

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY)
THE OIL CONSERVATION DIVISION FOR THE)
PURPOSE OF CONSIDERING:)
APPLICATION OF TEXACO EXPLORATION AND)
PRODUCTION, INC., FOR AMENDMENT OF)
DIVISION ORDER NO. R-9714 TO AMEND THE)
INJECTION PERMIT FOR THE VACUUM GLORIETA)
WEST UNIT WELL NO. 108 AND TO ESTABLISH)
AN ADMINISTRATIVE PROCEDURE WHEREBY)
ADDITIONAL WELLS WITHIN THE VACUUM)
GLORIETA WEST UNIT WATERFLOOD PROJECT)
AREA MAY BE DRILLED AND COMPLETED AS)
HORIZONTAL INJECTION WELLS, LEA COUNTY,)
NEW MEXICO)

CASE NO. 12,123

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

February 4th, 1999

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, February 4th, 1999, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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OIL CONSERVATION DIV

I N D E X

February 4th, 1999
 Examiner Hearing
 CASE NO. 12,123

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A P P E A R A N C E S

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Santa Fe, New Mexico 87504-2208
By: WILLIAM F. CARR

* * *

1 WHEREUPON, the following proceedings were had at
2 11:05 a.m.:

3
4
5 EXAMINER CATANACH: At this time we'll call Case,
6 12,123.

7 MR. CARROLL: Application of Texaco Exploration
8 and Production, Inc., for amendment of Division Order
9 Number R-9714 to amend the injection permit for the Vacuum
10 Glorieta West Unit Well Number 108 and to establish an
11 administrative procedure whereby additional wells within
12 the Vacuum Glorieta West Unit Waterflood Project Area may
13 be drilled and completed as horizontal injection wells, Lea
14 County, New Mexico.

15 EXAMINER CATANACH: Call for appearances.

16 MR. CARR: May it please the Examiner, my name is
17 William F. Carr with the Santa Fe law firm Campbell, Carr,
18 Berge and Sheridan.

19 We represent Texaco Exploration and Production,
20 Inc., in this case, and I have three witnesses.

21 EXAMINER CATANACH: Call for additional
22 appearances.

23 Okay, will the witnesses please stand to be sworn
24 in?

25 (Thereupon, the witnesses were sworn.)

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KEVIN F. HICKEY,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name for the record, please?

A. Kevin F. Hickey.

Q. Mr. Hickey, where do you reside?

A. Midland, Texas.

Q. By whom are you employed?

A. Texaco.

Q. And what is your position with Texaco?

A. I'm a reservoir engineer.

Q. Have you previously testified before this Division and had your credentials as a reservoir engineer accepted and made a matter of record?

A. Yes.

Q. Are you familiar with the Application filed in this case on behalf of Texaco?

A. Yes.

Q. Are you also familiar with the Vacuum Glorieta West Unit and Texaco's plans to utilize horizontal injection wells in their waterflood project area?

A. Yes.

Q. Have you prepared exhibits for presentation here

1 today?

2 A. Yes.

3 MR. CARR: We would tender Mr. Hickey as an
4 expert witness in reservoir engineering.

5 EXAMINER CATANACH: He is so qualified.

6 Q. (By Mr. Carr) Would you briefly summarize what
7 Texaco seeks with this Application?

8 A. Texaco seeks amendment of Division Order R-9714,
9 dated September 3rd, 1992, which approved the Vacuum
10 Glorieta West Waterflood Project for the injection of water
11 into the Glorieta and Paddock formations, and to authorize
12 the use of Vacuum Glorieta West Unit Well Number 108 as a
13 horizontal injection well, and to establish administrative
14 procedure whereby additional wells within the Vacuum
15 Glorieta West Unit may be drilled and completed as
16 horizontal injection wells.

17 Q. I think it would be helpful if initially you
18 would just summarize what benefits Texaco believes can be
19 obtained by using horizontal injection wells in this unit
20 area.

21 A. We believe they will provide for a more efficient
22 reservoir sweep.

23 Q. When was the Vacuum Glorieta West Unit founded?

24 A. The Vacuum Glorieta West Unit was formed pursuant
25 to the Statutory Unitization Act by Order Number R-9710,

1 dated August 25th, 1992. It is operated by Texaco. It is
2 qualified for enhanced oil recovery project by Order Number
3 R-9714, and positive production response was certified by
4 Order Number R-10,321, dated March 7th, 1995.

5 MR. CARR: May it please the Examiner, the
6 project previously qualified for the incentive oil tax
7 rate. It qualified because of the implementation of the
8 waterflood project.

9 This is a change in that project, but we believe
10 since we're not changing pressures, we're just injecting in
11 a different pattern, that it would trigger a new
12 application for certification to qualify for the incentive
13 tax rate.

14 Q. (By Mr. Carr) Mr. Hickey, let's go to Texaco
15 Exhibit Number 1, and I would ask you to just identify
16 that.

17 A. This is a copy of Division Order Number R-9714.

18 Q. Let's go to Exhibit 2. Would you identify this
19 and review it for Mr. Catanach?

20 A. Exhibit 2 is a production plot of the Vacuum
21 Glorieta West Unit.

22 Texaco has conducted waterflood operations in the
23 unit area since 1992, pursuant to Division Order R-9714.
24 In 1992 and 1993, 53 injection wells were drilled, or
25 infill drilled, and one well was converted to injection.

1 To date, we've injected approximately about 70 million
2 barrels of water. Currently our water injection rates are
3 about 33,000 barrels per day.

4 We have a total of 37 active producers.
5 Cumulative oil production to date since discovery is about
6 24 million barrels, and we have produced about 3 million
7 barrels since unitization.

8 Q. Would you identify Exhibit 3, the map of the
9 project area, and then review the information on this
10 exhibit?

11 A. The map of the project area shows there is a
12 green outline, which shows the original unit -- it would
13 show the unit boundary.

14 The yellow-shaded area is the horizontal
15 injection project area. This is the area subject to this
16 Application. This area is less than the waterflood project
17 area approved by Division Order R-9710.

18 There's also one other offset Glorieta flood --
19 or Glorieta unit, sorry. It is the Vacuum Glorieta East
20 Unit, which is operated by Phillips.

21 Q. Mr. Hickey, the central Vacuum Unit, the CO₂
22 project that was approved by the Division in 1996 actually
23 overlies this entire unit area; is that not correct?

24 A. Right, it overlies the project areas.

25 Q. And the wells in this project area would have

1 been subject to a C-108 review by the Division in 1996?

2 A. Correct.

3 Q. Now, when we look at the exhibits, you've got
4 your horizontal injection project area. It actually covers
5 less than the entire unit. Can you just briefly state why
6 that is?

7 A. The boundaries are based on geological data. The
8 unitized formation formations are the Glorieta and the
9 Paddock. The main producing interval is the Paddock
10 formation. This Paddock formation was subsequently divided
11 into two zones, the upper Paddock and the lower Paddock.

12 The lower Paddock is predominantly dolomite
13 inside the unit boundary. The upper Paddock, on the north
14 end of the unit, is also predominantly dolomite. The upper
15 Paddock on the south end of the unit is actually
16 predominantly limestone.

17 Almost all the response we have to the waterflood
18 has been found in the upper Paddock limestone area, which
19 is the south half of the unit. The dolomite intervals have
20 exhibited poor sweep efficiency and rapid water
21 breakthrough. Therefore, we are concentrating our effort
22 in the limestone area.

23 Q. When you have a rapid water breakthrough, those
24 breakthroughs are of a horizontal, not a vertical nature;
25 isn't that right?

1 A. Right.

2 Q. What is the present status of the wells which
3 Texaco proposes to utilize for horizontal injection?

4 A. They are active vertical injection wells.

5 Q. Before we leave Exhibit 3, if we look at the area
6 shaded yellow, there appear to be a number of horizontal
7 wellbores indicated. Are those producing wells?

8 A. There are -- We have drilled to date 11
9 horizontal wells. Ten of those are producers. There is
10 the one injector, Number 108. Of those wells, ten of them
11 are in the project area, including the Number 108. There
12 was one well that was drilled, Number 23, on the north end
13 of the unit.

14 Q. Let's go to Exhibit Number 4. Will you identify
15 and review that?

16 A. Exhibit Number 4 is a list of all the wells
17 inside the horizontal injection project area. That's the
18 yellow-shaded area on Exhibit 3. And basically,
19 information there is the lease name, the well number, the
20 API number, the operator, the total depth of the well, and
21 the status of that well.

22 Q. And then Exhibit Number 5 is what?

23 A. Exhibit Number 5 is the area that is in the half-
24 mile area of review. On Exhibit 3 there is a blue border
25 that goes approximately a half mile around the project

1 area. This is a list of all the wells that are in that
2 half-mile border area, and it contains the same data as in
3 Exhibit Number 4, basically the lease name, well number,
4 API number, operator, total depth and status.

5 Q. And all the wells that are shaded in the yellow
6 were -- that entire was subject to a C-108 review in 1996,
7 right?

8 A. That is correct, in 1996 this area was reviewed
9 for the Central Vacuum Unit, which produces from the San
10 Andres CO₂ flood, and the Central Vacuum Unit overlays the
11 Vacuum Glorieta West Unit horizontal project area.

12 Q. All right, let's go to Exhibit Number 6. Would
13 you identify this exhibit and explain to the Examiner what
14 it shows?

15 A. Exhibit 6 is a map of the project area again.
16 What I've highlighted are -- in red dots, are the wells
17 that have been drilled since 1996. There have been 11
18 wells drilled in the area.

19 Attached to that are wellbore diagrams and data
20 sheets, which are included for all the wells drilled since
21 1996 in the area of review of any horizontal injection
22 well. The data sheets include the well type, construction,
23 date drilled, the location, depth, and the record of
24 completion.

25 Q. Have you reviewed the data available on the wells

1 within a half mile of the horizontal injection project area
2 and satisfied yourself that there is no remedial work
3 required at this time on any of these wells?

4 A. Yes.

5 Q. How will the use of the horizontal injection
6 wells instead of vertical injection wells change waterflood
7 operations in the Vacuum Glorieta West Unit?

8 A. We believe it will, as I stated before, provide
9 for a more efficient reservoir sweep. However, there is no
10 real change in the scope of the project from the original
11 C-108.

12 Q. Will the injection of water in these horizontal
13 wellbores pose a threat to any underground source of
14 drinking water?

15 A. The currently approved injection pressures will
16 not be increased. The current conditions imposed by the
17 Division on this project will ensure the protection of
18 fresh water in the area.

19 Q. Are you aware of any potential for any water
20 injected as part of the horizontal project to escape from
21 the injection interval or otherwise pose a threat to water
22 supplies in the area?

23 A. No.

24 Q. Would you identify what has been marked as Texaco
25 Exhibit Number 7?

1 A. It is a map with an attached list of the offset
2 operators and surface owners.

3 Q. And what is Exhibit Number 8?

4 A. Exhibit Number 8 is an affidavit of notice.

5 Q. They've got these reversed on me, Mr. Hickey.

6 Exhibit Number 8, is Exhibit Number 8 the affidavit of
7 publication --

8 A. Oh, yeah.

9 Q. -- in the Hobbs newspaper?

10 A. Right, it is the application from the -- in the
11 *Hobbs* --

12 Q. -- *Daily News-Sun*?

13 A. -- the *Daily News-Sun*.

14 Q. Is Exhibit Number 8 an affidavit from my office
15 confirming that notice of this Application has been
16 provided in accordance with Oil Conservation Division
17 Rules?

18 A. Yes.

19 Q. And who was notified of the Application?

20 A. The offset operators, only affected parties.

21 Q. Can you go now to what has been marked as Exhibit
22 Number 10 and just identify that for Mr. Catanach?

23 A. Copies of these are copies of letters sent by
24 Texaco to affected offset operators providing them notice
25 of this Application.

1 Q. The surface owner was also notified?

2 A. Yes.

3 Q. And that's the State of New Mexico?

4 A. That is correct.

5 Q. Will Texaco call witnesses to review the geology
6 of the subject area and the recent injectivity test
7 conducted on the Vacuum Glorieta West Unit Well Number 108?

8 A. Yes.

9 Q. Were Exhibits 1 through 10 either prepared by you
10 or compiled at your direction?

11 A. Yes.

12 MR. CARR: At this time, Mr. Catanach, we would
13 move the admission into evidence of Texaco Exhibits 1
14 through 10.

15 EXAMINER CATANACH: Exhibits 1 through 10 will be
16 admitted as evidence.

17 MR. CARR: And that concludes our direction of
18 Mr. Hickey.

19 EXAMINATION

20 BY EXAMINER CATANACH:

21 Q. Mr. Hickey, the area shown in yellow, that's
22 going to be the area that's going to be the horizontal
23 project area?

24 A. That is correct.

25 Q. And the unit is shown in green; is that right?

1 A. Correct, there's a green boundary that goes --
2 that outlines the unit, the original unit area.

3 Q. Do you know how many horizontal injection wells
4 you're going to ultimately have within the area?

5 A. That is a matter of where we're to do is to
6 develop each well, each case, depending on how the last one
7 performs. I think there's probably a good chance we may
8 end up doing all of them, although that may be in that
9 area. But right now we don't have a firm idea on how many
10 we will eventually end up doing.

11 Q. And you said you went through an AOR review in
12 1996, for the Central Vacuum Unit?

13 A. The Central Vacuum is the CO₂ flood that was done
14 -- that has been started up since 1996. All the wells that
15 were drilled through the San Andres and into deeper
16 horizons were all covered in that area of review, and from
17 what I understand, it was a -- considerable volumes of
18 wellbore diagrams, and we decided we would not regurgitate
19 all those again, but we would just supply the information
20 on the wells that have been drilled since then. I reviewed
21 all the wells in the original C-108 for the Glorieta Unit.

22 EXAMINER CATANACH: I guess I don't recall. Did
23 I do that one, Mr. Carr?

24 MR. CARR: I can't imagine that you can't recall
25 that.

1 (Laughter)

2 MR. CARR: Yes, you did.

3 EXAMINER CATANACH: Okay.

4 MR. CARR: That was a case where we initially
5 filed certain information on certain wells, and then we
6 expanded it to include all wells. It was a CO₂ unit
7 bordered on each side by offsetting CO₂ units.

8 Q. (By Examiner Catanach) And as part of Exhibit 6,
9 these are the additional wells that were drilled since that
10 time?

11 A. Yes.

12 Q. 1996. Okay. Were there any additional wells
13 plugged that you know of?

14 A. I believe some wells have been plugged and
15 abandoned since that time. We can provide that data if you
16 need it.

17 EXAMINER CATANACH: I do. That's all I have.

18 MR. CARR: All right. Mr. Catanach, at this time
19 we call Robert Martin.

20 ROBERT MARTIN,

21 the witness herein, after having been first duly sworn upon
22 his oath, was examined and testified as follows:

23 DIRECT EXAMINATION

24 BY MR. CARR:

25 Q. Would you state your name for the record, please?

1 A. Robert Martin.

2 Q. Where do you reside?

3 A. Midland, Texas.

4 Q. By whom are you employed?

5 A. Texaco.

6 Q. And what is your position with Texaco?

7 A. Geoscientist.

8 Q. Have you previously testified before this
9 Division and had your credentials as a geoscientist
10 accepted and made a matter of record?

11 A. Yes.

12 Q. Are you familiar with the Application filed in
13 this case on behalf of Texaco?

14 A. Yes.

15 Q. Have you made a geological study of the area
16 which is the subject of this Application?

17 A. Yes, I have.

18 Q. And are you prepared to share the results of that
19 work with the Examiner?

20 A. Yes, I am.

21 MR. CARR: Are the witness's qualifications
22 acceptable?

23 EXAMINER CATANACH: They are.

24 Q. (By Mr. Carr) Initially, Mr. Martin, if you
25 could, I would ask you to generally describe the

1 characteristics of the Glorieta and Paddock formations in
2 this area.

3 A. The Glorieta in this area is composed mostly of
4 alternating silty, sandy dolomites and dolomites. When you
5 get into the Paddock formation it's predominantly dolomite,
6 with the exception of the south half in the upper Paddock,
7 where you run into the limestone that Kevin referred to
8 earlier.

9 Q. What intervals are actually unitized in the
10 Vacuum Glorieta West Unit?

11 A. The Glorieta and the Paddock are the ones that
12 are unitized in this area, and that's defined by the Mobil
13 Bridges State Number 95 in Section 26 of 17 South and 34
14 East.

15 Q. And that's the type log in the unit agreement?

16 A. That's correct.

17 Q. Into what portions of these formations are you
18 actually going to be injecting with these horizontal
19 injection wells?

20 A. We're targeting the upper Paddock limestone in
21 the south half of the unit.

22 Q. Let's go to what's been marked as Texaco Exhibit
23 11, and would you identify and review that, please?

24 A. Yes, this is the typical mud log that we get off
25 the unit when they're out there drilling the horizontal

1 wells. This helps us to continually watch the samples that
2 come in and make sure we stay within the target zone.

3 Q. The exhibit that I have is a mud log on the
4 northeast lateral on the 108 well. Is that the --

5 A. Yes.

6 Q. -- exhibit that you have?

7 A. It is.

8 Q. Would you just explain to the Examiner the
9 significance of the mud log?

10 A. Well, the significance is, we -- as we begin to
11 build our curve, as we're going through the Glorieta, we
12 can see what's just above the target zone, the Paddock
13 limestone. That helps us to identify if we begin to get a
14 little bit off target and start going up too high with our
15 horizontal, we begin to see some of these silty sands
16 appear in our samples, and it helps us to geosteer and get
17 back into the target area.

18 Q. So you're able to keep the well, the horizontal
19 portion of the wellbore, in the interval that you're
20 targeting?

21 A. That's correct.

22 Q. All right, what is the following exhibit, Exhibit
23 Number 12?

24 A. Okay, Number 12 is just a new way for us to
25 display the horizontal mud log data. This is something new

1 that the mud log companies just came out with. And the
2 blue line there shows you the actual path of the wellbore,
3 the one on the right actually going to the northeast and
4 the one on the left going to the southwest. And once again
5 that just shows us that as we go horizontal we stay within
6 the target zone of the Paddock limestone.

7 Q. And you have dual laterals in the Unit Well 108?

8 A. That's right.

9 Q. Let's go to Exhibit 13. Would you identify and
10 review that, please?

11 A. Yeah, 13 is just a type log for the unit, and
12 it's actually from the Vacuum Glorieta West Unit Number
13 108. You can see the Glorieta is highlighted in yellow
14 there at 5818, and then the upper Paddock, which is our
15 target zone, at around 5954.

16 Q. Generally summarize the conclusions you can reach
17 from your study of the area.

18 A. The target zone is very easy for us to pick out,
19 due to the lithology that occurs out there, due to the fact
20 that we have a difference above the limestone where we get
21 into the silty, sandy dolomites, versus the very hard,
22 dense dolomites and limestones below, keeps us in track and
23 keeps us horizontally in the target zone.

24 Q. And Texaco will be calling an engineering witness
25 to review the recent work on the Unit Well 108; is that

1 right?

2 A. Yes, that's correct.

3 Q. Were Exhibits 11 through 13 prepared by you?

4 A. Yes.

5 MR. CARR: At this time, Mr. Catanach, we would
6 move the admission into evidence of Texaco Exhibits 11
7 through 13.

8 EXAMINER CATANACH: Exhibits 11 through 13 will
9 be admitted as evidence.

10 MR. CARR: And that concludes my direct
11 examination of Mr. Martin.

12 EXAMINATION

13 BY EXAMINER CATANACH:

14 Q. Mr. Martin, are these injection wells -- are they
15 also open in the Glorieta and the lower Paddock?

16 A. That's cor- -- Not in the lower Paddock, no, sir.

17 Q. Not in the lower Paddock.

18 A. No, sir.

19 Q. But in the Glorieta they are injecting?

20 A. In the Glorieta section, part of it, the lower
21 part of it.

22 Q. Are the producing wells completed in this type of
23 manner also?

24 A. The producing vertical wells?

25 Q. The producing horizontal wells.

1 A. Yes. Yes, they are

2 Q. They're drilled horizontally in the upper Paddock
3 zone?

4 A. I believe that's correct. I may have to refer
5 that to an engineer, but yes, I believe that's correct.

6 EXAMINER CATANACH: Okay. I have nothing further
7 of this witness.

8 MR. CARR: At this time we call Britton McQuien.

9 BRITTON McQUIEN,

10 the witness herein, after having been first duly sworn upon
11 his oath, was examined and testified as follows:

12 DIRECT EXAMINATION

13 BY MR. CARR:

14 Q. Would you state your name for the record, please?

15 A. Britton McQuien.

16 Q. Would you spell your name, please?

17 A. M-c-Q-u-i-e-n.

18 Q. And where do you reside?

19 A. In Hobbs, New Mexico.

20 Q. By whom are you employed?

21 A. Texaco.

22 Q. And what is your position with Texaco?

23 A. I'm a production engineer.

24 Q. Have you previously testified before this
25 Division?

1 A. No, I have not.

2 Q. Could you summarize your educational background
3 for the Examiner?

4 A. I have a bachelor of science degree in petroleum
5 engineering from Texas A&M University.

6 Q. And when did you receive your degree?

7 A. In May of 1996.

8 Q. And since graduation in 1996, have you been
9 employed at all times as an engineer for Texaco?

10 A. Yes, I have.

11 Q. Does the geographic area of your responsibility
12 include the portion of southeastern New Mexico involved in
13 this case?

14 A. Yes, it does.

15 Q. Are you familiar with the Application filed in
16 this matter on behalf of Texaco?

17 A. Yes.

18 Q. And are you familiar with the wells in the area
19 of the proposed horizontal injection project?

20 A. Yes, I am.

21 MR. CARR: At this time we tender Mr. McQuien as
22 an expert witness and production engineer.

23 EXAMINER CATANACH: He is so qualified.

24 Q. (By Mr. Carr) What is the current status of the
25 Vacuum Glorieta West Unit Well Number 108?

1 A. It is shut in.

2 Q. Was a temporary injection authority obtained by
3 the Division for this well?

4 A. Yes, it was obtained on July 14th, 1998, for a
5 six-month injectivity test.

6 Q. And has this test period subsequently been
7 extended by the Division?

8 A. Yes, we received a one-month extension that
9 expires on February 14th.

10 Q. And if the order is not signed by February the
11 14th, will it also be necessary for us to seek a further
12 extension of this temporary permit for the use of this well
13 as a horizontal injector?

14 A. Yes, we'll need temporary approval.

15 Q. Let's go to Texaco Exhibit Number 14. Would you
16 identify that and review it for the Examiner, please?

17 A. This is a map, a close-up map, of the Vacuum
18 Glorieta West Unit 108 injection well. It has two
19 horizontal legs, a northeast-trending lateral and a
20 southwest-trending lateral.

21 These injection laterals are -- Out of the
22 producing Well Number 115, we have an injection lateral
23 that horizontals this -- or it parallels this -- the 108.

24 And then in the 103 we have another injection
25 lateral that roughly parallels the 108 injection.

1 Q. Let's go to Exhibit Number 14. Will you identify
2 and review that?

3 A. Number 14?

4 Q. I'm sorry, Number 15, the wellbore diagram.

5 A. This is a wellbore diagram of the Vacuum Glorieta
6 West Unit Number 108 as it currently is. It shows that
7 this was previously a vertical injection well where the
8 injection perforations were plugged back with a cast-iron
9 bridge plug, and two laterals were drilled in the Glorieta
10 formation and in the Paddock formation and completed open-
11 hole in the Paddock formation.

12 Q. What is Exhibit Number 16?

13 A. Number 16 is the plotted plan view and a cross-
14 section view of the well paths for the Vacuum Glorieta
15 Number 108.

16 We also have tabular data there. The first page
17 shows one of the laterals, the second page is the other
18 lateral, and then tabular data is presented after that.

19 Q. What was the initial injection pressure
20 authorized for this waterflood project?

21 A. 1200 pounds.

22 Q. And did the order that authorized this initial
23 project provide for an administrative procedure whereby
24 these pressure limitations could be increased?

25 A. Yes, it did.

1 Q. What is Exhibit Number 17?

2 A. This was proposal to increase the injection
3 pressure on a number of the injection wells in the Vacuum
4 Glorieta Unit.

5 Q. What was the result of this application?

6 A. The injection pressures were increased on a lot
7 of the injection wells in the unit.

8 Q. What is the information behind the initial letter
9 application?

10 A. This is just the tabular data, the step-rate
11 tests performed on Vacuum Glorieta West 108.

12 Q. And as a result of this, the pressure for that
13 well was increased to 2200 pounds; is that right?

14 A. Yes, it was.

15 Q. What is generally the range of pressures that are
16 now authorized on a well-by-well basis throughout this
17 area?

18 A. It ranges from 2000 to 3500 pounds.

19 Q. Is Texaco seeking any additional increase in the
20 authorized injection pressures for wells in the portion of
21 the unit which is the subject of this Application?

22 A. No, we are not.

23 Q. Let's go to what has been marked for
24 identification as our Exhibit Number 18. Would you review
25 that, please?

1 A. Okay, Exhibit Number 18 is injection history on
2 the Vacuum Glorieta West Unit Number 108. It shows we were
3 -- in 1997, the end of 1997 and the beginning of 1998 -- we
4 were injecting approximately 2000 barrels of water a day at
5 about 1600, 1700 p.s.i.

6 Then there is an area in there around March of
7 1998, where it says we set a bridge plug. This was to shut
8 off -- We believed a lot of the water was channeling
9 through the lower Paddock. We set the bridge plug to shut
10 off the lower Paddock and try to divert most of the water
11 into the upper Paddock formation, and the data shows that
12 we did have a lot of diversion there. The water rate was
13 reduced significantly.

14 And then in approximately July of 1998, there's
15 some missing data there. That's when we were drilling
16 horizontal.

17 And after that, starting in late July and August,
18 1998, we show that we are at the same pressure. We have
19 increased our injection rate, so it appears we are putting
20 more water into the upper Paddock portion of the Glorieta.

21 And then there's a couple places where we're
22 down, and we have been down, now, since the end of
23 November, due to some injection line leaks.

24 Q. Let's now go to Exhibit Number 19, the
25 information on the unit wells 115 and 103. These are the

1 wells that parallel the laterals in the 108 injection well;
2 is that not correct?

3 A. That is correct.

4 Q. Okay, let's go with the first, the 115. Would
5 you review the information on that well, please?

6 A. Okay, this is a historical -- approximately one
7 and a half years of production history on the Glorieta 115.
8 The first page is logarithmic, and then we have the 1998 --
9 just the 1998 portion on 115 on the second page, which is
10 on a Cartesian scale.

11 You can see we're -- in early 1998 we drilled the
12 horizontal producing leg on 115 and saw a very positive
13 production response. And then it fell off rapidly but
14 leveled out in April of 1998, approximately 150 barrels a
15 day and produced there.

16 And then in approximately November of 1998, we
17 started to see a positive production response that we
18 attributed to the Glorieta 108 where the production, it
19 appears, increased 60 to 70 barrels of oil per day. And
20 then when we shut the 108 in for the injection line leaks,
21 the production response dropped off sharply.

22 Q. Let's go to the 103.

23 A. The 103 is a plot over the same time range.

24 There is also a logarithmic and a Cartesian
25 presentation. We added a horizontal leg to this one in

1 early 1998 and saw a very positive production response that
2 did fall off rapidly, and it leveled out in about 100, 130
3 barrels a day in 1998.

4 And then approximately October of 1998, we
5 started -- when the Glorieta 108 was shut in, we started
6 having production problems on it, because without the
7 pressure support we haven't been able to maintain a fluid
8 level, and we've experienced a lot of gas-locking problems
9 with our pump.

10 Q. Let's go now to Texaco Exhibit Number 20, the
11 injection profile, and if you could orient us as to the
12 depth we're talking about on this exhibit and then explain
13 what it shows.

14 A. This exhibit shows that we have our windows cut
15 between 5800 and 5900 in the Glorieta 108 well. It shows
16 that these windows were cut within the vertical limits of
17 the Vacuum Glorieta Pool and that all that all of the water
18 is entering at the depths of the two windows, and there is
19 no channeling behind pipe.

20 Q. Let's go to Exhibit 21.

21 A. Exhibit 21 is the tabular presentation and a plan
22 view of the proposed Glorieta injection wells, Vacuum
23 Glorieta West Unit Number 93 and 94 wells. These wells --
24 We are planning on beginning the first one, the Glorieta
25 93, in March of 1999, and they will be targeted in the

1 upper Paddock portion of the Glorieta Pool.

2 MR. CARR: Mr. Examiner, since we are intending
3 to go forward with these two wells and convert them to
4 horizontal injectors in a matter of weeks, we'll need to
5 coordinate with you exactly how we have those approved,
6 either if they could be approved as part of this
7 Application, or we will need to file a subsequent
8 administrative application with you to be sure that we're
9 authorized before we go forward with these plans. We'll
10 coordinate that with you.

11 EXAMINER CATANACH: I actually think that we
12 probably need to file after the Order is issued, because
13 this Application doesn't really cover --

14 MR. CARR: Okay.

15 EXAMINER CATANACH: -- those two wells.

16 MR. CARR: And our problem really, in this case,
17 is the timing of it. We can file an administrative
18 application. We need to coordinate that with what's
19 authorized in this order, but we can work with you on that
20 after the hearing.

21 Q. (By Mr. Carr) Mr. McQuien, if an administrative
22 procedure is approved whereby additional wells can be
23 completed as horizontal injection wells, what volumes would
24 you anticipate injecting?

25 A. We are anticipating we will be injecting

1 approximately 1500 barrels of water per day.

2 Q. And what would be the maximum daily injection
3 pressure that you would propose to utilize?

4 A. We anticipate that we will be injecting at 2000
5 p.s.i.

6 Q. And this is below -- will keep it below the
7 pressure that has been authorized for these individual
8 wells in any circumstance?

9 A. Yes.

10 Q. Are you familiar with the order that was entered
11 in a case on application of Mobil for horizontal injection
12 wells earlier this year?

13 A. Yes, I am.

14 Q. And that order provided that there were currently
15 administrative procedures in place under Rules 111 and 701
16 for -- and there was a vehicle in place, whereby operators
17 could, through an administrative process, seek approval of
18 horizontal injection wells; is that right?

19 A. That's correct.

20 Q. And are those the procedures that Texaco would
21 propose to follow in bringing any applications for
22 additional wells to this Division?

23 A. Yes, it is.

24 Q. That is Order Number R-4430-B.

25 In your opinion, will approval of this

1 Application and the use of horizontal injection wells in
2 the portion of the Vacuum Glorieta West Unit which is the
3 subject of today's hearing be in the best interest of
4 conservation, the prevention of waste and the protection of
5 correlative rights?

6 A. Yes, I believe so.

7 Q. Were Texaco Exhibits 14 through 21 prepared by
8 you or compiled under your direction and supervision?

9 A. Yes.

10 MR. CARR: Mr. Catanach, at this time we move the
11 admission into evidence of Texaco Exhibits 14 through 21.

12 EXAMINER CATANACH: Exhibits 14 through 21 will
13 be admitted as evidence.

14 MR. CARR: And that concludes my direct
15 examination of Mr. McQuien.

16 EXAMINER CATANACH: While I'm still thinking
17 about it, Mr. Carr, let me at this point give you verbal
18 authority to extend that test period on the 108 --

19 MR. CARR: Thank you.

20 EXAMINER CATANACH: -- past the February 14th
21 deadline. We'll give you another 30 days past there, and
22 an order should be out by then, I hope.

23 EXAMINATION

24 BY EXAMINER CATANACH:

25 Q. Mr. McQuien, are the proposed horizontal

1 injectors, are they each going to have two laterals?

2 A. No, the 93 has been permitted for two laterals,
3 but the 94 has only been permitted for one lateral.

4 Q. So that's going to vary from well to well within
5 the unit?

6 A. Yes.

7 Q. And how is that determined? Just based on offset
8 producing wells?

9 A. Yes, where we can fit a horizontal in and we need
10 the injection support.

11 Q. Are you able -- Have you seen an increase in
12 volume that you're able to inject into these wells once the
13 laterals are drilled?

14 A. Actually, a lot of times we see a decrease
15 because we are no longer injecting into that lower Paddock
16 interval. That interval is completely sealed off, and we
17 are positive that all of our water is going into the upper
18 Paddock, which is a much -- We don't have the channeling
19 problems from well to well that we see in the lower
20 Paddock.

21 Q. Are the producing wells going to still be
22 completed in the lower Paddock? You're not proposing to
23 abandon the lower Paddock interval?

24 A. On the vertical wells where it's already
25 perforated and we see that there is some oil production

1 from the lower Paddock, it will be left open. We are
2 targeting the upper Paddock with all of our horizontal
3 wells, so we're drilling horizontal producers; they are in
4 the upper Paddock.

5 Q. You don't see any benefit in utilizing horizontal
6 wells to produce the lower Paddock?

7 A. We really haven't seen -- We haven't really
8 looked into it, but it doesn't seem that there's a large
9 benefit to the lower Paddock.

10 Q. Is that going to reduce recovery that you might
11 have otherwise got from the lower Paddock, if you don't use
12 the horizontal wells to --

13 A. We believe that the increased recovery we get in
14 the upper Paddock will more than offset anything we were to
15 give up in the lower Paddock, if there is any given up in
16 the lower Paddock. We haven't -- We've see very little
17 production out of the lower Paddock.

18 Q. And the problem with the lower Paddock, again, is
19 channeling? Is that right?

20 A. Yes, there are high-permeability streaks in it,
21 or fractures, we're not exactly sure what it is. But the
22 water channels directly from one well to the other without
23 sweeping any oil.

24 EXAMINER CATANACH: Okay, I think that's all I
25 have.

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Mr. Carr?

MR. CARR: That concludes our presentation in this case. We will get you information on the wells that have been plugged and abandoned within the area of review, and we will file separate applications on these additional wells as our timing -- if we get close to them before there's an order out.

EXAMINER CATANACH: Okay. There being nothing further in this case, Case 12,123 will be taken under advisement.

(Thereupon, these proceedings were concluded at 11:45 a.m.)

* * *

I do hereby certify that this is a complete record of the proceedings of the Executive Hearing of the Board of Conservation on February 4, 1999.
David R. Catanach
Off Conservation Division

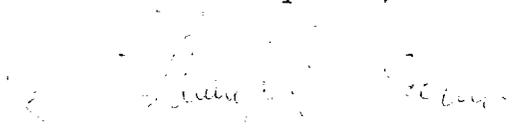
CERTIFICATE OF REPORTER

STATE OF NEW MEXICO)
) ss.
 COUNTY OF SANTA FE)

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL February 8th, 1999.


 STEVEN T. BRENNER
 CCR No. 7

My commission expires: October 14, 2002