STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

COPY

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

APPLICATION OF ENERVEST OPERATING LLC TO AMEND THE UNIT AGREEMENT AND THE UNIT OPERATING AGREEMENT FOR THE WEST LOCO HILLS GRAYBURG NO. 4 SAND UNIT, AND FOR STATUTORY UNITIZATION, EDDY COUNTY, NEW MEXICO — CASE NO. 14242

APPLICATION OF ENERVEST OPERATING LLC FOR EXPANSION OF THE WATERFLOOD PROJECT FOR THE WEST LOCO HILLS GRAYBURG NO. 4 SAND UNIT, EDDY COUNTY, NEW MEXICO — CASE NO. 14243

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID K. BROOKS, Legal Examiner
WILLIAM V. JONES, Technical Examiner
TERRY G. WARNELL, Technical Examiner

December 4, 2008

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID K. BROOKS, Legal Examiner, WILLIAM V. JONES, Technical Examiner, and TERRY G. WARNELL, Technical Examiner, on Thursday, December 4, 2008, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico.

REPORTED BY: JOYCE D. CALVERT, P-03
Paul Baca Court Reporters
500 Fourth Street, NW, Suite 105
Albuquerque, New Mexico 87102

A P P E A R A N C E S

FOR THE APPLICANT:

James G. Bruce, Esq.
ATTORNEY AT LAW
P.O. Box 1056
Santa Fe, New Mexico 87504

MR. JONES: Okay. Let's go back on the record, and let's call Case 14242, Application of EnerVest Operating LLC to Amend the Unit Agreement and Unit Operating Agreement for the West Loco Hills Grayburg No. 4 Sand Unit, and for Statutory Unitization, Eddy County, New Mexico.

Do you want to combine the two cases?

MR. BRUCE: Yes.

MR. JONES: Okay. Let's also call Case No. 14243, Application of EnerVest Operating LLC for Expansion of the Waterflood Project for the West Loco Hills Grayburg No. 4 Sand Unit, Eddy County, New Mexico.

Call for appearances in both cases.

MR. BRUCE: Mr. Examiner, Jim Bruce of Santa Fe representing the application. I have three witnesses.

MR. JONES: Any other appearances?

Will all witnesses please stand and state your names one after another?

MR. BLAKLEY: Duane Blakley.

MR. KOWALCZYK: Gary Kowalczyk.

MR. LEE: Robert Lee.

[Witnesses sworn.]

DUANE BLAKLEY

after having been first duly sworn under oath, was questioned and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Mr. Blakley, would you please state your full name and city of residence and maybe spell your last name for the court reporter.

A. Duane Blakley, Houston, Texas. And it's B-l-a-k-l-e-y.

Q. Who do you work for and in what capacity?

A. I'm a senior landman for EnerVest Limited.

Q. And have you previously testified before the Division?

A. No.

Q. Would you please summarize your educational and employment background including some of your oil and gas employers for the record, please?

A. I've got a BA and a JD from the University of Texas; an MBA from the University of St. Thomas; I've been in private law practice; I've been an attorney for various oil companies, including Sohio; an independent landman; a contract landman working for Exxon, BP, Amoco, numerous others; vice president of oil and gas trust with Ross Bank; and land manager and senior landman.

Q. And does your area of responsibility at EnerVest include this part of southeast New Mexico?

A. Yes.

Q. And are you familiar with the land matters involved in these applications?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Mr. Blakley as an expert petroleum landman.

MR. JONES: Mr. Blakley should look a lot older with this resume. So let's qualify Mr. Blakley as an expert in petroleum land matters.

Q. (By Mr. Bruce): Mr. Blakley, would you please summarize what EnerVest seeks in these two cases?

A. In Case 14242, EnerVest seeks to amend the unit agreement and unit operating agreement and statutorily unitize all interests in the unitized Grayburg formation underlying the 5,307.73 State, federal and fee lands.

In Case 14243, we seek to expand the waterflood project for the unit.

Q. And what is the unitized interval?

A. The unitized interval is the underground reservoir, the top of which is found at 2,767 feet, and the base, which is found at 2,792 feet, on the gamma ray neutron log of the Newmont-Ballard Well No. B-6 located in the SE/4, SW/4, NE/4 of Section 1, Township 18 South, Range 29 East of Eddy County, New Mexico, together with the Grayburg Sands stringers encountered at varying intervals between the depths of 100 feet above the top and 50 feet below the bottom of the

principal sand body shown by the log insofar as the same areas lies within the geographical boundaries of the unit.

Q. And the unitized formation will include all stratographic subsurface points through the unit?

A. Correct.

Q. Okay. Let's go into the -- there is an existing unit here, correct, Mr. Blakley?

A. There is an existing unit and the definition is from that original unit.

Q. And referring to Exhibit 1, what is the history of this unit?

A. The unit was actually formed about 1962. It was approved in Case No. 2472 by the Commission Order No. R-2166, which is marked Exhibit 1, I believe. Waterflood operations have been conducted in the unit since that time.

MR. BRUCE: Mr. Examiner, I've highlighted a couple of things. As Mr. Blakley has testified, the correct acreage is 5307.73 acres. The original was listed 5320. But there are some lots in Section 7 and 18. So that is the acreage discrepancy.

Q. (By Mr. Bruce): Was the unit agreement approved by the Bureau of Land Management and the State Land Office in 1962?

A. Yes.

Q. And are Exhibits 2 and 3 copies of the original

unit agreement and the unit operating agreement?

A. Yes.

Q. Was this unit formed before Statutory Unitization Act was enacted?

A. Yes, it was. Joinder in the unit was voluntary.

Q. And because it was voluntary, was participation based on participating areas?

A. It was. In 1964, all lands within the unit area were committed to the participating areas.

Q. Okay. And is Exhibit 4 the document and approval which expanded the Grayburg participating area to encompass the entire unit area?

A. It was.

Q. And this was approved by all the pertinent governmental agencies, was it not?

A. That's correct.

Q. And because the participating area encompassed the entire unit, were any lands eliminated under the old unit agreement?

A. No, they weren't.

Q. Would you identify Exhibit 5 and describe its contents for the Examiner?

A. Exhibit 5 is the land plat which outlines the unit area and identifies the separate tracts which comprise the unit area. Attached to the plat is a legal description of the

entire unit area. There are 43 main tracks with subtracts 54 in the unit. EnerVest operates all the unit area.

MR. BRUCE: And Mr. Examiner, I do have the exact property description sitting in my office. It seems to be a theme here today.

MR. JONES: It's in the application, isn't it?

MR. BRUCE: It is in the application, I think. But I do have an up-to-date description. Mr. Examiner, for your information, you might want to set this aside later. I believe that some of the data on this, Mr. Lee, the engineer, will be testifying about. It's easier to look at this plat than the one that is in his exhibit.

By the way, Mr. Examiner, Exhibit 5-A is simply the original land plat for unit area from the original Division hearing. So you can compare the two to see that they are the same.

Q. (By Mr. Bruce): Again, Mr. Blakley, the unit area already exists. Why is EnerVest here today?

A. We purchased the property with the intent to redevelop the waterflood project in the unit. The redevelopment could potentially encompass about 124 injection wells, 96 producing wells and expenditures over $100 million.

When the unit was formed, it was voluntary and about 10 percent of the royalty interest owners and 10 percent of the working interest owners did not ratify the unit. Because this

project is expensive, EnerVest wants to ensure that all interest owners are subject to one unit agreement, all working interest owners are subject to an updated operating agreement. As a result, we are amending both agreements.

Q. And the agreements we are using are the type that are -- especially the unit agreement -- is the type that is actually directly off the State Land Office website; is that correct?

A. It is exactly off the State Land Office website.

Q. Would you please identify Exhibit 6 for the Examiner?

A. Exhibit 6 is the proposed amended unit agreement, and it is the standard form from the State Land Office website. It describes the unit area, the unitized formation, the unitized substances, and includes all oil and gas produced from the unitized formation and designates EnerVest as operator.

Q. And what is Exhibit 7?

A. The proposed unit operating agreement which sets forth the authorities and duties of the unit operator as well as the portion of the expenses between the working interest owners.

Q. Does the amended unit operating agreement contain a provision for carrying working interest owners?

A. Yes. That would be Article 11.

Q. And does it also provide for a penalty against

any non-consenting working interest owners?

A. Yes, it does.

Q. Because New Mexico Statutory Unitization Act allow for an amended plan of unit operations?

A. Yes. Submitted as Exhibit 8 are portions of the act which specifically allow an amendment to the plan unitization. It also provides tract participation factors previously approved shall remain the same after amendment.

Q. And what are the tract participation factors?

A. If you refer back to Exhibit 4, the expansion of participating area, you'll see that it fixes participation factors for each tract. These are the factors which will be used so no one already committed to the unit will have his participation changed.

Q. Now, let's discuss ownership of tracts in the unit area. Would you -- and maybe I'll refer you back to Exhibit 6 -- would you just briefly describe tract ownership and how you determine the names of the working interest and royalty interest owners in the unit area?

A. Well, the tracts are formed according to common mineral ownership. In Exhibit 6, the amended unit agreement -- and take a look at Exhibit B-1 to that agreement -- you'll find a tract-by-tract listing of names and interests that were obtained from current Division orders, title opinions or billing records.

Q. And you mentioned Division orders. The unit has been in effect and producing for 40-some years as of this point, correct?

A. Yes.

Q. As the operator, you took over -- I believe most of the Division order files were from Yates Petroleum, one of the prior operators?

A. Yates started it, and some of them came through from -- T-Rex was the last one.

Q. Okay. Now, how many interest owners are there in the proposed unit?

A. Well, the working interests: We started out with 14. Three of those have sold to EnerVest, so we're now down to 11. Those agreements have been submitted to the BLM, and the assignment has been sent to be filed with record, but we haven't received those back yet, so those are pending.

158 overriding royalty interest owners when we started this will probably end up with more because, as we send these things out, we find some of the folks were, you know -- it's now in estate. We've got several folks we'll probably have to add to the list as we go. Sometimes the estate can sign off on it, sometimes not. And 14 royalty owners.

There's really only one tract out there that's fee land. The rest of it's either federal or State -- that would be tract 43.

Q. The fee tract?

A. Right.

Q. Let's talk about the working interest owners. Who are -- what is Exhibit 9, I should say?

A. That's all the working interest owners including the ones, I believe, that we've already purchased.

Q. And this was a proposal letter to all of the working interest owners within the unit area to join in the unit?

A. That's correct. So far Thompson has sent us back the operating agreement signed, and they didn't realize they needed to also sign on the unit agreement, so I asked them to please do that for me.

Q. Okay. And does -- skipping ahead a little bit, do Exhibits 11 and 12 contain the signatures of working interest owners to the unit agreement and the unit operating agreement?

A. That's correct. At this point, including Thompson, about 98 percent -- a little bit more on the working interest side -- have signed up.

Q. You anticipate Tompson will sign the unit agreement, also?

A. Oh, yeah. They seem to be rather anxious to proceed.

Q. And was a proposal on the unit, the amended

unitization, sent to the fee royalty plus the overriding royalty owners?

A. Yes.

Q. And is that reflected on Exhibit 10?

A. Yes.

Q. And -- go ahead.

A. We've actually sent out the notice to them. We did a second one here just recently in order to get everybody to sign up. I mean, it's -- you know, we're in third generation on a lot of this stuff. And it takes a long time to track everybody down, and they've all got small interests, and this isn't exactly on the front burner for them. We're getting them back in steadily, but not very fast.

Q. Does Exhibit 13 contain copies of the ratifications from private royalty owners received to date?

A. Yes.

Q. And approximately what percentage to date of the royalty and overriding royalties have ratified the unit?

A. Assuming that both the State and federal are going to agree, then we're a little over 70 percent.

Q. Okay. Is Exhibit 13-A the letter of preliminary approval from the Commissioner of Public Lands?

A. It is.

Q. And to date, we have not yet received the BLM -- a letter from the BLM, have we?

A. No. We've been talking with them, but no letter as yet.

Q. Okay. And is it your understanding that, under the Statutory Unitization Act, you have six months from the date of an order to obtain the required percentage ratifications?

A. Yes.

Q. Okay. And --

MR. BROOKS: I'm sorry. Did you ask him about percentage ratification obtained from the royalty interest owners?

MR. BRUCE: Yes.

MR. BROOKS: I missed it.

MR. BRUCE: Okay.

Q. (By Mr. Bruce): What is the approximate percentage, Mr. Blakley?

A. Just a little over 70 percent at this point.

MR. JONES: That's after these people -- the State and the federal --

MR. BRUCE: That's correct.

THE WITNESS: They are the bulk of it.

MR. JONES: Okay.

Q. (By Mr. Bruce): And Mr. Blakley, when we receive a letter from the BLM, will that be submitted to the Division?

A. Yes.

MR. BRUCE: And of course, Mr. Examiner, both the BLM and the State preliminarily approve it, and they don't give their final agreement until after the Division approves it.

MR. JONES: Okay.

Q. (By Mr. Bruce): Now, we've submitted the letters you've sent out, but especially with respect to the working interest owners, do the proposals on the amended plan of unitization with the working interest owners precede the letters that we submitted in the record?

A. Yes. Actually T-Rex started it, and I think they did the original letter out to the working interest owners. Then we came in and followed up. Let's see -- I think they sent it out June 6 of '08.

Q. And you referred to T-Rex. That's a company called Texas Re-exploration?

A. Yeah, Re-exploration.

Q. And in your opinion, has EnerVest made a good-faith effort to secure voluntary unitization of the amended plan of unitization?

A. Yes, I believe we have. Tompson helped us write the operating agreement, and they're the other large interest owner in there.

Q. Now, was notice of the hearing on both -- notice of the unitization application sent to all uncommitted royalty interests and working interests?

A. Everybody that we had an address for.

Q. And for the waterflood application, was notice sent to all of the offsetting operators and working interest owners who were within a half a mile of the proposed injection wells, the initial injection wells?

A. Yes, there was.

MR. BRUCE: Mr. Examiner -- wait a minute.

Q. (By Mr. Bruce): Mr. Blakley, when the notice first went out to the royalty interest owners, by mistake did it go out not certified?

A. That's correct.

Q. And was a subsequent certified letter sent?

A. It was.

MR. BRUCE: Mr. Examiner, at the end of these hearings, I'd like to ask that both matters be continued to December 18th because when the subsequent notice went out, it gave the December 18th notice. They received -- they were sent notice non-certified. And I would, rather than submit piecemeal, I would prefer to have Mr. Blakley submit all notices at one time.

MR. JONES: Okay.

MR. BRUCE: And Mr. Examiner, submitted as Exhibit 14 out of excess of caution, I notified a lot of overriding royalty owners, and those are in Exhibit 14. I think a lot of them did receive actual notice, but I did that nonetheless.

Q. (By Mr. Bruce): Mr. Blakley, were Exhibits 1 through 14 prepared by you or under your supervision or compiled from company business records?

A. Both.

Q. And in your opinion, is the granting of this application in the interests of conservation and the prevention of waste?

A. Yes, it is.

MR. BRUCE: Mr. Examiner, I move the admission of EnerVest Exhibits 1 through 14.

MR. JONES: Exhibits 1 through 14 will be admitted.

[Applicant's Exhibits 1 through 14 admitted into evidence.]

MR. BRUCE: No further questions of the witness.

EXAMINATION

BY MR. JONES:

Q. The reasons you gave to statute -- to convert to one of these old units to an officially statutory unit, you said approximately 10 percent did not sign the original one, and then you said to cover all your bases, and what else? Was there anything else that you can remember?

A. Well, of course, the operating agreement was originally set up for a much more diverse group. Quite frankly, we can't get the percentages required under the operating agreement to do anything. So it has to be changed in

order for us to be able to operate the thing under the terms of the operating agreement.

Q. Okay. And all the tracks produced that you -- you have the general tracts, and then they're broke up into subtracts. And that was the original tract division; is that correct?

A. Yes. They broke some of those up into subtracts because of the diverse mineral ownership. I mean, it really had nothing to do with production. It's just making sure that it was easy to pay and easy to bill.

Q. And I can ask your other witnesses about the production of the different tracts. But you said something about Yates originally had it, and then it went to T-Rex?

A. Yates had it at one time. Newmont had it at one time I think Newmont may have had it -- I think Yates had it and gave it to Newmont and maybe got it back briefly, and then so --

Q. Why is the BLM delaying here? Is it that they are just busy? What office do you talk to about this?

A. I've been talking with Carlsbad. And they've actually been moving along pretty good.

Q. Okay.

A. We've had very good conversations with them. We've been out with the archeologist, the chicken-and-lizard man, conservationist. And everybody seems to be pretty happy

over there at this point.

MR. BRUCE: Mr. Examiner, these units used to be supervised by the Roswell BLM office. And just in the last few months, supervision of the unit areas has been given to the Carlsbad office, so they are still on a learning curve, also.

MR. JONES: I knew they were beefing up that Carlsbad office with personnel. I didn't know if they had switched from Roswell for injection type applications.

MR. BRUCE: They have.

MR. JONES: But they have now, I guess?

MR. BRUCE: Yes.

MR. JONES: Okay. I'm forgetting something here.

MR. BROOKS: Well, I don't think so. I may not have understood everything, though.

EXAMINATION

BY MR. BROOKS:

Q. Are you proposing to expand the unit area compared to the unit that was originally formed?

A. No.

Q. Okay. So this is just the same unit that was originally formed?

A. Yes; same unit, same interests. Of course, the folks owning -- working interests -- have changed. I think, of course, they'll get into -- the other folks will get into it. Basically, they are going in and doing smaller blocks on the

lower flood is what they have in mind.

Q. Yeah, well, why is it necessary to do a statutory unitization if you're not -- if you're just unitizing the same area that's already been unitized?

A. Well, we're amending the unit.

Q. Amending terms of the unit?

A. Right.

Q. But you pointed out that statute says you can't amend the participation factors, right?

A. Right.

Q. So you're not amending the participation factors?

A. We're just modernizing the language so it's easier to work with.

Q. Okay. Originally it was a voluntary unit, right?

A. That's correct.

Q. Everybody signed up on this old unit agreement?

MR. BRUCE: Not everybody, Mr. Examiner.

THE WITNESS: Not everybody.

MR. BRUCE: Mr. Examiner, that's part of it. If you go to the records of the Division in the Land Office, you'll see notations that about 10 percent never joined in. So they would have to be paid on a lease basis.

MR. BROOKS: They were uncommitted tracts?

MR. BRUCE: Uncommitted. So they would have to be paid out on a lease basis.

MR. BROOKS: So you would bring them in and they would be paid on whatever was allocated. Under the new proposal they would be paid on whatever is allocated to their tract under the old proposal?

MR. BRUCE: Correct.

MR. BROOKS: But not the way they would have been paid under the old agreement?

MR. BRUCE: Yeah, the uncommitted, correct.

MR. BROOKS: Okay. I think I understand it. It's all fairly complicated.

MR. BRUCE: Plus, the other thing is that Mr. Blakley didn't note, under the old unit operating agreement -- and old unit operating agreements can be kind of odd -- it would be hard to get the voting percentages necessary just to -- and I think the other witnesses can testify about this -- even to drill injection wells or -- they spend all the money they want to spend.

MR. BROOKS: Yeah. Okay. That's all I have.

MR. WARNELL: No questions.

MR. JONES: Okay. Mr. Blakley, thank you very much. We've only got ten minutes until we break for lunch.

MR. BRUCE: I think we can put the geologist on. He told me he doesn't want to testify anyway.

GARY R. KOWALCZYK

after having been first duly sworn under oath,

was questioned and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name for the record and city of residence?

A. My name is Gary Kowalczyk. I live in Houston, Texas.

Q. And who do you work for and in what capacity?

A. I work for EnerVest Houston as a senior geologist.

Q. Have you previously testified before the Division?

A. No, I have not.

Q. Would you please summarize your educational and employment background for the Examiner?

A. I received a Master's of science degree in geology from the University of Toledo in Ohio in 1976. Since 1979, I have worked numerous projects in exploration and/or development geologist for Columbia Gas Development, Belco, Texas American Resources and now EnerVest.

Q. And does your area of responsibility at EnerVest include this portion of southeast New Mexico?

A. Yes.

Q. And have you made a geologic study of the Grayburg Reservoir in this unit, and are you familiar with the geologic matters involved in these cases?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Mr. Kowalczyk as an expert petroleum geologist.

MR. JONES: Mr. Kowalczyk qualifies as an expert in petroleum geology.

Q. (By Mr. Bruce): Could you identify Exhibit 15 for the Examiner and describe the zone that is unitized?

A. Yes, I can. Exhibit 15 is an east/west stratographic cross section across the unit area. It shows the continuity of the Grayburg 4th Sand Reservoir across the West Loco Hills unit. The thickness value shown within the boxes with the Grayburg Sand correspond to the values that were used to construct the Grayburg 4th Sand isopach map, which I'll show you soon.

Q. Okay. What is Exhibit 16?

A. Exhibits 16 is a structure map on top of the Grayburg 4th Sand Reservoir. It shows a gentle east/southeast dip of the Grayburg 4th Sand Reservoir across the West Loco Hills unit.

Q. And finally, what is Exhibit 17?

A. Exhibit 17 is the isopach of the Grayburg 4th Sand Reservoir. As I mentioned, the isopach values used to

construct this map were derived from a series of cross sections which correlated all the available well log control within and immediately offsetting the Loco Hills unit. The map shows a thick sandstone running generally east/west through the center of the West Loco Hills unit.

Q. And in your opinion, is the unit outline, even though it was previously established, justified from a geologic standpoint?

A. Yes, it is. As you can see on the isopach map, the Grayburg 4th Sand Reservoir thins towards the northwest and south boundaries of the West Loco Hills unit.

Q. The reservoir continues outside of the unit area; does it not?

A. And thins, yes. It's thinner and less.

Q. Okay. From a geologic standpoint, has this reservoir been reasonably defined by development?

A. Yes.

Q. Is the reservoir, the Grayburg Reservoir, continuous across the unit area?

A. Yes, it is.

Q. Are there any faults in this area?

A. No.

Q. Were Exhibits 15 through 17 prepared by you or under your supervision?

A. Yes, they were, directly by me.

Q. And is the granting of these applications in the interests of conservation and the prevention of waste?

A. Yes, it is.

MR. BRUCE: Mr. Examiner, I move the admission of Exhibits 15 through 17.

MR. JONES: Exhibits 15 through 17 will be admitted.

[Applicant's Exhibits 15 through 17 admitted into evidence.]

EXAMINATION

BY MR. JONES:

Q. Mr. Kowalczyk, the type log, is it on here somewhere?

A. No, but the cross section has some of the more recent logs on it, right.

Q. They're close by?

A. They're typical of the --

Q. Well, on this cross section, could you point out the unitized little sand, and then the 100 feet above and 100 feet below?

A. The unitized sand is the yellow, as I defined as yellow, interval.

Q. That's Loco Hills pay?

A. Yeah. Eight percent porosity has been cut off, and then it is 100 feet above the top of that yellow sand and 50 feet below.

Q. So it says "any sands that appear 100 feet above."

A. Yes. Stringers, mostly.

Q. So we're just talking Grayburg Sands here. We're not talking any kind of carbonates?

A. Not that I'm aware of, sir.

Q. Okay. Sands are the only producing interval, then?

A. Yes.

Q. And these -- a lot of these logs don't go much -- they don't go 100 feet below.

A. Most wells stopped as soon as they penetrated the base of that yellow sand, the 4th Grayburg Sand.

Q. The production -- the cumulative production here in this unit, and then these tract, are any of the cumulative contributed from pay zones above the unitized interval or below the unitized interval?

A. No, not that I'm aware of.

Q. So they definitely were held?

A. Most definitely.

Q. Was there any interest in zone above or below this unitized interval?

A. Not that I'm been able to find on the logs, no.

Q. Okay. And these top of pay amount, is that above sea level or below sea level?

A. That's above sea level. They're above.

Q. So we're talking elevations of around 4,000 feet or 3500 feet?

A. Topographic elevations?

Q. Yeah.

A. I think it's less than that.

MR. LEE: I think it is in that neighborhood.

THE WITNESS: Yeah. You're right.

Q. (By Mr. Jones): Do you guys intend -- you say $100 million in the new investments. What geologically are you going to do here? Are you going to do any more coring? Are you going to do some special logs?

A. I'll provide the prognoses for the depths for the drillers and correlate the logs once we log the producing wells, and then help our engineers pick the perforations and completion.

Q. So no coring or special core analysis?

A. Not that we're planning at this point. There are some cores, I believe, that are available that have been looked at by our engineers. He could probably describe them better.

Q. Are you two looking at any infill drilling?

A. Absolutely, yeah, that's the idea.

Q. Oh, okay. That's the bulk of the expense, then?

A. Right, right.

Q. So what does the existing spacing, well spacing,

and patterns look like?

A. It's not a regular pattern. It's more on a 40-acre.

MR. BRUCE: Our next witness has a map that kind of shows it. It is very well irregular.

MR. JONES: Okay.

MR. BRUCE: The reservoir itself is under statewide rules.

MR. JONES: Okay.

Q. (By Mr. Jones): So geologically, you think it needs to be infill drilled?

A. I believe so. I believe there's been success on other similar projects.

Q. So you see some intervals that might be -- that you think might be encountered that would not be encountered as --

A. That's correct.

Q. Okay. I think that's the gist of my questions.

MR. BROOKS: No questions.

EXAMINATION

BY MR. WARNELL:

Q. These five wells represented here by these logs, the ones on each end --

A. Uh-huh.

Q. -- have not been perforated?

A. That's correct, uh-huh.

Q. Did they ever produce?

A. I think the one on the far right was never perforated. The one on the far left is a deeper penetration that is completed in a deeper -- the Morrow.

Q. So this one was a dry hole?

A. Yeah, correct. Never tested.

MR. WARNELL: No more questions.

MR. JONES: Okay. Well, thank you very much, Mr. Kowalczyk.

Let's break. We will break for lunch and return at 1:15 p.m.

[Noon recess was taken from 11:40 a.m. to 1:20 p.m.]

MR. JONES: Okay. Let's go back on the record in Case No. 14123.

MR. BRUCE: Mr. Examiner, the first exhibit Mr. Lee will be testifying on is No. 18, which is a bunch of plats and charts put together.

ROBERT LEE

after having been first duly sworn under oath,

was questioned and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. Robert Lee.

Q. And where do you reside?

A. Midland, Texas.

Q. What is your occupation by profession?

A. I'm a petroleum engineer, and I'm a consulting petroleum engineer.

Q. And have you been employed by EnerVest with respect to these cases?

A. I have.

Q. Have you previously testified before the Division as a petroleum engineer?

A. Yes, sir.

Q. And were your credentials as an expert accepted as a matter of record?

A. They were.

Q. And are you familiar with the engineering matters related to this application?

A. Yes, sir.

Q. And have you studied this reservoir?

A. Yes, sir.

MR. BRUCE: Mr. Examiner, I tender Mr. Lee as an expert petroleum engineer.

MR. JONES: Mr. Lee is qualified as an expert in petroleum engineering.

Q. (By Mr. Bruce): Mr. Lee, would you refer the

Examiners to Exhibit 18 which contains a lot of data in it, and rather than me slow you down, why don't you run through and tell the Examiners what each of these plats says.

A. You bet. This is some data that we'll move through that goes over some of the reservoir characteristics, reservoir properties and historical data of the unit here.

The first map that we see with the gray outline of unit and some yellow dots on it just shows the unit outline with what the current active wells are. And right now there are 30 active wells in the unit. There's two active injection wells and 28 active producers. On Exhibit 5 that Gary had talked about earlier, they're shown as red dots on his map. On this map they're yellow dots.

The next piece of paper shows a permeability and porosity plot. In the sheet right after that, shows 12 wells and where they were located that had core data. Unlike a lot of the projects that we seem to do, there's a fair amount of core data available out here. So we're able to do some analysis, and you can see kind of what that distribution looks like on the permeability and porosity. Gary had used an 8 percent porosity cutoff which gives you about 1.5 millidarcies on that fitted line through the data.

A lot of times, I will look at stuff down to 1 millidarcy. That gives you about a 7 percent porosity cutoff on that; very good formation, very good reservoir in this unit.

You can see that there's a substantial amount of the data cloud above 10 millidarcy with a few points over 100 millidarcy. So it's a very good reservoir primary and secondary.

After those two pieces of paper, I have a reservoir description table. The reservoir -- the field was noted on here, but it was discovered in 1939, and I have a historical production plot that will show that. Here I'm just listing quite a bit of standard reservoir data that we look at.

Probably the takeaways off of this is that the initial GOR was fairly low. It was about 470 standard cubic feet per barrel, and that's based on some completion data that we had on the early wells. There was no gas reported at that time, so we can't see what the early gas production was doing. But based on the initial ITs, it was fairly low.

The average thickness throughout the reservoir -- throughout the unit -- is 22.7 feet, almost 23 feet. Porosity is a little over 16 percent, 16.3. The initial water saturation was very low out here; it was 22 percent, which gives us 77.8 percent original oil saturation. And that was verified from some of the early core work that was done, some of the work that was done there.

The average permeability from the data that we have is about 23 millidarcies, maximum 134. There's some pretty tight stuff, half a millidarcy.

Also on this sheet, I'm showing what the reserves

oil-in-place and recoveries were. The original oil-in-place that I've calculated for the entire unitized area is almost 90 million barrels. The primary EUR was a little less than nine million barrels. I'm calculating the recovery of 10 percent of the original oil-in-place on primary.

The secondary recovery to date has been 15.1 million barrels, which is another 16.8 percent for a total secondary and primary of 24 million barrels. Almost 27 percent of the original oil-in-place has been recovered. Based on some analysis that we've done, we feel like there's nearly another 10 million barrels to be recovered out here; almost 11 percent of the original oil-in-place. And that would bring the total recovery for, once again, the unitized area, up to a little less than 34 million barrels, almost 38 percent of the original oil-in-place.

And then down at the very bottom, the cumulative water injection is about 150 million barrels. The cum water production is about 56 million barrels.

The next sheet that we can look at -- this is a historical production curve for the unit starting back in 1939. The initial production in '40, '41, was about 100,000 barrels a month. It just goes on a standard primary decline. You see a little blip there in the middle and late '50s. That's when the fracing program was instituted.

A lot of these wells were completed open hole,

natural shot with nitro. In the 1950s, they had brand new technology with sand fracs, so they came in and had some success sand fracing these wells. Then it goes back on to decline, gets down to about almost 10,000 barrels a month.

And then in 1963, in actually 7/63, the waterflood starts. And you can see the increased -- the green line that shows our oil production there. And it gets up to a peak of about 150,000 barrels a month. At that same time frame on this plot in 1963, I show the water injection in the purple line there, and the injection volumes at that time was about 800,000 barrels per month.

The water production, I pick it up as starting in 1970. That's when the data, the IHS data, starts reporting water production, but you can see the water production increasing from 1970 through about 1978. Around 1980, they -- you can see the oil is on decline, starting to see breakthrough in some of these areas. From 1980 on, pretty much the injection is just comprised of the existing produced water.

Oil production declines down to about 2500 barrels a month in the early '80s and just kind of languishes in there. And then in the middle '90s, Yates came in, and there's some plugging of wells at that point in time, shutting more wells in and the oil continues to kind of drop down. Right now, it makes about 30 barrels a day.

The next plot, next page, just shows what I'm using

as my volumetric calculation. Once again, a lot of the same data we've seen on porosity water saturations. In the middle box on the oil per acre feet, I calculate about 776 barrels of oil per acre feet. And then at the third box down, looking at the net volumes, we have 5300 acres, 21.8 feet average thickness. And so I get an acre-feet number of 115,000, which, times the 776, gives us the original oil-in-place number of 89,865,000; once again, about 90 million barrels.

This is the next plot, next map, and it shows what the historical pattern was. You had asked earlier about the spacing, and if you look at the acres of the developed portion of the field and the number of wells, you're on 40-acre spacing, but it really wasn't a very regular injection pattern that they had here like you'd like to see, you know, coming in and putting in a five-spot pattern.

Some of those patterns are huge in size, over 100 acres, 150 acres in size, and so it just kind of lends itself to maybe not having the most effective and efficient sweep that you might like to see even though we had very good permeability on our rock.

And that's one of the things when we were looking at this that kind of pointed out the fact that there may be some additional potential here; these wide-spaced patterns, very irregular. There's some colors on this map. Each pattern is colored.

There's a legend over on the right-hand side that talks about recovery of original oil-in-place. I don't take those recoveries as being literal, and where I got those from was in the late 1970s, there was a New Mexico Tech doctoral student named Anil Kumar that was commissioned to do a reservoir study of this West Loco Hills unit.

And he went in and created this database where he took all the patterns and came up with fee-to-pay, original oil-in-place, all the saturation work and did a pretty extensive analysis of that primary. Then he looks at it in whatever it was -- 1978 -- at that time frame, which pretty much you had recovered all the primary and all the secondary at that point in time, and he looks at what the recoveries were allocating to those patterns as best he could using an angle open to flow method to put that oil that came out of the wells or quarter wells back into that pattern.

And doing that, he calculated what kind of recoveries he would have had. Some of these don't make a lot of sense. I wouldn't expect to get 55 percent recovery out of the reservoir, but what it showed me -- and the people who have studied this with me -- was that for the most part, some of the smaller patterns -- I don't believe the 65 -- but they had better recoveries than these large irregular patterns. So once again, that was another indication that this would be a viable field and reservoir to come in and tighten up that spacing on.

I think that's probably -- I think that's all to take away on that one. But that just shows you the history, shows you what it looked like and some of the recovery.

The next map shows once again the outline of the unit. And what I would envision to be kind of the ultimate final pattern out here, coming in and drilling this up on 20-acre spacing, the blue triangles being the injection wells, green dots being the oil producers. And just collapsing everything down into where you got confined patterns, and you've got a better sweep through the reservoir.

And there's been other units out here where they have done that up along this same trend. So based on what we saw by analogy on some of the other Grayburg units -- the wide pattern, better coverage on small spacing -- it just kind of indicated to us that there was going to be additional reserves here to come in and revitalize this thing.

Q. And Mr. Lee, looking at the plat you just referenced and turning back to your color-coded recovery plat, the initial development, where will the initial development of EnerVest be?

A. It will be shown as shown here on Exhibit 5, basically kind of in the S/2 of Section 11, SW/4 of Section 12, kind of along the east middle of Section 10.

Q. So you can say it's in the south central portion of the unit where the recoveries have been less?

A. Have been poorer, yes. Where I'm showing a lot of red, where I'm showing poor recovery of original oil-in-place, that's where they focused their phase one development at.

Q. Go ahead.

A. Sorry. And their well spots don't necessarily -- I didn't measure out the footages on this. This is sort of a visualization of where these are, but what I'm proposing as being a field-wide pattern does match what their plans are.

The next exhibit, next piece of paper in that exhibit, is an expected oil and gas production plot. And the well count is shown there, also. Where you ramp up to a little over 200 producing wells, expected oil rate gets up to about 90,000 barrels a month. As potential, we feel like it would be a pretty significant project.

The last piece of paper in that exhibit are some economics. And I'm showing kind of a phase one, which has been proposed today, and then the full development, which is what I had analyzed here. And for phase one, you have seven producers, 16 injection wells. The total cost of that project is going to be a little less than $11 million. And we hope to recover a little less than a million barrels, incremental barrels, from that work. And the value of those barrels is about $15 million.

The total field project, as you can see there, will

be to come in and drill 102 producers, 131 injection wells; total cost about $85 million. Once again, getting about 10 million barrels. Incremental value of that is going to be about $225 million.

The water that we're going to be using for our injection -- and I'm planning on -- I would expect to put away about 200 barrels a day in our injection wells. Initially, you might be able to put away more until you get the pressure back into the reservoir, but that shouldn't take long. I mean, you don't really have any gas volume left to fill up here, so once you -- you should see pressure response pretty quick.

And I think about 200 barrels a day is what I'm using for my injection volumes. That water is going to come from whatever produced water we have here in the unit, and also produced water from some Yeso-Paddock-Glorieta wells operated by Concho and Marbob. And Birch Keeley, you know, they are about two or three miles just due north of us, and we've been in contact with them; they're amenable to letting us tie-in and use that water right now.

Disposal is an issue out there for them, and they are agreeable to provide that water, but nothing has been signed yet. But that's where my injection water is planning to come from.

Q. Mr. Lee, was the waterflood expansion posed as a method of extending the life of the reservoir?

A. Absolutely, yes.

Q. And based on your studies, will the project be economic?

A. Yes, sir.

Q. And is the portion of the pool which is unitized suitable for a waterflood expansion?

A. Infill drilling and some expansion, yes. Yes, sir.

Q. And is the project area at this time depleted so it is prudent to apply an enhanced recovery program?

A. Yes. The enhanced recovery program had already been put in place, and now we're down to about a barrel a day per well. And the proposed project is going to recover additional barrels with a more efficient sweep, yes, sir.

Q. So it will be technically and economically feasible at this time?

A. That is correct.

Q. And will the expanded waterflood operations result in the recovery of substantially more hydrocarbons from the pool than would otherwise be recovered?

A. Yes, sir. Nearly 10 million barrels.

Q. And will this expansion project benefit the working interest and royalty interest owners in the unit?

A. Yes, sir.

Q. Let's move to your C-108, Mr. Lee.

A. Okay. You want to go page-by-page?

Q. I think we're going to go through it in detail.

A. Okay. Very good.

Q. Let's discuss the injection operations in your Exhibit 19 -- and no, I do not want you to go in detail through it -- but why don't you leaf through the tabs and maybe start out with the well data, and we'll just go on from there.

A. Absolutely. The first tab is item 3 and is listed as well data on the injection wells. On the tagger data, I have presented what's anticipated to be done. This is just a typical well. I didn't do it on every injection well. They're going to be the same: Brand new drilling project; brand new wells to work with; and it's going to be good.

Surface casing is going to be set down to about 450 feet with enough cement pumped to circulate to the surface. They're going to use on the injection wells 4 1/2 casing, once again, circulate cement to surface. There is a drilling prognosis included in this data, in this tab, also.

And the very last sheet is a schematic of a well bore diagram of what a typical injection well is going to look like. And the second sheet in there is a list of the wells that will be drilled, whether they are going to be producers or injectors, and what the exact footage locations are.

Q. And this is the initial phase of the project?

A. This is phase one: What's been presented today

to be drilled. And Gary has said the depth of the intervals is going to vary across the field, but we're going to come in and set a Lok-Set packer within 100 feet of that top perf. It's just going to vary down in there, but we'll be within 100 feet of the top perf.

Injection zone in the Grayburg Field Loco Hills: Some of the wells will be drilled as producers; others are going to be drilled as injectors, but they may be produced for a short period of time to kind of evaluate pressures, saturations in the reservoir at that point in time while they're in the process of building facilities and getting ready for injection.

There's no shallower oil and gas zones out in this area that are productive. There are some deeper producing wells; there are some Bone Spring wells, there are some Morrow wells out in here.

Q. On that Exhibit 5, aren't there some Bone Spring horizontals out there?

A. There are. And they are shown -- Section 12 has a couple of horizontal wells in it. Bone Spring wells are running east/west. Section 7 has a couple that run almost a mile north and south on the W/2 of Section 7, then OXY has a few Morrow wells out here also.

Q. Okay. Let's go to that plat. It just says map. What does that reflect?

A. This is a map of the -- a land map -- of the area. The outline is not particularly easy to discern on this, but what you can see is the half-mile radiuses around the unit. And what I did, since we didn't have injection wells, you know, I've got my recommendation, my proposal, of where the injection wells ought to go.

Some operators, at some future point in time, they want to have a lease-line injection well. So for my area review, I went one-half mile away from the unit boundary rather than from 330 inside the unit where I think that probably the injection well will actually be drilled. But to give us some latitude to put in a lease-line well in if they ever wanted to, I looked at everything a half-mile outside from the unit boundary.

Q. So you expanded the area that you would technically be required to submit at this time?

A. That's correct. Because I looked at the entire unit, not just the phase one portion there in the south-central part of the unit.

Q. And this Exhibit 19, although we are discussing at this point, the phase one, the data in Exhibit 19 contains all data within the area of review and within the unit area?

A. That is correct. That is correct.

Q. Okay.

A. And all wells that fall within my half-mile

radius around the unit boundaries are shown in item 6, the tab that's labeled "Area of Review." And I've sorted those by section, and included all of the applicable data that's requested on the C-108.

Q. Approximately how many wells are there in the area of review? Just a ball park figure.

A. I think there's probably about 300, a little over 300. Of those, if I recall correctly -- and I'm not exactly sure -- but probably about 270 of them are plugged. You look troubled, Will.

MR. BROOKS: He's got his work cut out for him.

THE WITNESS: So a lot of the wells have been plugged out. We have plugging reports on diagrams on those. But anyhow, all the data for all the wells in the area of review are shown here in that section.

Q. (By Mr. Bruce): And why don't you go back to those P and A wells?

A. The tab behind that -- I have a tab called "P and A" wells. And there they just start. And we have the tabs listed by section. As you work down through there, all the well bore diagrams based on the plugging reports of all the plugged wells out in the area of review. And I'd say skip through all those, there's --

Q. And you did personally and with the assistance of some other people, look at all this plugging data?

A. That's correct. That's correct.

Q. And are there some problem wells?

A. There are some wells where we deem them to have some issues. Some of them that I'm not positive on how they'll be viewed, and so --

Q. Is that set forth under a separate tab?

A. Yes. And it's labeled "Problem Wells."

Q. Give Mr. Jones a chance to --

A. Before we look at those well bore diagrams in there, there's two items to examine: One is a map of the unit. And once again, we've gone in and with a green line kind of put where the area of review is -- to delineate that.

And also then, in Section 10, 11 and 12, you can see red triangles showing where the proposed injection wells are, yellow circles showing where the proposed producers will be.

Q. In phase one?

A. In phase one, that's correct. And in addition to that, I've got three classifications of wells shown by red dots, green dots and blue dots.

Red dots, there's five of them. These are plugged wells that we just have some issues with. The green dots are plugged wells that potentially could have issues. We just kind of need some guidance on how the Commission would view those. And I have -- there's five of these.

And then there's two wells that are with blue dots up

in Section 33 and 34. One of the things that we looked at was how much cement we had above the injection zone. And I've got two wells here where I have less than 100 feet of cement above the zone of injection, so we included those.

Q. And again, how many -- the red dots, how many of those wells?

A. There's five.

Q. Okay. So overall, despite the quite large number of P and A'd wells, your review shows that there are a dozen wells with issues.

A. Yes, that's correct. That's correct.

Q. Go ahead, Mr. Lee.

A. Probably, I'm just going to run through those wells. Behind those maps, I have well bore diagrams, and I have the plugging reports on the ten plugged wells with issues. The two wells where it doesn't look like we have sufficient cement above the interval, they're actually still producing, so I didn't have a well bore diagram on those. But I've got ten well bore diagrams on the other wells, and they are in the order of which they are on our list here.

There's two wells in there, the Miller #5 and the Guy N #1X, that we just didn't have any data. There's nothing out on the OCD website. They're just wasn't any information on them. The Miller #5 was plugged by a company called Resler Oil Company in Section 4. And Resler had plugged another well in

Section 4, the Miller #1. It shows up on my green list down there. It had several plugs, but they were ten-sack plugs. So the number of plugs that they had in the well was probably sufficient. It had ten sacks. That's just where we needed some guidance on. I can't find any data on this Miller #5, but at least I know the operator. I know how he plugged that Miller #1.

Then the Guy N #1X, once again, there's just no data at all that I can find, and I can't find where Underwood Sanders, the operator on this well, plugged any of the wells within this area of review.

Q. And you said there was no data that you could drum up on the OCD's website. Did you also -- were you in town and did you check the physical files of these old wells?

A. Yes, we did. We went upstairs to the third floor -- last name is Romero and --

MR. JONES: Lawrence.

THE WITNESS: Exactly, Lawrence. And we dug out -- a lot of the files fortunately had not gone to storage yet. And so he still had them for this area. So I looked at all those and the microfiche that you had, and there was nothing else to be gleaned that wasn't already on the website, and that's what Lawrence said that I would find. So if it's out there, we got it.

I also -- and it became somewhat pertinent in one of

the other questionable wells -- we checked with the BLM in Carlsbad. I submitted a request to Kirk Simmons down there, a written letter, asking them to review the files on these wells. And I talked to Kirk several days ago.

He said they did not find anything on these wells with plugging reports. They have some microfiche data that he said there might be a very slight chance -- once again -- there might be something on microfiche that they didn't have in the physical file.

But the bulb to their microfiche reader has been out for several months and they haven't gotten it replaced yet.

Q. (By Mr. Bruce): They couldn't afford the light bulb?

A. So we really tried hard to gather whatever data we could. I don't know where else to go. These operators are not in existence anymore, so I won't have any luck with that.

Q. I was saying in following these two charts, you do have well bore plugging diagrams together with other material from the Division's files?

A. Yes. And the next one on the list is the West Loco Hills Unit, Tract 11-6. I have a plugging diagram and a plugging report on it. It was plugged in '98 by Yates. It was drilled back in 1945 to 3,000 feet. They set surface at 400 feet, had 8 1/4 surface pipe in there, but they never ran a long string, never ran a production string, and it sat there

from 1945 on. Yates goes in and tries to plug it, and they got down to 450 feet and couldn't get any further.

MR. JONES: Which well?

THE WITNESS: This is the West Loco Hills Gas Unit Trace 11-16. It's in Section 11.

MR. BRUCE: The diagram is attached, Mr. Examiner. If you go to -- past the two spreadsheets and three pages in.

THE WITNESS: There's the two. The first ones I don't have any data on at all.

MR. JONES: Okay.

MR. BRUCE: Yes. That the Yates well.

THE WITNESS: Okay.

Q. (By Mr. Bruce): And what year, approximately, did Yates attempt that?

A. '98.

Q. 1998.

A. The next well in that section is called the State 0-16 #1. It's a well that was plugged in 1965. It looks like -- it appears to me that the bottom plug that they put in the open hole did not cover the pay zone. Then they pulled the 7-inch at about 1,000 feet, then they pumped a 20-sack plug up at the 8 5/8 casing at 412 feet. Then they set a surface plug.

So that's one I would bring to your attention that it looks like it may not have cement across the zone based on the plugging report.

The one after that one is the Southern Union #1. This is the well I was really kind of speaking about with the USGS. As you can see on the plugging report in 1961, that there's nothing left else out on the OCD file about this well, but their USGS report says that, "As per our intention to plug, all plugs were set as intended with the exception of surface plug."

So I'm told what they changed and what they plugged as a surface plug, but I don't have the intent. And so, you know, this is one of those wells that, you know, in the year 1961, you know, probably they plugged it correctly. I mean, they've been putting something at the base of salt and top of salt, but I just don't have that intent to really demonstrate that. So I included it there for your perusal.

And those are the five wells that really we saw that kind of had issues. The other wells -- I've got a couple of wells in here, West Loco Hills Tract 31 #1 and #2. They pumped cement plugs in the bottom of the open hole. It looks like they covered the pay zone, cut off the 7-inch casing and set a surface plug. So we did not have a plug at the top of the base of the salt that was recorded.

Then there was another well called the Western Develop Miller #1. And on this well, it was drilled -- they pulled all the pipe. There was not even surface pipe left on this well. The plug set at the bottom of the hole does not

appear to cover the pay zone. Then they set a plug at the bottom of the salt and surface and top of the salt. So it does look like they would contain any fluid movement in there from getting up to any fresh water. You've got a couple of plugs in there. But, like I say, it doesn't look like they got cement across the pay zone.

But I don't know. That's a well that you could almost say, well, it look like they've got sufficient plugs to protect my freshwater in it. But just to be prudent and diligent in the examination of the wells within the area of review, we felt like we ought to include it and once again, put it before you and see what you say.

Another well that shows up in there is the Miller #1. This one had a plug at the bottom of the 7-inch and plugs off the producing zone. They set a plug at the base of the salt, top of the salt, plug at the surface -- probably the number of plugs was adequate as they were ten-sack plugs. So once again, I could go either way on that saying that it's sufficiently plugged just because of the number of plugs they put in there.

Then the last well that we're hooking at here is called the Canfield Federal well. And it was -- had a cast-iron bridge plug set at the bottom zone. It was plugged in 1996 by Herman Ledbetter. And they put cement on top of that cast-iron bridge plug, then they came up to top of the salt at 400 feet and squeezed 150 sacks in there and plugged it

out from here. Other than having a plug at the base of the salt, it would probably look okay to me. But once again, I wanted you to see.

So that kind of covers the wells that we think we might have potential issues on.

Q. Other than those wells you've just itemized, are the other wells properly plugged and abandoned so as to prevention the movement of fluids?

A. That is correct, yes.

Q. Let's move to on your basic injection program and why don't you discuss that and the injection program, the produced water, et cetera.

A. Right. This is the last tab. As I said earlier, we're anticipating about 200 barrels a day per injection well into the ground. The injection system is going to be a closed system. The surface injection pressure should be around 500 pounds. That's going to be dictated by the .2 PSI per foot gradient so that will vary a little bit across the field, but it's going to run about 500, 510 pounds.

Once again, the proposed injection fluid is going to be produced water here plus water we get from Concho and Marbob out of that Birch Keeley stuff to the north. The injection, once again, is for increased waterflood recovery. On the completion of the wells, I anticipate that there will be at least a small frac job put on these -- maybe 15, 20,000

pounds -- just in order to get some water in the ground in some of these Permian sands. After drilled, logs will be submitted.

There does appear to be some freshwater in the area. I found three freshwater wells kind of in the area of this flood. One is in 35, Section 10, Section 24; the data is there. They are about 200-, 250 feet deep. And I got that data, and I included the data from the State Engineer's website in the WAIDS New Mexico website. You can see what the chlorides are on each of those wells that was reported.

The casing program is going to be sufficient to isolate those zones and has been historically in the past sufficient to cover all the freshwater zones. And the injection water comes from the north. The water analysis and the commingling of those waters -- there's analysis of that water in there also behind these papers.

Q. And you've already mentioned the source of the injection waters, but will the injection water be compatible with the formation water?

A. Yes, it will be. And that's shown on the water analysis and the combinations of water that we have presented here behind -- at the end of this C-108.

Q. One thing I meant to ask: Going back to the problem wells, in looking at that first plat, insofar as the initial phase of the waterflood expansion goes --

A. Uh-huh.

Q. -- there appear to be --

A. Two.

Q. -- two wells that need to be looked at before injection begins.

A. That's correct. The one at 11-N in Section 2, unit letter M. There's also a well in 2-N, N or I, but it's going to be over a half mile from the injection well to the south. So there's two wells to be examined.

Q. Okay. Now, at the next hearing, we'll be submitting data on notice to the offsets. Insofar as this hearing went, was notice given to all offset operators or working interest owners within a half mile of the proposed initial phase injection wells?

A. Yes, sir.

Q. But you submitted data on all lands in the area of review. Does EnerVest request in the order an administrative procedure whereby it can gain approval for additional injection wells?

A. Yes, sir.

Q. Were Exhibits 18 and 19 prepared under your supervision?

A. Yes, sir.

Q. In your opinion, is the granting of these applications in the interests of conservation and the prevention of waste?

A. Yes, sir.

MR. BRUCE: Mr. Examiner, I move the admission of Exhibits 18 and 19.

MR. JONES: Exhibits 18 and 19 will be admitted.

[Applicant's Exhibits 18 and 19 admitted into evidence.]

EXAMINATION

BY MR. JONES:

Q. You did an awful lot of work here, and we really appreciate you doing this, especially the detailed AOR work and all the reservoir engineering work you did. It's very valuable.

I think you covered pretty much everything. I could ask lots of questions here for -- but I don't want to drag it out here too much. But the 7 percent cutoff versus the 8 percent; you said you could have with your .2 -- I've heard that in the past, too, you know .2 for your permeability and then go off over and go down to your porosity. Was that log porosity you're talking about?

A. Yes.

Q. Already been converted?

A. No, it was core porosity. It's the core porosity, the core permeability, that we were plotting.

Q. Okay.

A. And we did it at one time, and I can't remember

what the results were, but we did look at the log versus core porosity. And I just can't recall what the --

Q. But I guess the gist of my question would be would that make even more reservoir rock available?

A. Right.

Q. So that would drop your recovery --

A. Recovery.

Q. -- just a tiny bit, but it would raise your OIP a little bit?

A. Right. Exactly. And I don't think it's going to be huge because of that 1 percent.

Q. That recovery factor has been reasonable for -- does this compare? Was it is 1.2 you had, 1 point --

A. The secondary to primary ratio?

Q. Secondary to primary ratio? 1.68.

A. Yeah.

Q. Does that compare to any analogous waterfloods in this Grayburg Sands?

A. Yes. Some of the stuff we looked at over to the east -- and I've just kind of gone brain dead -- it was like the Grayburg Jackson unit. Devon did -- Avon and Devon did a big project out there probably 15 years ago. And that's one of the places we looked at.

There was also some leases there, the Keel A and the Keel B. We looked at those, and that was part of the analysis

we did. We just didn't bring it today to demonstrate the floodability, but we did look at those. And we saw it was comparable to what the results of those had been.

You know, that 1.68, that's kind of a -- we call it a secondary to primary ratio, but, you know, a lot of times it's really technically like a secondary plus development ratio. Because you had additional wells drilled after the flood was put in. So it was not as pristine as having primary down to an abandonment point and then put a flood in.

Q. Okay.

A. So you're getting some pseudo-primary from that.

Q. Okay. So it seems to have decent porosity and permeability --

A. Yes, sir.

Q. -- for Grayburg Sands. Queen Sands, I'm more familiar with them, and they seem to have decent total porosity, but maybe less effective porosity, you know. What happened here is that you don't have it all cluttered up with stuff?

A. I don't know. But, I mean, this is the best rock I've seen in a Grayburg reservoir where you're getting core data with 130 millidarcies of permeability. I mean, it's just fantastic rock. I haven't ever worked on anything that looked this good.

But it's just the way it was piled up. And it seems

like it gets a little more finger, a little less faulty looking as you get on out of going east and then going west.

Q. Is this, since it's a sand and everything, maybe -- does it have any kind of mobile clays or anything? Do you have to be careful with waters you put in and make sure you have all the option out of your freshwater and all the corrosion inhibitors, your scale inhibitors and everything? Do you have to be careful with it?

A. I guess I would say, well -- I'm trying to think. Back in the '60s when a lot of these were put in, a lot of them used freshwater. You had that Double Eagle water line that comes off the Caprock going to Carlsbad coming through here. A lot of people used that water. It seemed like they used some here, but I don't think that was predominant.

I don't know that I've seen a lot of swelling clays or issues like that in the Grayburg. But definitely in the facilities -- and that's why you have a closed system -- you definitely want to keep that oxygen down and put in the oxygen scavenger and everything like that to prevent the corrosion and issues that will occur and arise here.

Q. And your iron.

A. Exactly. As best as you can. I have yet to figure out a good way to get iron sulfide totally resolved and to deal with it. You just kind of put the frac to it and do the best you can with the filtration.

Q. Okay.

A. It's a problem.

Q. Okay. Well, it sounds like being a sand, you'd have to -- you would have to frac it, though, right?

A. Yeah. And that's why we're kind of putting these, you know, kind of small fracs on it, you know, the 15- to 20,000.

Q. You're going to have to energize them a little bit?

A. You know, I haven't ever out there. I've always just used a gel frac. It seems like it comes back okay. The CO_2 energizes it and sometimes I think it's kind of a -- in reservoirs like this, I've always kind felt like it was a kind of a waste because if I put that gas in there, my experience has been I've had to just kind of dissipate.

So I don't really get the flow-back like you do, say, in your -- some of these bigger fracs that they're doing in the Wolfberry or some of these gas zones and things like that where I'm really trying to get that fluid back quick. The fluid doesn't seem to be that damaging to my reservoir, and so we just swab it back or even just hang it on a pump.

But I've put gas in fracs out there, and they blow back pretty good for about 30 for 40 minutes, and then it's kind of dead, and I think I lose a lot of energy just adding to the reservoir. I don't think it helps me that much.

Q. The pressure out there now, you think it's pretty depleted?

A. Yes. And I don't have a pressure where we've gone in and actually ran a bomb or anything. I'm guessing it's probably down to a couple hundred pounds or so.

Q. Even the initial pressure, you think would that have been good enough for admissible CO2 or even this type plug or --

A. I don't know.

Q. Is that totally out of the question for the picture?

A. That's an excellent point, excellent question, because I have an answer for you.

Q. Okay.

A. Yates actually went in and had a CO_2 pilot out here.

Q. Oh.

A. And that's really why Anil Kumar was doing a study on the project. But you're very borderline to being able to reach admissibility. We looked at that and admissible pressure that you've got to get to -- you might achieve it, but it's going to be about 11 or 1200 pounds, maybe 1300 hundred pounds, and your initial pressure was 1,000.

Q. Okay.

A. It's borderline whether or not you're going to

achieve admissibility. But Yates drilled it up -- drilled a little pilot up on 10-acre spacing and trucked CO_2 from Denver City for about a year-and-a-half, two years. And they were wagging it, of course. This was in the early '80s.

And we saw an increase in oil production. And then they cut the CO_2 down because of the expense of trucking it and the price of CO_2, but they kept the water going. And what we saw was that the oil production stayed up.

And then later on in the late '80s, whenever there was a cut, in the early '90s, they cut back the water injection. And at that point in time, I saw the oil production drop. So once again, that was another thing that we looked at that really kind of gave us, you know, a lot of confidence or gave us some confidence that the tighter spacing would be beneficial.

It was always kind of a question, you know, did the CO_2 help me get the oil? Was it tighter spacing? But since they cut the CO_2, and I still had my oil rate up, we felt like it was the tighter spacing in the water injection. And like I say, subsequent work that we had done and examined says that it was questionable as to whether they ever reached admissibility. They would see at the injection wells pressures that should be admissible at the injection well, but by the time I get to my producer, I'm hundreds of pounds less, and then you just got free again, gas. And it didn't retain its admissibility. But

the whole reservoir wasn't pressured up to the 12-, 1300 pounds.

Q. Okay. Okay. Starting out in the area that has been the porous first, if you weren't going to infill drill it, would you still have done that?

I guess I should rephrase that. It seems like different people have different theories on whether to concentrate in the good areas with some enhanced work or try to just get more oil in place out in the areas that haven't responded so far.

A. I think ultimately it's going to become a two-pronged attack. If I have an area that did not recover or do very well, and I can identify why, it's tied, I think -- it's whatever, then, I might lean to kind of shy away from that. But what we saw was that our isopach maps didn't really lend itself to a reason as to why these should not have been better.

The logs that we had that we looked at, I can't recall anything in here that looked detrimental. So it just seemed liked it was an area that didn't get a very good sweep. It just didn't perform very well. So that was one of the reasons to hone in on that part of the reservoir.

Q. Okay. I don't have anymore questions.

MR. WARNELL: I have a concern about some of the area of review wells, and I'm glad that you're looking at those.

Some of those first wells were first drilled the 1939, and a couple of them, like you are pointing out, there's no plugging history or anything at all on them.

A. On two of them; that's correct.

Q. So if OCD was to come back and say, "Those need to be plugged," what do you do?

A. I would ask my client, EnerVest, what are they going to do. You'll have to resolve it somehow, and whether it is to -- ultimately, I think it's going to boil down to an economic decision as to whether or not, based on the results that you see in some of these other areas, I can carve out a half-mile radius around a well that may be problematic where I just don't have any data on it.

Is it worth avoiding that part of the reservoir, or do I think that it's successful enough where I'm putting my pilot at that I can extend it out here. Maybe it warrants going in and trying to do something with that well. I don't know where else to go to look for data. Maybe there's some other place to go to look for some data.

But I don't know where it is. I would say it comes down to economics of what's the potential of the reserves around or near a well that may not be properly plugged.

MR. WARNELL: I don't have any further questions.

MR. JONES: The data is probably in an attic or something. Some geologist that was -- laid off. How @ McDonald's

THE WITNESS: Exactly.

MR. BROOKS: No questions.

THE WITNESS: Thank you, sir.

MR. BRUCE: That concludes our case.

MR. JONES: Thank you, very much. Okay, Mr. Bruce, so we've heard these cases, but we're going to continue them to December the 18th.

MR. BRUCE: Yes.

MR. JONES: That being the last case on the docket, the docket is adjourned.

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 14242, heard by me on _____.

_____, Examiner
Oil Conservation Division

REPORTER'S CERTIFICATE

I, JOYCE D. CALVERT, Provisional Court Reporter for the State of New Mexico, do hereby certify that I reported the foregoing proceedings in stenographic shorthand and that the foregoing pages are a true and correct transcript of those proceedings and was reduced to printed form under my direct supervision.

I FURTHER CERTIFY that I am neither employed by nor related to any of the parties or attorneys in this case and that I have no interest in the final disposition of this proceeding.

DATED this 4th day of December, 2008.

JOYCE D. CALVERT
New Mexico P-03
License Expires: 7/31/09

STATE OF NEW MEXICO)
)
COUNTY OF BERNALILLO)

I, JOYCE D. CALVERT, a New Mexico Provisional Reporter, working under the direction and direct supervision of Paul Baca, New Mexico CCR License Number 112, hereby certify that I reported the attached proceedings; that pages numbered 1-64 inclusive, are a true and correct transcript of my stenographic notes. On the date I reported these proceedings, I was the holder of Provisional License Number P-03.

Dated at Albuquerque, New Mexico, 4th day of December, 2008.

Joyce D. Calvert
Provisional License #P-03
License Expires: 7/31/09

Paul Baca, RPR
Certified Court Reporter #112
License Expires: 12/31/08