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

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

APPLICATION OF OXY U.S.A., INC. FOR APPROVAL OF A PRESSURE MAINTENANCE PROJECT, EDDY COUNTY, NEW MEXICO. CASE NO. 20449

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

May 2, 2019

Santa Fe, New Mexico

BEFORE: SCOTT DAWSON, CHIEF EXAMINER
MICHAEL McMILLAN, TECHNICAL EXAMINER
DAVID K. BROOKS, LEGAL EXAMINER

This matter came on for hearing before the New Mexico Oil Conservation Division, Scott Dawson, Chief Examiner; Michael McMillan, Technical Examiner; and David K. Brooks, Legal Examiner, on Thursday, May 2, 2019, at the New Mexico Energy, Minerals and Natural Resources Department, Wendell Chino Building, 1220 South St. Francis Drive, Porter Hall, Room 102, Santa Fe, New Mexico.

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APPEARANCES

FOR APPLICANT OXY U.S.A., INC.:

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EXHIBITS OFFERED AND ADMITTED

(3:50 p.m.)

EXAMINER DAWSON: Back on the record. It's 3:50.

The next case we will hear is 20449, and it's OXY U.S.A., Incorporated for a pressure maintenance project in Eddy County, New Mexico.

Please call for appearances.

MR. FELDEWERT: May it please the examiner, Michael Feldewert, with the Santa Fe office of Holland & Hart, appearing on behalf of the witnesses. And I have four witnesses.

EXAMINER DAWSON: Any other appearances in this case?

Seeing none, can your witnesses please stand and be sworn in by the court reporter?

(Mr. Van Liew, Dr. Liu, Mr. Troutman and Mr. Foppiano sworn.)

MR. FELDEWERT: We'll call our first witness.

EXAMINER DAWSON: Yes.

PETER VAN LIEW,

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

DIRECT EXAMINATION

BY MR. FELDEWERT:

Q. Would please state your name, identify by whom you're employed and in what capacity?

A. My name is Peter Van Liew. And I work for Occidental Oil & Gas Corporation, and I'm a landman there.

Q. A land what?

A. A landman.

Q. How long have you been a landman with the company?

A. Just over four years.

Q. Mr. Van Liew, didn't you previously testify before this Division as an expert in petroleum land matters?

A. Yes, sir, I did.

Q. In fact, were you here in January when we had similar hearings for injection projects in adjacent nearby sections?

A. Yes, I was.

Q. Are you familiar with the application that's been filed by OXY in this case?

A. I am.

MR. FELDEWERT: I would retender Mr. Van Liew as an expert in petroleum land matters.

EXAMINER DAWSON: Mr. Van Liew will be admitted to the record as an expert in petroleum land matters at this time.

Q. (BY MR. FELDEWERT) Would you turn to what's been marked as OXY Exhibit Number 1? And I want you to identify what that is and summarize what the company seeks under this application.

A. Yes, sir. This is a project map for this case. It shows a 480-acre project area outlined in blue, one, and a proposed injector well, the Cedar Canyon 15 #3H; and then, two, producing and what would be offset producers, if we are granted authority to inject, and those are marked in green. And they are the Cedar Canyon 15 #2H and the Cedar Canyon 15 #4H. And generally we are seeking authority to turn the Cedar Canyon 3H from a producer into an injector and to inject CO2, produced gas and water.

Q. And do you know specifically what interval you intend -- are you seeking permission to inject into?

A. Yes, sir, into the 2nd Bone Spring.

Q. The 2nd Bone Spring Sand?

A. Yes, sir, 2nd Bone Spring Sand.

Q. Okay. Looking at this particular area, what type of acreage comprises the 480-acre project?

A. It's one fee lease.

Q. Okay. All right. And how many -- is there only one lessee?

A. There is.

Q. Who is that?

A. That's OXY.

Q. Is OXY the only operator in this area?

A. That's correct. OXY operates all the wells in 15.

Q. And so this project area would encompass all of Section 15 except the north half of the north half?

A. Yes, sir. That's correct.

Q. If I then turn to what's been marked as OXY Exhibit Number 2, does this contain the as-drilled C-102 plats for the three horizontal wells reflected on Exhibit 1?

A. Yes, sir, it does.

Q. And does this provide the examiner with the pool and pool code that's involved with this injection project?

A. Yes, sir. It's the Pierce Crossing; Bone Spring, East, and it's pool code 96473.

Q. And in this particular exhibit, the proposed injection well will be the second C-102, correct?

A. Yes, sir. That's correct.

Q. For the 3H?

A. Uh-huh.

Q. Okay. How was notice -- or how was the notice area identified for this particular project?

A. So looking at the wells -- the injection well will draw essentially a half-mile radius around the oblong circle, around that well, and then identify in two ways. If OXY operates those wells, we need to notify all the working interests, all the parties, that are a party to the wells that fall in the area. If OXY does not operate, then we need to notify those operators and owners in those wells that still fall within that area.

Q. Okay. So let's turn to what's been marked as OXY Exhibit Number 3. Is this the C-108 application that's been put together for this project?

A. Yes, sir, it is.

Q. If you turn to page 7 -- let me step back. This is paginated in the bottom right-hand corner?

A. Yes, sir.

Q. If you turn to page 7, does this identify the oval notice area that you were just discussing?

A. Yes, sir. The smaller blue circle around Section 15, that's the notice area I referenced earlier.

Q. And, again, we see the Cedar Canyon 16 #3H?

A. 15H.

Q. 15.

That's identified in blue as the injection well?

A. That's correct. Yes, sir.

Q. And were all the affected parties within the this blue oval ascertained?

A. Yes, sir.

Q. And if I look at the last page of this exhibit, page 14, does this provide a list of all those affected parties?

A. Yes, sir, it does.

Q. And it includes the New Mexico State Land Office?

A. It does.

Q. And it includes the Bureau of Land Management?

A. Yes, sir, it does.

Q. Now, with respect to that injection well, if we look at the location of surface hole, who is the surface owner?

A. OXY U.S.A. is the surface owner.

Q. Okay. If I turn to what's been marked as OXY Exhibit Number 4, is this an affidavit prepared by my office with the attached letter providing notice of this application and this hearing to the affected parties on the list we just reviewed?

A. Yes, sir, it is.

Q. And is Exhibit 5 a copy of an Affidavit of Publication providing notice of this application and the hearing in a local newspaper by name to these affected parties?

A. Yes, sir.

Q. Okay. Now, in preparation for this hearing, did we ascertain whether or not Devon Energy, which is an affected party, actually received the Notice of Hearing?

A. Yes. During preparation, we determined they had actually not received notice, as the address I used at that point in time was an incorrect address. So in the intervening time between yesterday, 4:00, and this morning, we were able to contact Devon, discuss with them the project, seek a waiver and be granted that waiver from Devon.

Q. If I turn, then, to what's now been marked as OXY Exhibit Number 13 in the packet --

A. Yes, sir.

Q. -- is that the waiver that was received by Devon based on the efforts that you undertook starting last night into this morning?

A. Yes, sir, it is.

Q. So everybody now has received notice or has

waived notice?

A. Yes, sir, they have.

MR. FELDEWERT: Mr. Examiner, I'd move the admission into evidence of OXY Exhibits 1 through 5, as well as 13.

EXAMINER DAWSON: Exhibits -- OXY Exhibits 1 through 5, as well as Exhibit 13 will be admitted to the record at this time.

(OXY U.S.A., Inc. Exhibit Numbers 1 through 5 and 13 are offered and admitted into evidence.)

MR. FELDEWERT: And that concludes my examination of this witness.

EXAMINER DAWSON: All right. Thank you.

EXAMINER McMILLAN: I don't have any questions.

EXAMINER DAWSON: David?

EXAMINER BROOKS: No questions.

EXAMINER DAWSON: I don't have any questions for you either. Thank you very much.

MR. FELDEWERT: We'll call our next witness.

EXAMINER DAWSON: Okay.

SHUNHUA LIU, Ph.D.,

after having been previously sworn under oath, was

questioned and testified as follows:

DIRECT EXAMINATION

BY MR. FELDEWERT:

Q. Doctor, would you please state your name, identify by whom you're employed and in what capacity?

A. I'm Shunhua Liu, and I work for Occidental Petroleum. And I'm the director of unconventional simulation and the process design.

Q. How long have you been working in that capacity for OXY?

A. So I work for OXY for almost 12 years, so in that position, it's like a full -- almost five years.

Q. Okay. And you are a petroleum reservoir engineer by training, correct?

A. Yes.

Q. And have you previously testified before this Division as an expert in petroleum reservoir engineering?

A. Yes.

Q. And, in fact, Dr. Liu, didn't you testify in January of 2019 for a similar Bone Spring -- or 2nd Bone Spring injection project?

A. Yes.

Q. Okay. Are you familiar with the application filed by OXY in this particular case?

A. Yes.

Q. And, in fact, Dr. Liu, is it your team that identified this area for injection and designed the proposed injection project?

A. Yes.

MR. FELDEWERT: I would retender Dr. Liu as an expert witness in petroleum reservoir engineering.

EXAMINER DAWSON: Dr. Liu will be admitted to the record as an expert in petroleum engineering at this time.

Q. (BY MR. FELDEWERT) Mr. Liu, this involves Section 15 in this particular township and range, correct?

A. Yes.

Q. Were you also involved in the permitting and approval of an injection project in adjacent Section 16?

A. That's correct.

Q. And is this a similar project?

A. Yes.

MR. FELDEWERT: And, Mr. Examiner, that was the project that was approved under Division Order R-14322, Section 16 injection project, R-14322.

EXAMINER DAWSON: Okay. Thank you.

Q. (BY MR. FELDEWERT) If I turn to what's been marked as OXY Exhibit Number 6, does this provide a

general overview, Dr. Liu, of the injection project that you now seek to bring over into most of Section 15?

A. Yes.

Q. Would you just please walk through this and explain to us how this is going to work and the benefits?

A. Okay. So as you can see, the plot -- the red line represents the Section 15 three well -- 3H well. So we propose to convert this to an injector and inject natural gas -- actually the field-produced gas and the CO2 and water into the well, and we are hoping to get -- we are expecting to get the benefit from the offset producer from this injection, the 15 4H and the 15 2H. And so currently the plan is to inject produced gas into that 3H, and we might inject water, if necessary, and CO2 when CO2 is available.

Q. And you've done this same project now in adjacent Section 16?

A. Yes.

Q. And you reported back to the Division about the success of that project in January?

A. Yes.

Q. Do you expect similar results here?

A. That's correct.

Q. What will be the source of the produced water

and the produced gas?

A. So the produced -- produced gas is from the central gas -- central gas point in the Cedar Canyon, and the water is also for the central water battery from the Cedar Canyon Central Water Station.

Q. So is this project going to utilize the same source for gas as the Section 16 project?

A. That's correct.

Q. And the same source for water?

A. Yes.

Q. And with respect to the water -- you mention it's a central treatment facility -- it will always be treated water?

A. That's correct.

Q. And if I look at OXY Exhibit Number 3, I believe, Dr. Liu, that the water comparability studies are reflected on pages 12 and 13.

A. Yes.

Q. You're familiar with this analysis?

A. Yes.

Q. Are you familiar with the result?

A. Yes.

Q. Does it demonstrate that there is any issue using this water source for this type of injection operation in this proposed --

A. It has demonstrated no issues to inject the water.

Q. Okay. And it also discusses, I believe -- or you mentioned that you're going to use gas --

A. Uh-huh. Yes.

Q. -- in the central facility?

A. Yes.

Q. What about CO2? Are there any issues that arise with the use of CO2?

A. The CO2 is an inured gas, should not have any, you know, damage to the reservoir rock or --

Q. So in your opinion, it creates no compatibility concerns?

A. That's correct.

Q. Will this be a closed system?

A. Yes.

Q. Now, when I look at your overview slide, going back to Exhibit 6, based on what occurred -- what has occurred to date in adjacent Section 16 and based on your understanding and analysis of this area, which direction do you expect the injection fluid to move?

A. We expect the injection fluid to move north-south, just go up or go down on this plot, and then we observe this actually -- the reason for that is -- there are two main reasons. The first reason is

the hydraulic fracture direction, when we designed for the primary drainage, it's the north and south. So when we inject our gas, the gas tends to move north and south. And the other thing is that the two offset producers act as an injection -- like a production pressure sink. So like any process, the fluid will go to the pressure sink.

And also we have the Section 16 result that we presented in January, and we observed the response in the north-and-south offset producer. And we have not observed the east to west. Actually, we do have an east-to-west offset producer on the Section 16 wells. We have not observed that.

Q. So no observation of movement east-west. It's been north-south?

A. Yes.

Q. Do you expect the same thing here?

A. Yes.

Q. Let me ask you this: In the event that there is any migration east or west, is OXY positioned to able to observe that?

A. Yes. We have an offset producer. We can observe that.

Q. Well, in your opinion, Mr. Liu, will the approval of this injection project result in the

recovery of oil underlying the project area that may otherwise not be recovered by primary means?

A. Yes.

Q. And this is a -- this type of project requires a significant amount of investment by the company; does it not?

A. That's correct.

Q. What do you have to do?

A. So we have to add additional facilities, especially for the injection facilities. That's not normally what we do in the primary production. So we have to buy the compressor, lay the additional injection line and the surface, and because we have a closed system, we have to connect all the injectors and the injection system together. So that's a significant facility cost. And also when we convert that injector to producer, there is some downhole cost associated with that.

Q. You also have to upgrade, then, your central treatment facilities as these projects increase?

A. Yeah. Yes.

Q. Now, the company currently -- I wish Mr. Goetze was here. The company currently has a number of these projects pending before the Division for approval?

A. That's correct.

Q. And are we getting to the point where the company needs some of these projects actually approved so that you can continue with the investment that the company has started?

A. Yes.

Q. What's going to happen -- have you already purchased some equipment?

A. Yes. We've purchased some compressors for this.

Q. And what's going to happen to the equipment that you already purchased if you can't get approval on these projects fairly soon?

A. So if that happens, we have to -- we have to move the pressure -- the compressor to another state for a similar project.

Q. You're going to have to move it to that big, bad state of Texas?

(Laughter.)

A. That's correct (laughter).

Q. And we don't want to do that?

A. No. Currently, we want to stick to New Mexico.

Q. But you're coming up on a time frame, right?

A. That's correct.

Q. How soon do you need some of these projects,

Dr. Liu?

A. As soon as possible.

EXAMINER BROOKS: I'm sorry. I didn't hear you.

THE WITNESS: As soon as possible.

EXAMINER BROOKS: As soon as possible.

THE WITNESS: Yeah.

Q. (BY MR. FELDEWERT) Is there another benefit here with respect to the efforts by the company to, you know, avoid, for example, flaring of gas?

A. That's correct. You know, this can take additional gas into effect into the reservoir. Actually, any outside happening [sic], it could take more gas, and that could avoid additional flaring, you know, issues.

Q. Okay. All right. If I then turn to what's been marked as OXY Exhibit Number 7, are you involved, Dr. Liu, in the analysis of the surface-injection pressures that have been requested for this project?

A. Yes.

Q. And does Exhibit 7 identify how they were arrived at?

A. Yes. Uh-huh.

Q. Would you explain briefly how you arrived at the proposed surface-injection pressure for water and

then gas and CO2?

A. So basically for water, we just follow the guidance from the NMOCD UIC manual, and then we use the surface pressure limit of .2 psi per foot and times TVD, the true vertical depth, and that's how we calculate the water surface-injection pressure. And then from that, we calculate the bottom-hole pressure of the water injection, you know, based on the freshwater pressure gradient. So that's how we get the bottom-hole pressure for water. And then we use a commercial software from that bottom-hole pressure, back-calculate the surface pressure, because the produced gas and the CO2 have significant different density. So that's why we back-calculate. And we got 4,350 psi for produced gas, 2,300 CO2.

Q. So what bottom-hole pressure did you utilize to arrive at those figures?

A. So the bottom-hole pressure we arrived at is the 8,336 -- sorry. It's the -- it's the .443 psi per foot, you know, that we use -- derived from the water injection.

Q. And that's in paragraph one at the bottom, towards the middle of this exhibit?

A. Yes.

Q. And that's what you utilized to determine --

how did you say it?

A. To back-calculate the surface pressure.

Q. For gas?

A. For gas and CO2.

Q. And why is there a difference between the two?

A. Like I said, the density of the two fluids -- the three fluids is so different.

Q. In your opinion, is this a -- is there a methodology that you used to back-calculate these surface-injection pressures?

A. Yes. We use, you know, the well-known commercial software of Petroleum Experts' PROSPER to back-calculate that. This is a well-known and well-established industry software.

Q. In your opinion, is this a conservative surface-injection pressure?

A. Yes, I believe.

Q. And does OXY request authority in this order, as it did in the prior order, to increase the surface pressures administratively if it proves to be necessary?

A. Yes.

Q. In your opinion, do you believe that OXY can operate its proposed injection project using these conservative surface-injection pressures?

A. Yes.

Q. And in your opinion, do these proposed surface-injection pressures pose a threat to the integrity of the targeted interval?

A. No.

Q. And will OXY's proposed injection project impair the correlative rights of mineral owners in adjacent sections?

A. No.

Q. Or other oil-and-gas-producing zones?

A. No.

Q. Dr. Liu, were OXY Exhibits 6 and 7 prepared by you or compiled under your direction and supervision?

A. Yes.

MR. FELDEWERT: Mr. Examiner, I would move the admission into evidence of OXY Exhibits 6 and 7.

EXAMINER DAWSON: At this point OXY Exhibits 6 and 7 will be admitted to the record.

(OXY U.S.A., Inc. Exhibit Numbers 6 and 7 are offered and admitted into evidence.)

MR. FELDEWERT: That concludes my examination of this witness.

EXAMINER DAWSON: Thank you.

EXAMINER McMILLAN: Go ahead.

CROSS-EXAMINATION

BY EXAMINER DAWSON:

Q. Just a quick question. You said you were doing another similar injection project in 16?

A. Yes. We have done that, and we reported in January.

Q. Okay. And so that's -- I wasn't at the January hearing.

A. Oh, sorry.

Q. Is that the -- are those both like lay-down? Or the three wells in that are lay-down wells also?

A. Yes. It's also like an east-to-west. You know, we have offset the north and south (demonstrating). It's the same -- same configuration like this one.

Q. Okay. So you'll have -- you'll have an injection well. That will be -- it will be the producing well and then another injection well.

A. Yeah.

Q. And then you'll have it to the south --

A. Yeah.

Q. -- in 16 also?

A. Uh-huh.

Q. Are you going to have other planned injection wells between?

A. It's actually -- in Section 16, we have five wells.

Q. Oh, okay.

A. So we have three injecting in the center, plus the one producer between those injectors, and then we have one -- north, we have one producer. South, we have another producer. So five wells. Think about that, five. One, two, three, four, five (demonstrating). Two and four are injectors, so one, two, three, four, five. This is an injector (demonstrating). This is an injector (demonstrating). So we have offset producer, offset producer, offset producer. So that protects this section.

Q. All right.

CROSS-EXAMINATION

BY EXAMINER McMILLAN:

Q. Right. The middle is the -- the two and four are injectors.

A. Yeah. Two and four are injectors.

Q. And one, three and five are producers.

A. One and five are a producer and the three is a producer.

Q. Okay.

RECROSS EXAMINATION

BY EXAMINER DAWSON:

Q. How come you're not going to do a five-well project in this section? You think five may be too many?

A. Yeah. No. This is -- currently, we have just three in this section. You know, currently, if you look at the --

Q. Oh. You're doing everything but the north half-north half?

A. Yeah. We don't have that.

Q. I gotcha.

REDIRECT EXAMINATION

BY MR. FELDEWERT:

Q. And I probably didn't make it very clear. These are all existing wells?

A. These are all existing wells.

Q. You're not drilling any new wells?

A. That's correct.

RECROSS EXAMINATION

BY EXAMINER McMILLAN:

Q. My question goes -- how much additional recovery are you expecting in Section 16 based on what you have so far?

A. So we do -- you know, we did show in January.

We see -- for a limited injection time, we do see significant oil come out, but we have not injected for long enough, let's say several years, to -- you know, we do see significant oil recovered, but if you say, "I need to know how much percentage uplift," we have a simulation model that can say we probably uplift like 30 to 70 percent of the primary. But we don't have the solid -- you know, like a flat ten years' evidence to show that.

Q. So you're seeing some rest and decline?

A. Yes, of course. We see even incremental oil.

Q. Oh, you do?

A. Yeah. In the -- in January's testimony, hearing here, we show incremental showing in those offset wells.

Q. Okay. So actually -- okay.

And so what is your expected primary recovery in Section 15?

A. So let's -- you know, like, I can give you a rough number.

Q. Yeah. That's what we're asking, just a rough. We're not --

A. I can say like a single-digit recovery factor, less than 10 percent on the primary. So we are talking about maybe -- we got 30 to 70 percent -- from the

target. Let's say primary is ten. Then I can get an additional maybe three, seven, something like that. But this is -- a lot of this is from our simulation study and from some lab work. We did some lab work as well. But, you know, we have to demonstrate in the field, right?

Q. Right.

But the biggest thing is you're actually seeing --

A. Positive for oil.

Q. Right.

You're seeing the rest and decline and additional oil?

A. Yes. So that's why we come here for an injector.

Q. All right. And you have haven't used CO2 yet?

A. We have not used CO2. The main reason is CO2 will need more significant capital.

Q. Oh, okay.

EXAMINER DAWSON: Because you have to put in the lines to drive the CO2 to the facility.

THE WITNESS: Yeah. For CO2, you put a really long line to the field, and also you have some -- like a processing CO2 long-term contract. So we have to approve these first.

EXAMINER McMILLAN: Oh, okay.

I don't have any more questions.

RECROSS EXAMINATION

BY EXAMINER DAWSON:

Q. So your fluids that you're using are coming from the Bone Spring Formation?

A. Yes.

Q. From the 1st, 2nd and 3rd Bone Spring?

A. Yes.

Q. And they're already pretty compatible with the zone --

A. Yes.

Q. -- that you're injecting into, so there is not a whole lot of treatment that's necessary for that?

A. For the produced gas, no.

Q. Okay. All right.

RECROSS EXAMINATION

BY EXAMINER McMILLAN:

Q. And you're using Delaware, too, aren't you?

A. So there is not too much Delaware production from -- the majority is -- whole majority is Bone Spring.

Q. Okay.

EXAMINER DAWSON: Is that all you have?

EXAMINER McMILLAN: Yeah. That's the

questions I've got.

EXAMINER DAWSON: What about the packer? Did you want to ask?

MR. FELDEWERT: I have a witness who is going to address that.

EXAMINER DAWSON: That's all the questions I have. Thank you very much.

THE WITNESS: Thank you.

EXAMINER McMILLAN: Very nice presentation.

THE WITNESS: Oh, thank you.

EXAMINER DAWSON: You may call your second witness, Mr. Feldewert.

TONY TROUTMAN

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

DIRECT EXAMINATION

BY MR. FELDEWERT:

Q. Would you state your name, identify by whom you're employed and in what capacity.

A. I'm Tony Troutman. I work for Occidental Petroleum. I'm a geologist.

Q. And, Mr. Troutman, how long have you worked as a geologist focusing on the Permian Basin?

A. I've been working for OXY in the Permian for four-and-a-half years primarily in New Mexico.

Q. And the Delaware?

A. In the Delaware Basin, correct.

Q. And how long have you worked as a petroleum geologist?

A. About 20 years.

Q. And, Mr. Troutman, like the other witnesses you saw today, have you previously testified before this Division as an expert in petroleum geology?

A. Yes, I have.

Q. And, in fact, did you testify for similar injection projects in January?

A. I did.

Q. Now, have you analyzed the -- as part of this project and all those other projects, have you analyzed the geology in the proposed injection zone in this area?

A. I have.

Q. And if I go to OXY Exhibit 3, the C-108, and I go to page 11 --

A. Yes.

Q. -- are you the individual that authored and certified this statement on the geology in this area?

A. I did.

MR. FELDEWERT: I would retender Mr. Troutman as an expert witness in petroleum geology.

EXAMINER DAWSON: Mr. Troutman will be

admitted to the record as an expert in petroleum geology at this time.

Q. (BY MR. FELDEWERT) Mr. Troutman, as a geologist, what exactly is the proposed injection interval here?

A. It's the 2nd Bone Spring Sand member of the Bone Spring Formation.

Q. And is it -- is it -- how is it confined?

A. It's confined above it by the 2nd Bone Spring Limestone, which is an impermeable barrier above the 2nd Bone Spring Sand. And it's confined below it by the 3rd Bone Spring Limestone, which is another impermeable barrier.

Q. If I go to what's been marked as OXY Exhibit Number 8 --

A. Yes.

Q. -- is this a type log that you have previously used in hearings before the Division to identify the injection interval in the barriers?

A. Yes, it is.

Q. Okay. Why don't you orient us here starting on the left-hand side?

A. Okay. The left-hand side is where I've zoomed in so you can see the 2nd Bone Spring member, which is labeled by the red letters "BSPG 2_SS." That's my

abbreviation for Bone Spring 2 Sandstone. You can see above it the Bone Spring Limestone --

Q. That's LS?

A. -- and below it the Bone Spring 3 Limestone.

Q. Is that the LS?

A. Right.

Q. Okay.

A. Just looking at that log, the left-hand track is a gamma ray. The middle track, the next tract over, is a resistivity log. The next track are the porosity logs, and the final tract there is a petrophysical analysis that provides us lithology. And you can see the sand content there in yellow and the limestone above and below it in blue.

Q. In that interval that you have identified here as the target interval for your injection, that corresponds with the perforations that are requested in the C-108?

A. Yes, it does.

Q. Okay. Then if I move to the right-hand side, you can take that analysis over, right?

A. Sure. That's the same log going from almost the surface down to the base of the Bone Spring 3 Limestone. And what you can see there, the lowest fresh water is near the base of the Rustler, which is in the

first 500 feet of that log. Below that, you have the Salado Salt, which is roughly another 1,000 feet, and then you have the Castile Anhydrite, which is about 1,500 feet thick.

Under that, you have the Delaware Formation, which is not an impermeable barrier. But below that, you have the Avalon, which has several impermeable lines. You have the 1st Bone Spring Lime, the Bone Spring 2 Lime. And then, of course, below our 2nd Bone Spring Sand, you have the Bone Spring 3 Lime.

Q. Mr. Troutman, is this the same injection interval that is -- that was approved and is being utilized in adjacent Section 16?

A. Yes, it is.

Q. And in your opinion, is the 2nd Bone Spring Sand sufficiently confined across this area to support this operation?

A. Yes, it is.

Q. Are there any water wells within a mile of this --

A. No.

Q. No? Okay.

And in your opinion, are there sufficient impermeable barriers in the 8,000 feet between the injection zone and the lowest source of fresh water to

prevent any upward migration into the water zones?

A. Yes.

Q. Have you prepared a cross section to review with the examiners that extends this analysis across the area?

A. Yes, I have.

Q. Let's turn then to what's been marked as OXY Exhibit Number 9. Does this map identify the cross-section wells that you utilized?

A. It does.

Q. Okay. Would you first show us -- identify what wells you utilized and then orient us to the area that's involved here.

A. All right. The cross section goes from north to south, from A to A prime. The red spots are where the wells are located that I've used in the cross section. I believe this cross section is representative of the geology through Section 15, and these wells were picked because they have full penetration of this interval and a good set of curves.

Q. And you've identified here the location of the injection well?

A. I have. The yellow spot is the surface location of the well that will be the injector.

Q. Okay. Then if I move to what's been marked as

OXY Exhibit Number 10, is this the structural cross section that corresponds with the A to A prime well shown on Exhibit 9?

A. Yes, it is.

Q. And what do you observe about the 2nd Bone Spring Sand injection interval as you move across this area?

A. It's very consistent across this interval, across this area.

Q. And are the impermeable barriers likewise consistent?

A. They are.

Q. Did you -- there was some discussion here about the packer. Okay?

A. Yes.

Q. And where it was going to be set. Okay? And I guess we can go there real quick. If I go to Exhibit Number 3 --

A. Okay.

Q. -- and we go to page 4, it says the packer setting depth is going to be 100 feet below the top of the barrier at approximately 7,900 feet?

A. Correct. So that packer will be set at least 100 feet below the top of the 2nd Bone Spring Limestone, which is our barrier above our 2nd Bone Spring Sand.

Q. And since we were kind of moving into an adjacent section, did you calculate that depth --

A. I did.

Q. -- make sure it corresponded with the limestone barrier -- upper portion of the limestone barrier?

A. I did.

Q. All right. And I think it's intuitive, and I want to make sure we understand. You're seeking authority to inject into one member of the Bone Spring Formation, correct?

A. Correct.

Q. Not the entire Bone Spring Formation?

A. Correct.

Q. Even though this is all part of the Pierce Crossing; Bone Spring Pool?

A. It is.

Q. Okay. And the member that you seek to inject into is the 2nd Bone Spring Sand?

A. Correct.

Q. This is the plan?

A. Correct.

Q. Okay. You're not seeking to inject in any other portion of the Bone Spring Formation?

A. No.

Q. Okay. Did you also then create a structure map

of this area?

A. I did.

Q. And if I turn to what's been marked as OXY Exhibit Number 11, is this the structure map that you created?

A. It is.

Q. And did you utilize the 25-foot contours that Examiner McMillan likes?

A. I used 25-foot contours, and you can see the subsea values for my data points are posted on those wells with the red diamonds. And I've labeled the Cedar Canyon 15 3H there in the middle of the map.

Q. What are the other green dots?

A. The other green dots are also 2nd Bone Spring wells.

Q. And what do you observe about the structure as you look at this area?

A. I'm sorry?

Q. What do you observe about the structure?

A. It dips gently from west to east. It's generally unbroken and does not appear to have any faulting.

Q. So is it your opinion that you don't see any evidence of faulting that can act as conduits for migration of fluid out of the 2nd Bone Spring Sand

injection interval?

A. Correct.

Q. In your opinion, Mr. Troutman, does this proposed injection project pose any threat to underground drinking sources?

A. No.

Q. And in your opinion, will this proposed injection project have any negative effect on the correlative rights of mineral owners in the shallower and deeper oil-and-gas-producing zones?

A. No, it should not.

Q. Were OXY Exhibits 8 through 11 prepared by you or compiled under your direction and supervision?

A. Yes. They were prepared by me.

MR. FELDEWERT: Mr. Examiner, I would move the admission into evidence of OXY Exhibits 8 through 11.

EXAMINER DAWSON: Okay. At this time Exhibits 8 through 11 will be admitted to the record.

(OXY U.S.A., Inc. Exhibit Numbers 8 through 11 are offered and admitted into evidence.)

MR. FELDEWERT: That concludes my examination of this witness.

EXAMINER DAWSON: Thank you.

Mr. McMillan?

CROSS-EXAMINATION

BY EXAMINER McMILLAN:

Q. I guess I was the one concerned about the packer setting because it was somewhat confusing on your application. And now that I look, I literally have in my hand here Case Number 16159, and you more or less mimic exactly that order, which is what we wanted to see. I was concerned that you were saying you wanted 100 feet from the perf, and I got worried about whether it can get seated [sic] in there. But that's obviously not going to be an issue, so I'm satisfied with that.

A. Okay.

EXAMINER DAWSON: Anybody else?

Do you have any questions?

EXAMINER BROOKS: No questions.

CROSS-EXAMINATION

BY EXAMINER DAWSON:

Q. So the shale is above and below the injection zone? The porosity on those are like zero to --

A. They're near zero porosity. They have, at best, nanodarcy perm.

Q. And the 2nd Bone Spring there probably has a porosity of about 6 to 8 maybe?

A. Yes.

Q. Okay. That's all the questions I have.

MR. FELDEWERT: We'll call our last witness.

EXAMINER DAWSON: Okay.

RICK FOPPIANO,

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

DIRECT EXAMINATION

BY MR. FELDEWERT:

Q. Please state your name, identify by whom you're employed and in what capacity.

A. My name is Rick Foppiano, and I'm employed as a consultant to Occidental in the capacity of a petroleum engineer for this project.

Q. How long have you been a professional petroleum engineer?

A. For at least 20 years, I've been a registered professional engineer in the state of Texas.

Q. And you previously were employed by OXY, correct?

A. Yes, for about 33 years.

Q. Okay. And, Mr. Foppiano, you've also testified before this Division, as well as the Oil Conservation Commission as an expert petroleum engineer, correct?

A. Yes, many times.

Q. And you were likewise here in January when

presentations were made on similar injection projects?

A. Yes, I was.

Q. And are you familiar with the C-108 application that's been submitted to the Division for this injecting project?

A. I am.

MR. FELDEWERT: I would retender Mr. Foppiano as an expert witness in petroleum engineering.

EXAMINER DAWSON: Mr. Foppiano will be admitted to the record as an expert in petroleum engineering at this time.

Q. (BY MR. FELDEWERT) Mr. Foppiano, I want to turn to what's been marked as Exhibit Number 3. And I'm going to walk through a couple of areas that we have not yet touched on, the data which starts on page 3 and extends over to page 4. What do you observe about the injection-well data here that's important to this case?

A. Yes. This is the injection well-data sheet as part of the C-108 package, and it's for the Cedar Canyon 15 3H well. As we've already noted, it's an existing well. And to the left is a visual presentation of the well's construction, the location of the cement behind the pipe, the tubing, the packer and the perforations. And on the right, there is more detail about the exact

locations of casing, where it's set, how much cement was used and the top of cement and how that top of cement was determined.

Q. And will the packer, as we previously discussed, be set within the confinement barrier?

A. Yes, no higher than 100 feet above the top of the confinement.

Q. And depending how it works out, maybe at some point below that so you have room to move up?

A. Exactly. Yes.

Q. Will the packer always be within a properly cemented section of the wellbore?

A. Yes. As you can see from the diagram on the left, the production casing, 5-1/2-inch casing, has been cemented with 1,300 sacks, and the top of cement is at 478 feet and is verified by a cement bond log. So there is plenty of cement across the confinement zone.

Q. Okay. Will this location also then allow the company to utilize a wireline for injection operations?

A. Yes. That's one of the issues about setting packer in a horizontal well, is beyond a certain angle of the wellbore, it gets difficult to prosecute wireline operations and setting plugs and things like that, which are a normal part of operations. And so we want to set the packer as low as possible, but we have to set it in

a section of the wellbore that doesn't have too much angle in it.

Q. On this -- we see the perforations that are depicted on this exhibit. Is OXY intending to use the existing perforations that are currently being used for production?

A. Yes.

Q. No plans to stimulate this well?

A. No plans to do any additional stimulation beyond what was already done.

Q. What about the packer fluid? What's going to be involved there during injection?

A. It's just going to be water treated with biocide.

Q. If I turn to the second page, I see a notation up at the top. At this point the company is proposing no lining material but will use lined tubing and water injection?

A. Yes. We feel, based on experience, there is no need to use lined tubing when the gas is dehydrated. And that would be the case for when the well is under produced gas injection and even CO2 injection. But, of course, when there is necessary -- when it's necessary to inject water, then that tubing string will be switched out for the -- and lined tubing can be

installed.

Q. And the gas here will be from the central delivery point?

A. Yes, which has been already processed in terms of liquids being removed and -- I mean, oil being removed from it, not NGLs, and it's also been dehydrated.

Q. And has unlined tubing for gas injection been used in the adjacent injection project in Section 16?

A. Yes, it has.

Q. How will OXY monitor the injection well to ensure the integrity of the well?

A. Well, there are a number of ways. The primary ones, obviously, are with pressure monitors both on the tubing and the tubing casing annulus. And so the tubing pressure will be continuously monitored, as well as the tubing casing annulus. So any indication of a leak will be immediately evident via this pressure monitoring because that will be hooked to an automation system which will alert people that there's a pressure anomaly. So that would be something that can be caught immediately.

Q. Were you able to determine the top of cement on this particular well?

A. Yes.

Q. And how is that done?

A. By a cement bond log.

Q. In your opinion, is this well designed to safely and efficiently inject produced gas, produced water and CO2, if it's available, into the proposed injection interval?

A. Yes, it is.

Q. If I turn to page 7, do we see the two-mile blue oval that Mr. Van Liew testified to earlier that was utilized for notice purposes?

A. Yes.

Q. Has this also been utilized for the area of review?

A. It was.

Q. Okay. And then you also provided on this exhibit in red the two-mile radius oval?

A. Yes.

Q. Focusing on the area-of-review analysis done within this oval, would you just briefly explain how this information within this half-mile area of review was developed and analyzed --

A. Yes. One of the primary duties I had for this project was to do the area-of-review analysis based on public data. So starting with the proposed injector in the Cedar Canyon 15 3H, I looked at all the data on

NMOCD's website for that particular well to specifically identify its location from surface location to terminus and then also to identify where the top of the Bone Spring was. And so once I had that information, I went to the OCD's GIS system and E-Permitting system. And, in fact, if you'll turn to the next page, page 8, is a picture of the map from the OCD's GIS system with the half-mile possibly evident.

Q. Yeah. I don't know what happened here.

A. But it is the same half-mile circle as shown in blue on page 7. There is a shaded area that's supposed to show on page 8, but I guess the color didn't come through.

So utilizing this information, I've identified wells that had any part of their wellbore that intersected or fell within that half-mile area of review of the proposed injection well and penetrated the Bone Spring Sand. And so that involved, obviously, looking at all of these wells in this area on the OCD's website to identify and make sure I had all those wells that both penetrated and had a portion of their wellbore within the AOR.

Q. Mr. Foppiano, let me stop you there. I think you said you looked at wells that penetrated the Bone Spring Sand. Is that true, or did you just look at

wells that penetrated the Bone Spring, period?

A. I apologize. It penetrated the Bone Spring.

Q. Okay. And any wellbore that penetrated the Bone Spring within the area of review, correct?

A. That is correct.

Q. Okay. And if I look at these little circles here on page 8, it looks like the largest number goes up to 46; is that right?

A. Yes. This GIS map -- if a well did penetrate the Bone Spring and a portion of this wellbore fell within the AOR, I identified that with a yellow circle and a number so that I could then compile it into a spreadsheet, which is shown on the next page, and get all the construction information. So this is the AOR map that identifies any well that fell into that criteria.

Q. All right. And just so we're clear, if I -- let's go back to the prior page where we see that little oval that was supposed to show up on the next page but didn't. If you had a surface location that was outside that blue oval, but the horizontal wellbore penetrated the Bone Spring within the oval, did you include that in your --

A. Yes, I did.

Q. Okay. All right. And then you came up with

roughly 47 wells; is that right?

A. 46.

Q. 46.

And then within the C-108, we had pages that had some well information on it that was a little bit difficult to read. So if we turn to OXY Exhibit 12, is this an easier-to-read spreadsheet that contains data for all of the wells that you've identified on page 8 of the C-108 application?

A. Yes. It's much easier to read, and I'll walk through what the different columns mean on this spreadsheet.

As I mentioned before, the map that I referenced to have the yellow circles on it, those numbers correspond to the first column, the well ID number, and you'll see 1 through 46 on here. And then the rest of it, you see well information, the API number, the operator and the lease name and location information.

And then in about the middle of the page, we get into the well construction data, which is the TD of the well, and then the different casing strings that were run in the well and what those depths were. And then right next to that, there is a column that is headed "Cement Top." That's the information about the

top of cement behind each of those casing strings. And then the next column after that, moving to the right, is how that cement top was determined, how it was measured.

And then we see under "DVT," if there was a DV tool run, then that was the depth at which that tool was run. The current production pool well is shown on the NMOCD records, and then the perforation is under "Current Completion." And then the last column is additional information that has information that might be pertinent to the examiners and particularly in the case of some downhole commingle wells. I've identified those.

Q. Okay. We'll get to that. Just so we don't have any confusion, keep your finger here. Okay?

A. Okay.

Q. And go back to Exhibit 3, and we look at page 8 where we were before. We see the numbers that correspond with what we see on Exhibit 12, correct?

A. That's correct.

Q. Okay. 1 through 46?

A. That's correct.

Q. Now, if the examiners look at pages 9 and 10, I think we'd find that there was a printing error, correct?

A. Yes. Somehow inadvertently what got submitted

with the C-108 missed a page or two of the detail Excel spreadsheet.

Q. It only went up to well 31?

A. Correct.

Q. But Exhibit 12 appears to take it all the way up to well 46?

A. Correct.

Q. And this would have been printed some time ago, right, a little while back?

A. Yes. Uh-huh.

Q. In preparation for this hearing, Mr. Foppiano, did you take the time to do an updated analysis to make sure that the information on Exhibit Number 12 is the most accurate information we have on these wells?

A. Yes. Just a couple of days ago, I reviewed the area of review again just to make sure this information was correct and also if any additional wells had been drilled or plugged. I wanted to make sure I got that information so I could present it here.

Q. Did you find any change?

A. There was just only one change.

Q. Do you recall what wells?

A. Well number 18, I believe.

Q. I think so.

A. Yeah. Well number 18 was shown -- it is shown

on this schedule as an active oil well, and it has since been converted to injection. So it is an active injection well.

Q. Okay. So if we wanted to scrap, take -- on line 18 there, under "Status," instead of "Accurate," it should say "Injection"?

A. "Injection."

And, in fact, that's the Cedar Canyon pilot that we've talked about that's right next to it.

Q. That's the pilot project right next door?

A. Right.

Q. Okay. Now, one of the things you mentioned was that you did an examination to determine whether there were any commingled wells?

A. Yes.

Q. What you do you mean by that?

A. In my examination of these wells, I discovered that there were a couple of wells that have Bone Spring commingled with Delaware in the wellbore for production purposes, and they're properly commingled under an order. But, of course, my original concern -- my initial concern was well, is that 2nd Bone Spring perforated? It turns out that further investigation revealed that no, those are 1st Bone Spring perforations that are being commingled with Delaware. So the two

cases, the wells that is occurring is well number 32 and well number 36, I believe. Those two wells are the downhole commingled wells.

And since the Bone Spring perforation that is open to the Delaware is 1st Bone Spring, it would be my opinion that those don't represent -- those wellbores do not represent a potential conduit for injection fluid to get out of the 2nd Bone Spring Formation into other formations.

Q. So our injection zone is the 2nd Bone Spring Sand?

A. Yes.

Q. You were here for Mr. Troutman's testimony that it's a confined zone?

A. Yes.

Q. Okay. So you're not concerned about any commingling that occurs between the 1st Bone Spring and the Delaware?

A. No.

Q. Because that's not our injection zone?

A. Correct.

Q. In other words, they are not seeking to inject into the entire Bone Spring Formation?

A. Right.

And there is a sufficient confinement layer

between the 1st and 2nd Bone Spring that gives me confidence there wouldn't be any communication.

EXAMINER DAWSON: And you said that was what? Well number 32 on the list?

THE WITNESS: There are two wells. It's number 32 -- and it's actually discussed in the additional information column to the far right.

EXAMINER DAWSON: Oh, okay.

THE WITNESS: I identified those, about the downhole commingling. It's well number 32 and well number 36.

EXAMINER DAWSON: So OXY operates both those wells, so if there was some kind of communication, you guys would know?

THE WITNESS: Yes, we would.

Q. (BY MR. FELDEWERT) Mr. Foppiano, did you observe any concerns with the wells in the area of review?

A. I did not.

Q. In your opinion, are these wells sufficiently cased and cemented to prevent fluid migration out of the proposed injection zone?

A. They are.

Q. In your opinion, does this proposed injection project pose any threat to public health or the

environment?

A. It does not.

Q. And based on your analysis and the testimony here today, will approval of this injection project promote the efficient recovery of oil underlying the project area?

A. Yes, I believe it will.

Q. I believe all we need to introduce then is OXY Exhibit Number 12, which I believe was prepared by you, correct?

A. It was, yes.

MR. FELDEWERT: Mr. Examiner, I would move the admission into evidence of OXY Exhibit Number 12.

EXAMINER DAWSON: At this point OXY Exhibit Number 12 will be admitted to the record.

(OXY U.S.A., Inc. Exhibit Number 12 is offered and admitted into evidence.)

MR. FELDEWERT: And that concludes my examination of this witness.

EXAMINER DAWSON: Okay. Do you have any questions?

EXAMINER BROOKS: I have none.

EXAMINER DAWSON: I just have a couple.

CROSS-EXAMINATION

BY EXAMINER DAWSON:

Q. You did say that it would be continuously monitored?

A. The tubing casing annulus and the tubing --

Q. Like a SCADA? That way somebody --

A. Yes, pressure.

Q. -- in OXY's office will be alerted immediately?

A. Yes. And that's the standard we have for these injection wells, continuously monitored.

Q. And the MIT will be run on it?

A. As required, yes.

Q. Okay. All right. That's all the questions I have?

MR. FELDEWERT: Mr. Examiner, that concludes our presentation. We would ask this case be taken under advisement.

EXAMINER DAWSON: Okay.

MR. FELDEWERT: And then I know you guys are busy, and I know there's a lot on your plate, but, you know, some of these have been pending for a while. If there is any way we can get the process of approval moving forward to avoid the loss of equipment to Texas and allow the company to make the investments necessary to get these projects moving forward.

EXAMINER DAWSON: I will relay that information, and we'll try our best. I mean, we are flooded like you are, but we'll try our best. And I'll let them know that you guys really need this done quickly.

MR. FELDEWERT: Thank you.

EXAMINER DAWSON: Thank you.

So at this point, Case Number 20449 will be taken under advisement.

Thank you very much.

(Case Number 20449 concludes, 4:48 p.m.)

STATE OF NEW MEXICO

COUNTY OF BERNALILLO

CERTIFICATE OF COURT REPORTER

I, MARY C. HANKINS, Certified Court Reporter, New Mexico Certified Court Reporter No. 20, and Registered Professional Reporter, 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 that were reduced to printed form by me to the best of my ability.

I FURTHER CERTIFY that the Reporter's Record of the proceedings truly and accurately reflects the exhibits, if any, offered by the respective parties.

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 case.

DATED THIS 21st day of May 2019.

MARY C. HANKINS, CCR, RPR
Certified Court Reporter
New Mexico CCR No. 20
Date of CCR Expiration: 12/31/2019
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