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:	)	CASE NO. 12,592
APPLICATION OF TEXACO EXPLORATION AND PRODUCTION, INC., FOR AMENDMENT OF DIVISION ORDER NO. R-4442, AS AMENDED, TO AUTHORIZE A TERTIARY RECOVERY PROJECT BY THE INJECTION OF CARBON DIOXIDE IN ITS VACUUM-GRAYBURG-SAN ANDRES PRESSURE MAINTENANCE PROJECT AREA, APPROVAL OF AMENDMENT OF THE COOPERATIVE WATER INJECTION AGREEMENT BETWEEN THE CENTRAL VACUUM UNIT AND THE VACUUM-GRAYBURG-SAN ANDRES UNIT, AND QUALIFICATION OF THE PROJECT FOR THE RECOVERED OIL TAX RATE PURSUANT TO THE ENHANCED OIL RECOVERY ACT, LEA COUNTY, NEW MEXICO	)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: MICHAEL E. STOGNER, Hearing Examiner

February 8th, 2001

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, MICHAEL E. STOGNER, Hearing Examiner, on Thursday, February 8th, 2001, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

* * *

I N D E X

February 8th, 2001
Examiner Hearing
CASE NO. 12,592

* * *

E X H I B I T S

Applicant's	Identified	Admitted
Exhibit 1	7	22
Exhibit 2	9	22
Exhibit 3	10	22
Exhibit 4	10	22
Exhibit 5	13	22
Exhibit 6	15	22
Exhibit 7	16	22
Exhibit 8	17	22
Exhibit 9	18	22
Exhibit 10	18	22
Exhibit 11	19	22
Exhibit 12	20	22
Exhibit 13	29	39
Exhibit 14	32	39
Exhibit 15	49	53

* * *

A P P E A R A N C E S

FOR THE APPLICANT:

HOLLAND & HART, LLP, and CAMPBELL & CARR
110 N. Guadalupe, Suite 1
P.O. Box 2208
Santa Fe, New Mexico 87504-2208
By: WILLIAM F. CARR

* * *

WHEREUPON, the following proceedings were had at 10:20 a.m.:

EXAMINER STOGNER: Okay, call the hearing to order. At this time I'll call Case Number 12,592, which is the Application of Texaco Exploration and Production, Inc., to amend Division Order Number R-4442 and authorize a tertiary recovery project in one of the project areas down in Lea County, New Mexico.

At this time I'll call for appearances.

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe office of the law firm Holland and Hart, L.L.P. We represent Texaco Exploration and Production, Inc., and I have three witnesses.

EXAMINER STOGNER: Any other appearances?

Will the three witnesses please stand to be sworn?

(Thereupon, the witnesses were sworn.)

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

BRITTON McQUIEN,

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Would you state your full name for the record?

A. Britton McQuien.

Q. Could you spell your name?

A. B-r-i-t-t-o-n M-c-Q-u-i-e-n.

Q. Where do you reside?

A. In Midland, Texas.

Q. By whom are you employed?

A. Texaco Exploration and Production.

Q. Mr. McQuien, what is your current position with Texaco Exploration and Production, Inc.?

A. I am a reservoir engineer on the CO_2 asset team in the Permian.

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, I have.

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

A. Yes, I am.

Q. Are you familiar with Texaco's plans to implement a tertiary recovery project in the Vacuum-Grayburg-San Andres Pressure Maintenance Project Area by the injection of carbon dioxide?

A. Yes, I am.

Q. Are you familiar with the status of the lands in the Vacuum-Grayburg-San Andres Unit area?

A. Yes, I am.

Q. Have you made an engineering study of the area which is the subject of this Application?

A. Yes.

Q. Are you prepared to share the results of your work with Mr. Stogner?

A. Yes.

MR. CARR: Mr. Stogner, are the witness's qualifications acceptable?

EXAMINER STOGNER: They are.

Q. (By Mr. Carr) Initially, Mr. McQuien, could you summarize for Mr. Stogner what it is that Texaco seeks with this Application?

A. Basically, we want to amend Division Order Number R-4442, dated November 27th, 1972, that was reviewed at a hearing November 1st, 1972. This order approved the Vacuum-Grayburg-San Andres Unit Pressure Maintenance Project in the Vacuum-Grayburg-San Andres Unit. We would like to amend this order to implement a tertiary recovery project by the injection of carbon dioxide, along with other noncommercial produced gases associated with the oil production, into the Vacuum-Grayburg-San Andres Unit area.

To do this, we will need to obtain surface injection pressures of 1500 pounds on water for wells that are not currently permitted for at least that pressure. We will run a step-rate test to make sure there will be no

break. And then to account for the density differences between carbon dioxide and water, we would like to be approved for, on CO_2 injection, a maximum injection pressure of 350 pounds above the water surface, maximum surface injection pressure, not to exceed 1850 p.s.i. at this time.

We would also like to qualify this tertiary recovery project for the recovered oil tax rate pursuant to the New Mexico Enhanced Oil Recovery Act.

Q. Have you prepared exhibits for presentation here today?

A. Yes, I have.

Q. Let's go to what has been marked Texaco Exhibit Number 1, and Mr. McQuien, if you would initially just explain what this is a and then orient us as to the acreage which is the subject of today's hearing.

A. Okay, this is a general map of the unit and the unitized acreage in the Vacuum field. These are the Vacuum-Grayburg-San Andres units up here. Notice the Texaco units are shown in yellow, the Vacuum-Grayburg-San Andres Unit would be the middle unit, Phillips units are shown in green, and you can also see blue outlines in Phillips' East Vacuum Unit, Texaco's Central Vacuum Unit and Phillips' State 35 Unit. These are all existing CO_2 injection projects, currently active projects, and they are

bordering on the entire north and east side, the Vacuum-Grayburg-San Andres Unit, these existing CO_2 projects.

Q. And what you're proposing is to implement a similar CO_2 project in a portion of the Vacuum-Grayburg-San Andres Unit; is that right?

A. That is correct.

Q. Now, the pressure limitations you're seeking here today, are they consistent with the approved pressure limits for the other CO_2 projects indicated on Exhibit 1?

A. Yes.

Q. And so what Texaco is seeking here today is consistent with what's previously been approved for the offsetting units?

A. Correct.

Q. When was the Vacuum-Grayburg-San Andres Unit formed?

A. The unit was formed by Division Order R-4433, dated November 27th, 1972, and it's been operated by Texaco Exploration and Production since its formation.

Q. And when did waterflood operations actually commence in the unit area?

A. The waterflood operations commenced in the unit area in 1973 pursuant to Division Order R-4442.

Q. And that's the order we're addressing here today --

A. Correct.

Q. Does the unit agreement for this unit provide for carbon-dioxide flooding?

A. Yes, it does. We have in here Exhibit Number 2, which is a copy of the unit agreement. In Section 4.4, if you go to Section 4.4, and on the next page it says "...inject into the Unitized Formation, through any well or wells completed therein, brine, water, air, gas, oil and any one or more other substances or combination of substances, whether produced from the Unitized Formation or not, and...the rate of production shall be governed by standard of good geologic and petroleum engineering practices and conservation methods."

EXAMINER STOGNER: Okay, this is in part 4.4 of the unit agreement?

THE WITNESS: Yes, Article --

MR. CARR: 4.4 on page 6.

THE WITNESS: Yes.

EXAMINER STOGNER: Thank you, go ahead.

Q. (By Mr. Carr) The unit agreement authorizes CO_2 injection, correct?

A. Yes, by referring to other substances.

Q. And the working interest in the unit is 100-percent Texaco, so you have not had partners you've had to go through and obtain their participation and approval; is

that right?

A. That's correct.

Q. Let's go to Exhibit Number 3. Would you identify and review that for the Examiner?

A. Okay, Exhibit Number 3 is what we call our area-of-review map. It is a half-mile radius around all of the proposed injection wells for the target area of the CO_2 project, showing all wells inside the circles that were reviewed, according to the C-108 procedure, approval procedure.

Q. And the unit boundary is shown in red?

A. Correct, and it also -- we are bordered on the east and northeast sides by the Central Vacuum Unit, and on the north also by Phillips' State 35, another San Andres Unit, Vacuum-San Andres CO_2 flood.

Q. How many acres are we talking about in this particular unit?

A. 1486, more or less.

Q. Mr. McQuien, is Exhibit Number 4 an affidavit confirming that notice of this Application has been provided in accordance with Oil Conservation Division Rules and Regulations?

A. Yes, it is.

Q. And attached to that affidavit is a list of the parties to whom notice was provided and copies of the

return receipt; is that right?

A. That is correct.

Q. To whom was notice provided?

A. Notice was provided to all the offset operators within a half mile of the proposed injection wells.

Q. Was the surface owner of each tract upon which a well was located also notified?

A. No, they were not.

Q. They were not? Who was not?

A. The State --

Q. Were the surface owners also notified of the Application?

A. The leaseholders of the surface land were notified, but the surface owner is the State Land Office.

Q. Okay, and was the State Land Office notified?

A. No, they have not been.

MR. CARR: Mr. Stogner, we notified each of the lessees of the State leases which cover the surface of the land. We failed to talk to the State Land Office. Accordingly, following this hearing, I will request that you leave the record open so we can review it and obtain the concurrence in this effort from the Commissioner of Public Lands.

EXAMINER STOGNER: Anticipating no problem, do you foresee that you could obtain that without mailing,

perhaps --

MR. CARR: What I intend to do -- This was actually my slip. I told Texaco you notify the surface owner, and they notified the people who hold the leases but not the underlying owner, being the State of New Mexico. I intend to take the Application to the State Land Office and request a letter from them and request that that be sent to you, expressing, hopefully, that they have no objection to this proposal. They have not objected to the offsetting units, and so we don't anticipate a problem with that.

EXAMINER STOGNER: Well, it can also be noted that most of the -- if you refer to Exhibit Number 1, most of the acreage depicted on there is state land anyway --

MR. CARR: Yes, sir, it is.

EXAMINER STOGNER: -- with the CO_2 injection.

MR. CARR: Yes, it is, and we really don't anticipate a problem.

It was yesterday afternoon that we realized we had talked to and notified the people who hold the leases and actually are on the surface but not the underlying owner, and I will take care of that.

EXAMINER STOGNER: Thank you.

Q. (By Mr. Carr) Mr. McQuien, would you describe the current status of Texaco's efforts to implement the proposed carbon-dioxide flood in the unit?

A. At this point we have completed the geologic and engineering characterization of the field.

We have performed a reservoir simulation of this area, the Vacuum-Grayburg-San Andres field and its response to CO_2. We have designed the facilities that will be required to produce the CO_2 flood, and we will implement those in the near future, and we have obtained the corporate approvals from Texaco to commence the CO_2 flooding in this unit.

Q. And how soon do you anticipate commencing, actually, the CO_2 flooding operation?

A. We're looking at the end of the first quarter of 2001.

Q. Let's go to what has been marked as Exhibit Number 5. Would you identify that for Mr. Stogner and review it, please?

A. Exhibit Number 5 is lease-line agreement between the Central Vacuum Unit and the Vacuum-Grayburg-San Andres Unit. It governs the cooperative water injection between the two units for the lease-line wells.

We asked that the -- or we negotiated that this agreement be amended to also allow for CO_2 injection in the lease-line wells.

Q. At the second to the last page in the exhibit is a plat that shows the location of the injection wells; is

that correct?

A. That is correct.

Q. And these wells are current injection wells being operated pursuant to this agreement, and they're water injection wells; is that right?

A. That's correct.

Q. And the purpose of the amendment to this agreement is simply to use the existing wells now for the injection of water and CO_2, since both projects will be projects into which you will be injecting both water and CO_2?

A. Correct.

Q. Can you explain exactly how Texaco will implement the project? And here I'd like you to explain how you intend to actually physically conduct the injection operation.

A. The injection will require an upgrade of the downhole equipment to more durable tubulars and packers, to prevent corrosion of the tubulars, to allow for the CO_2. We will begin with a large initial slug of CO_2, ranging from 10 to 50 percent of the hydrocarbon pore volume for that pattern.

When, after an engineering review, it's determined either by high gas utilizations or a breakthrough of gas at the offsetting producers, we will

then do what's called a WAG, which is, we will alternate water and gas and WAG on a one-to-one ratio where we will probably inject equal reservoir volumes of CO_2 and water, switching back every one to six months.

Q. Let's go to what has been marked Exhibit Number 6. Would you identify this, please?

A. Exhibit Number 6, this is a map of the Vacuum-Grayburg-San Andres Unit. The blue is the unit boundary for the Vacuum-Grayburg-San Andres Unit.

There's also a blue line going to the north. That is part of the Central Vacuum Unit boundary, but the parts in Sections 1 and 2 and parts south of that and then a small portion of Section 35 is the actual Vacuum-Grayburg-San Andres Unit.

There is also a red line bordering much of the Vacuum-Grayburg-San Andres Unit. This red line is the actual target area for the CO_2 flood.

Q. You testified a few minutes ago there were 1486 acres in the total unit. How many acres, approximately, fall within your target area?

A. 1280, which is approximately 86 percent of the unit.

Q. And how were the boundaries of this target area determined?

A. Based on a simulation we had, we did a pattern-

by-pattern analysis of CO_2 performance, and if the pattern was economic we included it, and the ones that were not economic were not included in the proposed targeted area.

Q. As we go off to the western portion of the unit area, are there geological considerations which limit the viability of the area for a CO_2 flood?

A. Yes.

Q. Are there current plans to add producing or injection wells in the area covered by this Application or in this target area?

A. No, not at this time.

Q. Let's take a look at the geology of the area. I'd ask you to refer to what has been marked as Texaco Exhibit Number 7, identify that and review it for Mr. Stogner.

A. This is -- Exhibit 7 is the original type log for the Vacuum-Grayburg-San Andres Unit. It is Texaco's New Mexico "M" State Well Number 8, located on the north side in Section 1, part of the Vacuum-Grayburg-San Andres Unit. This type log shows the tops of the unitized interval, the top of the Grayburg and the San Andres zones and the base of the unitized interval.

Q. Is this the same interval that's being utilized for a CO_2 flood in the Central Vacuum Unit?

A. Yes, it is.

Q. Could you describe the general characteristics of the Grayburg-San Andres formation in this area?

A. The San Andres formation is approximately 800 feet thick. The entire unitized interval, the Grayburg-San Andres, is 910 feet thick, approximately, ranging from about 3900 to 4910 TVD. That's a subsea of -- Base would be 803 feet subsea.

Primary reservoir lithofacies of the San Andres consists of dolomitized subtidal grain dominated carbonates deposited as shoals.

Q. When you look at this portion of the Grayburg-San Andres, you have a section that's approximately 910 feet thick?

A. Yes.

Q. And you have characteristics when you look at this formation that would make it a good candidate for carbon-dioxide flooding?

A. Yes.

Q. And you can say that because in similar offsetting properties in the Vacuum Unit with similar reservoir characteristics, you have been able to successfully implement CO_2 flooding?

A. That is correct.

Q. Let's go to Exhibit Number 8. Would you identify that?

A. Exhibit Number 8 is a contour map. It is the top of the San Andres formation over the Vacuum-Grayburg-San Andres Unit and part of the Central Vacuum Unit.

What you'll notice immediately is the eastern section, Section 1 of the Grayburg-San Andres Unit, is a small high there, but fairly flat. And then as you move towards the west and southwest, it starts to dip rather steeply as you move off the northwest shelf, which starts to cause rapid pay degradation, moving off to the southwest. The flat part on the eastern half makes for a very good CO_2 target.

Q. Could you just identify what's been marked as Texaco Exhibit Number 9?

A. Yes, this is another map of the Vacuum-Grayburg-San Andres Unit, outlined in pink, and it has two cross-section lines, an east-west cross-section line and a north-south cross-section line.

Q. Let's go first to the west-east cross-section, which is marked as Exhibit Number 10, and could you review the information on this exhibit?

A. Yes, the cross-section moving from west to east, you'll notice that you have very good continuity across the lease, the zones are -- and this is a stratigraphic cross-section, and the zones are very continuous, very easy to correlate across.

But as you move over onto the western side, you can see that the zones really start to thin out, which makes for a much smaller target for the CO_2 flood.

Q. Okay, let's go to Exhibit Number 11, the north-south stratigraphic cross-section.

A. This, once again, shows the nice thick continuous zones across from north to south, and on this side there really isn't much thinning.

One thing, this cross-section was extended up into the Central Vacuum Unit, and it shows that we do have a very similar target on the Vacuum-Grayburg-San Andres unit that we are successfully flooding on the Central Vacuum Unit.

Q. Why does Texaco seek to implement this CO_2 project at this time?

A. The reason -- We implemented the Central Vacuum Unit in 1997, have had a very successful CO_2 flood on the Central Vacuum Unit. This seemed to be the next logical step, moving from the Central Vacuum Unit to the Vacuum-Grayburg-San Andres Unit.

Q. The pricing is favorable at this time?

A. Yes, pricing is favorable.

Q. In fact, when you look at this independent of the units but focused just on the reservoir, don't you have basically a stepout into this area from the successful

flood in the Central Vacuum Unit?

A. Yes.

Q. Now, Mr. McQuien, Texaco is seeking an order qualifying this project under the New Mexico Enhanced Oil Recovery Act. Would you identify Exhibit Number 12?

A. Yes, Exhibit Number 12 is an Application to qualify this project as an enhanced oil recovery project.

Q. Is this Application complete? Does it meet all the requirements of the OCD rules?

A. Yes, it is complete.

Q. What are the estimated additional capture costs to be incurred in this project expansion?

A. As stated in Answer Number 4 here, $8.6 million is the anticipated additional capital required for facility upgrades.

Q. And what are the total project costs?

A. The total project cost is forecast right now as $93.5 million. That is inclusive of all the CO_2 purchases required to conduct this project.

Q. And how much additional production does Texaco expect to obtain from this CO_2 project?

A. The forecast reserves improvement is 14.4 million stock tank barrels of oil and an additional 19.3 billion cubic feet of hydrocarbon gas.

Q. And what is the total estimated value of this

additional production?

A. Based on $23-per-barrel price, the additional value is $404.7 million, also assuming a 6-MCF-per-barrel equivalent factor.

Q. When we look at Exhibit 12 and turn to the last page, Attachment "D", is Attachment "D" a production history and production forecast for oil, gas and water from this project area?

A. Yes, it is.

Q. And this is the projection that is required by the rules governing applications for approval of these projects to qualify as EOR projects; is that right?

A. Yes, that is correct.

Q. Will Texaco call additional witnesses to review the status of the wells in the area of the proposed CO_2 flood and also to review the pressure and step-rate test information that supports the request for pressure increases?

A. Yes.

Q. In your opinion, Mr. McQuien, will approval of this Application and the implementation of the proposed CO_2 flood be in the best interest of conservation, the prevention of waste and the protection of correlative rights?

A. Yes.

Q. Were Texaco Exhibits 1 through 12 either prepared by you, or have you reviewed them, and can you testify to their accuracy?

A. Yes.

MR. CARR: Mr. Stogner, at this time we would move the admission into evidence of Texaco Exhibits 1 through 12.

EXAMINER STOGNER: Exhibits 1 through 12 will be admitted into evidence.

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

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. McQuien, referring to Exhibit Number 3, what is this showing again?

A. Exhibit Number 3 -- Oh, the area-of-review map. This is showing a half-mile radius around all the injection wells that will be -- that were reviewed and will be planned for CO_2 injection. It's not the entire unit, but the actual target area for CO_2.

Q. Okay. Now, which wells on the border are these lease-line wells, cooperative water injection agreement? Which ones do they cover?

A. Cooperative water injection agreement covers Central Vacuum Unit Number -- Let's see, it's 135, I

believe, 136, 137, 138, 139, 140 and 141.

Those wells were not included in this area of review because when we applied for the Central Vacuum Unit several years ago, those wells were included in the Central Vacuum Unit review.

EXAMINER STOGNER: Okay, what order was that? Let's reference that, Mr. Carr.

MR. CARR: Just a minute, Mr. Stogner, we do have that.

THE WITNESS: It's R-5530-E.

EXAMINER STOGNER: R-5530-E was the --

MR. CARR: -- Central Vacuum Unit authorization for the CO_2 flood, I believe.

THE WITNESS: Yes.

EXAMINER STOGNER: I'm going to take administrative of the record in that case, which resulted in Order Number 5530-E, as in Edward.

Q. (By Examiner Stogner) So one of our -- I'm still referring to Exhibit Number 3. When I go over toward the northwest side of this project area, then I see a little bump or a bubble that extends upwards. That's to account for the well number, I guess, 63, that's going to be a lease-line injector between the Phillips project and this one?

A. Correct.

Q. Now, what is the lease-line cooperative water injection agreement between Phillips and Texaco for this particular injection?

A. We have a cooperative water injection agreement. We weren't addressing it here because that -- Our feeling, we were not starting that area for several years, and we didn't want to start negotiating on that contract and amending that contract at this point; we would just like to get the Central Vacuum Unit, Vacuum-Grayburg lease-line agreement amended.

Q. But now that Number 63 -- That is 63, right?

A. Yes.

Q. That is the only well in which would have the CO_2 injection that you're proposing at this time?

A. Yes.

Q. Between these two leases, the Phillips lease --

A. Actually, the State 35 Well Number 37 will, but that's a State-35-Unit-operated well, so that one would have to be covered under Phillips'.

And then I believe the Central Vacuum Unit Number 161, that is actually a lease line between the State 35, the Vacuum-Grayburg and the Central Vacuum Unit. That well should have been covered under the Central Vacuum Unit project, but the only lease-line agreement we wanted to amend right now was the Vacuum-Grayburg and the Central

Vacuum Unit to get this project started anyway.

Q. Okay. So for the record, the lease-line agreements between the Central Vacuum and the Vacuum are already covered in that Central Vacuum agree- -- or the injection authority was under the Central Vacuum pressure-maintenance project area in that Order Number R-5530, and you are proposing today to address the agreement between those two areas, or modify it, I should say?

MR. CARR: Yes.

Q. (By Examiner Stogner) Now, you are asking for -- primarily a pre-injection, or at least the technical aspects on that Number 63 well in today's, but that will require, I guess, an amendment to the lease agreement between Phillips --

MR. CARR: Yeah.

Q. (By Examiner Stogner) -- and Texaco?

A. Correct.

Q. Now, is it just CO_2 that will be injected, or do you propose that the waste gas also be reinjected?

A. The waste gas will be recycled through a plant there at the Vacuum field, and that will consist of recycled CO_2, hydrocarbon gases that cannot be processed out and other non-marketable gases.

Q. Okay, Exhibit Number 15, now, this represents the active water injectors to be converted into CO_2 injectors

or gas injectors, and it looks like you've got 25 of these wells; is that correct?

A. Yes.

Q. Okay. And then you have one producing well being converted to a CO_2 injector.

What about those other water injection wells? What are these showing? What are you representing here?

MR. CARR: Mr. Stogner, this exhibit was prepared by a subsequent witness --

EXAMINER STOGNER: Oh --

MR. CARR: -- who will go through this in detail.

EXAMINER STOGNER: -- did I get ahead of myself? I'm sorry. That's right, we only did Exhibits 1 through 12.

MR. CARR: 1 through 12, yes, sir.

EXAMINER STOGNER: I'm sorry.

MR. CARR: I think we can cover all of that with --

EXAMINER STOGNER: I'm sorry, I just -- I apologize.

Okay, I have no further questions of this witness.

You may be excused.

MR. CARR: Mr. Stogner, at this time we call Darrell Carriger.

DARRELL J. CARRIGER,

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Would you state your name for the record?

A. Darrell Jeffrey Carriger.

Q. Would you spell your last name, please?

A. C-a-r-r-i-g-e-r.

Q. Where do you reside?

A. In Midland, Texas.

Q. By whom are you employed?

A. Texaco Exploration and Production.

Q. And what is your position with Texaco?

A. I'm a production engineer.

Q. Mr. Carriger, have you previously testified before this Division?

A. No, I have not.

Q. Would you summarize your education for Mr. Stogner?

A. I've got a bachelor of science degree in mechanical engineering from the University of Alabama. In addition to that, this last October I passed the professional engineering exam in the State of Texas. Due to the timing of that process, I still -- I've received

notice that I did pass, but I do not have the official certification yet and a number.

Q. So you're a registered petroleum engineer, sort of?

A. I've met all of the requirements in the State of Texas, yes, but I don't have the certificate in hand yet.

Q. Summarize for Mr. Stogner your work experience.

A. Okay, I started with Texaco in 1994 in Hobbs, New Mexico. For 22 months I worked as an engineering assistant. In this job I performed regulatory duties for our operation in southeastern New Mexico and light production engineering duties for training purposes.

At the end of that period I was promoted to production engineer, full time, and I've remained in that position for five years. I've worked the Buckeye area for three years and the deep gas well Carlsbad area for two.

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

A. Yes, sir, I am.

Q. Are you familiar with Texaco's plans to implement a CO_2 flood in the Vacuum-Grayburg-San Andres Pressure Maintenance Project area?

A. Yes.

Q. Have you reviewed the status of each of the wells in the areas of review that penetrate the injection

interval?

A. Yes, I have.

Q. Are you the person who prepared the C-108 Application for this project?

A. Yes, sir.

Q. Are you prepared to share the results of your work with Mr. Stogner?

A. Yes.

MR. CARR: Mr. Stogner, at this time we'd tender Mr. Carriger as an expert witness in petroleum engineering.

EXAMINER STOGNER: Mr. Carriger is so qualified.

Q. (By Mr. Carr) Would you identify first what has been marked as Texaco's Exhibit 13? And then I think it would be useful for you to work through the exhibit and just explain how it's organized.

A. Okay. In this binder is our official C-108 form. It's behind Tab Number 1. And the way I organized this was to try to follow the same flow as the form. So for each numbered item on the form, there's a tab that corresponds to that, whatever information is requested under that item.

So just for example, if you look at Item Number 5 on the form, it asks for the map of the review area. We go to Tab Number 5, and there's your map. Okay, as far as -- That's the way it's organized.

As far as the information therein, the

predominant information in the bulk of this whole thing is wellbore information within that wellbore review. In addition to that, the injection well data sheets and the injection wellbore diagrams.

Getting back to the wellbores that penetrate the injection interval that are in the review area, I've got that organized by different units. As you can see, those tabs, behind Tab 6, first of all there's list of all the wells in that project area, and I think there was about 240-some-odd of them.

After that list, there's -- that's where the tabs start, and we have wellbore diagrams for each well in that review area. And I say wellbore diagrams. We have wellbore diagrams for the wells that Texaco operates. There's wells, obviously, that Texaco does not operate. I put that construction data of those wellbores in tabular form, in accordance to the C-108.

Q. And in doing this, you have basically used the same format that was used in the formation of, and approval of, the unit to the north --

A. Yes.

Q. -- the State 35?

A. The State 35. I had researched what they did, what they presented in their C-108, and they presented all their wellbore data in the review area in tabular form, and

I kind of mimicked their format there.

Q. You also have in the exhibit a section that sets out all the required information on plugged-and-abandoned wells --

A. Yes, sir.

Q. -- both in tabular and schematic format; is that correct?

A. Yes, sir. The last section within Item Number 6 contains the P-and-A'd wellbores, and this, we tried to include wellbore diagrams and -- Well, we did include wellbore diagrams, and the actual C-103 subsequent notice that explains the P-and-A procedure.

Q. Mr. Carriger, when I look at this exhibit and the way you've broken it down, a number of the wells are in other units which recently have been approved either for water injection or for CO_2 injection; is that correct?

A. That is correct.

Q. In preparing this exhibit, have you gone through the information on each of the wells to confirm that what you have in this exhibit is current and accurate as the wells stand today?

A. Yes, I have reviewed all the wells, and everything has been updated.

Q. So what we have here is not just forms that were filed, say, with the Central Vacuum Unit, but you've

checked them and revised them, and what we have here today is accurate?

A. Yes, sir.

Q. In your opinion, having looked at this information, are wells in the project area properly completed and cased so as to prevent any problem with these wells, either the injectors or the producers?

A. Yes, they are.

Q. Have you reviewed the data available on all wells within the area of review?

A. Yes.

Q. And are you satisfied that there's no remedial work required on any of these wells to enable Texaco to safely conduct CO_2 injection operations?

A. Yes, I am satisfied that no remedial work is necessary.

Q. What is the current status of the wells Texaco is proposing to utilize for injection in this CO_2 project?

A. Okay, we have got 25 -- Well, we are requesting 26 total wells: 25 of those are active water-injection wells and one of them is a producing well that will be converted.

Q. Why don't we go to what has been marked as Exhibit Number 14, and if you would identify that first and then review the information on this exhibit and revise it

for us?

A. Okay. This is simply a tabulation of the wells in our target area in the Vacuum-Grayburg-San Andres.

Q. This was Exhibit A to the actual written Application we filed with the Division --

A. Yes.

Q. -- is that right?

Okay, and there are certain things that need to be changed or --

A. Yes.

Q. -- if necessary. Would you do that?

A. Well, first of all on the left column we've got the producers within the target area. It's got the well number and the API number. We made some modifications to this list. Wells -- I'm looking at the producer column.

Wells 1, 2 and 3 have been P-and-A'd.

Well 58 has been P-and-A'd.

Well 59 was a typo; that's supposed to be 159.

And Well 122, that's the one producing well that will be converted to an injection well.

On the other column, the injector column, Well Number 68 has been P-and-A'd. And we include this for clarity with our Application so we know exactly what we're asking for, which wells we're talking about.

Q. So we have 25 active injection wells, and we have

one producing well that will be converted to injection?

A. That is correct.

Q. And we have, after you take out the plugged-and-abandoned wells, 47?

A. Forty-seven producing wells.

Q. Okay. How does Texaco monitor wells in this area to ensure the integrity of the wellbore?

A. Okay, when we convert these injection wells to CO_2, we will install an automation system similar -- well, it's identical to the one that we have on the adjacent Central Vacuum Unit injection wells. This automation system will monitor backside pressure, casing pressures. And we will set flags in there. We have 500 pound set on the Central Vacuum Unit, and we'll have that on the Grayburg wells also.

So whenever -- If ever the pressure on the back side exceeds that flagged amount, the well will automatically be shut in by the automation.

Next, we conduct monthly Bradenhead surveys on the injection wells. We do one annual Bradenhead survey that's witnessed by a representative of the OCD. That's on the injection wells. On the producing wells, we just do one Bradenhead survey per year that's witnessed by an OCD representative.

In addition to that, we conduct wellbore

integrity tests. And we do this at a minimum of every five years. And we chart those and we submit that information to the Commission Office.

And finally, we have a pumper that will actually go by and visually inspect the well every day. And we have a lot of -- It's clear that we have a lot of redundancies in the way that we check to ensure the integrity of these wellbores, and this is done just to -- well, I guess just to ensure the integrity of the wellbores.

Q. Are you satisfied that your proposal to inject CO_2 in this area and the procedures in place to monitor the integrity of the wellbore will ensure that there's no threat to any underground fresh water?

A. That's correct, I'm satisfied.

Q. Are there freshwater zones in this area?

A. Yes, there are.

Q. And what are they?

A. The Ogallala, the base is approximately 220 feet, depending on where you are in the field, as the primary source of drinking water in that area.

Q. And are there freshwater wells within a mile of any of the proposed injection wells?

A. Yes, if you refer to Tab 11 in the C-108, there's the Grayburg Water Supply Wells 1 and 2, accompanied with the water analysis from our chemical company.

Q. And there are a number of monitor wells in the area that monitor fresh water; is that correct?

A. That's correct.

Q. And does Texaco prepare and file with the Division annual Vacuum water flow reports?

A. Yes, we do. We have 83 monitoring wells out there. Our freshwater wells, some are test wells, some are potash wells, some are for the utility company, some are rancher's wells. We perform chloride testing on all these wells across the field, and we submit that data to the Commission on an annual basis.

Q. There were problems with water contamination in this area in the past, were there not?

A. Yes, there were.

Q. And this effort is part of the method to stay ahead of and monitor this situation that was worked out with industry and OCD; is that correct?

A. That's correct.

Q. And by using these procedures and the monitor procedures that you've discussed, are you satisfied that Texaco stays aware of the status of all wells in the area and is advised as to the potential, or lack thereof, for crossflow in the wells in this area?

A. Yes.

Q. In your opinion, are there sufficient procedures

in place to assure that by the implementation of this CO_2 flood there will not be a threat to fresh water?

A. Yes.

Q. And you have examined the geologic and engineering data available on this reservoir, have you not?

A. That is correct.

Q. As a result of that examination, have you found any evidence of open faults or hydrologic connections between the injection interval and any source of underground drinking water?

A. I've found no evidence of any of those items.

Q. Mr. Carriger, what is the source of the carbon dioxide you intend to inject in this unit?

A. Okay, the source is, there's -- The actual source is from southern Colorado. The CO_2 comes down -- We have a pipeline, and we have an agreement with that pipeline. The problem that we have is that we haven't secured our transporter yet to get CO_2 to our area. We do have the actual source under contract, though.

Q. So you've got -- source supply, McElmo Dome, is that where it's from?

A. Yes.

Q. And that's under contract?

A. Yes.

Q. And you're working on the transportation part of

the agreement to bring the CO_2 to this area?

A. That's correct, and that's with Trinity CO_2 pipeline.

Q. And then you will be not only injecting that new CO_2, but will you inject any produced CO_2 as you implement the project?

A. That is correct. As Britton mentioned, we will inject recycled CO_2.

Q. What is the average volume that Texaco proposes to inject in these wells?

A. Okay, the average is 3.5 million per day.

Q. And what would be the average water injection when you're in a water-injection mode?

A. Approximately 1000 barrels per day.

Q. Now, what is the source of the water you will be injecting?

A. The water is produced water from the unit.

Q. And these were average figures. What are the maximum injection loads that you would be requesting?

A. We would expect 5 million a day on the CO_2 and approximately 2500 barrels per day on the water.

Q. Will pressure information be reviewed by a subsequent witness?

A. Yes, it will.

Q. Were Texaco Exhibits 13 and 14 either prepared by

you or compiled at your direction?

A. Yes.

MR. CARR: Mr. Stogner, at this time we would move the admission into evidence of Texaco Exhibits 13 and 14.

EXAMINER STOGNER: Exhibits 13 and 14 will be admitted into evidence at this time.

MR. CARR: That concludes my direct of Mr. Carriger.

EXAMINER STOGNER: I've been waiting for a long time to have Mr. Carriger up here.

EXAMINATION

BY EXAMINER STOGNER:

Q. Tab Number 3, your injection well data sheet, what will be done to these wells, or will there be any modification of these wells to handle the CO_2 as far as the completion of the wells?

A. Okay, when we convert, what we typically do is, we use 2-3/8 dual-line tubing, and dual-line is fiberglass interior coating of the tubing.

In addition to that, we'll be using Guiberson G-6 packers. And this particular packer works well with the CO_2 environment because it is also dual-lined. It's got the fiberglass coating on the inside of the mandrel of that particular packer. Externally, all the surfaces on the

external of that packer are nickel-coated, which that metallurgy works well with CO_2 as well.

Q. Do you also work with the other CO_2-injection projects over in the Central Vacuum area?

A. Yes.

Q. How about H_2S environment? Why don't you kind of expound on that a little bit? Is there any found over there? And what kind of problems have you encountered?

A. Well, the H_2S -- These are both mature waterfloods, and the CVU is at CO_2 now. The last survey we did on the Grayburg, on the Vacuum-Grayburg-San Andres, showed 58,000 parts per million of H_2S. It's an extremely corrosive environment.

What we do to mitigate this environment is, we have a very aggressive chemical program. On some of these wells, depending on the volume of liquid that they produce per day, we pump chemical down the back side, which a chemical truck will pump these, and they're called batch treatments. And we do these as often as twice a week in some of the higher-volume wells.

What this chemical is, it's an oil-soluble amine, and basically it goes down and it coats -- You pump it down the back side, and it gets circulated up through your subsurface production equipment. It adheres to your equipment and creates an actual barrier between your

corrosive reservoir fluids and your equipment.

So as far as any changes in our chemical program, there's not really any with the corrosion side, because we're already in a 58,000-parts-per-million environment. It's not going to get much worse with the introduction of CO_2. We will continue that corrosion plan on the Grayburg.

You asked for what else happens. One part of our standard operating procedure that will change quite a bit is the way we do our scale squeezing. Once you go to CO_2, you get a lot of presence of calcium sulfate on your formation face and on your equipment. As you know, calcium sulfate is not soluble by acids. You have to go in and pump some kind of bicarbonate to convert that, then go in with the acid job. It converts it to something that's acid-soluble, then you go in and pump the acid, and that will clean that up.

So we will have to go to a more aggressive scale-squeeze program to prevent that from happening, and then when we aren't able to prevent it, we'll have to go in with these more elaborate cleanup jobs.

Q. With the introduction of the CO_2 out here, aren't you going to have more of a corrosive environment in combination with the H_2S and the carbonic acid that's going to be formed?

A. Yes, it will no doubt be more corrosive, but it's

so corrosive already that, you know, we're already treating these wells twice a week.

Q. But there's no other plan of treatment that you have had to do over in the Central Vacuum area, other than what you're doing now?

A. No. What I just told you is based on the experience we have from the CVU.

Q. Okay, I want to make sure that I'm understanding correctly on the wells in the area of review, because they're quite comprehensive here. How many wells are in this area of review that penetrate the injection interval, roughly? You've mentioned 240, but I didn't know if that was the Texaco wells --

A. No.

Q. -- and then the Vacuum-Grayburg-San Andres Unit.

A. Okay, referring back to my list here, there's 244 wells total --

Q. What list are you referring to?

A. Go to Tab 6 --

Q. Tab 6, okay.

A. -- behind the cover page.

Q. Okay. This is the total number of wells?

A. Yes, sir.

Q. Okay, so then this represents your 240-plus?

A. Yes, sir.

Q. And all of these wells have penetrated this zone?

A. Yes, sir.

Q. And then you broke these 240 wells into different segments?

A. Yes, sir. After reviewing some of these previous C-108s, I tried to make it a little more simpler to follow.

Q. Now, you mentioned, you made a statement today when Mr. Carr asked you if there was any remedial work necessary. In anticipation or whenever you were preparing this information, when Texaco was planning on this, was there any remedial work done on any of these wells so that you can make this statement today?

A. No, there was not.

Q. Is that because -- I guess there's active injection out there anyway. This is not a new area as far as injection of any kind?

A. That's correct, we're constantly working on wells.

Q. And I'm referring to -- or at least I'm looking back through Tab 7. This has something to do with the proposed operation. the injection system is closed. Will there be a new facility out there on this Vacuum-Grayburg-San Andres Unit that processes or brings in the CO_2 and compresses it, or will you utilize the facilities that's already available over in the Central Vacuum Area?

A. We have a plant on the CVU that will handle all the processing of the CO_2.

Q. In the CVU, that's the --

A. The adjacent property.

Q. The adjacent one.

A. Yes, sir.

Q. So you'll just utilize those facilities, or utilize that facility to process your CO_2 and then pipe it over?

A. That is correct.

Q. And the unit agreement, I'm assuming -- maybe even the previous witness can answer that -- that charge, then, will be distributed or at least charged against the unit agreement; is that correct?

MR. McQUIEN: Okay, the plant is not a CVU or a Central Vacuum Unit property. It is an individual entity that contracts processing to each individual lease, so both leases will be supplied in kind. There is no swapping of gas between units; everything is an in-kind supply. What the unit agreement does, or this lease-line agreement, is, it allows for the measuring of that gas, how that gas is going to be measured to be supplied in kind by both leases.

EXAMINER STOGNER: Okay, but there is a charge from this separate entity on the supply of the CO_2?

MR. McQUIEN: Yes, there's actually -- The

purchased CO_2 will come from the pipeline. We will pay another supplier for that. And what we produce, we pay a charge to the plant per MCF, plus there's a split on the liquids processed out at the plant, and that is --

EXAMINER STOGNER: But that charge is reflective just for the Vacuum-Grayburg-San Andres Unit, as is the Central Vacuum-San Andres Unit?

MR. McQUIEN: Yes, that --

EXAMINER STOGNER: You're not charging both of them, are you, equal amounts?

MR. McQUIEN: Yes, it will be --

EXAMINER STOGNER: You're not doubling the --

MR. McQUIEN: No, we're not doubling the charge.

EXAMINER STOGNER: Oh, okay.

MR. McQUIEN: The gas will be split between what Grayburg wells produce. It's separate contracts between the CVU and the Grayburg. What the Grayburg wells produce will be credited back to the Grayburg wells, and what the Central Vacuum Unit wells produce will be credited back to the Central Vacuum.

EXAMINER STOGNER: Okay. What do you anticipate the price of CO_2 in MCF will be?

MR. McQUIEN: Our current price or --

EXAMINER STOGNER: Yes. What are they charging you, and what --

MR. McQUIEN: We pay 50 cents an MCF, plus a transportation fee for CO_2.

EXAMINER STOGNER: Okay. Is that fairly well consistent? Constant, I should say?

MR. McQUIEN: Actually, that's a confidential --

EXAMINER STOGNER: Okay, I will get away from that, then. I could pursue it and hold you under, because you are -- you have taken a sworn statement, but I won't go into that. I have elected to stay away from that.

Q. (By Examiner Stogner) Okay, Tab Number 11, let's talk about the fresh waters for a little bit. Now, these are -- The wells depicted on this map are the freshwater wells within this -- What am I looking at? What sections am I looking at?

A. (By Mr. Carriger) Section 1 and 2 on the map, behind Tab 11, the bulk of the Grayburg.

Q. And these wells shown are supply wells for your injection purposes, or Texaco's and other parties' injection; is that correct?

A. They're inactive, we don't use them.

Q. Okay, but they are active --

A. Yes --

Q. -- water wells?

A. -- uh-huh.

EXAMINER STOGNER: I find no need of

interrogating Mr. Carriger any further, Mr. Carr. You may be excused, sir.

MR. CARR: He's disappointed.

At this time, Mr. Stogner, we call Steve Guillot.

STEPHEN N. GUILLOT,

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

DIRECT EXAMINATION

BY MR. CARR:

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

A. Stephen N. Guillot.

Q. And would you spell your last name, please?

A. G-u-i-l-l-o-t.

Q. Where do you reside?

A. Midland, Texas.

Q. By whom are you employed?

A. Texaco Exploration and Production, Inc.

Q. And what is your current position with Texaco?

A. I'm a production engineer in the Hobbs operating unit.

Q. Have you previously testified before this Division?

A. I haven't.

Q. Would you summarize your educational background for Mr. Stogner?

A. Yes, I received a bachelor's degree in civil engineering from the University of New Orleans in 1980 and in 1994 received a master's degree in petroleum engineering from the University of Texas at Austin, and I've been a registered professional engineer in the State of New Mexico since 1986.

Q. Could you review your work experience for the Examiner?

A. I've worked for Texaco for 20 years. Fourteen of those years I've spent working in the Permian Basin, the other six years were spent in the Gulf Coast area, and I've worked the Vacuum field as a production engineer for about the last nine months, and I'd also previously worked the Vacuum field in the 1980s as a reservoir engineer for about three years.

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

A. Yes, I am.

Q. Are you familiar with the plans to implement a CO_2 flood in the Vacuum-Grayburg-San Andres Pressure Maintenance Project area?

A. Yes.

Q. Have you made an engineering study of the unit, particularly focused your work on the pressures necessary to effectively implement the CO_2 flood?

A. Yes.

Q. Are you prepared to share the results of this effort with Mr. Stogner?

A. Yes.

MR. CARR: Mr. Stogner, at this time we tender Mr. Guillot as an expert witness in petroleum engineering.

EXAMINER STOGNER: Mr. Guillot -- I hope I'm pronouncing that right -- is so qualified.

Q. (By Mr. Carr) Initially, would you identify what it is you've studied in preparation for your presentation here today?

A. I have studied the injection pressures, the current injection pressures under which we are injecting water in the waterflood at the Vacuum-Grayburg-San Andres Unit and the pressures that we would need to inject CO_2 under a CO_2 flood.

Q. Let's go to Texaco Exhibit 15, and I ask that you first identify it and then review the information on this exhibit for Mr. Stogner.

A. Yes, the first list on the Exhibit 15 is the 25 injection wells that we're currently injecting water, and basically what we are asking for is a pressure limit for CO_2 injection, which would be the lesser of either 1850 pounds or 350 pounds above the existing water injection pressure.

There's also one active producing well to be converted to CO_2 injection. We're currently requesting a water injection pressure for that well point conversion equivalent to the standard .2-p.s.i.-per-foot injection pressure for new water injectors, and a CO_2 injection pressure which would be 350 pounds above that.

And as previously asked, the last nine wells on this list are simply the other injection wells on the western of the Vacuum-Grayburg Unit. That information is just for information only, and they're not really germane to this request, or they're not part of the target area.

Q. And those are out of the target area, and they're just included for information purposes?

A. That's right.

Q. If I look at the column that says "NMOCD Pressure Limit (Water)", some of them have an "N/A", not applicable, notation there. What does that indicate?

A. Those were the original 11 injection wells from the original approval of the pressure maintenance project for the Vacuum-Grayburg-San Andres Unit, and there was no pressure limit specified for water injection on those wells.

Q. If we look at that column, we have either of those wells that were initially approved in waterflood was authorized by the OCD, and then we have various other

pressures that are indicated, some of these much higher than basically what we're requesting here today. How were those established?

A. Those were established through step-rate testing of the injection wells in determination of what the parting pressure was from that step-rate test and approved by the OCD.

Q. Could you summarize what Texaco seeks in regard to these currently approved water injection pressures?

A. We seek -- For the current water injectors, we seek no change in the pressure limit for water. What we're asking for is 1850 pounds for nearly all the wells for CO_2 injection, with the exception being where the -- adding 350 pounds to the current water injection pressure would be less than the 1850. And the reason for the 1850 is, that is the currently supply pressure from the pipeline for CO_2.

Q. When we look at the Number 26 well, the producing well that's going to be converted to injection, you initially are requesting for water 860 pounds. Do you anticipate that you could conduct step-rate tests on that well to establish what is the appropriate injection pressure for that well?

A. Yes, we would want to do that.

Q. And what is the reason for seeking this pressure increase for CO_2?

A. The CO_2 is a less dense fluid than water, and basically by adding 350 pounds we are getting roughly the same bottomhole pressure under an injection situation that we would have with water. In this case, it would be with water at 1500 pounds. There's about a 350-pound differential between the two.

Q. Can the injection pressures for both CO_2 and water be increased as you're requesting, without damaging the formation?

A. Yes, they can.

Q. And you're actually, when we look at this, only seeking an increase in pressure for a fairly limited number of wells in this target area; is that correct?

A. That is correct.

Q. In your opinion, is there any potential risk in terms of injection fluid getting out of zone or otherwise damaging the formation if these pressure increases are, in fact, approved?

A. I believe there's no risk.

Q. Are these pressures comparable to what has been approved for wells in the offsetting Central Vacuum Unit?

A. Yes, they are.

Q. In your opinion, will approval of this Application and the implementation of a CO_2 flood in the Vacuum-Grayburg-San Andres Unit at the pressures requested

be in the best interest of conservation, the prevention of waste and the protection of correlative rights?

A. Yes.

Q. Was Texaco Exhibit Number 15 prepared by you?

A. Yes, it was.

MR. CARR: At this time, Mr. Stogner, I move the admission into evidence of Texaco Exhibit Number 15.

EXAMINER STOGNER: Exhibit Number 15 will be admitted into evidence.

MR. CARR: And that concludes my direct examination of this witness.

EXAMINATION

BY EXAMINER STOGNER:

Q. What does Texaco consider as the reservoir pressure, overall, the whole project, at this point, at this time?

A. We've found the reservoir pressure varies significantly from one area of the flood to the others in the Central Vacuum Unit. In the Vacuum-Grayburg Unit we think that's the same. In some areas we may have over 2000 pounds' reservoir pressure, in some we may have as low a 1000.

Q. So it ranges anywhere from 2000 to 1000, depending on your area there?

A. That's, right, and that's based on some, you

know, fairly rough determinations also, just from standing fluid levels in the wellbore, those kind of things.

Q. So is it my understanding that your requesting this pressure limit of 350 plus is due to the pipeline pressure? Is that what I'm hearing?

A. No, no, no, that's -- The 350 pounds' additional pressure at the surface basically allows us to compensate for the lower hydrostatic pressure in the well due to the lower density of CO_2 and give us the same bottomhole injection pressure that we would get with 1500 p.s.i. for water. So the ΔP at the formation face, Δ pressure at the formation face, would be the same.

Q. Well, what will be the pressure of the supply line of the CO_2 gas coming into the project area?

A. Right now it is running about 1850 p.s.i.

Q. Okay.

A. And with friction losses it may be a little bit lower by the time it actually gets to the well.

Q. Okay. Now, are these pressure limits that you're requesting, is that wellhead pressure limit?

A. Yes.

Q. Okay. Now, on those that you're requesting a lower than 1850, how do you bring that pressure down at the wellhead?

A. Every well will have an automatic choke at the

wellhead to control the pressure, and if the pressure ever exceeds that downstream of the choke, the choke will close until the pressure is back to within an acceptable level.

Q. Do you anticipate any time in the near future a request to increase this from 350 to, say, something else? Or do you see a need of it?

A. Right now I can't see a need to do that.

Q. Okay, so that's going to be sufficient to get this -- Will this be a continued injection, or will it be a -- turn the CO_2 on, let it pressure up and then turn it off? Or is this going to be a continued injection?

A. It will be a continuous injection of CO_2 until, as dictated by economic conditions, that we would want to go to a WAG situation to try to control gas production.

Q. Okay. Initially, the CO_2 injection, will that be pure CO_2, or will you introduce the by-product gas initially?

A. Initially it will be pure CO_2 from the pipeline, until we start getting a significant amount of CO_2 in the produced gas, that would have to be sent to the CO_2 plant.

EXAMINER STOGNER: No other questions. Thank you, sir.

THE WITNESS: Thank you.

MR. CARR: Mr. Stogner, that concludes our presentation in this case.

We would request that following the hearing we be permitted to secure and submit to you a letter from the Commissioner of Public Lands concerning what we believe will be their support for the project.

And other than that, that concludes our presentation.

EXAMINER STOGNER: Thank you, Mr. Carr, and I'll leave that up to you to provide that information, and I'll leave the record open pending that particular information. But I don't see any need further, we can take this under advisement at this time.

And as opposed to me asking for a rough-draft order, I would ask your assistance from time to time. And one of the things that I see that I would like for you to address -- not now but at a later time -- on these lease-line injectors --

MR. CARR: Yes, sir.

EXAMINER STOGNER: -- will we need to make a separate paragraph or perhaps modification in the order to account for that Phillips --

MR. CARR: I will, Mr. Stogner. I've already made notes on what a finding on that might need to contain.

EXAMINER STOGNER: Good.

MR. CARR: And the prior orders have contained as Exhibit A a list of the wells that are subject to the

order, providing their locations and their API numbers, and we will prepare that for you.

The Exhibit A that I attached to the Application, as Mr. Carriger pointed out, there were several errors in that. And so that we don't have confusion later, I think it would be appropriate for us to file a revised exhibit that is in the form of the Exhibit A's on previous CO_2 orders. We'll do that.

EXAMINER STOGNER: I'd like that, and I'd like to also work with you in preparing this where I will come to you and feel free to come to you and ask for your assistance, I'm having trouble with this wording, as opposed to just getting a rough draft --

MR. CARR: Yes, sir --

EXAMINER STOGNER: -- and working --

MR. CARR: -- and we'll be happy to draft any portion of this you desire.

EXAMINER STOGNER: And I think that's very conducive to this, since it's not an objected case --

MR. CARR: Yeah.

EXAMINER STOGNER: -- assuming that the Land Office is not going to have a problem here.

MR. CARR: Yes, sir.

EXAMINER STOGNER: If they do have a problem, then we can just throw everything away at this point.

With that I also -- There I'm just asking for your assistance.

MR. CARR: Yes, sir.

EXAMINER STOGNER: If there's nothing further in Case 12,592, we'll take this under advisement, pending the additional notification information.

With that, this hearing is adjourned.

(Thereupon, these proceedings were concluded at 11:30 a.m.)

* * *

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 14th, 2001.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 2002