BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 15, 1976

EXAMINER HEARING

IN THE MATTER OF:	
Application of Atlantic Richfield Co. for a unit agreement, Lea County, New Mexico.	CASE 5761
Application of Atlantic Richfield Co. for a waterflood project, Lea County, New Mexico.	CASE 5762

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the New Mexico Oil Conservation Commission:	William F. Carr, Esq. Legal Counsel for the Commission State Land Office Building Santa Fe, New Mexico
For the Applicant:	Clarence E. Hinkle, Esq. HINKLE, BONDURANT, COX & EATON Attorneys at Law Hinkle Building Roswell, New Mexico

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MR. STAMETS: We will call next Case 5761.

MR. CARR: Case 5761, application of Atlantic Richfield Company for a unit agreement, Lea County, New Mexico.

MR. HINKLE: Mr. Examiner, Clarence Hinkle, Hinkle, Bondurant, Cox and Eaton, appearing on behalf of Atlantic Richfield Company. We have two witnesses we would like to have sworn.

(THEREUPON, the witnesses were duly sworn.)

MR. HINKLE: Mr. Examiner, we have a lot of exhibits, sixty-seven of them, in fact, but most of them are diagrammatic sketches of the injection wells and producing wells so the testimony will be in respect to those. They are all under these folders.

MR. STAMETS: I presume what you would like to do then is consolidate this case and the next case?

MR. HINKLE: Yes, sir, I would.

MR. STAMETS: Let me call that next case then. Case 5762 being the application of Atlantic Richfield Company for a waterflood project, Lea County, New Mexico.

For purposes of the record, Cases 5761 and 5762 will be consolidated.

JOHN KNEPLER

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q. State your name, residence and by whom you are employed?

A. My name is John Knepler, I live in Midland, Texas and I'm employed by Atlantic Richfield Company.

Q. What is your position with Atlantic Richfield?

A. I'm an Operations Engineer.

Q. Petroleum engineer?

A. Yes, sir.

Q. Have you previously testified before the Commission?

A. No, I have not.

Q. State briefly your educational background and your experience as a petroleum engineer?

A. I graduated from the Missouri School of Mines with a B.S. in petroleum engineering in 1967 and I received a M.S. in petroleum engineering from Stanford University in 1968. I have worked for Atlantic Richfield as an Operations Engineer for eight years. I'm a Registered Professional Engineer in the State of Louisiana and I've worked in the Permain Basin for three-and-a-half years.

Q. Are you familiar with Atlantic Richfield's operations in New Mexico and in particular in this Vacuum area?

A. Yes, sir.

Q. Have you made a study of the Vacuum Pool and all of

the wells that have been drilled in the area?

A. Yes, sir.

MR. HINKLE: Are his qualifications sufficient?

MR. STAMETS: They are.

Q. (Mr. Hinkle continuing.) What is Atlantic Richfield seeking to accomplish by this application?

A. Approval for --

Q. There are two applications.

A. Approval for unitization and to waterflood the State Vacuum Unit.

Q. Have you prepared or has there been prepared under your direction certain exhibits for introduction in this case?

A. Yes, sir.

Q. These are the exhibits that have been marked One through Sixty-seven, I believe?

A. Yes, they are.

Q. Refer to Exhibit One and explain what this is and what it shows?

A. This exhibit shows the outlines of the proposed unit area and all wells that have been drilled on the unit area and wells within two or more miles surrounding the same and the formations which they are producing from.

This exhibit also shows the outlines of the West Vacuum Unit which is contiguous to the proposed unit on the east and southeast. Also it shows the outline of the EK Queen

Unit which lies to the southwest of the proposed unit.

Exhibit Number One also shows the ownership of all of the leasehold interests within the unit area and in the surrounding area.

The proposed injection wells within the unit are shown by triangles and the additional injection well which is to be drilled is shown near the south boundary of Section 32.

Q. Refer to Exhibit Two and explain that?

A. Exhibit Number Two is a plat showing the outlines of the unit area which is the same as Exhibit A attached to the unit agreement, copies of which have been filed with the application for approval of the unit agreement.

Q. Are all of the lands State lands?

A. Yes, they are.

Q. How many acres are involved?

A. Eight hundred, approximately.

Q. Now, refer to Exhibit Three and explain what this is?

A. Exhibit Three is a structural map contoured on top of the Grayburg-San Andres formation with a twenty-foot contour interval, which is to be unitized. The Grayburg-San Andres formation as defined by the unit is the seven-hundred-and-seventeen-foot interval, the top of which is shown on the Lane Wells Radioactivity Log dated January 30th, 1948 at a subsurface depth of forty-one hundred and ninety-four

feet in the Cole and Darden Phillips State B No. 1-X Well located six-hundred-and-sixty feet from the south line and six-hundred-and-sixty feet from the west line of Section 29, Township 17 South, Range 34 East, Lea County.

Q. What does Exhibit Three show in effect?

A. It shows that the proposed unitized formation has continuity and is substantially uniform over the entire unit area.

Q. Refer to Exhibit Four and explain this?

A. Exhibit Four is a north-south cross section across the unit, utilizing logs of the unit wells and showing the Grayburg-San Andres interval we propose to waterflood.

Q. Is the waterflood interval rather uniform throughout the area?

A. Yes, sir, this exhibit and the next one indicate that the unitized formation has continuity and is substantially uniform over the entire area.

Q. The next exhibit is Five and it is an east and west cross section showing the same thing?

A. That is correct.

Q. Now, refer to Exhibits Six through Fifteen and explain what these are and what they show?

A. Exhibits Six through Fifteen are schematic drawings of ten of the eleven injection wells which are to be utilized in the unit. These ten wells, Six through Fifteen, are wells

that are to be converted to injection. Each of these drawings show all casing strings, including diameters and setting depths, quantities used and tops of cement, open-hole intervals as well as tubing strings, including diameters and setting depths and location of packers.

Logs of each well to be converted to injection were filed with the hearing application.

Q. In your opinion will the completion of these wells in the manner shown by these exhibits confine injection water to the unitized formation?

A. Yes, sir, they will.

Q. Do you intend to use plastic-coated tubing in connection with each injection well?

A. Yes, we do.

Q. Refer to Sixteen and state what that is.

A. This is a schematic drawing of the State Vacuum Unit Well No. 21 which is to be drilled and completed as an injection well on the south edge of the unit.

Q. What would be the location of that well?

A. Approximately three, thirty from the south line and twenty-three, ten from the west line of Section 32, 17 South, 34 East.

Q. In this connection have you given all of the offset owners notice of the application?

A. Yes, we have.

Q. Have you had any objections?

A. No, we haven't, all of our offset owners are also partners in the proposed unit.

Q. Now, refer to Exhibits Seventeen through Twenty-Six and explain what these are.

A. These are schematic drawings of the producing wells in the unit. Each of these drawings show all casing strings, including diameters and setting depths, quantities used and tops of cement, open-hole intervals and tubing strings, including diameters.

Q. Did you find any particular problem in connection with any of these wells as far as waterflood is concerned?

A. No, sir, I did not.

Q. Now, refer to Exhibits Twenty-seven and Twenty-eight.

A. These are schematic drawings of two plugged and abandoned wells within the unit area. Each of these drawings shows all casing strings left in the well, including diameters and setting depths, quantities and tops of cement, sizes and locations of cement plugs placed in the wells and the plugging date as completely as I was able to determine.

Q. Why did you include these two wells?

A. Atlantic Richfield is aware of the waterflow problems that have developed in the Vacuum Field and we are participating in the Vacuum Waterflow Committee.

Wellbore diagrams and Bradenhead surveys have been

submitted to the Commission on all wells within the proposed unit and no waterflow problems were found in any of these wells.

We have submitted schematic diagrams on all wells within the unit area. All of these diagrams on active wells indicate open-hole completions in the Grayburg-San Andres interval with at least six-hundred-and-seventy-five feet of cement above the casing shoe.

The schematic drawing of the proposed injection well to be drilled indicates that we will circulate cement to the surface on the production casing.

The schematic diagram of the two plugged and abandoned wells within the unit area indicate that these wells were properly plugged and should not be a source of water migration out of the waterflood zone.

We intend to run periodic injection surveys and step rate tests on our injection wells to monitor waterflood performance and maximize all producing rate and ultimate recoveries. We will run the first set of the pressure parting tests within sixty to a hundred-and-twenty days after injection starts, if the injection wells have pressure on them. If these wells are still taking water on a vacuum at that time we will be unable to run these tests and it would be unnecessary to do so. We plan to keep our injection pressures below the formation parting pressure as indicated by these step rate tests. This formation parting pressure will continue to increase as

reservoir pressure increases with the waterflood operation. However, we do not at any time plan to exceed a formation base injection pressure in excess of one psi per foot. In addition, we will equip the wellhead of each well within the unit area in such a manner so that periodic Bradenhead monitoring can be done.

Q. Now, refer to Exhibits Twenty-nine through Sixty-six and explain what these are.

A. Exhibits Twenty-nine through Sixty-six are schematic drawings of all wells producing, injection or plugged and abandoned within one-half-mile of the unit boundary. Each of these drawings show all casing strings, including the diameters and setting depths, quantities used and tops of cement, open-hole intervals and tubing strings, including diameters, as completely as I was able to determine from the Commission records.

Q. Why did you include these wells?

A. We wanted to be as certain as possible that there were no problems to be anticipated with waterflows around our proposed unit. There were schematic drawings and Bradenhead surveys made on all wells in the field in accordance with the Waterflow Committee recommendations and there were no problems appeared on any of these wells and we wanted the record to reflect that they were, in our opinion, safe and should not present any problem to our waterflood.

Q. This was simply because they have had the waterflow problem in the Vacuum area?

A. In some parts of the field there have been problems.

MR. STAMETS: While we are right on this subject, do you know of your own knowledge, if any of the wells offsetting your proposed waterflood had pressure on the Bradenhead?

A. Well, the criteria that was determined by the Committee as a problem well would be a well that would flow water under a certain -- had a certain pressure on it and would flow water when the valve was open. Now, if a well actually had pressure and it was just a puff of gas that would blow off immediately this was not considered significant and I do not know well-by-well if any of these had that problem but I do know that none of them had a waterflow within the criteria established by that Committee.

MR. STAMETS: Thank you.

Q. (Mr. Hinkle continuing.) Have you made an estimate of the additional oil you expect to recover by reason of the waterflood?

A. Yes, we expect to recover approximately one million, seven hundred thousand barrels of secondary oil that would otherwise be unrecoverable without waterflooding the unit area.

Q. In your opinion, would it be helpful and advisable if the order approving the waterflood project provides for administrative approval of any changes which might prove

necessary as far as the location of the injection wells are concerned?

A. Yes.

Q. Are you requesting a project allowable?

A. Yes, we would like to have the benefit of a project allowable as provided in Rule 701 of the Commission so that the allowable assigned for the wells may be equal to the ability of the wells to produce and so that they would not be subject to the depth bracket allowable for the pool nor the market demand percentage factor.

Q. What quanitity of water do you anticipate you will inject initially?

A. Approximately fifty-five hundred barrels a day into the eleven wells beginning about January 1st, 1977.

Q. What is going to be the source of your water?

A. The City of Carlsbad ity water supply system which obtains water from the Ogallala formation in Lea County.

Q. Do you also contemplate injecting produced water?

A. Yes, we do as it becomes available.

Q. Have all of the wells in the proposed unit reached an advanced stage of production and are classed as stripper wells?

A. Yes, Exhibit Sixty-seven is a plat of the unit area and shows the proposed injection and producing wells and the average daily oil and water production for each well during

May of 1976.

Q. In your opinion will approval of this application be in the interest of conservation, prevention of waste and protect correlative rights?

A. Yes, it will.

MR. HINKLE: We would like to offer Exhibits One through Sixty-seven.

MR. STAMETS: Exhibits One through Sixty-seven will be admitted.

(THEREUPON, Applicant's Exhibits One through Sixty-seven were admitted into evidence.)

MR. HINKLE: That's all the direct we have.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Going back to Exhibit Number Twenty-seven.

A. Yes, sir.

Q. The well here, located six, sixty north and east of Section 31 has been plugged with a series of five-sack plugs, it appears. Do you think this is adequate by today's standards?

A. Well, certainly if we were going to plug this well today we would probably put more than that amount of cement in the well. However, this is the information which I was able to find after diligent search of our records and the lease

owner on whose lease this well is located and the only source of any data from this old well was the Commission's records and the five sacks might or could be sufficient in the proper location. On the note here in the middle of the diagram there is a plug at the base of the salt with no description as to what size it was and also the five-and-a-half casing, the records indicate that it was probably pulled but not definitely. It could possibly be in the well. So certainly with this cement with the casing in the well would be much better than if this amount of cement was used in essentially an open-hole interval of a dry hole that had been drilled with no casing left in the well at all.

Q. Nonetheless, this is not the type of plugging program you would recommend today?

A. No, sir.

Q. Is there a possibility that Atlantic might have to go in this well and re-plug it to assure that water is not going to escape through it?

A. Well, there is certainly a possibility. We do intend to monitor all of the wells, including these plugged wells.

Q. How would you propose to monitor this well?

A. Since this well is cemented about the only thing we could do would be to maybe, and I have not physically been on the site to look at it, we could possibly get into the surface casing and weld a valve on there to see if there was any pressure

on it and continue to monitor that but if a problem develops and when the problem develops, it would just depend on what the problem was and we would begin a search to try to determine the source and correct the problem, yes, sir.

Q. Now, did I understand you to say that you had checked the Bradenhead on every well within the project area, every well that has one?

A. There has been submitted and it is in the Commission files a sketch and a pressure survey on all wells in this field and I have looked at the records on these wells. I have not personally been out to the wells, especially if they weren't on our lease but this Committee flagged all wells in which there was any problem that exceeded their criteria and this was with people with the Commission staff in the Committee and with their guidance and none of the wells in this area, including the wells that I have shown all of these sketches on, had any problem that was considered significant.

Q. Will the Bradenheads be periodically tested in this area during the course of your flood?

A. Yes, within the unit area. As I said we intend to equip the wellheads so that we can periodically check the pressure on them. Now, as far as those outside the unit area, that would be dependent upon what Commission rules are eventually issued for this field where a problem has been found.

Q. Right. I was concerned primarily with the unit area in this case.

A. Yes, indeed, we will monitor those.

Q. And you have reviewed the well construction on all of the wells in the unit area and you are fairly confident that they are in good shape?

A. Yes, very much so.

Q. Now, you indicated that you planned to limit pressures to one psi per foot. The recent Commission orders have limited pressure generally to seven-tenths of a pound.

A. Well, I said that first and foremost we will limit the pressure to what the step rate tests indicate we should limit it to but under no circumstances would we go over one psi. We fully anticipate that we will limit it to much less than that by those step rate tests and other monitoring techniques which we intend to employ.

Q. Now, these step rate tests would be commenced, what, sixty to a hundred-and-twenty days after you get some pressure built up?

A. Well, I said within sixty to a hundred-and-twenty days after injection starts, depending upon if the wells had pressure on them and I think the way you have stated it would probably be more concise that once the wells get enough pressure on them to enable us to run the tests we will run them and we anticipate that it would be something like sixty to a hundred-

and-twenty days.

Q. If you were initially limited to seven-tenths of a pound per foot formula you would not have any problems with that lease as the flood began?

A. I don't see that we would, we anticipate that the wells will take water on a vacuum for awhile and then the pressure would gradually increase as we increased the pressure in the reservoir, now, at which time we ran step rate tests which indicated we would not be parting the formation in a pressure in excess of that seven-tenths, we would probably come back to the Commission with that evidence and request that we be allowed to go up to what the step rate test indicated would be a safe operating pressure.

Q. Do you plan to run a synergetic log on the well to be drilled in here? This is a log which can be utilized to calculate the parting pressure of the formations in the area.

A. I'm not familiar with that log.

Q. It might be something to look into when this well is drilled and I know that Schlumberger out of the Hobbs office has run them because I have seen a couple of them.

A. It sounds like a new application of some existing logging techniques.

Q. It is.

A. Which probably we will be running those logs anyway and it wouldn't be any problem to incorporate that calculation

from the data.

Q. I would encourage you to work with our District Supervisor in Hobbs on this particular problem and if it is run, the Commission would like to have a copy. Would you be agreeable to submitting copies of parting pressure tests as they are run?

A. Yes, sir.

Q. And I presume the annulus on all of these wells would be loaded, gauged or left open or some other method to test those?

A. It will be loaded with a treated water to prevent corrosion and hooked up for pressure monitoring.

MR. HINKLE: One other question.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q. Does Atlantic Richfield own the leases upon which the two dry holes are located, shown by Exhibits Twenty-seven and Twenty-eight?

A. We own the lease where one of them is located.

Q. Which one is that?

A. Well No. 28 is located on Atlantic Richfield's lease in the south half of Section 32.

Q. Were these wells plugged and abandoned by Atlantic Richfield?

A. No, sir, they were plugged and abandoned a long time

before we acquired the lease.

Q. By other owners?

A. By other owners, yes.

MR. HINKLE: That's all.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. HINKLE: We have one other witness.

THOMAS R. BARR

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q. State your name, your residence and by whom you are employed?

A. Thomas R. Barr, I live in Midland, Texas and I'm employed by Atlantic Richfield.

Q. What is your position with Atlantic Richfield?

A. Landman.

Q. Have you had considerable experience as a Landman?

A. Yes, sir, I have been employed here in the Permian Basin and New Mexico area for about a year-and-a-half and I have had another additional year in other parts of the country.

Q. Are you familiar with the application which Atlantic Richfield has made for the pool of the unit agreement in this case?

A. Yes, sir, I am.

Q. Have you been handling the matter as far as obtaining approval of the unit by the working interest owners?

A. Yes, sir, I have.

Q. Has there been filed with the application in this case, three copies of the unit agreement?

A. Yes, sir.

Q. Has this form been approved by the Commissioner of Public Lands?

A. Yes, sir, it has.

Q. Is this substantially the same form as has heretofore been approved and used where State lands are involved or where a waterflood project is contemplated?

A. Yes, sir, it is.

Q. Is Atlantic Richfield designated as operator in the unit agreement?

A. Yes, sir.

Q. I believe that the previous witness testified as to the formation which is being unitized, there is only the one formation being unitized by the unit?

A. Yes, sir.

Q. Does the unit agreement specifically provide for the

primary purpose of the unit and what is that?

A. Secondary recovery, sir.

Q. Does the unit agreement contain a participating formula?

A. Yes, sir, Section 13 which begins on page twelve provides that the respective tracts shown on Exhibit B attached to the unit are to participate in accordance with the percentages as set forth in Exhibits C-One, C-Two during Phase One and Phase Two of the waterflood.

Q. Have you contacted all of the working interest owners and invited them to join the unit?

A. Yes, sir.

Q. What is the present status?

A. We currently have signed joinders from all parties with the exception of Texaco. Texaco has by phone stated that they will join but it has not been formally approved through their organization and shortly we expect their signed joinder as well.

Q. So you contemplate one hundred percent joinder?

A. Yes, sir.

Q. And all of these parties have approved the participating formula?

A. Yes, sir.

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

CROSS EXAMINATION

BY MR. STAMETS:

Q. What percent do you have signed up on this unit at this time?

A. It depends on the basis of Phase one or Phase Two. If it is on the basis of Phase One we have approximately fifty percent sign up. Texaco owns currently in Phase one fifty point six, eight percent.

Q. Do you anticipate a hundred percent sign up?

A. Hopefully within two weeks, yes, sir.

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

(THEREUPON, the witness was excused.)

MR. STAMETS: Anything further in this case?

MR. HINKLE: That's all.

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

REPORTER'S CERTIFICATE

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

Sidney F. Morrish

Sidney F. Morrish, C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 5761-5762 heard by me on 8-15, 1976.

Richard L. Stamets, Examiner
New Mexico Oil Conservation Commission