BEFORE THE

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

May 21, 1969

EXAMINER HEARING

IN THE MATTER OF: Application of Atlantic Richfield Company for a unit agreement, Eddy County, New Mexico.	Case 4137
Application of Atlantic Richfield Company for a waterflood project and unorthodox injection well location, Eddy County, New Mexico.	Case 4138

BEFORE: ELVIS A. UTZ, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 4137, application of Atlantic Richfield Company for a unit agreement, Eddy County, New Mexico.

MR. HINKLE: I am Clarence Hinkle, attorney from Roswell appearing on behalf of the Atlantic Richfield Company. 4137 and 4138 are companion Cases and I would like to move that they be consolidated for purposes of testimony.

MR. UTZ: Case 4137 and 4138 will be consolidated for purposes of testimony.

MR. HINKLE: We have two witnesses, Mr. Biard and Mr. Tweed.

JACK BIARD

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q Will you state your name, your residence, and by whom you are employed?

A My name is Jack Biard, Roswell, New Mexico. I am employed as District Landman for Atlantic Richfield Company.

Q What is your position with the Atlantic

Richfield Company?

A I am presently and have been for five years District Landman for Roswell Office.

Q Are you familiar with the Atlantic applications in these Cases?

A Yes, sir.

Q What is Atlantic Richfield seeking to accomplish?

A We seek the approval of the East Shugart Unit Area comprising 1359.40 acres, a Federal and State land in Township 18 and 19 South, Range 31 East, Eddy County, New Mexico. Also, the approval for a waterflood project co-extensive with the unit area for the purpose of secondary recovery for the Shugart Pool which includes the Yates, Seven Rivers, Grayburg, Queen formation. We, also, seek an exception to permit the drilling of injection wells at an unorthodox location 100 feet from the south line and 990 feet from the west line of Section 35, Township 18 South, Range 31 East.

Q Have you been in charge of the formation of this unit?

A Yes, sir, it has been done under my direction.

Q And getting it executed and all that?

A Yes, sir.

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

A Yes, sir.

Q Refer to Applicant's Exhibit 1, and explain what it shows?

A Exhibit 1 is a plat of the proposed East Shugart Unit area, and gives the outline of the proposed unit. It also shows all the wells that have been drilled within the proposed unit area, and within a radius of two miles; as well as the formations from which they are producing, or have produced. Also, indicated on the plat, are the proposed injection wells within the unit area, and it is also an index map for the north, south, east, west cross sections which are later referred to. The plat also shows the ownership of the oil and gas leases surrounding the unit area.

Q What is the character of the land within the unit area.

A All the lands are Federal lands except 40 acres in Section 36 which is State land. The total acreage within the unit area amounts to some 1359.40 acres.

Q The acreage in 36 is 40 acres, is it not?

A That's right, sir.

Q That's the only State land?

A That is right.

Q What land or leases do Atlantic Richfield own in the area?

A We own all of the leases in the unit area, except southwest quarter, northwest quarter of Section 36, the State tract; also, except the south half, southeast quarter section 34, which is contributed by City Service, and also, except 80 acres in Section 3 of 19 South 31 East, being the northwest quarter southeast quarter and northeast quarter southeast quarter of Section 3.

Q Why do you show the last mentioned acreage in 36 as dotted lines rather than solid lines?

A In the original drafting of the unit plans, in the outline of the unit area, we included those two tracts which are owned by Texaco, because Texaco indicated a willingness to participate -- an interest in participating in the proposed unit, and the unit instruments are drafted with that in mind. Since that time, for reasons best known to the Texas Company, Texaco, they have changed their minds, and informed us that they do not wish to participate in the unit.

Q So these two tracts will not be committed to the --

A They will not be committed.

Q Has this area been designated by the USGS as an area suitable and proper for utilization under the provisions of Mineral Leasing Act?

A Yes, sir, it has.

Q Refer to Exhibit No. 2, and explain what that is.

A Exhibit No. 2 is a letter dated August 15, 1967, from the United States Geological Survey to Atlantic Richfield Company, advising that our unit outlined for the East Shugart unit, is acceptable as the logical unit area for the secondary operations which we proposed to carry on.

Q Does this letter also approve the form of unit agreement?

A Yes, sir, we have submitted for their review a form of the unit agreement. We have their preliminary approval.

Q Are you familiar with the form of unit agreement?

A Yes, sir.

Q Copies of this form have been filed with the application in this Case. Is Atlantic Richfield Company

designated as a unit operator?

A Yes, sir.

Q Is the proposed form substantially the same form as heretofore been approved by the USGS and by the Commission where Federal and Fee lands are involved?

A Yes, sir.

Q What is the present status of the execution of this unit?

A Besides Texaco Company, Texaco, which has indicated it will not execute, all other working interest owners have signed the unit agreement as well as the unit operating agreement. The only realty owners, of course, are the Federal Government and the State of New Mexico. The State will eventually not be a realty owner, because Texas Company is contributing the only State tract and, therefore, that tract will not be committed.

Q Outside of the Texaco acreage then, you anticipate a 100 percent --

A 100 percent of the royalty will be committed, yes sir.

Q That is the working interest, not the overriding royalty?

A Yes, sir. We anticipate 100 percent of the

overriding royalty interest, also. As of the present time, 96 percent in interest of the overriding royalty have signed.

Q Does the proposed unit cover all formations, or is it limited to certain formations?

A It is limited to certain formations, namely, Yates, Seven Rivers, Grayburg, and Queen formations in the Shugart Pool.

MR. HATCH; Injection will be in all those four in all those zones?

MR. HINKLE: We will go into that with Mr. Tweed, who is Petroleum Engineer, and will testify as to the formations that will be injected.

MR. UTZ: The units advertised here are all four of them?

MR. HINKLE: The unit covers, as I understand it, all four, but the testimony will later show they are going to inject into three of them.

MR. HATCH: I just wondered if I had misadvertised.

MR. HINKLE: No, no, I think you are right.

Q (By Mr. Hinkle) Do you have further statements to make?

A No, sir, that completes what I wish to present.

MR. HINKLE: That is all the direct examination.

MR. UTZ: Are there any questions of Mr. Biard? You may be excused.

JERRY TWEED

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 are you employed?

A Jerry Tweed. I live in Roswell, New Mexico. I am employed by Atlantic Richfield Company.

Q What is your present position with Atlantic Richfield Company?

A I am Petroleum Engineer.

Q Have you previously testified before the Commission?

A Yes, sir.

Q Your qualifications as a Petroleum Engineer are a matter of record with the Commission?

A Yes, they are.

Q Are you familiar with the proposed unit agreement

for the East Shugart unit area?

A Yes, I am.

Q Have you made a study of this area?

A Yes.

Q Of all the wells that have been drilled?

A I have.

Q Have you prepared, or has there been prepared under your direction certain exhibits in this Case?

A Yes, sir.

Q Refer to Exhibit No. 3, and explain what that shows.

A Exhibit No. 3 is a north to south cross section of the electric logs across the unit area. The designation of the zones in here are for our particular purpose, and don't have any geological significance. I might point out one thing, that the zone designated, Upper Queen 1, is actually the Seven Rivers zone. On this cross section, the major zones that are to be flooded, are shown. The three zones in the Yates are colored green. The Upper Queen in Seven Rivers, these three zones are colored orange, and then the Lower Queen, three zones, are colored yellow. This shows the continuity of the pay in this particular area. All of the Queen's and Seven Rivers zone are blanket

in nature in the unit area, and are continuous. The Yates zones are continuous over most of the areas, but dew pinch out in certain locations, as might be noted in the Yates "D" zone on the cross section.

Q Do you propose to inject water into all these zones as shown?

A Yes. All these zones will be flooded.

Q I refer you to Exhibit 4, and ask you to explain this to the Commission.

A Exhibit 4 is a west to east cross section of the electric logs in the area crossing. And, again, these three Yates zones are shown on it. It also shows the continuity of these zones in this area.

Q Between these two exhibits, it shows the continuity north, south, east, and west?

A Yes, sir, across the unit. The location of the two cross sections are shown on Exhibit 1.

Q Now, refer to Exhibit 5, and explain what this shows.

A Exhibit 5 is our logs of the wells we planned to convert to injection. There are here nine logs. We planned to convert eleven wells. One well to be drilled,

and one well, the City Service well, did not have an electric log available.

Q I refer back to Exhibit 1. Does this show all the proposed wells?

A Yes. All the proposed eleven injections wells are shown on this exhibit.

Q Do you have any further comments with respect to Exhibit No. 5?

A No. The one well we planned to convert into injection, it does not have a log, is a East Shugart unit well No. 28. It does not have a log run on it.

Q Well, there is still one log that you do not have here, is that right?

A Yes.

Q That is the one to be drilled?

A Yes, that's the No. 28 Well.

Q Why do you not have the log for that well?

A The log was not available, and it is my understanding, that there was not a log run on the well.

Q Identify the injection well that you propose to drill at an unorthodox location on Exhibit 1.

A This well is located 100 feet from the south line parameter pattern in this particular area. The drilling of this well in this location is necessary in order to sweep most oil in this area -- it might be noted that that the wells to the south there are primarily Grayburg producers, and are not opened in this zone. Therefore, if we locate it on a normal spot, we would be sweeping oil to the south that would not be recovered.

Q In your opinion, with the location of the injection, at an unorthodox location, as you have indicated, tend to violate correlative rights.

A It would not violate correlative rights.

Q Would it militate against any of the interests to the south which are not within the unit area?

A No, it would not. If they choose to open the zones to be flooded, then they would benefit from the drilling of this well.

Q Does the unit agreement contain a participation formula?

A Yes, it does. A participation formula is two phases. Phase One consists of 50 percent current rate and 50 percent remaining primary. Phase One will be in effect until, from 7:00 A.M., May 1, 1969; from that time

until 667,317 barrels have been recovered. When, from May 1, that much oil have been recovered, then there will be a Phase Two participation, which amounts to 95 percent ultimate primary, and 5 percent acreage; and it will be in effect until cessation of the unit activity.

Q I refer to Exhibit 6, and I will ask you to explain what this shows.

A Exhibit 6 are schematic diagrams of the proposed eleven injection wells. Shown on these are the tubing setting depths, size, casing strings setting depths, amounts of cement, and tops of cement. It might be noted that there are essentially three types of completions that we are proposing here. The top well, East Shugart unit well No. 1, would be a dual completion with two strings of tubing. A dual packer set above the Yates, and a single packer set below it. The Yates would then be injected into, down one string of tubing, and then the Queen down the other string of tubing. The other type -- one of the other type would be East Shugart Well No. 16, which is a single completion, and this type of completion we plan to inject down to the packer set above the perforations for open-hole. One other type is East Shugart Well No. 19. This well is

equipped with 4 1/2 inch casing; therefore, we plan to set a packer between the Yates and the Queen, and yet injection down tubing into the Queen perforations, and down the annulus into the Yates.

Q How many wells do you have of this type, where you are going to inject in the annulus?

A We have two.

Q Does the unit agreement provide for the filing of a plan of development operation at the time you file for final approval?

A Yes, it does.

Q Have you formulated that plan?

A Yes, I have. It is attached.

Q Refer then to Exhibit No. 7.

A This is a plan for the development of the East Shugart unit. The unit consists of some 1,359.4 acres in the unit area. Texaco chose not to participate with their 120 acres; therefore, the remaining 1,239.4 acres will be developed for water flooding. The zones to be flooded, as previously stated, are the Yates, Seven Rivers, and Queen, as shown on the cross sections which we have reviewed. The Yates is found at approximately 2,700 feet, and the lowest Queen zone to be flooded is found to be

approximately 3,900 feet. All nine separate zones are to be flooded in the three formations. The tract in this area is essential stratagraphic in nature, and all three formations with productive limits determined by sand pinch out. The only exception being the southern limits of production for the two lower Yates zones in this area; and they are controlled by the presence of an occipter. The producing mechanism in all cases, was solution gas drive. There are now, within the producing boundary, 26 active producing wells, one shut-in well and four injectors. Wells are presently producing some 164 barrels of oil per day; which is 6.3 barrels of oil per day per producing well. The area is in the latter stages of the primary depletion.

The cumulative production for the participating area is some 2,330,000 barrels, with the estimated remaining primary of 490,000 barrels. This is, as of March 1, 1969. The existing four injectors were converted May, 1966, and with new installations, it is planning to have a total of 11 injectors. The wells will eventually form two large parameter-type patterns. Those patterns include the drilling of one additional well to be located 100 feet from the south line of 99 west line, in Section 35. It is planned to inject separately into the Yates and to inject together

into the Seven Rivers-Queen formations. In the well that has 7 inch casing, there will be the two strings of 2 3/8 inch tubing. In the wells with 4 1/2 inch casing, injection will be down the tubing in the Seven Rivers-Queen and down the annulus into the Yates.

Q This also lifts all the injection wells, does it not?

A Yes, it lifts all the injection wells. We found that out. Approximately 7,000 barrels of water per day will be injected in the 11 wells. The supply of water will be purchased from Double Eagle Corporation, and the facilities for regathering and reinjecting for this water will be constructed. The water would be treated to assure a minimum amount of corrosion, and frequent checks will be made to insure that control is maintained. It is estimated that an additional 2,800,000 barrels of oil will be recovered due to waterflooding, and project will have a life of 13 years.

Q In your opinion, if this unit is approved, will it be in the interest of conservation and the prevention of waste.

A Yes, it will.

Q Will it tend to protect correlative rights.

A Yes, it will.

Q And promote the greatest ultimate recovery of unitized substances?

A Yes.

MR. HINKLE: We would like to offer in evidence Exhibits 1 through 7.

MR. UTZ: Without objection, Exhibits 1 through 7 will be entered into the record of this Case.

(Thereupon, Applicant's Exhibits 1 through 7 were admitted in evidence.)

Q (By Mr. Hinkle) Have you further comments to make Mr. Tweed?

A No, sir.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Tweed, will all the water -- the injection water, be fresh water?

A No, sir, it will not. We will reinject produced water.

Q Do you intend to line the tubing?

A No, we do not. We have injected -- reinjected produced clean water and supply water in a project approximately

two miles north of here for -- ever since December, 1965. And we, to date, have not had a failure in that project, due to an internal corrosion. It is our contention, that water properly treated, will not be sufficiently corrosive to warrant plastic coating. Also, the injection linings will not be plastic coated and there would be injection down the annulus, which would be bare steel; which requires for our operation that we may maintain that corrosion protection.

Q It's just the produced water that you will treat?

A No, sir, we also treat the supply water to remove the oxygen from it.

Q The reason for using the annulus to inject in the upper zones of these two wells is because of the small casings?

A Yes, sir, that is right.

Q There are three kinds of completions that you had, wasn't there? I can't find but two of them here, right now.

A One was a dual completion, and the other one, the one that we just mentioned, and the third type was just a single completion; such as East Shugart Unit Well

No. 29, which is second from the back. This is just a single completion. We will inject down tubing in the packer set above the perforations. We have, I believe, three of these.

Q That annulus could be loaded pretty handily, couldn't it?

A Yes, sir. It will be.

Q Any other questions?

MR. HINKLE: I might ask one further question. In your injection system, will this be a close system so as to prevent corrosion?

A Yes, it will be a close system.

MR. HINKLE: That's all.

Q (By Mr. Utz) Do you have any idea why they didn't log your Yates on the east-west cross section?

A No, I think possibly what happened in a lot of these wells is, they drill to the Yates earlier and made producing wells out of them, and later on they deepened to the Queen and probably, in these two wells, they had been Yates, but when they deepened to the Queen, they logged the same.

MR. UTZ: Any other questions of the witness? If not, you may be excused. Do you have anything further, Mr. Hinkle?

MR. HINKLE: No. That is all.

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

STATE OF NEW MEXICO)
) SS.
COUNTY OF BERNALILLO)

I, KURLEEN McCUTCHEN, Court Reporter 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.

Kurleen McCutchen
Notary Public

My Commission Expires May 22, 1973

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4137, heard by me on May 24, 1962.

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