

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

14 September 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Murphy Operating Corp-
oration for a unit agreement, Chaves
and Roosevelt Counties, New Mexico,
and
Application of Murphy Operating Corp-
oration for a waterflood project,
Chaves and Roosevelt Counties, New
Mexico.

CASE
9477

9478

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division:

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1 MR. CATANACH: Call the next
2 case, 9477.

3 MR. STOVALL: Application of
4 Murphy Operating Corporation for a unit agreement, Chaves
5 and Roosevelt Counties, New Mexico.

6 MR. CATANACH: Are there ap-
7 pearances in this case?

8 MR. EZZELL: Yes, sir, Calder
9 Ezzell with the Hinkle Law Firm, representing the appli-
10 cant.

11 I would move that we consoli-
12 date Cases 9477 and 9478.

13 MR. CATANACH: At this time
14 we'll call Case 9478.

15 MR. STOVALL: Application of
16 Murphy Operating Corporation for a waterflood project,
17 Chaves and Roosevelt Counties, New Mexico.

18 MR. CATANACH: Are there any
19 other appearances in these cases?

20 MR. EZZELL: I have two
21 witnesses to swear.

22 MR. CATANACH: Okay. Will
23 the witnesses please stand and be sworn in?
24

25 (Witnesses sworn.)

1 ANN MURPHY EZZELL,
2 being called as a witness and being duly sworn upon her
3 oath, testified as follows, to-wit:

4
5 DIRECT EXAMINATION

6 BY MR. EZZELL:

7 Q Will you state your name and place of
8 residence, please?

9 A Ann Murphy Ezzell, Roswell, New Mexico.

10 Q Who is your employer and what is your
11 occupation?

12 A My employer is Murphy Operating Corpor-
13 ation. I'm the Chairman and Chief Executive Officer. I
14 act as the Corporate Attorney and Petroleum Engineer.

15 Q And have you previously testified be-
16 fore the Commission and have your qualifications as an ex-
17 pert in the field of law and petroleum engineering been
18 accepted as a matter of record?

19 A Yes, they have.

20 Q Are you familiar with Murphy Operating
21 Corporation's applications in the consolidated cases 9477
22 and 9478?

23 A Yes, I am.

24 Q What does Murphy seek by these applica-
25 tions?

1 A We seek approval of our Haley Chaveroo
2 San Andres Unit and authority to institute a waterflood
3 project in that project.

4 Q How did you become familiar with the
5 facts concerning these applications?

6 A I personally prepared or supervised the
7 preparation of the exhibits that were previously submitted
8 to the OCD in connection with this hearing.

9 MR. EZZELL: Mr. Chairman,
10 are the witness' qualifications acceptable?

11 MR. CATANACH: They are.

12 MR. EZZELL: Mr. Chairman,
13 the applications in these cases were filed in triplicate
14 with the OCD along with four copies of all supplemental
15 data. All of this data, as you know, is contained in
16 Files 1 through Four, which were submitted to the
17 Division.

18 In order to facilitate loca-
19 ting specific exhibits from which testimony will be given,
20 we propose to introduce Files 1 through 4 as Exhibits One
21 through Four. Then during testimony we will refer to the
22 exhibit and divider number in reference to the specific
23 exhibit from which testimony is being given.

24 Q Mrs. Ezzell, I direct your attention to
25 Applicant's Exhibit Number One, which is the black file

1 folder number one, specifically referring you to One-A and
2 One-E and ask you to identify them.

3 A Exhibit One-A is a map of the unit
4 area, the proposed unit area, that delineates the unit
5 outline and also provides tract numbers. All of the
6 leases are state lands. There are four leases, and the
7 unit area as proposed consists of 1840 acres.

8 Q Okay, and what is Exhibit One-E?

9 A Exhibit One-E is a map of the vicinity
10 of the unit area. It delineates in a black outline the
11 unit boundary; in a yellow outline a 2-mile perimeter
12 around the unit boundary, and the area of review wells are
13 delineated by a red circle, a half mile radius around each
14 proposed injector.

15 Q Okay, what is the proposed unit area
16 initially developed?

17 A The initial well in this field was
18 drilled over 20 years ago and all the wells are about that
19 same vintage.

20 Q Okay, what is the current status of
21 production from the wells located in your proposed unit?

22 A The production at this time is margin-
23 ally economical.

24 Q Would you consider that the wells that
25 are still producing within your proposed unit would pro-

1 perly be classified as stripper wells?

2 A Yes, I would.

3 Q What are the unitized formations for
4 your proposed unit?

5 A If I may paraphrase from the unit
6 agreement, it is that subsurface portion of the unit area
7 known as the San Andres formation, with a vertical limit
8 the interval 4158 to 4470 as measured on the compensated
9 formation density log in the Murphy Operating Corporation
10 (unclear) Well No. 15, which was drilled March 23rd, 1966,
11 and it's located 990 feet from the south line and 1980
12 feet from the east line of Section 34, Township 7 South,
13 Range 33 East.

14 Q Okay, I now refer you to Exhibit One-B
15 and ask you to identify that.

16 A Exhibit One-B is a schedule of owner-
17 ship and unit participation factors. The exhibit lists by
18 tract number, the lease name, and the description of the
19 lease; of course the serial number and lease date, the
20 lessee of record, the basic royalty and the percentage
21 which in all cases is the State of New Mexico 12-1/2 per-
22 cent.

23 An additional column for the overriding
24 royalty owners and there are no overriding royalty owners,
25 and then the working interest owners and their respective

1 working interest percentages together with the unit par-
2 ticipation factors allocated to each tract.

3 Q How were you able to determine who were
4 the working interest owners and the royalty owners in the
5 proposed unit area?

6 A By title examinations based on ab-
7 stracts and physical examination of the records in the
8 county and also the State Land Office records, all of
9 which was done by title examiners from the Hinkle Law
10 Firm.

11 Q I now refer you to Exhibits One-C and
12 One-D, and ask you to identify them.

13 A Exhibit One-C is the unit agreement for
14 the Haley Chaveroo San Andres Unit.

15 Exhibit One-D is the unit operating
16 agreement for said unit.

17 Q Are you familiar with the provisions of
18 these agreements?

19 A Yes, I am.

20 Q Who is designated as unit operator?

21 A Murphy Operating Corporation.

22 Q How many working interest owners own an
23 interest in the proposed unit?

24 A There are two working interest owners,
25 Murphy Operating Corporation and American Energy Capital

1 Corporation.

2 Q And how many of the working interest
3 owners have executed the unit agreement and unit operating
4 agreement?

5 A These agreements have been executed by
6 100 percent of the parties, both parties.

7 Q Okay, so there was voluntary joinder in
8 the unit by 100 percent of the working interest owners?

9 A That's correct.

10 Q The unit is comprised of 100 percent
11 State of New Mexico oil and gas leases and there are no
12 overriding royalty interests?

13 A Yes.

14 Q Are there any owners of record of any
15 of the leases within the proposed unit who are not a party
16 to your unit agreement or unit operating agreement?

17 A Yes. Sun Operating, a limited partner-
18 ship is a lessee of record.

19 Q Okay, a lessee of record in what has
20 been identified as Tract 3 on the maps, although they own
21 no rights, or no operating rights in the unitized
22 interval, is that correct?

23 A That's correct.

24 Q Have they ratified the unit?

25 A Yes, they have.

1 Q I hand you what is marked as Exhibit
2 Five, which is a cover letter from you with a copy of the
3 ratification attached. That is a ratification sent to you
4 by Sun?

5 A That's correct.

6 Q And that was forwarded by you to the
7 State Land Office and the Oil Conservation Division?

8 A Yes. Three originals of this document
9 were provided to each office.

10 Q Okay. Does the unit agreement use a
11 formula for the allocation of unit production and costs to
12 the various tracts?

13 A Yes, it does.

14 Q What is that formula?

15 A The formula is based upon 80 percent of
16 primary production to be through January 1, 1988. In ad-
17 dition there is a 20 percent factor for usable wells with-
18 in the unit area.

19 Q Okay. Do you feel that this formula
20 represents a fair and equitable division of production
21 among the royalty owners and working interest owners?

22 A I do.

23 Q Has this formula been accepted by all
24 of the working interest owners?

25 A It has.

1 Q Does your unit agreement further con-
2 tain provisions for operations, voting procedures, remov-
3 al of operator, which have been agreed upon by all the the
4 owners?

5 A It does.

6 Q Does the unit agreement and unit oper-
7 ating agreement contain a system for credits and charges
8 for existing equipment?

9 A Yes, it does.

10 Q Do you feel that system is fair and
11 equitable?

12 A I do.

13 Q Do you have a proposed unit well num-
14 bering system for your unit?

15 A Yes, we have provided in the documen-
16 tation a redesignation of well numbers consistent with
17 guidelines provided to us by the State Land Office, where-
18 by a well name is changed to coincide with the section
19 number, being the first number, and then a unit number for
20 the location of a well consistent with the A through P
21 designations.

22 Q So Units A through P would be given
23 corresponding numbers 1 through 16.

24 A That's correct.

25 Q Has the State Land Office designated

1 your proposed unit as a logical unit for secondary re-
2 covery and have they given preliminary approval to your
3 unit and the unit agreement and operating agreements?

4 A Yes, they have.

5 Q I hand you what has been marked as
6 Exhibit Six and ask you to identify that.

7 A This letter was prepared on August
8 29th, 1988, and grants preliminary approval by the State
9 Land Office. It is signed by Floyd (unclear) as Director
10 on behalf of W. R. Humphries, Commissioner of Public
11 Lands.

12 Q This preliminary approval, is it condi-
13 tioned on any occurrence?

14 A Yes. There were three requirements.
15 Two have to date been fulfilled.

16 They asked for copies of the Exhibit B,
17 setting out the tract participation; also a ratification
18 from the lessee of record and working interest owners.

19 These items have been complied with and
20 the final pending item is the order of the New Mexico Oil
21 Conservation Division, and that approval awaits the out-
22 come of this hearing.

23 Q Okay. To whom was notice of your ap-
24 plication furnished?

25 A Notice was given to offset operators

1 within one-half mile of the unit boundary, in addition to
2 also the surface owner of lands that any proposed injector
3 is located, and all of the surface is owned by the State
4 of New Mexico.

5 Q Okay. I have given you what has been
6 marked Exhibit Seven, the first page of which is a list of
7 all the owners whom you've identified as being offset
8 operators within one-half mile of the unit boundary and
9 the State Land Office for the state lands.

10 Have all of these individuals received
11 the required notice?

12 A Yes, they have.

13 Q How was that notice sent to them?

14 A It was sent certified, return receipt
15 requested and we received in a timely manner the return
16 receipt.

17 Q In each and every case was the notice
18 received by the person to whom it was addressed at least
19 20 days prior to this hearing?

20 A Yes.

21 Q And the second page to Exhibit Seven
22 shows the xeroxed copies, second and third page, shows the
23 xeroxed copies of each of those return receipts showing
24 the timely delivery of the notice.

25 A Yes, it does.

1 Q Mrs. Ezzell, in your opinion will the
2 approval of the application in these cases promote the
3 conservation of oil or gas and the better utilization of
4 reservoir energy?

5 A It's my opinion that it would.

6 Q In your opinion would the proposed unit
7 agreement and unit operating agreement be in all respects
8 for the best interest of the state and will the state and
9 each beneficiary of the lands involved receive its fair
10 share of the recoverable oil or gas in place under the
11 land affected?

12 A It will.

13 Q In your opinion is unitized management
14 necessary to conduct a secondary recovery operation?

15 A Yes.

16 Q Does your proposed plan have a reason-
17 able expectation of increasing recoveries from the field?

18 A It does.

19 Q Would the granting of these applica-
20 tions be in the interest of conservation and the protec-
21 tion (sic) of waste, and the protection of the correlative
22 rights of all parties involved?

23 A Yes.

24 Q Was Exhibit One, parts A through E,
25 prepared by you or under your direct supervision?

1 A They were.

2 Q Were Exhibits Five, Six and Seven
3 either prepared by you or received by you through the U.
4 S. Mail?

5 A Yes.

6 MR. EZZELL: Mr. Chairman, I
7 now offer Exhibits One, parts A through E, inclusive, and
8 Exhibits Five, Six and Seven into evidence, and have no
9 further questions of this witness.

10 MR. CATANACH: Exhibit One,
11 parts A through E, and Exhibits Five through Seven will be
12 admitted as evidence.

13 MR. EZZELL: Call Mr. Bert
14 Murphy.

15
16 BERT MURPHY,
17 being called as a witness and being duly sworn upon his
18 oath, testified as follows, to-wit:

19
20 DIRECT EXAMINATION

21 BY MR. EZZELL:

22 Q Would you state your name, residence,
23 and occupation, please?

24 A I'm Bertram H. Murphy, Roswell, New
25 Mexico. I'm an independent oil producer and a Registered

1 Professional Engineer, petroleum, in Texas and New Mexico.

2 Q Have you testified previously before
3 this Commission on unitization and waterflood matters and
4 had your qualifications as an expert engineer and geolo-
5 gist accepted as a matter of record?

6 A Yes, and I have also been accepted as
7 an expert in hydrology and groundwater by the State En-
8 gineer.

9 Q Are you familiar with the San Andres
10 formation and the area in Roosevelt and Chaves Counties
11 that is the subject matter of these applications?

12 A Yes.

13 Q What does Murphy Operating Corporation
14 seek by its applications today?

15 A Unitization and approval of the water-
16 flood, the proposed Haley San Andres Unit.

17 Q How did you become familiar with the
18 specifics of the proposed unit?

19 A I am an officer and chief engineer for
20 the applicant, Murphy Operating Corporation, and have ex-
21 perience in San Andres waterfloods as a consultant for a
22 third parties as well as for my own account.

23 MR. EZZELL: Mr. Chairman,
24 are the witness' qualifications as an expert in the fields
25 of petroleum engineering and geology acceptable?

1 MR. CATANACH: They are.

2 Q Mr. Murphy, I refer you to Exhibit
3 Four, which is the black file number -- marked Number 4,
4 which also contains the exhibit -- the map you see on the
5 right on the wall.

6 Would you identify those exhibits?
7 I'll get out of your way if you need to talk from them.

8 A This is a field map that also shows the
9 plan of operation for the proposed unit.

10 We have outlined in yellow the proposed
11 unit. We have circles, half circles around the ultimate
12 total number of injection wells. We have the status of
13 the existing wells to the -- to the legend here on the --
14 on the thing.

15 Our intention is to commence immediate-
16 ly with gravity into these four wells which are -- well,
17 they're not marked on there, but the 34-6, 34-14, 33-8 and
18 33-16.

19 33-16 is currently a salt water dispo-
20 sal well. As soon as the plant is built, which we antici-
21 pate will take 60 to 90 days, we'll then convert these
22 three wells to injection and have a double 5-spot pattern
23 with inside producers and with the pattern affecting out-
24 side peripheral wells.

25 Q Okay. Mr. Murphy, could you briefly

1 describe the history of the Chaveroo Field in general and
2 the proposed unit area specifically?

3 A The Chaveroo Field was discovered in
4 March of '65 with the Champlin Petroleum and Warren Amer-
5 ican No. 1 Hondo State.

6 The field has 425 wells with cumulative
7 production to January 1, 1988, of a little -- of almost
8 23-million barrels of oil; almost 34-million MCF of gas;
9 and approximately 27-million barrels of water.

10 The field produces from the San Andres
11 formation in the porous intervals of 1, 2 and 3 on the
12 P-log, which we'll get to in a minute. Specifically the
13 proposed Haley Chaveroo San Andres Unit has 44 wells, two
14 of which have been permanently plugged and abandoned.
15 These wells have produced over 3-million barrels, approxi-
16 mately 3,075,000 barrels of oil to January 1st, 1988. The
17 average for the unit area is just over 73,000 barrels per
18 well, while the field average for the entire Chaveroo
19 Field was approximately 54,000 barrels a well.

20 Q So the wells in your proposed unit on
21 an average have a -- they are a slightly better recovery
22 rate than the average well in the field?

23 A In my judgement they are superior, the
24 superior area in the field.

25 Q Have all of the wells in your proposed

1 unit area reached an advanced stage of depletion so that
2 they could properly be classified as stripper wells?

3 A They have.

4 Q Have you done any work or an estimate on
5 remaining underground reserves in the unit area?

6 A We have. We have graphed and studied
7 the decline curves on all the wells in the -- in the area
8 of review.

9 Q In your expert opinion has the primary
10 production decreased to a point where the field is at or
11 reaching its economic limit?

12 A It is.

13 Q You say you calculated remaining primary
14 by the decline curve method on the existing wells?

15 A That's correct.

16 Q Do you have an estimate of potential for
17 secondary reserves?

18 A We do from analogy to other San Andres
19 waterfloods in the Northwest Shelf Area, which starts in
20 the (not clearly understood) land area in Texas and goes
21 clear to the Cado and beyond in the -- in New Mexico.
22 There are many San Andres waterfloods in this area and
23 we've made a detailed study of those floods and found that
24 by analogy you can expect approximately one barrel recovery
25 for each barrel of primary recovery. So we would estimate

1 the potential of the secondary in this unit to be something
2 in excess of 3-million barrels.

3 Q Mr. Murphy, I refer you now to the File
4 numbered Exhibit Number Three. I'd ask you to briefly ex-
5 plain its contents and would encourage the Examiner to in-
6 terrupt with any questions they have as we go through.

7 A Attachment A is an engineering and geo-
8 logic report prepared by me August 1st, 1988.

9 It briefs the history and reservoir and
10 performance characteristics of the San Andres regional
11 area, regional geology, stratigraphy, porous zones, struc-
12 tural influences, and reservoir characteristics, and it has
13 a section on the Chaveroo Field stating when the field was
14 discovered and giving the performance and reservoir and
15 geologic characteristics of the field.

16 It also has a section on propose Haley
17 San Andres Unit and does the same same thing; in summary, a
18 review of the technical data and proposed operational plans
19 indicate that the unit is similar or superior to the rest
20 of the Chaveroo San Andres Field and is typical or superior
21 to numerous other San Andres fields in the Northwest San
22 Andres Trend that have been waterflooded successfully. The
23 proposed operational plan appears to be sound. Unitization
24 and waterflooding of the unit should protect correlative
25 rights, promote conservation and prove beneficial for the

1 interest owners and the county, state and federal --
2 county, state and federal treasuries.

3 The -- on the right side are the exhi-
4 bits supporting this report.

5 Exhibit Roman Numeral VIII-A is a loca-
6 tion map showing the location of the Chaveroo Field on the
7 common line between Chaves and Roosevelt County.

8 Roman Numeral VIII-B is a copy of the
9 Roswell Geologic Society Symposium with their attached
10 structure map, isopach map, and a type log. This report
11 was prepared by them in 1966 over a year after the discov-
12 ery of the field.

13 Our studies from data developed since
14 that time indicate that their conclusions were generally
15 average and correct in their discussions with regard to the
16 pay zone, the type of trap, reservoir data, completion
17 methods, the horizontal -- deepest horizons penetrated, and
18 the production from the field.

19 Exhibit Roman Numeral VIII-C is a tabu-
20 lation and summary of geologic data for wells within the
21 proposed unit area. It here shows the operator and lease
22 as --

23 Q Excuse me, you need to be on VIII-C, the
24 core data?

25 A Oh, core data, yes, sorry. VIII-C, we

1 had -- we were able to find core data on one well in the
2 unit and on two wells in the area of review. We've in-
3 cluded that data, which further supports the reservoir
4 information given by the Roswell Geologic Society.

5 Q Okay.

6 A All right, now VIII-D?

7 Q Right.

8 A VIII-D is a tabular summary of geologic
9 data for wells within the proposed unit area. It shows the
10 operator and lease as they were carried prior to our re-
11 designation of the wells. It shows the original well and
12 unit and then the redesignated well number, the elevations
13 for both ground and Kelly bushing and the tops of the P-1,
14 P-2 and the thickness of the P-1 to the P-3.

15 Q Okay, at this time we have some addi-
16 tional data supplementing that was requested by the Oil
17 Conservation Division. I have marked that as Exhibit
18 Eight. Would you briefly explain what this supplemental
19 data shows?

20 A This information gives in more detail
21 the well information in the proposed Haley Unit area. It
22 gives the unit under the new designation, the current well
23 status, the proposed well status, the casing record,
24 drilling date and completion date, TD, perforations, and
25 completion.

1 Q And it shows (unclear) casing program,
2 cement tops --

3 A That's correct. It shows the -- for
4 both the surface pipe and the long string.

5 It also gives that information for the
6 area of review.

7 Q So between this Exhibit VIII and Exhibit
8 Three, Roman Numeral VIII-D, we have a tabulated summary
9 for all wells both within the unit and outside the unit but
10 within the area of review?

11 A That's correct.

12 Q Okay. I now refer you to Exhibit VIII-E
13 and ask you to identify that. It is on the wall right here
14 behind me.

15 A Exhibit VIII-E, or attachment VIII-E to
16 Exhibit Three, is a structure map of the San Andres on a
17 correlation point picked above the first porosity. It also
18 has a marker well, or a type well, that shows a electric
19 log -- electric log showing the first, second and third
20 sub-sections of porosity in the San Andres formation.

21 Here we have a structure map prepared by
22 us which is in addition to the map prepared by the Roswell
23 Geologic Society but which conforms very closely with it.

24 It shows the influence of structure,
25 local structure, on reserve accumulation and the perfor-

1 mance of the unit area and area of review.

2 Q You've identified as your unit interval
3 in the marker well between the depths of 4158 and 4470.
4 How was that interval identified?

5 A It was identified by a field study that
6 indicated that in the Chaveroo Field there's production
7 from all three of those porosity zones.

8 Q Known as the P-1, P-2 and P-3?

9 A P-3, yes.

10 Q Okay. What are Exhibits Three F and G,
11 which are right here?

12 A These exhibits are an east/west cross
13 section --

14 Q F is your isopach.

15 A Okay. Three, Roman Numeral VIII-F, is
16 an isopach map. This information is a net -- is a net pay
17 map or net porosity map based on net porosity of greater
18 than 4 percent in the first and second porosity intervals.

19 The major producer of oil in here is the
20 second porosity interval with some production from the
21 first and a very small amount of production possibly from
22 the third.

23 This map is -- conforms with the Roswell
24 Geologic Society's work as previously submitted.

25 We looked at a gross pay map and found

1 from the study that was done our geologic section, that was
2 insufficient difference in the gross pay to make a gross
3 isopach map significant.

4 This is a north/south cross section
5 through Section 34 and Section 3 in the unit and it demon-
6 strates the continuity of producing intervals in the poro-
7 sity intervals across the unit area, demonstrating that the
8 injection of water should move oil from the injection wells
9 to the producing wells.

10 The other cross section is a similar
11 cross section that goes east and west across the Sections
12 33 and 34 and we won't hold that up unless you gentlemen
13 just want us to for some purpose.

14 MR. CATANACH: I don't think
15 that will be necessary.

16 Q Mr. Murphy, the structure map that we've
17 looked at along with the porosity isopach, combined with
18 your cross sections indicating the presence of the unitized
19 interval, in your opinion does -- does this indicate that
20 these -- the data we have looked at indicate that the uni-
21 tized formation has a continuity over the unitized area and
22 is essentially uniform throughout your entire unitized
23 area?

24 A Yes, essentially uniform. It's very
25 typical of the successful San Andres waterfloods in the

1 Northwestern Shelf Area. There's not -- in the San Andres
2 you never have complete -- complete uniformity of -- across
3 the various wells but you have sufficient that it's -- that
4 they waterflood successfully.

5 Q Okay. I direct you back now to the file
6 folder, I believe we're at Three, Roman Numeral VIII-H now?

7 A Yes, that's correct.

8 Q Referring you to Three, VIII-H, are you
9 familiar with the formula for allotting of the tract parti-
10 cipation factors?

11 A Yes, I am. I developed the tract parti-
12 cipation factors based on the cumulative oil recovery to 1
13 January 1988, and based on 80 percent of the formula and 20
14 percent of the formula being usable wells.

15 We also looked at a number of other
16 types of formulas and found insignificant differences in
17 the tract participation and feel that this is the most fair
18 and optimum formula for this unit.

19 Q And your reserves studies have indicated
20 that any additional production on primary is minimal and
21 therefor would not affect the fairness of the formula used?

22 A Yes, it's less than, probably, half of
23 one percent of what's been produced in there.

24 Q And Exhibit Three, Roman Numeral VIII-H,
25 shows the effect of the tract participation formula on each

1 tract in the -- in the proposed unit?

2 A That's correct.

3 Q Okay. And it also shows initial pri-
4 mary to date, to 1-1-88, for each of the -- each of the
5 wells and each of the tracts.

6 A And shows usable wells.

7 Q Okay, and that is the formula that was
8 approved by 100 percent of the working interest owners?

9 A That is correct.

10 Q Okay, I now refer you to Exhibit Three,
11 Roman Numeral VIII-I, A and B, your decline curves, I be-
12 lieve.

13 A Yes, These are the decline curves for
14 the area of review wells and they support the -- the unit
15 formula.

16 Q And these were also the primary data and
17 the decline curves from which you did your reserve calcula-
18 tions?

19 A Yes. These are the curves that I looked
20 at to be sure that we didn't have anything significant in
21 the way of remaining primary, or what have you, that had
22 been put into the consideration of the unit formula.

23 Q Mr. Murphy, (not understood) how would
24 the proposed waterflood be initiated? Again I might refer
25 you to Exhibit Four, your plan of operation and the Exhibit

1 Four map, if you wish to use it.

2 Q As we pointed out before, we plan a
3 5-spot pattern which is the -- universally the most promi-
4 nant pattern in flooding the San Andres formation.

5 We will start out with four initial
6 wells which we will inject the produced water into. Those
7 have been named in the testimony. One of them is currently
8 a salt water disposal well. We will be producing into
9 those, or injecting into those produced water. We will im-
10 mediately start to build an injection plan and as soon as
11 that plan is completed we will commence injection into the
12 seven wells that will make up the initial part of this --
13 of this project.

14 Q And your injection plant location is
15 shown on the map here?

16 A That's the tentative location for the
17 plant, yes. We also show the fresh water supply lines
18 coming in from the north there.

19 Q Mr. Murphy, what steps will be necessary
20 to convert wells to injection wells on your proposed unit?

21 A We'll remove the present producing
22 equipment. Plastic coat, or coat the tubing and run it
23 back into the well; after we've checked it for total depth
24 and clean up, clean perforations and so on, we'll run it
25 back into the injection wells and set the packer immediate-

1 ly above the upper perforation in the -- in most cases in
2 the first porosity.

3 We will then fill the annulus with an
4 inert liquid and put the -- a pressure gauge or other
5 device on the annulus wellhead so that we can monitor any
6 possible leakage.

7 Q Are there any open hole completions
8 among the wells which are scheduled for conversion to in-
9 jection?

10 A No, sir.

11 Q Okay. Mr. Murphy, I refer you now to
12 Exhibit Two, which is the black file folder numbered 2, and
13 ask you to explain this exhibit, please, sir.

14 A Exhibit Two is the supplemental data re-
15 quired by Form C-108.

16 On the left we have a summary of the --
17 an outline of the exhibits shown on the right.

18 Exhibit -- Exhibit Two, Roman Numeral
19 attachment III is well data in both tabular and schematic
20 form for each well proposed for injection. Do you want to
21 discuss that or shall we just go on through?

22 Q Go ahead. Go ahead and briefly discuss
23 that, the schematic, at least.

24 A This shows the pertinent well data of
25 perforations, completions, and so on for these wells and

1 has a schematic showing the proposed method of -- of
2 re-working and completing, recompleting the injection
3 wells.

4 Q Okay, on your schematic you have sub-
5 mitted a typical schematic rather than a schematic for each
6 individual well. At least as far as your initial seven
7 wells is concerned -- are concerned, is that schematic
8 accurate with respect to each of those wells?

9 A With one exception. The salt water
10 disposal well had -- which is the well in 33-16, had per-
11 forations in the fourth porosity in the San Andres, which
12 to our knowledge or to the knowledge of the people that
13 studied -- the other people that studies the Chaveroo
14 Field, it does not have any hydrocarbons commercially.

15 Q And that fourth porosity would be out-
16 side your unitized interval --

17 A It would be outside our unit. The evi-
18 dence in the Hobbs office of the OCC indicates that these
19 perforations have been squeezed off and we will run an in-
20 jection profile to be sure that's the case and if they have
21 not been, then we will squeeze off those perforations so
22 that this typical schematic, then, will apply to all of the
23 injection wells in the unit.

24 Q Are you ready for (not clearly
25 understood) I believe this is.

1 A Attachment 5 of Exhibit Two is an area
2 of review map and well name redesignation chart. I think
3 this exhibit was alluded to earlier in the testimony, and
4 the redesignation map just changes the well numbers to
5 conform with the guidelines of the OCC.

6 Q And Two-6, A, please.

7 A Attachment 6-A is a tabulation of well
8 data for wells within the unit area. This tabulation shows
9 the tract, operating lease, the original well number and
10 unit, the new unit well, its status, completion date, ele-
11 vation datum, total depth or plugged back total depth, cas-
12 ing record, completion interval, initial treatment, and
13 initial potential with remarks.

14 It also, in the unit area shows a cumu-
15 lative oil production at January 1st, '88, and the usable
16 wells.

17 Q Okay. And Exhibit 6-B shows exactly
18 the same data for wells outside the proposed unit but with-
19 in the area of review?

20 A With the exception of it does not have
21 cumulative or usable wells.

22 Q And this data together with the data
23 we've just submitted on Exhibit A gives the Commission and
24 the Examiner all of the -- both the geological data and the
25 physical data as to type of completion, where the cement

1 tops are, where intermediate casing or long string has been
2 set and cemented, as well as the types of acid and frac
3 jobs used to complete the wells?

4 A It does.

5 Q Then I refer you to Roman Numeral VI-C
6 in File 2.

7 A Which is the schematic well diagram of a
8 P & A'd well within the area of review.

9 On the top of that first sheet of that
10 exhibit is a -- shows the P & A'd wells in the area of
11 review and lists them. The following information is well
12 by well schematic of how the wells were -- were abandoned.

13 Q Okay, have you done a water sample or
14 chemical analysis of the water that you plan to inject in
15 your flood?

16 A We have. We had the Permian Treating
17 Chemical, Inc., take samples and to a compatibility test on
18 the fresh water and the produced water. They concluded
19 that the water could be injected separately or commingled
20 with -- and would be very compatible.

21 Q And that is, that report is shown on
22 Exhibit Roman Numeral VII-4?

23 A That's correct.

24 Q And that analysis is based upon a test
25 of both produced water from your proposed unit and the pro-

1 duced water that you intend to --

2 A It also conforms with the experience of
3 other operators in the San Andres and utilizing -- utiliz-
4 ing this fresh water source and the produced water.

5 Q Okay. What is Exhibit Roman Numeral X?

6 A Have we done -- have we done VIII?

7 Q Yeah, VIII was --

8 A Okay.

9 Q -- the other maps from --

10 A This is well logs for the proposed in-
11 jection wells. It shows in most cases gamma ray neutron
12 type of logs with the perforations or completion imposed on
13 the -- on the log.

14 Q Okay. Is there any fresh water source
15 in your proposed unit area?

16 A We've tried to find any significant
17 fresh water in the unit area or the area of review. We re-
18 quested that the State of New Mexico State Engineer's Of-
19 fice Water Division give us any information that they might
20 have and we've included a letter from them saying that they
21 find no water in that area.

22 It also is not in a declared water
23 basin, so there's essentially no water in the -- fresh
24 water in the -- in the area.

25 Q And that letter is Exhibit Two Roman

1 Numeral XI?

2 A That's correct.

3 Q The only other exhibit in File Two is a
4 list of the persons to whom notice was sent, which has also
5 been admitted definitely under the new exhibit with the
6 return receipts, so --

7 You briefly hit on it earlier, but
8 specifically what steps will be taken in the injection
9 wells to confine the injected water to the unitized forma-
10 tion?

11 A We'll confine the injection through a
12 coated tubing and confine it by a packer set just above the
13 upper perforations of the -- of the injected interval, and
14 confine it below by a plugback TD or the TD of the well.

15 Q In your opinion will the completion of
16 the injection wells in the manner shown on your schematics
17 and the exhibits submitted confine the injected water to
18 the unitized interval?

19 A Yes, it will.

20 Q In your opinion, again, are the proposed
21 injection wells shown on the map and that you've testified
22 on, are they located so as to obtain the most efficient
23 sweep and recover the greatest amount of oil that would not
24 be recovered through primary?

25 A In our best judgment at this time, that

1 is the -- that's the optimum pattern, the 5-spot pattern;
2 however, we'd like to request the possibility of adminis-
3 trative approval of a change in pattern should our initial
4 injection indicate zones of preferential -- zones of perm-
5 eability or fracture zones that would need to be handled in
6 some different pattern.

7 Q You say that you will be studying the
8 results from your initial seven wells. What -- what pro-
9 cedures will you specifically follow after you institute
10 your injection process?

11 A Well, we will of course put all of the
12 significant producing wells back into a good producing
13 capability. That will be the inside producers and the
14 surrounding producers that can be affected in any way by
15 the injection.

16 We'll also run injection profiles peri-
17 odically where we can determine where the injected water is
18 going in the -- in the unitized interval and we'll run a
19 pressure rate test or step pressure test to be sure that
20 we're not exceeding the formation breakdown pressure.

21 Q Okay. Do you have any specific guide-
22 lines or specific plan as to the amount of pressure you
23 will use on initial injection?

24 A We don't expect to exceed the guidelines
25 and the regulation of the Commission, which is .2 psi per

1 foot of depth. If we find that it's -- that it would be to
2 the benefit of the unit to do that, we would like to come
3 back for administrative hearing to increase that pressure.

4 Q What quantity of water do you anticipate
5 will be injected initially?

6 A We believe from the study of waste water
7 disposal and other water injection in the Chaveroo Field,
8 and based on the quality of the reservoir that we're water-
9 flooding, that we can inject approximately 600 barrels per
10 well per day; therefore with 7 wells we would start out
11 with probably in a very short time 4,200 barrels a day
12 total and we would eventually, when all of the wells were
13 -- 24 wells were on, we'll probably get a peak injection of
14 13,800 barrels.

15 Q What is your water source, Mr. Murphy?

16 A The water source is a fresh water source
17 for the Chaveroo Field which we believe to be a -- a buried
18 stream bed connected to the Ogallala formation further to
19 the east. These wells have been acquired by -- by contract
20 and by other appropriate legal means from the surface
21 owners in the area and they have been tested and used --
22 utilized in agriculture for many years and indicate a open
23 -- a daily rate and quantity of water sufficient to water-
24 flood the unit and other units, for that matter.

25 Q Do you contemplate injecting produced

1 water, as well?

2 A We do. We will inject any produced --
3 any water produced on the unit will be reinjected.

4 Q Will your waterflood be an open or
5 closed system?

6 A It will be a closed system. We'll also
7 provide for individual wellhead filters to take out any --
8 any solids that might affect the injectivity.

9 Q Are you requesting a project allowable
10 for your project?

11 A We're requesting the capacity allowable
12 under Rule 701.

13 Q So that the allowable will be based on
14 the ability of the wells to produce rather than the depth
15 bracket allowable?

16 A Yes.

17 Q Okay. In your opinion is unitized man-
18 agement necessary to conduct secondary recovery operations?

19 A It is. The location of the wells and
20 the reservoir conditions dictate that to do all of the
21 things that you wish to do in a secondary recovery project,
22 that you need to unitize this area.

23 Q And your plan, therefore, has an expect-
24 tation of increased ultimate recoveries, producing oil that
25 could not be produced through conventional primary means?

1 A It does. As outlined before, we would
2 expect to produce perhaps as much as an additional 3-mil-
3 lion barrels of oil from the unit area that would not have
4 been produced otherwise.

5 Q In your opinion will the proposed unit
6 agreement and unit operating agreement be in the best in-
7 terest of the state and will each beneficiary of the land
8 involved receive its fair share of the recoverable oil and
9 gas in place?

10 A They will and it will.

11 Q Will the granting of these applications
12 prevent waste and be in the interest of conservation and
13 protection of correlative rights of all parties involved?

14 A Yes.

15 Q Were the exhibits in File folders Two,
16 Three and Four, as well as Exhibit Eight, prepared by you
17 or under your direct supervision?

18 A They were.

19 MR. EZZELL: I'd like to offer
20 Exhibits Two, Three and Four in their entirety and Exhibit
21 Eight into evidence, please.

22 MR. CATANACH: Exhibits Two,
23 Three and Four and Exhibit Number Eight will be admitted
24 into evidence.

25 MR. EZZELL: I have nothing

1 further from this witness.

2

3

CROSS EXAMINATION

4

BY MR. CATANACH:

5

Q I just have a few questions.

6

7

Mr. Murphy, as I understand it, you're initially requesting approval for four injection wells, is that correct?

8

9

A No, sir, we're requesting approval for -- for all of the injection wells, for all of the --

10

11

Q How many?

12

A I believe there's 24, 23?

13

Q 23?

14

A 23.

15

16

Q As I understand it, your initially just going to use 4?

17

18

19

20

21

22

23

24

A This is -- we planned this in a progressive way. We can start immediately to inject the produced water into 4 of the wells while we're building a plant, which will take 60 to 90 days, and then we will immediately go ahead and recomplete 3 more wells which will give us a 5-spot. As soon as we're sure there's not going to be any bypassing through fractures or something, we'll expand out into a full injection over the entire unit.

25

Q The proposed injection Well 33-16,

1 that's a disposal well at this time?

2 A That's correct.

3 Q Do you know by what authorization that
4 is -- that was approved for disposal?

5 A No, sir, I don't.

6 Q We're going to have to reclassify that
7 well, probably, If you could maybe find that for me.

8 MR. EZZELL: I'll be able to
9 do that quicker, that was an old Chevron well.

10 MR. CATANACH: Texaco well.

11 MR. EZZELL: I mean Texaco
12 well.

13 Q And your Exhibit Number Four -- no,
14 sorry, Exhibit Number Two, the area of review wells --

15 A Yes, sir.

16 Q -- inside and outside the unit area, do
17 those wells represent all the wells that exist within a
18 one-half mile radius of all your proposed injection wells?

19 A To the best of our ability, they do,
20 sir, and the additional fact, we have a few in there which
21 probably technically don't fall in the area of review.
22 What we did was just -- we took a half mile from the unit
23 line and took all of the wells that -- all of the data that
24 we could find on the wells from that area.

25 Q In Exhibit Number Eight, the supplement-

1 al information, what is that exactly, Mr. Murphy?

2 A That was information that I believe was
3 requested by -- was it by the Land Office or by the OCC?

4 MR. EZZELL: By the Commis-
5 sion.

6 A By the Commission. I think the reason
7 for that, probably, primarily, was that they wanted addi-
8 tional information on the casing records because we had not
9 originally included the information on the surface pipe and
10 so --

11 Q Now, do these, the surface pipe and the
12 tops of cement on the long string, what do you mean?

13 A Well, that was -- the main reason for
14 that was the top of the cement on the long string and the
15 -- and the condition and information on the surface pipe.

16 Q Okay, do the wells on Exhibit Number
17 Eight represent all the wells within the area of review?

18 A It only -- it only has the initial 7.

19 Q The initial 7.

20 MR. EZZELL: That would be
21 these initial 7 injection wells.

22 Q I see.

23 A It looks like it has --

24 MR. EZZELL: Prior to convert-
25 ing any other --

1 A There's more than 7 here --

2 MR. EZZELL: No, within a half
3 mile --

4 A Within a half mile --

5 MR. STOVALL: Gentlemen, whoa,
6 whoa, whoa, let's go off the record if you would like to
7 discuss it amongst yourselves first.

8
9 (Thereupon a discussion was had off the record.)

10
11 Q Mr. Murphy, you've got some water analy-
12 ses, Exhibit Number 7-4, or whatever it is?

13 A Uh-huh, that's in File Folder Number
14 Two?

15 Q Right. You've got some fresh water
16 analyses. Where exactly did that fresh water analysis come
17 from, or fresh water come from?

18 A It came from the fresh water supply
19 wells that are located at the end of that pipeline, which
20 is several miles north of the Chaveroo Field and the loca-
21 tion is given on the analysis, and in this case they're
22 called the Moore, because Moore is the surface owner there
23 and the one with which we contracted for the water.

24 Q Do you know what depth those fresh water
25 wells are producing from ?

1 A Yes, they're shallow. They're probably
2 none of them are any deeper than 4-or-500 feet. They're
3 probably Ogallala, although there's no studies in the area
4 and there's no declared basin in here just because it is an
5 area of very, very sparse water reserves.

6 Q Okay, and you actually have contacted
7 the State Engineer and he has determined that there is no
8 Ogallala water in -- within the unit area?

9 A Yes, sir. He has none in his records
10 and there is no surface evidence of anything but minor
11 windmill water.

12 Q So there may be some present but not in
13 substantial quantities.

14 A That's correct. There's probably, any-
15 where out there you could get a few gallons a minute any-
16 where up on the Llano Estacado there.

17 Q Do you have listed somewhere the pro-
18 posed perforations in all your proposed injection wells?

19 A We have listed the -- the existing per-
20 forations in the schematics and in the tabular information
21 that we've submitted.

22 We have not yet determined, and will
23 probably not determine until we get it back into the wells,
24 whether we will open up additional intervals in the unit-
25 ized interval. I would expect we would open some of those

1 intervals as we study the wells and as we run, maybe, sup-
2 plemental electric logs, and so on in our recompletions and
3 workovers.

4 Q Okay, but for right now you plan on
5 using the current perforations that are open?

6 A We do unless there's evidence that de-
7 velops during the recompletion or workover that indicates
8 it would improve the flood to open additional zones.

9 What we were -- what we are looking at
10 is the best judgment of the people that originally drilled
11 and completed the wells, which is probably very good. We
12 probably won't -- we will probably not open the very much,
13 but we could if in running a log or looking at the later
14 injection profiles, we could find that we need to perforate
15 additional sub-intervals in the -- in the interval of the
16 unitization there.

17 Q I see. You've identified three zones
18 within the San Andres, the P-1, P-2 and P-3. Are those all
19 about equally productive?

20 A No, sir, the second porosity is by far
21 the most prolific. The upper zone carries, usually, some
22 oil and perhaps more gas than the second porosity, and the
23 third porosity normally does not produce in many parts of
24 the field but it does in certain areas produce a small
25 amount of oil.

1 Q But you do plan to waterflood all three
2 zones.

3 A Yes, sir. We feel that we need to do
4 that because it will not be economic to come back, leave
5 one and come back and get it later, so anything, in our
6 judgment and from the records and from the information we
7 can develop as we -- as we redevelop the unit, indicates
8 that it has recoverable commercial reserves, we'll open up.

9 MR. CATANACH: That's all the
10 questions we have of this witness at this time. He may be
11 excused.

12 Mr. Ezzell, could you submit a
13 rough draft order on the waterflood?

14 MR. EZZELL: Be happy to.

15 MR. CATANACH: That way we can
16 get everything straight and you're going to submit addi-
17 tional information --

18 MR. EZZELL: We'll work that
19 up for you for all wells.

20 MR. CATANACH: Okay. Okay, do
21 we have anything further in this -- in these two cases?

22 If not, they will be taken un-
23 der advisement, and we'll leave the record open until we
24 receive the additional information.

25 (Hearing concluded.)

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C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9477, 9478 heard by me on September 14 1988.
David R. Calamb, Examiner
Oil Conservation Division