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BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 11, 1965

EXAMINER HEARING

IN THE MATTER OF:

Application of Kewanee Oil Company for
a unit agreement, Eddy County, New Mexico.

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

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

Case No. 3289
3290 and 3291

BEFORE:

ELVIS A. UTZ

TRANSCRIPT OF HEARING

MR. UTZ: Case Number 3289.

MR. DURRETT: Application of Kewanee Oil Company for a unit agreement, Eddy County, New Mexico.

MR. MORRIS: If the Examiner please, I'm Dick Morris of Seth, Montgomery, Federici and Andrews, Santa Fe, appearing on behalf of Kewanee Oil Company.

At this time we would request that for the purposes of hearing, Case 3289, 3290 and 3291 be consolidated.

MR. UTZ: The 3289 is a unit agreement, the 3290 is a waterflood on that unit, is that correct?

MR. MORRIS: That is correct; and then, the --

MR. UTZ: 3291 is another waterflood on a previous unit?

MR. MORRIS: No, there's no unit but it's in the same area and there's some similar characteristics and problems.

MR. UTZ: Without objections, the three cases mentioned will be consolidated for the purposes of examination, however, separate orders will be written on each case.

MR. MORRIS: We will have one witness, Mr. J. W. Graham and I ask that he be sworn, please?

(Witness sworn.)

J. W. G R A H A M, called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Graham, will you please state your name, by whom you are employed and in what capacity?

A My name is J. W. Graham. I am employed by Kewanee Oil Company in Tulsa, Oklahoma, in the capacity of Joint Interest Superintendent.

Q Have you previously testified before the New Mexico Oil Conservation Commission or one of its examiners?

A No, I have not.

Q Would you briefly outline please, your education and experience in the oil industry?

A I received a B.S. degree in Chemical Engineering from Rice University in 1947. I was subsequently employed by Pan American Petroleum Corporation for 18 months, and for the past 16 and a half years I have been in the employ of Kewanee Oil Company in various engineering capacities up to my present position.

Q What are your duties in your present position, Mr. Graham?

A Essentially to oversee the preparation and execution of various unit agreements, to sit in on engineering committee meetings, relative to data that is prepared for the purpose of determining equities and to obtain ratification or

execution by other parties to various agreements.

Q Are you familiar with the application of Kewanee Oil Company in Cases 3289, 3290 and 3291 before the Commission here today?

A Yes, I am.

MR. MORRIS: Are the witness' qualifications acceptable?

MR. UTZ: Yes, they are.

Do you have your Exhibits marked?

MR. MORRIS: No, actually all of our Exhibits are attachments to the application and we were wondering if it would be acceptable to the Examiner to merely refer to those Exhibits as they are marked as attachments.

MR. UTZ: It will be all right as long as we get one of them marked.

MR. MORRIS: All right.

(Whereupon, Applicant's Exhibit Number 1 in Case 3289 marked for identification, and Exhibits A through G in Case 3290, and Exhibits A through F in 3291 marked for identification.)

Q (By Mr. Morris) Mr. Graham, what is it that Kewanee Oil Company seeks in its application in Case 3289?

A We seek there to unitize certain leases operated by Kewanee Oil Company and Standard Oil Company of Texas for

the purpose of conducting a secondary recovery project by the waterflood method. We are seeking to unitize the Grayburg formation.

Q If you will refer to what has been marked Exhibit Number 1 in this case, will you state what that is?

A Exhibit Number 1 is a copy of the unit agreement for the Atoka-Grayburg Unit, Eddy County, New Mexico.

Q If you will refer to the attachment to that unit agreement which is designated Exhibit G, it's the last page, I believe, will you state what that is?

A Exhibit B is a plat which shows thereon, outlined in heavy black line, the unit area and the acreage that will be included in the Atoka-Grayburg Unit. This area is located some five miles south and two and a half miles east of the City of Artesia, New Mexico, in Township 18 South, Range 26 East.

Q What area does this cover with respect to the producing wells in the Atoka-Grayburg Pool?

A The unit area covers all known production from the Grayburg Formation in the Atoka-Grayburg Pool.

Q Now, are the Grayburg wells shown on this plat by any particular legend?

A Yes, the Grayburg wells are designated by the lettering after the well number.

Q Now, in the customary manner, are the tracts within the unit area shown on this exhibit by number?

A Yes, they are.

Q And that is keyed over to Exhibit A to the unit agreement concerning ownership?

A Yes, Exhibit A describes each tract and lists the tract number.

Q Now, I believe you said before that the only working interest in this unit were Kewanee and Standard Oil Company of Texas?

A Yes. Actually, they operate under the name of Standard of Texas. It's the California Oil Company, the parent company who is the other working interest owner.

Q What is the status of the working interest commitment to the unit agreement?

A 100 per cent of the working interest has been committed to the unit agreement.

Q Are there any Federal or State lands involved in this unit?

A No.

Q It's all what we call fee lands?

A Yes.

Q Have you contacted the royalty owners to secure their approval to this unit?

A Yes, we have. We have obtained ratifications by all of the basic royalty owners, by all oil payment owners and by all overriding royalty owners with the exception of one.

Q Has anyone refused to -- Well, has the one overriding royalty interest that has not joined the unit been contacted?

A Yes.

Q Has he refused to join the unit?

A No.

Q You still expect to obtain his ratification?

A Yes, we do. He has traveled quite extensively and it has just been difficult to get in touch with him personally.

Q What is the form of the unit agreement?

A This unit agreement is patterned after the model API form which is used extensively in the mid continent area where Federal or State lands are not involved or where there is not a prescribed form of unit agreement to be employed.

Q I believe you said at the outset that the purpose of forming this unit was to conduct waterflood projects in this area?

A That's correct.

Q Again, would you state what formation is unitized under the unit agreement?

A We are seeking to unitize what is commonly known as the Grayburg formation, that formation is described in the unit agreement.

Q That is Section 1.2 of the Unit Agreement?

A Yes.

Q In Case 3291, Kewanee is applying for permission to institute waterflood project in the San Andres formation in this area. Why has not the San Andres been unitized as well as the Grayburg formation?

A Well, as mentioned, the Grayburg unit includes all known production from the Atoka-Grayburg Pool, whereas the leases which we propose to waterflood in the San Andres constitutes only a part of the Atoka-San Andres Field. It's quite extensive an area, covers much more area than the Atoka-Grayburg Pool does. There is still some development going on in the San Andres Field and the field as a whole has not reached the point where it's felt that unitization is practical.

Q Your proposal for waterflood in the San Andres only concerns one well and will be proposed merely as a pilot project, is that correct?

A That's correct.

Q Under the unit agreement, what will be the participation factors for the various tracts?

A Participation was based 100 per cent on productive acre feet of the Grayburg formation as described in the unit agreement. The productive zone in the Grayburg formation which contributes to production is what is known as the Premier Sand and the basis of participation was determined from an engineering study of the area, a study of well logs, cores, to determine what the contribution of each tract would be to a unit project.

Q How do tracts become qualified under this unit agreement for participation in the unit?

A Tracts become qualified by the ratification of working interest and royalty interest.

Q That's Article Nine?

A Article Nine of the unit agreement. There are various provisions under Article Nine by which a tract can qualify, the first one being that 100 per cent of the working interest be committed to the unit agreement and that 65 per cent or more of the royalty interest be committed.

Q Under that criteria, have all tracts in the unit qualified for joinder and participation in the unit?

A Yes, they have.

Q With respect to the one overriding royalty interest that has not joined to date, are there provisions for subsequent joinder?

A Yes.

Q What will be the effective date of the unit agreement if approved by this Commission?

A If approval is obtained by the Commission prior to September 1st, we will be able to make effective date of the unit September 1st.

Q Turning your attention next, Mr. Graham, to the application by Kewanee in Case 3290, would you state what it is that Kewanee seeks by its application in this case?

A Kewanee seeks by this application as unit operator of the Atoka-Grayburg unit, to conduct waterflood operations on the leases comprising the Atoka-Grayburg unit.

MR. MORRIS: As an aside at this point, Mr. Examiner, I would point out that a waterflood project in this Atoka-Grayburg Pool has previously been authorized by the Commission at a Hearing before the same Examiner in Case 3062, which resulted in Order No. R-2721 dated June 3rd of 1964. That order authorized the injection of water into one well located in Unit F of Section 13, which was a well to be drilled. It does not appear on the plat the Examiner has before him. That well has not been drilled and the witness will explain the situation in that respect, but I thought that the Examiner should be apprised of the fact that a previous order has been entered respecting waterflood operations in this area.

MR. UTZ: For the Grayburg?

MR. MORRIS: Yes, sir.

Q (By Mr. Morris) With respect to the authorization that was previously granted by the order that I have just referred to, Mr. Graham, is it true that that Well Number 13 has not been drilled?

A It has not.

Q Why not?

A After we received commission approval to inject water into the Grayburg formation through Well Number 13, we had previously proposed to conduct a cooperative effort with Standard of Texas. Subsequent study of the area indicated that it was more feasible to unitize the leases in order to prosecute a waterflood project and for that reason, we did not drill the well pending formation of a unit to include the Standard of Texas lease.

Q What is your present proposal with respect to the institution of waterflood project in this area?

A Our present proposal would be to convert two existing oil wells to water input wells, these wells being Levitt Number 3-G and Levitt Number 11-G. Well Number 3-G is located 1650 from the north line and 990 from the west line of Section 13. Well Number 11-G is located 990 from the north line, 2310 from the west line of Section 13.

Q These wells are shown on the plat which has been marked Exhibit A in this case?

A Yes. They are marked with a circle as our proposed input wells. To go a step further with that, depending on the performance of the flood utilizing these two wells as input wells, we would determine whether or not to drill Well Number 13. If we get the stimulation we anticipate, then we would drill well Number 13 as originally planned.

Q Then, as a result of this Hearing, you would propose that a new order be entered but that it not supersede the previous authority given to you by Order Number R-2721?

A Yes, that's correct.

Q In the event that you decided that you want to drill the Well Number 13?

A Correct.

MR. UTZ: Actually, you want that order amended, is that right?

MR. MORRIS: It could have that effect, Mr. Examiner. Either way would be fine. Our proposal is that it not be superseded.

Q (By Mr. Morris) Referring to the Exhibits which were attached to the application in this case, would you state what Exhibit B is and what it shows?

A Exhibit B is a structure map of the Atoka-Grayburg Unit Area which has been contoured on top of the pay zone which is the Premier Sand. It shows essentially the limits of production from the Premier Sand in the unit area.

Q Referring next to Exhibit C to the application, will you state what that is and what it shows?

A Exhibit C is a production graph showing the monthly oil production from all wells in the Atoka-Grayburg Pool.

Q What is the present rate of production?

A The present rate of production is approximately 300 barrels per month, or approximately 10 barrels per day.

Q For how many wells?

A Eight active producing wells.

Q Based upon that rate of production, would it be your opinion that these wells properly may be classified stripper wells?

A Yes. They are definitely stripper wells, in fact, the lease has for all practical purposes reached an economic limit.

Q Referring to Exhibit D attached to the application, will you state what that is and what it shows?

A Exhibit D is a regional ownership and development plat showing production within the two mile radius of the

proposed injection wells.

Q This plat was submitted in accordance with the requirements of Rule 701?

A Yes.

Q Referring next to Exhibit E attached to the application, what is that?

A Exhibit E is a typical log of a producing well in the Atoka-Grayburg Pool. This particular log being the log of one of the proposed injection wells, specifically it's a gamma-ray sonic log. Shown thereon is the top of the Grayburg formation and the top of the oil producing zone or Premier Sand.

Q How are the two proposed injection wells presently equipped, mechanically?

A Levitt Number 3 has five and a half inch casing -- No, excuse me, has eight and five-eighths inch casing cemented 803 feet, cemented with 375 sacks which circulated to the surface.

Q Was that cementing witnessed by any regulatory agency?

A Yes, it was witnessed by the State Engineer's Office. In that well, also, there is five and a half inch liner cemented inside of the eight and five-eighths inch casing, total depth of the well is 975 feet. It was completed

open hole in the Premier Sand.

Q Go on to the next well and then point out, referring to Exhibits F and G to the application, how these wells will be converted to injection wells.

A Levitt Number 11 has seven inch casing cemented at 960 feet with 280 sacks of cement. It was cemented to the surface and again, this cementing operation was witnessed by a representative of the State Engineer's Office. Total depth of the well is 986 feet, it too is completed open hole in the Premier Sand. As to the completion of the wells for injection purposes, we propose to set two inch heavy duty fiberglass tubing on tension packers in each well, and to inject water through the fiberglass tubing into the pay zone.

Q Has this method of completion previously been approved by this Commission for water injection purposes?

A Yes. Essentially this same type of injection well was approved in our Dayton-Grayburg Flood approximately one mile south of the proposed Atoka-Grayburg Unit.

Q That area appears down in Section 25 as shown on Exhibit A that you previously referred to, is that correct?

A That's correct.

MR. MORRIS: For the Examiner's information, that waterflood project, the Dayton-Grayburg project was approved

by the Commission in Case 3061, Order R-2720 dated June 3, 1964.

Q (By Mr. Morris) Are there any substantial differences, Mr. Graham, between the type of completion that you have proposed in this case and the type of completion made in the injection well in that Dayton-Grayburg project?

A No, there is not.

Q What will be the source of water you propose to use for this injection program?

A For the Grayburg flood, we propose to use fresh water from the Artesian Basin. We have obtained certain water rights or certain water rights have been converted to this use. This is also the same source of water which is being used in the Dayton-Grayburg flood.

Q Have applications been made to the office of the State Engineer for transferring ownership, place of use and method of use of this water?

A Yes.

Q And have they been approved?

A Yes.

Q What will be the location of this source well for this fresh water?

A The source well will be located in the northeast quarter, southeast quarter, Section 14.

MR. IRBY: Township and Range?

A Township 18 South, Range 26 East, Eddy County.

Q (By Mr. Morris) Will fresh water be used exclusively as the source for this project?

A Initially it will be used exclusively; as the flood progresses and we begin to get produced water, it will be injected into the Grayburg formation.

Q What will be your total water requirements for the project?

A We estimate that it will require 1,800,000 barrels of water to flood this formation, of that we anticipate that 600,000 barrels of water will be fresh water, the rest will be reinjected produced water.

Q What will be the rate of injection and at what pressure will the water be injected?

A We anticipate an injection rate of 300 barrels per day per injection well and a pressure of 700 pounds.

Q What has been the ultimate, or what is your estimate of the ultimate primary production from this pool?

A Our estimate of ultimate primary production was some 180,000 barrels of oil and that is just about what we have produced. As mentioned previously, we are essentially at the economic limit and are continuing production in order that we might conduct this waterflood project.

Q What was that figure, again?

A 180,000 barrels of oil.

Q What do you anticipate will be your experience on secondary recovery operations as far as the recovery of additional oil is concerned?

A We anticipate that we will recover by secondary means at least 50 per cent of the ultimate primary.

Q Do you propose to operate this flood under the provisions of Rule 701 of the Commission's Rules and Regulations?

A Yes, we do.

Q Turning your attention next, Mr. Graham, to the application Kewanee has made in Case 3291, what is sought by that application?

A By this application Kewanee seeks to obtain approval to conduct a pilot waterflood project on its Levitt S lease, comprising the northwest quarter of Section 13 and the east half, northeast quarter of Section 14, Township 18 South, Range 26 East, Eddy County, New Mexico.

Q Is this area that you have just referred to shown on the Exhibit A to the application in this case?

A Yes, it is.

Q How do you propose to institute waterflood operations in this area?

A We propose to convert an existing oil well producing from the San Andres formation to an input well, this well being Number 9-S as shown on Exhibit A. This well is located 1680 feet from the north line, 990 feet from the west line of Section 13. We propose to utilize produced water as our source of injection water, that is, water produced from the San Andres formation.

Q I note on this Exhibit A, that there are a number of San Andres wells in the area. Why have you proposed only to convert one well to an injection well rather than a larger project at this time?

A As mentioned previously, there is still very primary development going on in the Atoka-San Andres Pool and we hope by means of a pilot project to gain information which will enable us to determine the feasibility later on of a field wide unit and waterflood operation in the San Andres formation.

Q Referring now to the other exhibits attached to this application, Mr. Graham, what is Exhibit B?

A Exhibit B is a structure map of the, one of the producing members of the San Andres formation, being the Slaughter C zone and as noted on Exhibit B this structure covers considerable more area than that which we propose to obtain approval for our pilot project.

Q It is the Slaughter C zone which will be water-flooded?

A In our particular case, yes.

Q What does Exhibit C show?

A Exhibit C is an oil production graph showing the daily average oil production of Kewanee's Levitt S lease in Eddy County, New Mexico.

Q What is the current rate of production on this lease?

A The current rate is approximately 65 barrels of oil per day.

Q For how many wells?

A For six producing wells.

Q In your opinion, Mr. Graham, could these wells be properly classified as stripper wells?

A Yes, sir.

Q I note on the exhibit that the production shows to have taken a jump during the recent months, could you explain that?

A That increase in production is due to the fracture treatment of one well on the Levitt lease, the number 2 well. It resulted in an increase of production from five barrels to a maximum of 32 barrels per day and that production has now declined to 25 barrels per day. We had an

attendant increase in water production from two to 40 barrels per day.

Q So that one well accounts for 25 of the 65 barrels per day that the six wells on this lease are producing at the present time?

A Yes.

Q What does Exhibit D to the application show?

A Exhibit D again is a regional ownership and development plat showing production within a two mile radius of our proposed injection well.

Q What is Exhibit E to the application?

A Exhibit E is a typical log of a well in the Atoka-San Andres Field, this particular exhibit is a log of the proposed injection well and is a gamma ray neutron log and shown thereon is the top of the Grayburg Formation, the top of the Grayburg Oil Sand or Premier Sand, the top of the San Andres formation, and the Slaughter C producing zone.

Q How is your well Number 9-S, your proposed injection well presently completed and equipped?

A This well has four and a half inch casing set at 1770 feet. It was cemented to surface with 195 sacks of cement. This cementing operation was witnessed by a representative of the State Engineer's Office. This well has casing set through the producing horizon and was completed

through perforations.

Q How do you propose to convert this well to water injection?

A We propose to run heavy duty fiberglass tubing, two inch, to set it on a tension packer above the perforations and to inject through the fiberglass tubing into the producing zone.

Q This is as shown on Exhibit F to the application?

A Yes.

Q How does ~~your~~ proposed completion and equipping of this well compare with the injection well previously approved for the Atoka-Grayburg area by Order Number R-2720?

A It is essentially the same equipment, the only difference being that this well is completed through perforations rather than open hole.

Q I believe you said previously, Mr. Graham, that your source for water for this flood would be produced San Andres water only?

A That's correct.

Q What rate of injection and pressure do you contemplate for this well?

A We anticipate an injection rate of 400 barrels per day at 1,000 pounds.

Q Do you have any estimate of the total amount of water

to be injected?

A Not of the total amount since this is a pilot project.

Q You will just have to wait and see?

A Yes.

Q What is the anticipated ultimate primary recovery in the San Andres on your Levitt S lease?

A We have estimated an ultimate primary recovery of 282,000 barrels of oil.

Q What do you expect performance on secondary recovery will be?

A We expect to recover at least 50 per cent of the ultimate primary by secondary means.

Q Do you expect this area to be the same, better or worse than your Grayburg flood?

A Based on our preliminary studies, we anticipate that this will be somewhat better or is a somewhat better waterflood prospect than the Grayburg formation.

Q Do you propose to operate this project under Rule 701 of the Commission's Rules and Regulations?

A Yes, we do.

Q Mr. Graham, did you prepare or participate in the preparation or supervise the preparation of the exhibits, being Exhibit 1 in Case 3289, Exhibits A through G in Case 3290 and Exhibits A through F in Case 3291?

A I did.

MR. MORRIS: We offer those exhibits into evidence, Mr. Examiner.

MR. UTZ: Without objection, the exhibits as stated will be entered into the record.

(Whereupon, Exhibit 1 in Case 3289, Exhibits A through G in Case 3290 and Exhibits A through F in Case 3291 were offered and admitted into evidence.)

MR. MORRIS: That's all that we have of Mr. Graham at this time.

MR. UTZ: Any questions?

MR. IRBY: Yes, sir.

CROSS EXAMINATION

BY MR. IRBY:

Q Mr. Graham, I am not sure that you are the one that prepared this reply to my letter, but you have an analysis on the Atoka-Grayburg water supply that indicates it came from Well Number 2 and I am not sure that I am familiar with where that well is. Is this your well or the Fanning Well?

A It's the Fanning well.

Q And this other analysis is the produced water from Levitt S-2?

A Yes, sir.

Q In your previous testimony, you said the method of completion for these wells had previously been approved by the Commission. Did this include the fiberglass casing in that approval?

A I think in that instance, we may have used steel tubing.

Q Do you know of any case where the Commission has approved fiberglass casing?

A It's my understanding that the project involving the Tesoro Company was approved using fiberglass tubing.

Q I'm familiar with this application, but not the approval of it.

A Well, I stand corrected as to the approval then. Then, I do not know specifically whether it has been approved or not.

MR. MORRIS: For the Examiner's information, this was, I think the application referred to was originally styled application of Texas Star Petroleum Company and they later changed their name to Tesoro and it involves the Hospah area in McKinley County.

MR. UTZ: Is this fiberglass tubing or fiberglass casing?

A It's fiberglass tubing.

MR. UTZ: Is this high strength fiberglass tubing?

A Yes.

MR. UTZ: What make?

A Rock Island.

MR. UTZ: What's its test strength?

A We have it --

(Whereupon, Exhibit G in
Case 3291 marked for
identification.)

MR. MORRIS: If I could, just an aside here, we
will introduce this as an exhibit.

MR. UTZ: Sure.

REDIRECT EXAMINATION

BY MR. MORRIS:

Q I hand you what has been marked Exhibit Number G
in Case 3291 and ask you to state what that is.

A Exhibit G is an engineering manual prepared by the
Rock Island Company in which they set out the properties of
their fiberglass pipe.

Q And this is the pipe you propose to use in your,
both your Grayburg and San Andres projects?

A Yes, it is.

MR. UTZ: What is the strength of that tubing,
is it laminated tubing, reinforced tubing?

A It's laminated, reinforced laminated.

MR. UTZ: What strength is it?

A If I might quote from a letter which was written to Mr. Morris by a representative of the Fiberglass Pipe Division of Rock Island, "the maximum operating conditions at temperatures to 150 degrees Fahrenheit, pressure 1250, collapse 1,000, axial tensile 8500."

Q What pressures were you going to inject at?

A In the case of Atoka-Grayburg, 700 pounds. In the case of the Atoka-San Andres, 1,000 pounds.

MR. UTZ: Do you think that's enough safety factor?

MR. OUSTS: This pipe was tested to five times the rated pressure and all pipe is hydraulically tested to one and a half times before it is shipped.

MR.UTZ: This pressure is a working pressure rather than an ultimate pressure?

MR. OUSTS: Yes, sir.

MR. MORRIS: Will you state your name?

MR. OUSTS: John Ousts with Kewanee in Tulsa.

(Whereupon, Exhibit H in Case 3291 marked for identification.)

Q (By Mr. Morris) I hand you Exhibit H in Case 3291 and ask you if that is the letter that you just referred to?

A Yes, sir, it is.

MR. MORRIS: We offer Exhibits G and H in Case 3291

in evidence.

MR. UTZ: They will be received.

MR. IRBY: Is your Exhibit G Rock Island's manual number 10-64?

A Yes, it is.

MR. IRBY: I have no further questions.

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

(Witness excused.)

MR. MORRIS: That's all I have.

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

(Whereupon, the Hearing was recessed until 1:45 o'clock P.M.)

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