

dearnley, meier & mc cormick

209 SIMMS BLDG. • P.O. BOX 1092 • PHONE 243-6691 • ALBUQUERQUE, NEW MEXICO 87103
1216 FIRST NATIONAL BANK BLDG. EAST • ALBUQUERQUE, NEW MEXICO 87108

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
OIL CONSERVATION COMMISSION CONFERENCE ROOM
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO
Wednesday, June 27, 1973

EXAMINER HEARING

IN THE MATTER OF:

Application of Atlantic Richfield Company
for a unit agreement, Lea County, New
Mexico.

Case No. 5016

AND

IN THE MATTER OF:

Application of Atlantic Richfield Company
for a waterflood project, Lea County, New
Mexico.

Case No. 5017

BEFORE: Elvis A. Utz,
Examiner

TRANSCRIPT OF HEARING

dearnley, meier & mc cormick

209 SIMMS BLDG. • P.O. BOX 1092 • PHONE 243-6691 • ALBUQUERQUE, NEW MEXICO 87103
1216 FIRST NATIONAL BANK BLDG. EAST • ALBUQUERQUE, NEW MEXICO 87108

1 MR. UTZ: Call Case 5016.

2 MR. CARR: Case 5016, application of Atlantic
3 Richfield Company for a unit agreement, Lea County, New
4 Mexico.

5 MR. HINKLE: Clarence Hinkle of Hinkle, Bondurant,
6 Cox & Eaton, Roswell, appearing on behalf of Atlantic
7 Richfield. I'd like for you also to call Case 5017,
8 and I'd like to make a motion that these be consolidated
9 for purposes of taking testimony, inasmuch as testimony
10 will overlap.

11 MR. UTZ: We will also call Case 5017, which is a
12 companion case to this.

13 MR. CARR: Case 5017, application of Atlantic
14 Richfield Company for a waterflood project, Lea County,
15 New Mexico.

16 MR. HINKLE: We have eight exhibits, one witness.

17 MR. CARR: Mr. Hinkle, would you like to move that
18 these be consolidated now?

19 MR. HINKLE: Yes, I move that these two cases be
20 consolidated.

21 MR. UTZ: Cases 5016 and 5017, Case 5016 being a
22 unit agreement and 5017 being a waterflood project for
23 that unit, will be consolidated for purposes of hearing,
24 separate orders will be written.

25 *****

1 JAMES D. JOHNSON,
2 a witness, having been first duly sworn according to law, upon
3 his oath, testified as follows:

4 DIRECT EXAMINATION

5 BY MR. HINKLE:

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

8 A My name is James D. Johnson, I'm employed by the Land
9 Department of Atlantic Richfield Company. I reside in
10 Midland, Texas.

11 Q Have you previously testified before the Commission or
12 one of its Hearing Examiners?

13 A No, sir, I have not.

14 Q What is your position with Atlantic Richfield?

15 A I am a land man.

16 Q Are you familiar with the operations of Atlantic
17 Richfield in New Mexico and in particular in the area
18 that's involved in this unit?

19 A Yes, sir, I am.

20 Q Have you made a study of the wells and so forth?

21 A Yes, sir.

22 Q Have you been in charge of getting the unit agreement
23 signed up?

24 A Yes, sir, I monitored the sign-up on the unit agreement.

25 Q Are you familiar with the applications of Atlantic

1 Richfield in these cases?

2 A Yes, sir, I am.

3 Q What is Atlantic Richfield seeking to accomplish by
4 Case 5016?

5 A Atlantic Richfield is seeking approval of a unit
6 agreement in connection with the waterflood project for
7 the Seven Rivers--Queen area.

8 Q Have you prepared, or has there been prepared under your
9 direction, exhibits for introduction into this case?

10 A Yes, sir, there have.

11 Q And the ones that you have referred to are the ones that
12 have been marked Exhibits 1 and 2?

13 A Yes, sir.

14 Q Refer to Exhibit 1 and explain what it is.

15 A Exhibit 1 is a plat which shows the boundaries of the
16 proposed Seven Rivers-Queen Unit area. It also shows
17 within a two-mile radius the acreage surrounding the
18 unit area. The producing wells are shown within and
19 without the unit area. The State lands within the unit
20 area are cross-hatched in yellow on the plat and the
21 fee lands are in white. The plat also shows two bordering
22 secondary recovery projects, Conoco's South Unit, and
23 Marathon's South Unit.

24 MR. HINKLE: I might say, Mr. Examiner, that this
25 plat will be referred to by the next witness, who is an

1 engineer, with respect to the cross sections and the
2 injection wells which are shown.

3 Q (By Mr. Hinkle) Do you have any further comments with
4 respect to this exhibit?

5 A No, sir.

6 Q Does this also show the acreage ownership?

7 A Yes, sir, it does.

8 Q Refer to Exhibit 2 and explain what this is and what it
9 shows.

10 A Exhibit 2 is a letter from the Commissioner of Public
11 Lands, which states that the proposed Seven Rivers-Queen
12 Unit Agreement has been approved as to form and content.

13 Q Now, you are familiar with the proposed form of the unit
14 agreement which has been filed with the application in
15 this case, are you not?

16 A Yes, sir.

17 Q Is Atlantic Richfield designated as the operator?

18 A Yes, we are.

19 Q What formation is being unitized?

20 A The unitized formation, reading from Paragraph 2-J in the
21 unit agreement, being the bottom 100 feet of the Seven
22 Rivers and the entire Queen formations, same being that
23 heretofore established underground reservoir encountered
24 in the drilling by the Gulf Oil Corporation of its J. R.
25 Jalmat I Number 10 Well between the depths of 3,468 feet

1 as identified on Frontier's Isotron Log dated February
2 13, 1961, run in said well, which is located in the
3 southwest quarter of the northwest quarter of Section 2,
4 Township 23 South, Range 36 East, Lea County, New Mexico.

5 Q Is this form of unit agreement in substantially the same
6 form as unit agreements heretofore approved by the
7 Commission which cover State and fee lands?

8 A Yes, sir, it is.

9 Q There is nothing unusual about it in that respect?

10 A No, sir.

11 Q What is the primary purpose of the unit agreement?

12 A The purpose of the unit agreement is to institute a
13 waterflood project, conserve natural resources.

14 Q Now, I believe you stated that you had been in charge of
15 obtaining the execution of the unit agreement. What is
16 the present status of execution of the agreement?

17 A All of the working interest owners in the tracts and the
18 unit area have consented to the agreement, and 99 percent
19 of the royalty interest have consented thereto.

20 Q So it's just about ready to be filed and approved by the
21 Commissioner of Public Lands?

22 A Yes, sir.

23 MR. HINKLE: We'd like to offer in evidence Exhibits
24 1 and 2.

25 MR. UTZ: Without objection, Exhibits 1 and 2 will

1 be entered into the record of this case. Are there
2 questions of the witness?

3 (No response.)

4 CROSS-EXAMINATION

5 BY MR. UTZ:

6 Q As I understand the unitized area, it's the bottom 100
7 feet of the Seven Rivers?

8 A Yes, sir.

9 MR. UTZ: The witness may be excused.

10 JERRY TWEED,

11 a witness, having been first duly sworn according to law, upon
12 his oath, testified as follows:

13 DIRECT EXAMINATION

14 BY MR. HINKLE:

15 Q State your name, address, by whom you are employed.

16 A Jerry Tweed, Midland, Texas. I'm employed by Atlantic
17 Richfield Company.

18 Q What is your position with Atlantic Richfield?

19 A I'm Area Petroleum Engineer responsible for New Mexico.

20 Q Have you previously testified before the Commission or
21 one of its Hearing Examiners?

22 A Yes, I have.

23 Q And had your qualifications as a petroleum engineer made
24 a matter of record with the Commission?

25 A Yes, sir.

1 MR. HINKLE: Are the witness' qualifications
2 acceptable?

3 MR. UTZ: Yes, they are.

4 Q (By Mr. Hinkle) You are familiar with the applications
5 of Atlantic Richfield in this case?

6 A Yes, I am.

7 Q What is Atlantic Richfield seeking to accomplish by
8 Application 5017?

9 A We are asking approval to convert 28 wells to injection
10 to initiate a waterflood project in the area that we call
11 the Seven Rivers-Queen Unit.

12 Q Now, have you prepared, or has there been prepared under
13 your supervision, certain exhibits for introduction in
14 this case which have been marked as Exhibits 3 through 8?

15 A Yes, there have.

16 Q Let us go first to Exhibit 1 and explain what this shows
17 with respect to the injection wells.

18 A The red triangles on Exhibit 1 are the proposed injection
19 wells for this project. If you will note, Conoco's
20 South Unit, which offsets us to the north and west, the
21 triangles shown are their current injection wells. With
22 the initiation of our project, both Conoco and Marathon,
23 to the east, will convert offsetting injection wells.
24 This pattern is an 80-acre 5-spot pattern. There would
25 be a continuous pattern across all three units.

1 Q And you've had the cooperation of Conoco and Marathon
2 in the South Eunice Unit?

3 A Yes, we have.

4 Q Have you had any objections from any offset owners or
5 anyone?

6 A No, we have not. I might add, that shown in yellow on
7 here is the State acreage. The yellow acreage is the
8 Langly Matrix Pool. The rest of the acreage to the
9 north, the white acreage, is in the South Eunice Pool.
10 The vertical limits for both pools are identical, they
11 are the bottom 100 feet of the Seven Rivers and to the
12 base of the Queen formation; and this is the unitized
13 interval for our project. They are on the same large
14 anticlinal structure and they were named separate pools
15 some years ago, before drilling showed both pools to be
16 continuous and to connect.

17 Q Now, does Exhibit 1 indicate the cross sections which you
18 will refer to in subsequent exhibits?

19 A Yes, A-A', shown in the green, is the east-west cross
20 section; and B-B' is the north to south cross section
21 which will be referred to.

22 Q Now, refer to Exhibit 3 and explain what this shows.

23 A Exhibit 3 is a structure map of the area. This structure
24 is a large anticlinal north-south trending anticlinal
25 structure. In the vicinity of the unit, there is a

1 terracing effect in the vicinity of the unit, and we
2 are on approximately the west side of this large
3 anticlinal structure. There is not a lot of structural
4 relief in the unit boundary.

5 Q Now, refer to Exhibit 4 and explain this.

6 A Exhibit 4 is a west to east cross section which was
7 labeled A-A' on Exhibit 1. In the green and yellow-
8 colored sand stringers are the Seven Rivers formation.
9 The red is the Queen. We plan to flood all three of the
10 intervals where they are below the gas-oil contact.
11 The gas-oil contact is approximately a minus 150 feet,
12 and where they are below this interval, they will be
13 opened and flooded.

14 Q Does this show the continuity of these formations over
15 the entire area?

16 A Yes, it shows the sands to be quite continuous over this
17 area.

18 Q Now, refer to Exhibit 5, please.

19 A Exhibit 5 is a north-south cross section. Again, the
20 Seven Rivers sands are colored green and yellow, and then
21 the Queen sand is colored red. This also shows the sand
22 stringers to be continuous over the unitized interval.

23 Q Now, refer to Exhibit 6-A, which is a composite exhibit
24 of several diagrammatic sketches of the injection wells,
25 and explain this.

1 A Exhibits 6-A through 6-AB, which are 28 of these, are
2 the diagramatic sketches for the injection wells. They
3 show the injection well number, the current well number,
4 the proposed unit number, the casing sizes, the amount of
5 cement, the top of the cement on the casing, proposed
6 perforations, where we intend to set the packer, and
7 total depth. These break into about three categories.
8 We intend to inject below packer into the producing
9 horizons. In most cases, we will be injecting -- like
10 6-A, we will be injecting through perforations below a
11 packer. There are a few cases where we will be injecting
12 into both perforations and an openhole interval, such as
13 in 6-G. We will have a packer set above the perforations;
14 we will inject into both perforated intervals and an
15 openhole interval in the wellbore.

16 There are, I believe, two cases where there will be
17 squeezed perforations above the packer and we will inject
18 into open perforations below the packer, such as in
19 Exhibit 6-I. The perforations shown squeezed here are
20 above the gas-oil contact, and it will be necessary to
21 squeeze them off to prevent channeling of water through
22 the gas horizon.

23 Q In your opinion, by the completion of the injection wells
24 in the manners which are portrayed by these diagramatic
25 sketches, will it confine injection of water to the three

1 formations that you have indicated would be waterflooded?

2 A Yes, it will. We plan to have an inert non-productive
3 fluid in the annulus of each injection well, and the
4 pressure gauge set at the surface.

5 Q Would you have plastic-coated tubing?

6 A Either plastic-coated or cement-lined tubing in the
7 injection well.

8 Q Any further comment with respect to diagramatic sketches?

9 A No.

10 Q Now, referring to Exhibit 7, explain what this shows.

11 A Exhibit Number 7 is a decline curve of the unitized area.
12 It shows essentially a common solution gas-type depletion
13 mechanism for the area. You will note the gas-oil ratio
14 has increased somewhat over the years with the harmonic-
15 type decline. At the current time, there have been 56
16 wells drilled within the unit boundaries to the Seven
17 Rivers-Queen formations. There are currently 39
18 productive and they are averaging approximately 86 barrels
19 a day from the 39 wells or slightly over 2 barrels a day
20 per well. They are near depletion. They have recovered
21 some 2.9 million barrels of oil and have remaining about
22 60,000 barrels of primary oil. We anticipate that the
23 flood will recover an additional 2.8 million barrels of
24 oil over a 12-year period.

25 Q Now, refer to Exhibit 8 and explain what this shows.

1 A Exhibit 8 is simply how we propose to renumber the
2 unitized wells. The proposed unit numbering system is
3 on Exhibit 8.

4 Q The injection wells are shown the same as those on
5 Exhibit 1, this just shows the manner in which they will
6 be renumbered?

7 A Right.

8 Q Now, are you asking for a project allowable?

9 A Yes, we are. We are asking that the Commission allow us
10 a project allowable for the unit.

11 Q As provided for in Rule 701 of the Commission?

12 A Yes.

13 Q Have you also requested that if these applications are
14 approved, that you be granted administrative approval to
15 make any changes which might be necessary in the location
16 of the injection wells?

17 A Yes, we have. We ask that this be included. We don't
18 anticipate at this time any changes; but some could arise.

19 Q In your opinion, if these applications are approved, will
20 it be in the interest of conservation and prevention of
21 waste?

22 A Yes, it will.

23 Q And it will also protect the correlative rights of others?

24 A Yes, it will.

25 MR. HINKLE: We would like to offer Exhibits 3

1 through 8.

2 A I have one other comment. Referring back to Exhibit
3 Number 1, within the unitized area there are also
4 numerous gas wells that are completed in the Jalmat
5 gas horizon. The Jalmat consisting of the Yates and
6 all but the bottom 100 feet of the Seven Rivers formation.
7 These are not being unitized and none of the gas wells
8 penetrate the unitized interval. They are all producers
9 above the unitized interval.

10 Q Do you have any further comments on these exhibits?

11 A No.

12 MR. HINKLE: I would like to offer Exhibits 3 through
13 8 into evidence.

14 MR. UTZ: Without objection, Exhibits 3 through 8
15 will be entered into the record of this case.

16 MR. HINKLE: That is all I have on Direct
17 Examination.

18 CROSS-EXAMINATION

19 BY MR. UTZ:

20 Q Mr. Tweed, the heading on all parts of Exhibit 6 show a
21 description of the wells and the well name as far as the
22 old name, the new name, and the old name. Now, do you
23 want to use the new name when we write the order on this?

24 A Yes, sir.

25 Q And all these headings show the proper locations?

- 1 A Right.
- 2 Q Now, I had some question in regard to your cross sections
- 3 where you show the gas-oil contact at a minus 150.
- 4 A Yes, sir.
- 5 Q The green-colored zone is what zone?
- 6 A The green and the yellow are sands in the Seven Rivers
- 7 formation.
- 8 Q And all those will be unitized?
- 9 A Yes, sir.
- 10 Q Well, now, what are the wells above the 150 foot level
- 11 from the Arco C. Jones Number 5 East? Are they gas wells
- 12 or oil wells?
- 13 A The wells east are oil wells; they are all oil wells,
- 14 generally.
- 15 Q Why are they above the gas-oil contact, then?
- 16 A The Seven Rivers in this area is above the gas-oil
- 17 contact. The wells are completed below the gas-oil
- 18 contact in the Queen formation. There is portions of the
- 19 pool or portions of the unitized area where the --
- 20 about 100 feet of Seven Rivers is above the gas-oil
- 21 contact.
- 22 Q No gas wells are completed in that zone?
- 23 A Not generally. There are a few wells completed up
- 24 there that make high gas-oil ratios; none of them are
- 25 classified as gas wells. But some people open the entire

1 section, the Queen and the Upper Seven Rivers.

2 Q Well, let's take the R. Jones Number 5 as an example.

3 Is that completed in either the green or yellow zone or
4 Seven Rivers?

5 A No, sir.

6 Q Well, you listed it as an injection well?

7 A Yes.

8 Q Where are you going to inject there?

9 A We are going to inject below the gas-oil contact in the
10 Queen.

11 Q Then, I misunderstood your unitized area. I thought it
12 was only the lower 100 feet of the Seven Rivers.

13 A It's Seven Rivers and Queen.

14 Q It's Seven Rivers and Queen?

15 A Yes, it's the lower 100 feet of the Seven Rivers to the
16 base of the Queen. This is the vertical limits of both
17 the South Eunice Pool and the Langly Matrix Pool that are
18 being unitized. It corresponds with the vertical limits.

19 Q Then, to make a flat statement, you will not inject any
20 water above the 150 foot level, above the gas-oil contact?

21 A I couldn't say for sure that we won't. The gas-oil
22 contact is not a definitive contact; it's a gradational
23 area. We have made efforts, where possible, to inject
24 below the gas-oil contact at all times; and there may be
25 a few wells that might get us at minus 135 or 140. For

1 instance, I believe there are a few wells that get above
2 a minus 150, to a degree.

3 For instance, if you will look at the cross section,
4 the C. Jones Number 5 and the C. Jones Number 8, it
5 might be advantageous, since the C. Jones -- if the C.
6 Jones Number -- I don't remember which of these is an
7 injection well right offhand, but if the Number 8 were an
8 injection well --

9 Q You show that as an injection well.

10 A It might be advantageous to inject above the gas-oil
11 contact in this well to drive oil to the Number 5 Well
12 which has the same zone below the gas-oil contact.

13 Q Okay. Now, in order to describe your injection zones as
14 simply as possible, can we say that all 28 wells will
15 have water injected below a packer and through perforations
16 or openholes in the Seven Rivers or Queen?

17 A That is true.

18 MR. UTZ: Are there other questions of the witness?

19 MR. HINKLE: I might ask him one other question.

20 REDIRECT EXAMINATION

21 BY MR. HINKLE:

22 Q Is it the intention of Atlantic Richfield to put all of
23 these injection wells on at the same time, approximately
24 the same time?

25 A Yes, it is.

dearnley, meier & mc cormick

209 SIMMS BLDG. • P.O. BOX 1092 • PHONE 243-6691 • ALBUQUERQUE, NEW MEXICO 87103
1216 FIRST NATIONAL BANK BLDG. EAST • ALBUQUERQUE, NEW MEXICO 87108

- 1 Q So the whole waterflood would start at the same time?
- 2 A Right.
- 3 Q Where are you going to obtain your water?
- 4 A We plan to obtain our water from Continental Oil Company's
- 5 Dan Singer Water Supply System. Their water supply
- 6 well is located in Unit D of Section 7, 23 South, Range
- 7 36 East.
- 8 Q Is that fresh water?
- 9 A Well, it has a chloride content of 25,600 parts per
- 10 million.
- 11 Q Would you also reinject produced water?
- 12 A Yes, sir, we would reinject any produced water, if it
- 13 becomes available.
- 14 Q What would be your initial volume of injection?
- 15 A We would initially inject approximately 8,000 barrels of
- 16 water per day at a maximum pressure of 2,000 pounds.
- 17 Q What is your estimate of the time before you will get
- 18 response that would be effective?
- 19 A We estimate that we will start receiving response within
- 20 9 to 12 months of the starting of the injection.
- 21 MR. HINKLE: Thank you.
- 22 MR. UTZ: Are there other questions of the witness?
- 23 (No response.)
- 24 MR. UTZ: The witness may be excused. Are there
- 25 statements in the case?

(No response.)

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

The hearing is adjourned.

R E P O R T E R ' S C E R T I F I C A T E

I, JOHN DE LA ROSA, a Court Reporter, 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.

I hereby certify that the foregoing is a complete record of the proceedings before the Examiner hearing of Case No. 5016 heard by me on June 27, 1973.

John De La Rosa
COURT REPORTER

WITNESS

I N D E X

PAGE

JAMES D. JOHNSON

Direct Examination by Mr. Hinkle

4

Cross-Examination by Mr. Utz

8

JERRY TWEED

Direct Examination by Mr. Hinkle

8

Cross-Examination by Mr. Utz

15

Redirect Examination by Mr. Hinkle

18

E X H I B I T S

OFFERED

ADMITTED

Exhibits 1 and 2

7

7 & 8

Exhibits 3 through 8

14 & 15

15

dearnley, meier & mc cormick