9 logs, the logs of all 9 of the injection wells. They are simply gamma ray neutron or

gamma ray logs and I don't think they require any discussion.

Q There is no information marked on these logs except the logs themselves?

A No.

Q Referring to Exhibit 3, identify them and discuss them?

A Exhibit 3 are the diagrammatic sketches of the 9 water injection wells. The first four of these wells are existing water injection wells for which authority is sought. The last five are producing wells which we intend to invert to injection in the manner shown on the diagrammatic sketches.

Q Now, on the exhibits, it shows calculated and logged on top of the cement in each instance, and the footage entered thereon. Can you state in reference to each exhibit whether it is a calculated top on the logged top?

A The first four sketches shown were drilled by Leonard Nichols and they were not logged. The last five were drilled by Standard. The other was acquired from Santiago. Two of those wells were logged and the cement is at log top. Two were calculated and one of them cement was circulated to the surface.

MR. IRBY: Mr. Kellahin, would you take them well by well?

Q (By Mr. Kellahin) Would you identify each well

and state whether it is a log and calculated top, and which was circulated?

A Iles Federal 30 Number 2 is an existing well; Iles Federal 26 is an existing well, it's calculated top of the cement. Iles Federal 27, existing water; 28, the top of the cement is calculated in that well; Taylor "E" Number 3 is an existing water injection well, top of the cement is calculated in that well. The Sinclair Taylor Number 1 is a producing well which we intend to convert, and the top of the cement is calculated in that well. The Taylor Ethel Number 3 is a producing well we intended to convert. The top of the cement is calculated in that well. The Taylor "H" Number 2 is a producing well we intended to convert, and the cement in that well was circulated to the surface. The Iles "X" Federal Number 8 is a well we intended to convert and the top of the cement there was logged temperature survey.

MR. IRBY: That was 8?

A Yes, sir. The Iles Federal Number 36, the well was logged by temperature survey.

Q (By Mr. Kellahin) Was the cement circulated in each instance on the surface string?

A Yes, that's correct.

Q With the exception of the Taylor "H" Number 2 well, there would be an open area behind the pipe uncemented in all

the other wells?

A That's correct.

Q Would you state what was behind the pipe?

A Yes, sir. Those are generally red beds anhydrite, primarily anhydrite. There is a salt section from about 1700 to 1800 feet.

Q Is there any producing zones behind the pipe?

A No.

Q Any fresh water zones behind the pipe?

A No, there's not.

MR. IRBY: Is there any water behind it?

A There may very well be salt water. Naturally any porosity behind the pipe would be filled with salt water if it's not all fresh water, and our geologist tells us there is no fresh water behind the pipes.

Q (By Mr. Kellahin) Will the casing be tested before this injection?

A Yes.

Q At what pressure?

A I have not really heard the engineers say, but I'm sure it would be an adequate pressure which would be in excess of what we intended to use for injection.

Q What would you use for injection?

A Presently from 675 pounds to 2675 pounds.

Q Would you clarify that statement, please?

A Yes, sir. As you'll notice on these sketches, they're all equipped with tubing and a packer with perforation below and above. Water is being injected below the anulus and down the tubing, but this arrangement is necessary simply for control of the injection rates, because of the differences in permeability. The formation above the packer is more permeable and required less pressure to get a proper injection rate than the formation below the packer. The formation above the packer takes water on the order of 675 PSI. The formation takes water more on the order of 200 up to 2,000 PSI.

Q What is your source of water?

A We have three sources of water. If you would like, we'll get into that on the next exhibit.

Q Referring to Exhibit 4, would you discuss what's shown on that exhibit, please?

A Exhibit 4 is a data sheet of the project showing the formation type and the number of wells in the unit area. As you will note there are 64 producing wells and 16 injection wells within the unit area. It also shows the three different sources of injection water. The first two sources are now being used. The third source we intend to use in the near future. The first two are fresh water, part of which is

produced from our own fresh water well in Section 1, and the other source of fresh water is purchased from Double Eagle Corporation of New Mexico. The third source is produced salt water which we intend to begin injecting in the near future.

Q How will it be injected? Will it go down the annulus or through the tubing?

A We'll use it only through tubing and only in wells in which tubing is the only method of injection.

Q What type of tubing?

A Standard 2" tubing, not plastic coated.

Q Will you determine whether corrosion is occurring in this tubing, and if so, install plastic coated tubing?

A Naturally, if water is corrosive it will be detected by pressure increases on the annulus and naturally we will have to replace the tubing and take action to keep this from occurring, and this would probably be plastic coated tubing then.

Q Exhibit 4 shows an analysis of the salt water?

A Yes, it does.

Q Does that indicate that the water is corrosive?

A The analysis doesn't, itself, to me indicate that it is particularly corrosive. There is only a trace of hydrogen sulfide on it. We do have Bradford Laboratories to analyze this for us, and they have selected a corrosion

prohibitive for us to use, so they consider it slightly corrosive.

Q Is this type of completion a type approved by the Commission heretofore?

A Yes, it has been. This type completion is being used in this particular project and it has been used in other projects.

Q Referring to what has been marked as Exhibit 5, would you identify that exhibit, please?

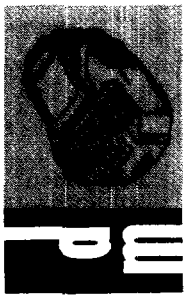
A Exhibit 5 is a tabulation of wells which we asked to be added to the project area as defined by Statewide Rule 701. This definition, of course, is for injection wells indirect and diagonal offset to injection wells.

At this time, 30 of our 60 producing wells are included in what the Commission calls a project area. With this application these additional wells should be added to the project area. We've also listed the allowable which we request and this is an allowable presently carried for these wells on a proration schedule.

Q There will be no change in the amount of oil produced?

A No, just from outside the project area for the inside.

Q Were the U.S.G.S. notified of this?



A Yes.

Q Did you receive a letter of approval?

A Yes. The U.S.G.S., on January the 3rd, wrote that they--that the project as we proposed is satisfactory to the U.S.G.S.

MR. KELLAHIN: Do you want a copy of that letter in the record?

MR. UTZ: Oh, I think it would be in order, yes.

MR. KELLAHIN: All right.

(Whereupon, Applicant's Exhibit 6 marked for identification.)

Q (By Mr. Kellahin) Were Exhibits 1 through 5 prepared by you; and Exhibit 6 is a copy of a letter from the United States Geological Survey which is in your files?

A Yes.

MR. KELLAHIN: At this time I offer Exhibit 1 through 6, inclusive.

(Whereupon, Applicant's Exhibits 1 through 6 were offered in evidence.)

MR. UTZ: Without objection the exhibits will be entered.

(Whereupon, Applicant's Exhibits 1 through 6 were admitted in evidence.)

Q (By Mr. Kellahin) Do you have anything to add to your testimony, Mr. Cameron?

A I don't think so.

MR. KELLAHIN: That's all I have.

CROSS-EXAMINATION

BY MR. UTZ:

Q Mr. Cameron, the wells listed on your application for this case are all the wells that you're requesting approval on at this time, is that correct?

A That's correct, yes, sir.

Q And I presume that the well names and locations are also correct?

A Yes, sir, those are correct.

MR. UTZ: Any questions of the witness?

MR. IRBY: Yes, sir.

CROSS-EXAMINATION

BY MR. IRBY:

Q You said that in this space where there's no cement in the annulus back of the production string that you had red beds, salt and anhydrite?

A Yes, sir.

Q And the salt section is 1800 to 2300?

A That's correct, yes, sir. Those figures are approximate, of course, it varies.

Q Now, what's the top of the anhydrite?

A Well, the entire interval between the base of the surface casing and top of the cement, say, from 300 to 3,000

feet is alternating beds of anhydrite.

Q Does this mean that all surface strings are set into the anhydrite?

A I can't answer that, Mr. Irby, I don't know. I understood that that was about 300 feet, was the top of the red beds. I don't know which would, of course, alternate with anhydrite to--

Q Do you know the porosity of the formation at a point where the surface casing is landed?

A No, sir, I do not.

Q What's in this annulus that isn't cemented, mud?

A Drilling mud, yes, sir.

Q Do you have the information or could you obtain the information and supply it to me as to what kind of a formation this surface casing is landed in?

A I certainly could supply it to you.

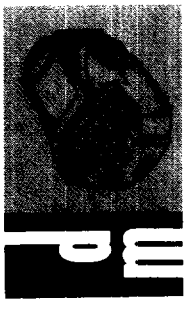
Q I think if we're set into a good tight anhydrite we don't have too much to worry about, but if we have porosity of any significance there we do have something to worry about.

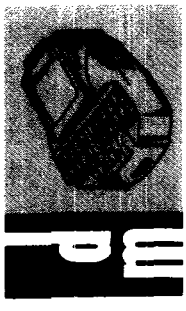
A I see.

Q And that's what I want the answer to.

A Yes, sir.

Q Now, to go to your Exhibit Number 4, the last sentence in your Source 3, what does the word "scavenged" mean?





A That means that oxygen will be scavenged. However, the analysis shows no oxygen in the salt water, however, the laboratories felt that if oxygen became a problem for corrosion, it would be scavenged, the water will be inhibited.

Q The fresh water you're using from Source 1 and 2, it has a small amount of oxygen, I believe, is that right?

A Yes.

Q And you don't intend to take that out?

A No, sir.

Q Will there be any inhibitor in the so-called fresh water you're using?

A No, sir, we don't find that fresh water corrosive.

Q Other than possible pressure changing, do you have any way of determining what's happening; will you have any way of determining what's happening to your tubing with respect to corrosion?

A I would think other than the pressure changing, no. Possibly a change in rate might give some indication, but--

Q You don't plan to use coupons or anything like that?

A No, sir.

Q Well, I'm not going to do a lot of worrying about your tubing. The thing I would be worried about is that casing, and possibly the information I just asked you for will

give me the answer to that. This cement that was circulated on the surface strings, this was determined by observation in each case?

A Yes, sir, that's correct.

Q The cementing of the production string, was the cement at the point of the shoe, was the cement used on the production string at the point of the shoe, neat cement?

A I can't answer that, Mr. Irby. I can get you the answer but I did not drill these wells myself. I could get the information for you.

Q Would you please do that?

A Yes, sir.

Q Thank you.

. RECROSS-EXAMINATION

BY MR. UTZ:

Q Mr. Cameron, in view of the fact that your injection pressures are, first, let me ask, is this 2,000 to 2600 a surface pressure?

A Yes.

Q So you have a hydrostatic head on top of that?

A That's correct.

Q Is this 2,000 to 2600 pounds pressure on the casing below the packer? What will you think that the casing should be tested at due to this 2,000, 2600 pound pressure?

A I would think 2600 pounds would be adequate. You would have the same hydrostatic pressure on your test as you do on your injection, and you would have less friction loss--you wouldn't have any friction loss on your test.

Q 2600 pounds without any safety factor?

A Yes.

Q It is unusual to test above the actual pressure?

A Yes, I feel sure the test would be done at the working pressure of the casing. This is 4 1/2 or 5" casing. I expect it is J55. It would be tested at the working limitation of the casing.

Q If you can test it at 2600, you could test it at 3,000, couldn't you?

A I feel sure you could.

MR. UTZ: Any other questions.

CROSS-EXAMINATION

BY MR. NUTTER:

Q Now, Mr. Cameron, I want to clarify this. Three sources of water, and two is fresh, and your third is the produced salt water. Now, all of your produced salt water will be injected ~~due to~~ tubing in the lower zone?

A That's correct.

Q And fresh water, only, will be injected down the casing?

A That's correct.

Q Now, corrosion tests will be run on the salt water that's going down the tubing, and then in response to the question from Mr. Kellahin, did you answer yes or no? When corrosion is indicated would you plastic coat that tubing?

A If corrosion is indicated and we can't correct it by an inhibitor we will.

Q Do you intend to run coupons in that tubing to detect the corrosion?

A No, sir. We'll have periodic tests by Bradford Laboratories and we'll also maintain a check of the annulus pressure to determine whether the tubing actually leaks.

Q If you're getting any abrasion on the annulus because of the wide differentiation of the two zones--

A We'll not be injecting anything down the annulus; these will be single completed wells.

Q All of your wells are dual completion?

A Not all of them.

Q But all nine that you're talking about today, is?

A Yes. You will note we intend to inject 200 into Iles Federal Number 2. This well is a single completion. There is no perforation above the packer.

Q All these dual completions will have fresh water going down the annulus as well as the tubing, both?

A That's correct.

Q Now, with reference to your exhibit that you list the wells you want included in the project area, are these wells that would come into the project area by virtue of the new injection wells being added to the project?

A Not completely. Five of these wells should already be in the project area and for some reason they're not included.

Q Possibly they're on separate leases from other wells in the project area, and the thing is not unitized as yet, is it?

A That's correct. I wouldn't think that would effect it, they should still be in the project area.

Q Normally, the project area is determined on the lease basis when there is a unitization or agreement in effect?

A If that is the reason, of course the Commission will determine that.

Q Some of these wells will have a project area on their own lease until such time as it's unitized?

A Yes, sir.

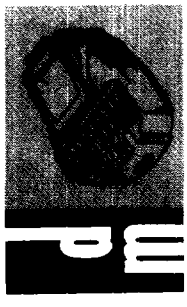
MR. NUTTER: I believe that's all.

MR. UTZ: Any other questions?

MR. IRBY: Yes, sir.

RECROSS-EXAMINATION

BY MR. IRBY:



Q Mr. Cameron, I believe when you were talking about injection pressures you were speaking of the present pressures--

A That's correct.

Q --of injection?

A Yes.

Q Now, are these to remain the same pressures in these other wells that are put on; is your pressure going to exceed what you're using now?

A Naturally we don't know what pressures are going to be required in these wells to be converted. We'll use whatever is required to get the water in the ground.

Just from our experience, we would think they would be on the order of the same pressures we're now experiencing.

MR. NUTTER: These pressures are in wells that have already reached fill-up, and this is waterflood pressure, isn't it?

A Yes.

Q (By Mr. Irby) Then you don't anticipate anything in excess of your 2600?

A That's right. I would not anticipate anything higher than that.

Q Now, these wells to be added to the project area, are these to be producers or injectors, or both?

A Both. If you'll note in the last column, the

"Requested Allowable", there are 5 input wells. These are the 5 wells we're asking authority for today.

MR. IRBY: I have no other questions of the witness. I would recommend to the Examiner and the Commission that the casing tests be a minimum of 3000 PSI in excess of injection pressures or anticipated injection pressures.

MR. UTZ: You wouldn't quibble over 3,000 pounds?

MR. IRBY: No.

MR. UTZ: Any other questions? The witness may be excused. Any other statements in this case?

MR. CHRISTY: Mr. Examiner, as an offset operator we have no objection. I would like to say I handled most of Leonard Nichols' correspondence and I believe those wells were approved by administrative order.

MR. UTZ: Any other statements? The case will be taken under advisement.

I N D E X

E X H I B I T S

NUMBER	MARKED FOR IDENTIFICATION	OFFERED	ADMITTED
Applt's 1	2	12	12
Applt's 2	2	12	12
Applt's 3	2	12	12
Applt's 4	2	12	12
Applt's 5	2	12	12
Applt's 6	12	12	12

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

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

Witness my Hand and Seal this 23rd day of February, 1966.

Bobby J. Davis
NOTARY PUBLIC

My Commission Expires:

March 13, 1969

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3365, heard by me on Jan. 26, 1966.

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