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:

ORIGINAL

APPLICATION OF BOPCO, L.P. FOR REVOCATION OF THE INJECTION AUTHORITY GRANTED UNDER ADMINISTRATIVE ORDER SWD-542, EDDY COUNTY, NEW MEXICO.

CASE NO. 15231

Consolidated with:

APPLICATION OF BOPCO, L.P. FOR REVOCATION OF THE INJECTION AUTHORITY GRANTED UNDER ADMINISTRATIVE ORDER SWD-1073, EDDY COUNTY, NEW MEXICO.

CASE NO. 15219

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REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

December 9, 2014

Santa Fe, New Mexico

BEFORE: PHILLIP GOETZE, CHIEF EXAMINER
WILLIAM V. JONES, TECHNICAL EXAMINER
GABRIEL WADE, LEGAL EXAMINER

This matter came on for hearing before the New Mexico Oil Conservation Division, Phillip Goetze, Chief Examiner, William V. Jones, Technical Examiner, and Gabriel Wade, Legal Examiner, on Thursday, December 9, 2014, 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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(8:26 a.m.)

EXAMINER GOETZE: The two remaining cases will be consolidated. There will be Case 15231, application of BOPCO, L.P. for revocation of the injection authority granted under Administrative Order SWD-542, Eddy County, New Mexico, and Case 15219, application of BOPCO, L.P. for revocation of the injection authority granted under Administrative Order SWD-1073, Eddy County, New Mexico.

Call for appearances.

MR. LARSON: Gary Larson for BOPCO, Mr. Examiner. And the gentlemen next to me is Mr. Steve Noyce, who is the vice president of engineering for BOPCO.

EXAMINER GOETZE: Any other appearances?

MR. FELDEWERT: Mr. Examiner, Michael Feldewert and Jordan Kessler of Holland & Hart appearing on behalf of OXY USA and Chevron USA.

EXAMINER GOETZE: You both have several witnesses?

MR. FELDEWERT: We have two witnesses.

MR. LARSON: We have three witnesses.

EXAMINER GOETZE: Would the witnesses please stand, tell your name to the court reporter and be sworn in, please?

MR. MORRISON: Hugh Andrew Morrison.

MR. PREGGER: Brian Herman Pregger.

MR. McGREGOR: Cary McGregor.

MR. SPARKS: William Jarrod Sparks.

MR. CLIFFORD: Thomas Clifford.

(Mr. Morrison, Mr. Pregger, Mr. McGregor, Mr. Sparks and Mr. Clifford sworn.)

EXAMINER GOETZE: Either attorneys have an opening statement?

MR. LARSON: I do not.

EXAMINER GOETZE: Do you have an opening statement?

MR. FELDEWERT: I do.

EXAMINER GOETZE: Very good. Proceed.

OPENING STATEMENT

MR. FELDEWERT: Gentlemen, OXY has produced water into the Bell Canyon since 1993, and that's the upper interval of the Delaware Formation.

Chevron has been injecting into the Bell Canyon and the Upper Cherry Canyon since 2007. That, again, is a higher interval than the producing interval, which is the Brushy Canyon, and they have been injecting since 2007 and 1993 without incident. In fact, they've been injecting through the perforations that are isolated by cement bond logs, cast-iron plugs and retrievable bridge plugs and injection pressures that have been examined three times by the Division in which they increase the injection pressures, finding no problems with the injection operations.

BOPCO's here today because they filed an application to revoke this long-standing injection authority only because Mesquite, who you heard about in the first case, chose to go out and inject in a zone 1,000 -- at least 1,100 feet lower than the lowest perforation on a Chevron well.

There is no debate. You look at their pleading that Mesquite was injecting into the Brushy Canyon, the producing formation through an open hole, not perfs. Mesquite was injecting into the same formation as BOPCO's Poker Lake Unit wells, and BOPCO experienced the pressure increase at one of its Poker Lake Unit wells apparently at a time when Mesquite decided to increase -- did dramatically increase their injection operations in April and May.

BOPCO then filed -- they not only filed their application against Mesquite, but about three or four months later, they filed their application against OXY and Chevron.

So they meet in October. BOPCO notes the Mesquite incident, but there is nothing analogous between the Mesquite issue and OXY and Chevron. OXY and Chevron are not disposing into the Brushy Canyon but the shallower of the Bell and Cherry Canyon Formations. Their injection is with isolated perfs, not by open hole, and it's a completely different injection environment. And we're going to have our witnesses walk you through that today, totally different from what's involved with Mesquite.

And that separate Lower Brushy Canyon Formation, with the Poker Lake Unit wells, located where they have their production, it's separated from where OXY and Chevron are injecting not only by the distances but also by limestone barriers.

So BOPCO, at the October meeting -- and I don't know if they've got any here today; I guess we'll find out -- did not present any direct evidence that this long-standing injection authority into the shallower zones is causing any issues with their Poker Lake Unit. Instead, they're asking you to suddenly shut in this long-standing injection authority simply because Mesquite started injecting large volumes by open hole into the same formation where they were producing. That's a totally different case.

We're not injecting via open hole into that formation, in the Brushy Formation. They have never injected -- Chevron and OXY have never injected into that formation, and they're not connected to Mesquite's disposal environment. Our witnesses are going to show you that here today. Okay?

So when BOPCO goes up there with their witnesses, ask them -- you guys ask them: Where's the evidence of any hydraulic connection between the Mesquite wells and the OXY and Chevron shallower injections? There is no connection here.

Ask them: Where's the evidence that Mesquite is somehow in the same disposal environment as OXY and Chevron? There's no evidence of that.

Ask them for the evidence indicating that OXY or Chevron's saltwater disposal wells are sending water into the Lower Cherry Canyon -- the Lower Brushy Canyon. There's no evidence of that.

Ask them for evidence indicating that OXY and Chevron are injecting into some fractured network. They haven't presented any evidence of that, and our witnesses are going to show you that we're not injecting into any fractured network.

And ask them for any evidence indicating any impact on the Poker Lake Unit by OXY and Chevron's injection operations in these lower shallower zones as opposed to what Mesquite was doing, which is completely different. Because without establishing here today that there is any actual or current impairment of the Poker Lake Unit production from Chevron and OXY's operations -- not Mesquite's, but from Chevron and OXY's operations, if they don't have any evidence of any actual impairment, then there is no basis for you to consider their application here today.

But we're going to put two witnesses on the stand; we've paired it down to two. And we're going to show you we're in a different injection environment than Mesquite was in. We're at a shallower zone. There's no hydraulic connection between our wells and the Mesquite wells, and, therefore, there is no and there could not be any connection with the Poker Lake Unit.

EXAMINER GOETZE: Very good. That's it?

MR. FELDEWERT: That's it.

EXAMINER GOETZE: Okay. Mr. Larson, proceed with the case. Call your first witness.

MR. LARSON: Call Mr. Morrison.

HUGH ANDREW "ANDY" MORRISON,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Good morning, Mr. Morrison.

A. Good morning.
Q. Where do you reside?
A. I reside in Fort Worth, Texas.
Q. By whom are you employed and in what capacity?
A. BOPCO, L.P. as a division landman.
Q. And what is your educational background?
A. A bachelor's degree from SMU, 2005.
Q. And would you please summarize your experience in the oil and gas business?
A. I started as an independent field landman working the Fort Worth Basin in 2007, in January. In August of that year, I went to Bass as an in-house landman, and in 2012, I was promoted to division landman.
Q. And Bass is connected to BOPCO?
A. Yes.
Q. Do you have responsibility for land issues pertaining to BOPCO's operations in southeastern New Mexico?
A. I do, land contract negotiations, oversight of regulatory filings, partner relations for joint ventures, clearing the title for drilling, lots of the primary contacts for the Bureau of Land Management, the State Land Office and for the OCD.
Q. And do you have personal knowledge of the

matters addressed in BOPCO's applications that are the subject of today's hearing?

A. I do.

MR. LARSON: Mr. Examiner, I move for Mr. Morrison's qualification as an expert in land matters.

EXAMINER GOETZE: Mr. Feldewert?

MR. FELDEWERT: No objection.

EXAMINER GOETZE: Very good. He is so qualified.

Q. (BY MR. LARSON) I'd direct your attention to the large map that is marked as BOPCO Exhibit Number 1, and could you identify this document?

A. Yes. This is a map of all three of our federal drilling units in Eddy County from north to south. It's the Big Eddy Unit, James Ranch Unit and the Poker Lake Unit. And the Bass acreage is shown in yellow, and the producing wells are shown on this map in green.

Q. And did you prepare this document?

A. I did.

Q. And would you describe generally the nature of BOPCO's horizontal drilling program in the areas exhibited on Exhibit 1?

A. Our horizontal program really started in earnest in 2009. Since that time, we've drilled 191 horizontal wells in these three units in the Bone Spring and the Delaware-Lower Brushy Canyon Formations. Of those 191, 138 were in the Poker Lake Unit, with 66 being Delaware-Lower Brushy Canyon and 72 being Bone Spring. James Ranch, we drilled 25 Bone Spring, 2 Delaware, and Big Eddy, 20 Bone Spring and 2 Delaware.

Poker Lake, which is going to be the unit we're talking about today, the Delaware wells are shown on a 45-degree angle, and wells that you see with a north-south or east-west orientation are going to be primarily Bone Spring.

Q. And in terms of the horizontal wells that are shown with an angle, the target zone for those wells is the Lower Brushy Canyon?

A. Yes. All of the angled wells are Delaware-Lower Brushy Canyon.

Q. And does BOPCO currently have any saltwater disposal wells that inject produced water into the Delaware Mountain Group in the Poker Lake Unit?

A. No, we do not.

Q. And does BOPCO currently have any plans to develop any additional horizontal wells in the Lower Brushy Canyon in the Poker Lake Unit?

A. Yes, we do.

Q. Currently what plans are on the table for

BOPCO?

A. In terms of horizontal drilling in Poker Lake?

Q. Yes.

A. We've got the Delaware-Lower Brushy Canyon horizontal program and the Bone Spring program both ongoing with one rig committed to each.

Q. And how does BOPCO currently dispose of water from the Poker Lake operations?

A. Devonian saltwater disposal wells. Over the past three years, we've invested $100 million -- over $100 million in a Devonian saltwater disposal system. It consists of five disposal wells in Poker Lake, one each in Big Eddy and James Ranch, and a pipeline to interconnect all the wells like a loop system.

Q. And when did BOPCO first identify what it sees as a problem with injected -- produced water injected into the Delaware Mountain Group?

A. We had seen evidence of it before, but 2012 was when it was really identified as a serious issue that we needed to address, and that's about the time when we started moving away from Delaware saltwater disposal and building a Devonian system.

Q. I'll next direct your attention to the document marked as Exhibit 2, and would you identify this document, please?

A. It's a zoomed-in map of the northeast corner of our Poker Lake Unit.

Q. Did you also prepare this document?

A. I did.

Q. Would you identify the wells that are highlighted in the shaded area to the left-hand corner of Exhibit 2?

A. That would be our Poker Lake Unit 392H, 393H and 401H, so they're all Delaware-Lower Brushy Canyon producing wells.

Q. And are these the BOPCO wells that BOPCO's contending have been adversely impacted by injection by Chevron and OXY?

A. Yes, they are.

Q. And BOPCO's application also identified the PLU #394H as the well that has experienced the water intrusion. Why haven't you highlighted that one?

A. At the time of the application, the most recent well test that we had indicated the 394 was starting to show the same effects that the other three wells had. Those results were not confirmed by subsequent tests, so we're no longer making any claim related to intrusion issues on the 394.

Q. I'll next ask you to identify the wells identified by green triangles in the upper, right-hand corner of Exhibit 2.

A. Oh, those are the group of saltwater disposal wells, the Chesapeake Littlefield #1, the OXY SDS 11 Federal #1, the Mesquite Bran SWD #1, Mesquite Heavy Metal 12 #2 [sic], and the Chevron Lotos 11 #1.

Q. And what is the current status of the Chesapeake Littlefield #1?

A. That was P&A'd in 2011.

Q. And BOPCO asserted claim against Mesquite with regard to Mesquite's Heavy Metal 12 #1 and Bran SWD #1 disposal wells?

A. Yes, we have.

Q. And directing your attention to well PLU 401H, when did this well go on production?

A. It came on in December of 2012.

Q. And was it a successful well?

A. It was. Initial production was between 4- and 500 barrels a day, and to date it's at least about 70,000 barrels of cum oil.

Q. And when did BOPCO discover that the 401H was no longer producing oil?

A. We discovered it on April 28th of this year. Those wells are only tested monthly after they're put on production. The last test showing oil was on March 24th, and by the next test on April 28th, there was no oil being produced and an increased amount of water.

Q. And what did BOPCO do initially to address this issue?

A. Initially the well was inspected to make sure that it was sound and that there weren't any mechanical issues that were causing -- production in the well and increase in water.

Q. And did BOPCO's management task its engineers and geologists to look at the possible cause of the water intrusion?

A. They did. I think a water sample analysis was done in an effort to determine if the extra water being produced was coming from the Delaware-Lower Brushy Canyon or another source, and our geologists also started studying the natural and induced fracture orientations in the area and the Poker Lake Unit and tried to determine if there was an intrusion what direction it might be coming from.

Q. And directing your focus back to Exhibit 2, what's the approximate distance between BOPCO's 401H producing well and the SWD wells operated by Chevron and OXY?

A. It's approximately three miles.

Q. And what was the end result of BOPCO's analysis of the potential cause of the watering out of the 401H?

A. The water sample analysis showed that there was water coming from a formation other than the Delaware-Lower Brushy Canyon, so we were able to determine if the water was not coming from the PLU 401H wellbore. And the fracture orientation study showed that water intrusion was most likely coming from the northeast, at specific angles that you'll hear about later.

Q. Mr. Pregger will address that?

A. Yes.

Q. And at that point, did BOPCO request a third-party evaluation of its analysis?

A. We did.

Q. And who performed that?

A. Platt Sparks out of Austin, Texas.

Q. And Platt Sparks is a consulting firm?

A. Yes, an engineering consulting firm.

Q. What was Platt Spark's reaction to the analysis that BOPCO performed?

A. They -- they concluded that our analysis was correct. They agreed with what we had come up with.

Q. And Mr. McGregor with Platt Sparks will be testifying today?

A. Yes, sir.

Q. Did BOPCO send a notice letter to Mesquite regarding what it had determined was produced water intrusion from Mesquite's wells?

A. We did. We sent a notice letter to Mesquite on July 23rd of this year.

Q. And what did Mesquite do upon receiving that letter?

A. Immediately upon receiving the letter, Mesquite shut in both wells. That evening, actually.

Q. And BOPCO filed that by filing the application the next day?

A. Yeah, the 24th.

Q. And have the issues raised by BOPCO in its application against Mesquite been resolved?

A. Yes, they have. We -- on September 11th, we executed a stipulation with Mesquite, that you heard about earlier, wherein they agreed not to oppose our application, not to appear at a hearing and that they would agree to an order revoking their injection authority for the Mesquite and the Bran wells.

Q. And subsequent to filing the application against Mesquite, did BOPCO have communication with Chevron and OXY regarding what BOPCO viewed as the cause of the produced water intrusion?

A. We did. We communicated with Chevron, as they're our partner out here in the Bone Spring

Formation, prior to filing the application and sending notice to Mesquite, and then we met with both parties in October. I believe Chevron was October 8th, and OXY was on the 14th.

Q. And did BOPCO share all the information that it had regarding that issue with Chevron and OXY?

A. We did.

Q. Much of that information is shown in the exhibits today; is that correct?

A. Yes. Yes, sir.

Q. And what has been the effect of Mesquite shutting in its wells on BOPCO's production of oil from the 401H?

A. We have not been able to fully recover production on any of the three wells.

Q. That would be the 401H, 392 and 393?

A. Yes, sir.

Q. And in your opinion, would continued injection of produced water into Chevron's Lotos 11 #1 well and OXY's SDS 11 #1 well impair BOPCO's correlative rights and result in waste?

A. Yes.

MR. LARSON: Mr. Examiner, I'd move admission of BOPCO's Exhibits 1 and 2.

EXAMINER GOETZE: Exhibits 1 and 2 are so entered.

(BOPCO Exhibit Numbers 1 and 2 were offered and admitted into evidence.)

MR. LARSON: Pass the witness.

EXAMINER GOETZE: Mr. Feldewert?

CROSS-EXAMINATION

BY MR. FELDEWERT:

Q. Mr. Morrison, you're aware that OXY has been injecting into the Bell Canyon interval of the Delaware Mountain Group since 1993, correct?

A. Yes, sir.

Q. Do you have the exhibits in front of you?

A. I do.

Q. Do you have an exhibit that shows the three intervals of the Delaware Mountain Group?

A. Yes.

Q. Which exhibit would that be?

A. It's Exhibit 3.

Q. Let me catch up with you.

EXAMINER GOETZE: Aren't we getting a little ahead of the exhibits that have not been admitted yet?

MR. FELDEWERT: I'm not going to ask for the admission.

EXAMINER GOETZE: Very good.

MR. LARSON: You're not going to object, though, are you?

MR. FELDEWERT: I'm just going to take a look.

EXAMINER GOETZE: We are talking about a landman here, so --

MR. FELDEWERT: Understood.

EXAMINER GOETZE: Very good.

Q. (BY MR. FELDEWERT) You're aware that the Bell Canyon is much shallower than the Lower Brushy Canyon, correct?

A. You can see that from the exhibit, sir.

Q. And have you analyzed how much it's grown?

A. I'm not a geologist. I'll defer any questions related to the depth or distance to our other witnesses.

Q. Why don't you look at BOPCO Exhibit Number 4. Have you ever reviewed anything like this previously?

A. I've seen well logs. It's not part of my job description to analyze them or review them.

Q. Okay. But this gives the approximate -- if I'm reading this correctly -- you tell me if I'm wrong -- this gives the approximate depths of the Delaware Mountain Group in this particular area, correct? Is that how you would read that?

A. Again, from a landman's position, yeah, that looks like what it says.

Q. All right. So you're aware that OXY's been injecting into the Bell Canyon member since 1993?

A. Yes.

Q. And you're aware that Chevron has been injecting into the Upper -- the Bell and the Upper Cherry Canyon since 2007?

A. Yes. I've read their injection orders. That's about the extent of my knowledge on it.

Q. And the Poker Lake Unit is way down there in the -- you've got it marked here as the Lower Brushy Canyon. Do you see that?

A. I do.

Q. Below 8,000 feet?

A. Uh-huh.

Q. You're not suggesting, are you, Mr. Morrison, that OXY or Chevron has been negligent in operating these long-standing injection wells?

MR. LARSON: Mr. Examiner, I have to object to that. He's already said this is outside of his area of expertise, that these questions are more properly asked of the geologist for BOPCO.

EXAMINER GOETZE: I am getting a little concerned here. We do have a landman, and he has expressed his opinion.

MR. FELDEWERT: He did express an opinion. That's why I'm asking him.

EXAMINER GOETZE: He can have an opinion here.

MR. FELDEWERT: Okay.

EXAMINER GOETZE: Doesn't necessarily make it fact.

Q. (BY MR. FELDEWERT) You're not suggesting that they've been negligent in operating their wells, are you, since 1993 and 2007?

MR. LARSON: I object to that question as well.

EXAMINER GOETZE: Could we try another line of questioning?

Q. (BY MR. FELDEWERT) Mr. Morrison, you gave an opinion that you thought that the continued injection by OXY into the Bell Canyon area and the Upper Cherry Canyon was going to have a negative impact on the Poker Lake Unit. Is that the opinion I heard from you?

A. That is the opinion you heard from me based on the evaluation of the BOPCO team and the information I've been given from people.

Q. Okay. So you don't have anything to offer to substantiate an opinion like that?

A. Only what's been offered by the rest of the

BOPCO team. That's where I get the information, and you'll hear from them directly.

Q. Based on the information that you got from the rest of the BOPCO team, okay, is it your contention here that OXY and Chevron have somehow been negligent in operating their wells in this area?

MR. LARSON: I object to that, too. We're not talking about a negligence standard here, Mr. Examiner.

EXAMINER GOETZE: I'm going to have to support Mr. Larson's statement.

Q. (BY MR. FELDEWERT) When you met -- were you part of the team that met with OXY and Chevron in October --

A. I was.

Q. -- about these matters?

A. Yes.

Q. In fact, you had separate meetings, correct?

A. Yes.

Q. Two separate meetings?

A. Yes. Chevron was on the 8th, and I believe OXY was the next week, the 14th.

Q. And I was looking at the response that was filed to our motion for consolidation. It expresses in there the purpose of the meeting was to share data that

BOPCO had gathered during its investigation to determine the cause of the water intrusion. Was that the purpose of the meetings?

A. Yes, sir.

Q. And did you review with OXY and Chevron all the data that you had on what you considered to be the cause of the water intrusion?

A. To my knowledge, we did, yes.

Q. And is that the same information that you're going to present here today?

A. Yes.

Q. Is there anything different that you're going to present here today?

A. I can't tell you if there is any different minutia that's changed between October and now as far as what the technical guys are going to present. It's substantially the same data and the same presentation, yes.

Q. Do you recall informing Chevron and OXY during those meetings that you did not know the source of the water that you were seeing at the Poker Lake Unit?

A. I don't recall that, but I wouldn't have been the one attesting to the source of the water.

Q. Do you recall having any conversation with representatives of Chevron and OXY that you didn't know the source of the water that you saw at the Poker Lake Unit?

A. No, I do not.

Q. Is Mesquite a commercial disposal operation?

A. Yes, they are.

Q. Which means the water source injected by Mesquite comes from different sources, correct?

A. Uh-huh.

Q. Are you aware that OXY and Chevron dispose water produced from the Delaware Mountain Group?

A. I'm not aware specifically what they're injecting into their wells.

Q. But you're aware they're not a commercial --

A. I'm aware, yes.

Q. Are you the -- who is the individual that is going to testify about the impact that the company saw on its well that it saw in April or May?

A. I believe that will be Mr. Cary McGregor.

Q. You mentioned briefly that you saw no oil in your 401H?

A. In the well test on April 28th, yeah.

Q. And at that point, then, had you shut in the 401H?

A. I know it was shut in at some point. Again, I'm a landman. I'm not the one to ask about the technical aspects of what we did as far as operating the well. There are two other individuals that will be much more qualified to answer those questions than myself.

Q. But essentially you saw -- you saw -- you decided to shut in the 401H in April or May? Is that about right?

MR. LARSON: Objection. He's misstating the testimony.

EXAMINER GOETZE: Let's revisit this again. Where are we going?

Q. (BY MR. FELDEWERT) So essentially you saw no oil in April of 2014 in the 401H?

A. Yes. The April 28th well test showed no oil.

Q. At what point did you shut in the 401H?

A. Again, that date is not something I know. There are other witnesses that are more qualified to answer that question. You'll hear that date in subsequent testimony.

Q. You said the water -- you testified the water sample was not Brushy Canyon water?

A. To my knowledge, yes. The water sample showed that there was water coming from somewhere other than the Lower Brushy Canyon.

Q. You'd be relying on others for that opinion?

A. Yes. Again, I'm a landman. This is my -- my knowledge as being part of the team that's been looking into this matter.

Q. So you said the 401H has not been able to fully recover. Are you talking about fully recover since Mesquite shut in its wells?

A. I don't -- we have not been able to fully recover. We have not fully recovered oil production to the point where it was in March when they had the last positive oil test.

Q. It is recovering, though, correct?

A. We've seen some production but nothing significant.

Q. What about your other wells?

A. Again, I think there's been some rebound, but I'm not the person to testify as to flow rates or the quality of the production of the well.

Q. But you've seen some -- in your words, some rebound since Mesquite shut in its well -- disposal wells?

A. I'm not sure of the time, but there has been some production recovered.

Q. Do you recall when Mesquite shut in its disposal wells?

A. Mesquite shut in their wells, as I said earlier, on July 23rd.

Q. And you said there's been some rebound since they shut in their disposal well?

A. I believe it would have been since that date. Again, I'm not the -- not the person who is going to have the most knowledge on that matter.

Q. Who will be testifying, Mr. Morrison, about the condition of your Poker Lake Unit wells since Mesquite shut in its well?

A. I'm sorry. Can you --

Q. Who will be testifying about the conditions of your Poker Lake 401 and the other three wells since Mesquite shut in its injection --

A. I believe that will be Mr. Cary McGregor.

Q. Mr. McGregor.

Now, is Mr. McGregor an employee of BOPCO?

A. He's not. He's a consultant.

Q. He's a consultant with Platt Sparks?

A. Yes.

Q. Is there anyone from the company who is going to be testifying about the condition of the disposal wells in the Poker Lake Unit since Mesquite shut in its wells?

A. I don't believe so. He's conducted a thorough review. He's been involved in the issue since prior to the filing of the application against Mesquite. He's very knowledgeable on the subject.

Q. Have you provided any production records of your four wells?

A. He's an engineer. I'm a landman. I'm not going to testify to what specific data he was given.

Q. That's all the questions I have.

EXAMINER GOETZE: Very good.

Any redirect?

MR. LARSON: I have one follow-up question.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. From the exhibits and testimony presented today, will there be factual information that BOPCO's gathered since it met with OXY and Chevron in October?

A. Yes, there will be.

MR. LARSON: That's all I have.

EXAMINER GOETZE: Follow-up with you, Mr. Feldewert?

RECROSS EXAMINATION

BY MR. FELDEWERT:

Q. What's the additional factual information?

A. There's been none to my two exhibits, but I'm certain that in the two months since we've had that meeting, there have been some additional facts that our technical guys will be adding.

Q. Do you know what they are?

A. Not specifically.

Q. Do you know generally?

A. No. I know there's been some additional facts. They've been doing ongoing studies. I know some things have changed. I'm not in a position to testify as to what technical issues have changed in the last two months.

Q. They didn't share that information with you generally? I'm not asking specifically, but generally.

A. I don't think the scope of our presentation or the scope of our assertion of what's going on here has changed. There may have been some factual issues and other things that have come up that we weren't aware of at the time of the October meetings.

Q. Do you know what they are?

MR. LARSON: Objection. Asked and answered.

EXAMINER GOETZE: Let us proceed. No, not with your question, but going down the road and actually hearing people testify. We've taken the landman as far as we can go.

MR. FELDEWERT: All right. That's all the questions I have.

EXAMINER GOETZE: Very good.

And just to clear up a formality, you have no objections to Exhibits 1 and 2 being entered?

MR. FELDEWERT: No, I do not.

EXAMINER GOETZE: Very good.

Mr. Jones, would you like to ask questions?

EXAMINER JONES: I would.

CROSS-EXAMINATION

BY EXAMINER JONES:

Q. Mr. Morrison, I know you can't say what Mesquite thought and what Mesquite said --

A. Uh-huh.

Q. -- but were you there talking to Mesquite about the settlement with Mesquite?

A. Yes.

Q. So you know what you heard in the meeting?

A. Uh-huh.

Q. So why didn't Mesquite choose a more intermediary solution than just totally giving up their ability to inject? In other words, run pipe and perforate the upper portion instead of down in the lower portion?

A. Mesquite had a Ph.D. geologist that was present at the meeting and saw the presentation and saw the data presented. And I can't speak for what was going on in Mesquite's mind, but I believe they understood what we were claiming and understood that it was what was actually happening, that they were adversely affecting our production. And in order to not cause any further damage, they agreed to shut in their wells.

Q. Totally shut in? Not just modify?

A. No. They shut their wells in and agreed -- the day we sent the letter, on July 23rd -- it was hand-delivered on July 23rd to them. They shut their wells in that evening, and they never resumed operations on those wells. We met with them twice, once on July 28th in Roswell and then again on August 18th in Fort Worth. And after those two meetings, during that time, we were negotiating stipulation that's attached to the motion for entry of order to revoke the authorization to inject, and they signed that stipulation at a separate settlement agreement as well on September 11th.

So I can't speak to their motivations, but clearly they thought that it was in their best interest to not harm our production anymore.

Q. And you don't want the settlement to be part of the order? You're attorney said that, but do you say that also? You want it to be fixed?

A. Yes, with the stipulation as attached as an exhibit to the order, and everything else relevant I think is in the order as it's currently drafted.

Q. In the draft order?

A. Yes.

Q. Thank you.

A. They were not asked to plug their wells. They were just asked to shut them in.

EXAMINER GOETZE: No questions, Counselor?

EXAMINER WADE: No.

EXAMINER GOETZE: Very good.

CROSS-EXAMINATION

BY EXAMINER GOETZE:

Q. Just one concerning future activity here: Now, Big Eddy Unit is also being developed for Delaware; is that correct?

A. Yes.

Q. And so you'll also be following the same potential through the Brushy Canyon Formation?

A. Yes.

Q. And then this is also true of your smaller units, the Little Eddy and the James Ranch?

A. Little Eddy is actually operated by Chevron despite the fact we own a lot of acreage.

But James Ranch already has 25 producing Delaware-Lower Brushy Canyon wells. And as you'll see from subsequent witnesses, we have seen issues with intrusion on Lower Brushy Canyon operations from

Delaware injection from third-party operators that we were able to handle outside of -- handle privately.

EXAMINER GOETZE: No further questions for this witness.

MR. LARSON: Can I follow up with a couple of questions?

EXAMINER GOETZE: You may.

MR. LARSON: Thank you.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Following up on Mr. Jones' question about the meeting with Mesquite, did Mesquite indicate to BOPCO where it was going to inject produced water into in the future?

A. They have multiple other injection wells in Eddy County, but actually the scope of the August 19th meeting in Fort Worth was to educate Mesquite on the information data we gathered on Devonian saltwater disposal. And the last discussion we had with them, they were planning a Devonian saltwater disposal well to replace the Bran and the Heavy Metal in the same area.

Q. Thank you.

MR. LARSON: That's all I have.

EXAMINER GOETZE: Well, Mr. Feldewert, any more?

MR. FELDEWERT: No.

EXAMINER GOETZE: Very good. Then we're done with this witness. Bring your next witness, please.

MR. LARSON: Mr. Pregger.

BRIAN H. PREGGER,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Good morning, Mr. Pregger.

A. Good morning.

Q. Where do you reside, sir?

A. Fort Worth, Texas.

Q. And by whom are you employed and in what capacity?

A. BOPCO, L.P. as a geologist.

Q. And what is your educational background?

A. I have a bachelor's degree in geology from Wittenberg University in Springfield, Ohio and a master's in geology from Northern Arizona University.

Q. And could you briefly summarize your experience in the oil and gas business?

A. I've been a petroleum geologist for 32 years, working for Unocal for 14 years, for Fina for nine years and BOPCO for nine years. I've worked the Permian Basin and south Texas.

Q. And are you familiar with the geological aspects of BOPCO's development in the Poker Lake Unit and the other units that it's developed in southeastern New Mexico?

A. Yes, I am.

Q. And do you have personal knowledge of the matters addressed in BOPCO's applications of Chevron and OXY?

A. Yes, I do.

MR. LARSON: Mr. Examiner, I move for the qualification of Mr. Pregger as an expert on petroleum geology.

EXAMINER GOETZE: Mr. Feldewert?

MR. FELDEWERT: No objection.

EXAMINER GOETZE: He is so qualified.

Q. (BY MR. LARSON) When BOPCO discovered in April of this year that the PLU 401H was no longer producing oil, did BOPCO's management call on you to evaluate the potential cause of the water --

A. Yes, they did.

Q. And how did you approach your analysis?

A. I used -- or I constructed maps and cross sections to analyze the relationship between the offending saltwater disposal well and the producing wells that had been affected.

Q. And I'll ask you to identify the document that's been marked as BOPCO Exhibit Number 3.

A. Okay. This exhibit is a generalized structural cross section east-west across a portion of the Delaware Basin in southeastern New Mexico.

Q. And did you prepare this document?

A. Yes, I did.

Q. And what does the box in the lower, right-hand corner of Exhibit 3 depict?

A. That box represents the line of cross section across the Poker Lake Unit that we're looking at here on the cross section.

Q. And would you please go through your illustration of lithological structures and --

A. Okay. What I want to show on this exhibit is just the various formations that are present in the 19,000-foot thick sedimentary column above the basement. The cross section is from surface to basement, and various formations are marked. I want to highlight the Delaware, which is the formation in blue, because this is the formation that we will be concentrating on today.

Q. Did you say blue?

A. Did I say blue? It's in yellow. Sorry. I'm sorry.

I've also put on a cross section three representative well types that will be apropos to the discussion today.

On the right, I've got a Delaware saltwater disposal well showing the typical disposal perfs in the Bell Canyon and Cherry Canyon Formations from 4,000 to 6,000 feet. In the middle, we've got a Delaware-Lower Brushy Canyon horizontal producing well with the perfs at 8,000 feet, and on the left, I've put in a Devonian saltwater disposal well with the injection interval down between 16,000 and 18,000 feet.

Q. Now, I'll next direct your attention to a document marked as BOPCO Exhibit 4 and ask you to identify this exhibit.

A. Okay. This is a type log of the Delaware section in the area of the Poker Lake Unit.

Q. Did you prepare this document?

A. Yes, I did.

Q. Please describe the lithologic sequence you've depicted in Exhibit 4.

A. The Delaware in this area -- and this is from the Poker Lake 123, which is the northeastern corner of the Poker Lake Unit. The Delaware section consists of 3,800 feet of interbedded deep-water sands, fine sands and siltstones, with very minor interbedded carbonates. The section sits between the impermeable anhydrites and tall [sic] to the Castile formation at the top and the carbonates and shales of the Bone Spring Formation at the base.

Q. And what do you interpret the lithologic characteristics of the Delaware Mountain Group to be?

A. It's a remarkably uniform section and has really little in the way of contrasting lithologies throughout the section.

Q. And in your opinion, does this type log appropriately represent the Delaware Mountain Group in Eddy County?

A. Yes, it does.

Q. And in your opinion, are there any affected frack barriers between the top of the Bell Canyon and the bottom of the Lower Brushy Canyon sections of the Delaware Mountain Group in Eddy County?

A. In my opinion, no.

Q. I'll next direct your attention to Exhibit Number 5. And would you identify this document, please?

A. Yes. This is a map of the fracture propagation direction in the Delaware Mountain Group in the Poker Lake Unit.

Q. And did you prepare this document?

A. Yes, I did.

Q. And what do the red arrows on Exhibit 5 represent?

A. Okay. Those red arrows represent the direction of the propagation of induced and then open fractures that have been seen in nine wells identified on FMI image logs.

Q. And would those all be BOPCO horizontal wells?

A. They would be, yes.

Q. And what do the blue arrows represent?

A. The blue arrows represent the direction of propagation of induced fractures in three wells that have been fracked, and the fracks were observed through microseismic.

Q. So the blue areas represent induced fractures?

A. That is correct.

Q. And what data did you rely on in creating this document?

A. This was -- I relied on third-party analyzed FMI data and microseismic data.

Q. And that data was requested by BOPCO?

A. That is correct.

Q. And what is the fracture orientation that you've indicated on Exhibit 5?

A. The fracture orientation --

And I'd like to go back and say that each arrow on each well represents the average of all the fractures along that wellbore. So the average of these fracture directions is, as you can see, strongly northeast-southwest and ranges from North 43 East to North 65 East.

Q. And in your opinion, do you have sufficient data to support your consideration [sic] of the fracture orientation?

A. Yes.

Q. I'll next ask you to identify the document marked as Exhibit 6.

A. This is a map showing all saltwater disposal wells in and around the Poker Lake and James Ranch Units.

Q. And did you personally prepare this document?

A. Yes, I did.

Q. And what is the blue circle intended to illustrate?

A. The blue circle encompasses five saltwater disposal wells in the Section 11 and Section 12 area that we've been discussing -- or that we will be discussing that we believe have adversely affected the production from the Poker Lake 401, 392 and 393 wells.

Q. And are the volumes of produced water injected into those five wells identified on this exhibit?

A. Yes, they are.

Q. And what are the red circles?

A. The red circles indicate areas where we have actually seen evidence of offset SWD wells affecting production or drilling from our producing wells.

Q. And how about the red circles with broken lines?

A. The ones with the broken lines -- and there are two of them to the southern part of the section, southern part of the unit there -- these are areas where we suspect we're seeing the same thing, but it's too early to tell yet.

Q. And would it be fair to say BOPCO has encountered problems with produced water injection into the Delaware Mountain Group throughout the Poker Lake Unit?

A. Yes.

Q. And referring you to the upper, right-hand section of the shaded area which identifies the three wells that are subject of the hearing today, did you use BOPCO's history with these other red-circled areas as part of your analysis of the cause of the watering out of those wells?

A. Yes.

Q. Next I'll have you identify the document marked as Exhibit 7.

A. Okay. This exhibit is a map of the southeast corner of the James Ranch Unit.

Q. And did you prepare this document?

A. Yes, I did.

Q. And what are you trying to show with this exhibit?

A. Well, this exhibit shows a number of things. First off, we have FMI data in four of the Lower Brushy Canyon lateral wells that we have drilled in this area, and they are shown again as the red arrows. The red arrows indicate the average of the fracture directions that we saw in these wells from FMI analysis. As in Poker Lake, they are oriented northeast-southwest.

The other thing I'm showing on this illustration are the effects we've seen from offsetting SWD on drilling wells in this area. To begin with, the James Ranch #120H, which is located just north of the line of cross section there, when we were drilling in the vertical well or vertical portion of this well, we saw evidence of an influx of saltwater while we were drilling. That's marked by the blue dot on the east end of the wellbore.

Moving down to the James Ranch 121, we

drilled this well out into the lateral. When we reached a depth of 8,911, also marked by a blue dot, we took a significant water flow and had to shut the well in and recorded pressure on the drill pipe.

Moving down to the 124H south of that, the FMI analysis indicated an area of several rather large open fractures in the area of the blue dot on the wellbore there.

Now, when you line these up, the orientation of the alignment of the influence that we saw here point directly to the northeast where Devon has saltwater disposal.

Q. And did BOPCO inform Devon about the water issues it was encountering with these four wells indicated on this exhibit?

A. Yes, we did. When we were drilling the 121 well and we took the water flow, we shut the well in, and we communicated with Devon about that.

Q. And what did Devon do after you communicated these issues to them?

A. Well, when we were talking to them, we requested that they shut their well in, and they did shut the well in for the remainder of the -- of the well.

Q. And what happened when Devon shut in its SWD well?

A. The water flow in the 121 stopped, and we were successful in drilling the rest of the well in.

Q. So you were able to successfully complete the well?

A. That's correct.

Q. I'll have you move on now to Exhibit Number 8 and have you identify that.

A. This is a structural cross section that goes along the line of the James Ranch 120H.

Q. And did you prepare this exhibit?

A. Yes, I did.

Q. And what are you illustrating with this exhibit?

A. What this shows is the relationship between where the injection perfs in the Devon well are and where we saw influence in our wells of water influx or water flows. The injection perfs on the Devon well are marked in blue. The areas where we've seen evidence of water coming into our wells are marked in the blue dots on the 120. As I said, we saw water influx in the vertical part of the well. It's actually up in the Brushy Canyon 200 feet above the perfs that Devon has in the Lower Brushy Canyon. In the 121, we took the water flow in the Lower Brushy Canyon. It is the same formation that they are injecting into, but it is at a distance of 4,000 feet from that well.

Q. So even though there was a 4,000-foot distance, your conclusion was there was communication between the saltwater disposal well and the well that BOPCO was drilling?

A. Yes.

Q. Let's move to BOPCO Exhibit Number 9. Would you identify this, please?

A. This is a map of the area of the Poker Lake 347H well in the central part of the Poker Lake Unit.

Q. And did you prepare this document?

A. Yes, I did.

Q. And similar to questions I asked you of a previous exhibit, what are you illustrating with this document?

A. What I want to show here are the adverse effects that we've seen from offset SWD on drilling and producing Lower Brushy Canyon wells. We drilled the 347H in 2011. The surface location is located to the southeast. It was drilled to the northwest, as is shown by the well pad. When we reached a measured depth of 10,170, which is noted by the blue dot on the wellbore, we took a significant saltwater flow. We shut the well in, and again we recorded pressure on the pipe.

We were able to eventually get back to drilling this well and drilled it out with some difficulty. We were never able to take it out to the originally planned TD.

After we finished drilling the well, we ran an FMI in the well, and one of the results of that is shown by the Rose diagram at the top of the map. This represents the analysis of the induced fractures from this well, and, again, it's showing, just like we've seen in every other Poker Lake well, a very strong northeast-southwest orientation. And it's interesting that the average in this well of North 56 East, where these induced fractures are, is almost the exact same orientation of the line from where we got the water inflow to the Poker Lake 127. The Poker Lake 127 was an active SWD well at the time. I've also shown on this map a picture from the FMI of a large open fracture that was very close to where we got the water inflow.

Q. And the 127 was a BOPCO disposal well?

A. That is correct.

Q. And because circumstances like this, BOPCO went ahead and shut in all of its Delaware Mountain Group disposal wells?

A. This was really the well that prompted us to say, Hey, this isn't just a one off [sic] kind of issue;

this is a pervasive issue; we've seen it in a couple of different areas. This one -- we had such strong evidence that if it -- if it was a problem here, that this was really what spurred us to get out of the Delaware and to direct all of our disposal into the Devonian.

Q. And we'll next move on to Exhibit Number 10. Would you identify this, please?

A. This is a structural cross section that goes along the well path of the Poker Lake 347, and it shows the relationship between the injection perfs and where we took the water flow. And the interesting thing about what we're seeing here is that the 127 well was not injecting into the Lower Brushy Canyon. It was injecting not in the Brushy Canyon. It was injecting into the Cherry Canyon 2,000 feet above where our lateral wellbore was.

Q. And did you prepare this document?

A. Yes, I did.

Q. And does this exhibit support your conclusion that you believe there are no effective frack barriers in the Delaware Mountain Group?

A. Yes, it does.

Q. I'll next ask you to identify Exhibit Number 11.

A. This is a map of the northeast corner of the Poker Lake Unit focusing on the area that we are talking about today.

Q. And did you prepare this document?

A. Yes, I did.

Q. And I'm going to move on to Number 12 and ask you to identify this, because these are basically tandem exhibits. Would you identify Exhibit Number 12, please?

A. Okay. This is a stratigraphic cross section of the Delaware section from the area of the saltwater disposal wells in Sections 11 and 12 down through the 401H well.

Q. Okay. And did you prepare this exhibit as well?

A. Yes, I did.

Q. Now we'll go back to Exhibit Number 11. Is the pinkish line called, quote, "line of cross section" referring to the cross section depicted in Exhibit 12?

A. Yes, that's correct.

Q. Now I'll shift you back to Exhibit 12. What is the total depth of Mesquite's Bran SWD disposal well?

A. That well is open to a depth of 6,740.

Q. And what is the total depth of Mesquite's Heavy Metal 12 SDS?

A. That well is open to a depth of 6,140 feet.

Q. And how far are the total depths of those two wells from the pay zone for BOPCO's 401H?
A. The Mesquite well is 1,400 feet above the Lower Brushy Canyon pay zone, and the Mesquite well is 2,100 feet above.
Q. And next I'll have you look at your last exhibit, which is Number 13. Did you prepare this document?
A. Yes, I did.
Q. And at first glance, it looks very similar to Exhibit Number 6. What's the difference between Number 6 and Number 13?
A. It is the same map with the exception that all wells -- all saltwater disposal wells that were shut in by the time we saw the water flow in the 401H have been marked with a black X.
Q. And when did BOPCO shut in the SWD wells that are marked with Xs on Exhibit 13?
A. It was -- I have to refer to my notes. It was on March 17th, 2014.
Q. In your professional opinion, what is the avenue of communication of the injected produced water that has impacted BOPCO's 401H, 392H and 393H producing wells?
A. In my opinion, it is through a fracture or

swarm of fractures from the area of the SWD wells in Sections 11 and 12, down to the southeast, down the section to our 401 well.

Q. In your opinion, can Chevron continue to inject produced water without adversely impacting the three BOPCO producing wells identified on Exhibit 13?

A. In my opinion, no.

Q. Can OXY continue to inject produced water without negatively impacting the three BOPCO producing wells?

A. In my opinion, no.

Q. And in your opinion, would continued produced water injection by Chevron and OXY impair BOPCO's correlative rights and result in waste?

A. In my opinion, yes.

MR. LARSON: Mr. Examiner, I move the admission of BOPCO Exhibits 3 through 13.

EXAMINER GOETZE: Mr. Feldewert?

MR. FELDEWERT: No objection.

EXAMINER GOETZE: Exhibits 3 through 13, inclusive, are so entered.

(BOPCO Exhibit Numbers 3 through 13 were offered and admitted into evidence.)

MR. LARSON: Pass the witness.

EXAMINER GOETZE: Mr. Feldewert.

CROSS-EXAMINATION

BY MR. FELDEWERT:

Q. Mr. Pregger, are you -- are you aware of the typical permeability that you see in the Lower Brushy Canyon in the Poker Lake area?

A. I am.

Q. What is that?

A. I would not want to give you numbers at this point in time, but I do know it is lower in the Lower Brushy Canyon than it is in the upper part of the Delaware.

Q. Okay. What is the permeability in the Brushy -- in the lower part of the Brushy Canyon than you have in your Poker Lake Unit producing wells?

A. I would refer to our engineer at this point.

Q. Do you know it? You said you know it. I asked you: Do you know the permeability? You said yes. What's the permeability?

A. I cannot tell you at this point.

Q. I thought you told me you did know the permeability. Can you not tell me, or you don't want to tell me? Which one? You're under oath.

A. I cannot tell you at this point.

Q. Do you know the permeability in the Lower Brushy Canyon in the Poker Lake producing area? Do you know it?

A. No.

MR. LARSON: Objection. Asked and answered.

EXAMINER GOETZE: Let's continue, Mr. Feldewert.

MR. FELDEWERT: Okay.

Q. (BY MR. FELDEWERT) Has the company made any attempt to determine whether there is a fractured network in the Lower Brushy Canyon for the Poker Lake Unit area?

A. I'm sorry. Could you repeat the question?

Q. Has the company made any attempt to determine whether there is a fractured network in your Lower Brushy Canyon and where your Poker Lake area is?

A. We have analyzed, like I said, FMI image data from wells, and we have seen evidence of a fracture.

Q. In the Lower Brushy Canyon?

A. In the Lower Brushy Canyon.

Q. And what's the estimate of your permeability there?

A. I do not have an estimate of the permeability at this time.

Q. Now, is it your testimony here today -- let me have you take a look at what's been marked as BOPCO

Exhibit Number 4. Have you prepared this?

A. Yes, I have.

Q. And is it your opinion, Mr. Pregger, that there is no geologic barrier between the Bell Canyon and the Cherry Canyon?

A. No geologic barrier?

Q. Yeah.

A. I would say there is no effective frack barrier.

Q. Is there a limestone geologic barrier?

A. There are thin limestones at the top of the Cherry Canyon and the base of the Bell Canyon.

Q. I'm sorry. Run that by me again.

A. There are thin limestones at the top of the Cherry Canyon and the base of the Bell Canyon.

Q. And then is there also a limestone barrier between the bottom of the Cherry Canyon and the top of the Brushy Canyon?

A. No.

Q. That's your opinion?

A. That's my opinion.

Q. Are you aware of a study done by the University of Texas Jackson School of Geosciences called the "Middle Permian Basinal" -- oh, boy, how do you say this? -- "Siliciclastic Deposition in the Delaware

Basin: The Delaware Mountain Group"? Have you looked at that study?

A. I believe I have. I can't say for sure.

Q. When was that study done?

A. I do not know.

Q. You've looked at it?

A. I believe I have. I can't say for certain.

Q. So if it's the one you're thinking of, is it a reliable study?

A. Well, if it's done by -- who is it done by?

Q. University of Texas.

A. University of Texas. I would say so, yes.

Q. Jackson School of Geosciences. They have a pretty good reputation.

A. Yes, they do.

Q. There are a lot of geologists who take stuff like this and come to a conclusion?

A. Yes.

Q. And you're aware that they have, in this area, said that these zones are genetically and hydraulically separate?

A. "In this area." Which area?

Q. In the Delaware Mountain Group in this area.

A. In which area?

Q. "Deposition of regionally extensive

fine-grained sediments during third-order sea-level rise recorded progressive basin starvation and produced top seals genetically and hydraulically separate the three Delaware Mountain Group formations." That's what they concluded. Do you agree with that?

A. In which area? In which area was this done, does the study encompass?

Q. In the Delaware Basin.

A. The entire Delaware Basin? Well, if they say so, I would have to agree with them.

Q. What's that?

A. If they say so, I would have to agree with them.

Q. Now, let me ask you another question. Are you familiar with something called Hall Plot analysis?

A. I have seen a Hall Plot analysis in the past, yes.

Q. Why do you do a Hall Plot analysis?

A. I cannot tell you at this time.

Q. Why do you say "at this time"? Do you know why you do a Hall Plot analysis?

A. No, I do not.

Q. What about an injectivity analysis? Do you know anything about that?

A. No. That is not in my purview.

Q. Now, as I understand it, keeping in mind Exhibit Number 4, you gave us two examples of where the company has observed water migration as a result of injections?
A. That is correct.
Q. One was the James Ranch example --
A. Yes.
Q. -- involving Devon's Pure Gold disposal well?
A. Yes.
Q. And the second one was your -- what do you call the next one? Poker Lake --
A. 347H.
Q. -- 347H; is that right?
A. Yes.
Q. If I look at Exhibits 11 and 12, I think they relate to what you call the Poker Lake Unit 347H circumstance; is that right?
A. Do I have the wrong exhibits? They're 9 and 10.
Q. I'm sorry. You're right, 9 and 10. Thank you.
Okay. Now, in this example that you gave, Exhibit 10 shows your well diagram?
A. It's a cross section.
Q. And then it has -- it looks like it has the BOPCO PLU 127 --

A. Yes.
Q. -- showing, right?
A. That's correct.
Q. That's a BOPCO saltwater disposal well?
A. That is correct.
Q. So that's one that BOPCO drilled and BOPCO decided to dispose into this area?
A. That's correct.
Q. And if I'm understanding it, eventually you saw some water flow into your 347H?
A. That is also correct.
Q. How far away was the PLU 127 from the PLU 347H? In other words, how far away from the saltwater disposal well in terms of horizontal distance from your producing well, PLU 347H?
A. 1,100 feet.
Q. So less than a mile?
A. That would be less than a mile.
Q. Is that less than a half mile? That's less than a quarter mile, isn't it? That's pretty close.
A. (Indicating.)
Q. And Chevron and OXY's disposal wells are, what, three, three-and-a-half miles away?
A. That is correct.
Q. You also show here that -- in terms of a

geologic depth difference, you show, what, roughly 2,000 feet?

A. 2,000 feet from the injection perfs to the water inflow of the lateral.

Q. That's assuming, is it not, that the cement plug was held and provided a good seal, that you show there at 61 -- 6,010, right? 6,200 feet? Do you see that?

A. Yes.

Q. Did you check that cement plug?

A. I have not checked that cement plug.

Q. Do you know if anybody at BOPCO checked that cement plug?

A. I do not know if anybody has.

Q. If that cement plug didn't provide a good seal, isn't there concern that the water would have moved down the wellbore into the Brushy Canyon member?

A. That would be a hypothesis, yes.

Q. It's my understanding, is it not, that you determined that interference was caused by the BOPCO PLU 127 -- or as part of the process, that you did some tracers of the water? Do you recall doing that?

A. We did do tracers, yes.

Q. How many tracers? Two?

A. I cannot tell you that. I would defer to the engineers who will talk about that.

Q. You're not familiar with the tracers?

A. I'm not familiar with the operation above and beyond the fact that we did run them and that we did see them show up at the 347H wellbore.

Q. Aren't you aware that one tracer never showed up?

A. I am not.

Q. Isn't that what you told Chevron and OXY at your meeting?

A. I did not tell them that, no.

Q. Someone with your company told them that?

A. I do not recall.

Q. Now, the second example you gave was the James Ranch example dealing with Devon's Pure Gold saltwater disposal well?

A. That is correct.

Q. And that involves Exhibits 7 and 8?

A. Yes.

Q. Is that correct?

A. That is correct.

Q. Now, in terms of distances, that Devon Pure Gold well, again, looks like, what, less than a mile from your producing wells?

A. It's less than a mile from the top two. It's probably about a mile from the 124.

Q. And if I look at -- if I look at Exhibit 8, this particular well -- this saltwater disposal well operated by Devon was injecting directly into the Lower Brushy Canyon; was it not?

A. As I said in my testimony.

Q. So it was injecting into the same zone that you're producing from?

A. That is correct.

Q. As opposed to a circumstance that we have with OXY and Chevron. We're looking at Exhibit Number 4. OXY's injecting into the Bell Canyon; is that right? Are you aware of that? I'm just looking at your Exhibit Number 4.

A. Exhibit 4 does not show where OXY is injecting.

Q. Are you aware of where OXY is injecting?

A. Yes.

Q. They're injecting into the Bell Canyon?

A. Yes, that is correct.

Q. Here we go. Look at your Exhibit Number 12.

A. Okay. Hold on.

Okay.

Q. OXY's injection by perforations is up in the Bell Canyon. The lowest perf is, according to the map, 5,212 feet; is that correct?

A. That's correct.

Q. And the lower producing zone of the Brushy Canyon, according to Exhibit Number 4 -- I'm sorry I'm flipping back and forth -- is over 8,000 feet; is that right?

A. That's correct.

Q. So there is a 3,000-foot difference there through the limestone of the Bell Canyon that the Texas study said existed and the limestone barrier of the Cherry Canyon that the Texas study said existed; is that correct?

A. That is correct.

Q. You have those separations.

And you have here the Chevron perf. Their lowest-most perf being in the upper part of the Cherry Canyon, 5,600 feet, right?

A. That is correct.

Q. Lower Brushy Canyon being over 8,000. So what? Roughly 1,500, 2,000-foot difference in depth? 5,632 versus somewhere below 8,000?

A. If you say so.

Q. Isn't that what these maps, Exhibits 4 and 12, indicate?

A. (No response.)

Q. Well, do the math for me.

A. Okay. Restate your question, please.
Q. Chevron's Cherry Canyon disposal, the lowest perf -- and these are perfs. This is not open hole like Mesquite.
A. That's right.
Q. The lowest perf is 5,632? That's what you measured.
A. That is correct.
Q. If we look at Exhibit Number 4 --
A. Uh-huh.
Q. -- you show the -- your horizontal Delaware program.
A. Yes.
Q. What depth is that?
A. It's about 8,000 feet.
Q. It's 8,000 what? Read that for me, Exhibit Number 12.
A. 8,200.
Q. Okay. So what's the distance, then, between Chevron's lowest perf, 5,632 and 8,300?
A. It's about 2,500 feet.
Q. 2,500 feet. Okay.
And then in addition, we have that limestone barrier between the Cherry Canyon, Lower Cherry Canyon and the Upper Cherry Canyon that the Texas

study says exists, correct?

A. That is correct.

Q. And the only other example we have of any interference you have seen was Mesquite's open-hole injection shown on your Exhibit Number 12, correct?

A. That is correct.

Q. And you're aware that there is no disagreement here that Mesquite, like Devon, was injecting directly into the Brushy Canyon by open hole?

A. That is correct.

MR. FELDEWERT: That's all the questions I have.

EXAMINER GOETZE: Very good.

Any redirect at this point?

MR. LARSON: Couple of questions, Mr. Examiner.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Mr. Pregger, are you familiar with the approximate size of the Delaware Basin?

A. Familiar, yes. I can't give you a number, but it is very large.

Q. So it's found in southeast New Mexico; is that correct?

A. That's correct.

Q. And also in Texas?
A. That is correct.
Q. I'll refer you to Exhibit Number 12. Are the OXY and Chevron SWD wells completed originally in the Lower Brushy Canyon?
A. Yes, they were.
Q. And are there plugs, like the 127 plug, isolating the Lower Brushy Canyon completions from the SWD zone?
A. Yes, there are.
MR. LARSON: That's all I have, Mr. Examiner
EXAMINER GOETZE: Very good.
Mr. Jones?

CROSS-EXAMINATION

BY EXAMINER JONES:
Q. Can I ask you to spell your name?
A. Brian, B-R-I-A-N, Pregger, P-R-E-G-G-E-R.
Q. Thank you. I have a card from you somewhere.
These FMIs that were run, you said they were third-party FMIs?
A. They were third-party FMIs, and the analysis was done through a third-party consultant.
Q. It costs a lot to do FMI analysis; does it not?
A. It does. It's a relatively expensive logging.

Q. Logging and the processing?
A. And processing, right.
Q. At what depth were these FMIs?
A. Most of the FMIs that I show, out of the nine, some of them were in the horizontal of the Lower Brushy Canyon, and two of them were in vertical portions of the wells up through the Cherry Canyon.
Q. So they went all the way up to the top of the Cherry?
A. Not necessarily to the top of the Cherry, but we had intermittent data through the Cherry down to the Brushy.
Q. I should ask the most important ones first. What do you think the geologic reason is for these fractures swarms?
A. It's the pervasive overall stress pattern that is seen in the Delaware at this time. It's -- it's pretty pervasive across the area. We actually see it down into the Bone Spring, but the Bone is not at issue here. It's just that the latest structural movement in the area has produced a stress field which has produced this directed orientation.
Q. When was that? Was that Laramide, or when was it?
A. I believe it's Miocene.

Q. Miocene --
A. Uh-huh.
Q. -- stress compression from northeast to southwest?
A. An actual uplift in the Miocene.
Q. What about cement in your porosity -- I mean, as far as brittleness of the rock, was there -- some rocks are more, obviously, ductal than others.
A. It's a big sand dump. It's cemented sands, but they're not highly cemented. So you do get -- it's not like a chert, which will just fracture or just shatter, but it has enough -- it's cemented enough that it will sustain fractures.
Q. So it's -- but it seems that you're making a case here for the whole Cherry Canyon to be -- or the whole Delaware Mountain Group to be connected through fracture forms vertically and extensively horizontally.
A. That is correct.
Q. So there must be a geologic reason for that, I mean besides just a stress direction.
A. Well, it's the stress direction, and it's actually not as much a geologic issue as it is -- and we'll get into that in the next part of the presentation -- an overpressuring due to saltwater disposal, which is creating fractures along the

prevalent stress direction.

Q. Did you look at any of the microseismic done on your wells?

A. I have seen some of it, yes.

Q. What can you see from that, those frack jobs on your Lower Brushy?

A. What it's showing is that the fractures -- at least during the last -- on those wells are very clean, very strongly oriented in this direction.

Q. Okay. So you see -- you see a plan view? Is that what you see?

A. Yes.

Q. So you don't really know how far they extend vertically, do you?

A. Actually we do have data on how far vertically they extend. And with the frack jobs, they extend on the order of a couple hundred feet; depending on the frack job itself, probably a couple hundred feet in each direction vertically. Now, that's not as much as we're talking about with -- you know, talking about 2,000 feet of fracture rope [sic]. But a frack job is a very time-limited event, and to propagate a frack, one of the more important things is the time it takes to propagate that fracture. So a fracture and a frack job is an almost instantaneous event that is not going to propagate your frack for very much height growth.

Q. And the proppant that you use, is that propping the whole affected area that the microseismic shows, or is it --

A. We hope to obviously prop most of the frack, but I don't know for sure.

Q. But you can't tell that from --

A. Right.

Q. Water flow -- you talked about water flows in these wells.

A. Uh-huh.

Q. That would connected with a good -- good saltwater disposal interval; would it not?

A. Well, what we believe is happening is that the pressure from the water injection in these wells is opening fracks -- opening fractures, and these fractures are intersecting the wellbore as we drill through them. And so what we're seeing is when [sic] our wellbore intersects one of these fracks that has been opened by the pressure from the saltwater disposal well.

Q. Okay. You were talking about the lithology and just a little bit of limestone in the Bell and some on the Cherry, correct?

A. That's correct.

Q. How are you so sure about the lithology out here?

A. In the -- well, we do run sample logs, mud logs when we drill our logs, but we also run a -- we run a log that -- it's called a PE curve on our logs that gives us what the lithology is, and you can pick out thin little carbonates within the sand section.

Q. So you do have some PE curves?

A. Yes.

Q. And so that means you have open-hole logs when you log through --

A. Yes. We have actually a great number of open-hole logs through the Delaware in this area.

Q. And that would be on the horizontal wells that were drilled through the Brushy?

A. It would be on both older vertical wells and on the vertical portion of the horizontal wells, yes.

Q. So there has been a lot of vertical production out here in the Brushy Canyon?

A. Yes, that's correct.

Q. So the pressure has drawn down in the reservoir?

A. In some areas.

Q. Okay. I guess your engineer can talk about that.

A. Right.

Q. And so your Lower Brushy is right on top of the Dela- -- Bone Spring?
A. Bone Spring. That's correct.
Q. But you don't want to get down in the Avalon? How come? Is it --
A. Well, there are a number of reasons that we don't want to get into the Avalon. But the Bone Spring limestone that sits at the very top of the Bone Spring we have found to be an effective frack barrier when we frack our Lower Brushy Canyon wells.
Q. Okay. So you've got a barrier below you --
A. Right.
Q. -- for the frack jobs, but not much barrier above you?
A. That is what we have found, yes.
Q. Did you study the type of water that you encountered with these water flows?
A. I did not. That would be something for the engineer to answer.
Q. Okay. And he would talk about the equipment and the cement jobs?
A. Yes.
EXAMINER JONES: That's all my questions.
EXAMINER WADE: No questions.
EXAMINER GOETZE: Very good.

CROSS-EXAMINATION

BY EXAMINER GOETZE:

Q. In general, your target rock for the Lower Brushy, is this a siltstone -- organic-like siltstone, or what are we looking at?

A. It's a fine-grain sandstone; it's a siltstone.

Q. And it's pretty uniform through the area?

A. Pretty uniform. It's -- it's layered. You have thin -- a little bit more organic-rich siltstone separating individual -- individual sand beds. For instance, in the Lower Brushy Canyon section, which is approximately 250 feet thick, we've got seven individual sand beds that we've actually named. But as far as being an effective frack barrier, there is nothing in between them, and we don't see any influence of anything between the individual sand beds in this area.

Q. So for this occurrence, what's your capping mechanism? Is there a change in lithology? Are we looking at just a diagenetic event?

A. I'm sorry. I didn't hear you.

Q. Okay. What's keeping the oil in place?

A. Oh, the oil is being kept in place by just the fact that it is very tight -- a relatively tight reservoir. From a conventional standpoint, the Lower Brushy Canyon is much tighter than the upper portions of the Delaware.

Q. Okay. Let's go to Exhibit Number 4, please. Can you give me what your marker was to do your picks for the Cherry and Brushy tops? Is this something you selected, or is this a BOPCO interpretation?

A. This is -- this is taken from what we at BOPCO have been picking for a long time, and it's a correlation on a couple marker beds that we have picked and that we have used.

Q. And for the Brushy, what kind of marker we're looking at, is that something you have named or identified out of this area or just in your area?

A. Well, the top of the Brushy Canyon I picked as being -- it's the first sand below, what we identify as the Lower Cherry Canyon. The Lower Cherry Canyon is something that we have picked and correlated across the area because it does produce a number of our wells. And so the sand below that we consider the top of the Brushy Canyon.

Q. And then for the Cherry?

A. For the Cherry Canyon, we picked a gamma ray marker on top of the sand. And I believe back in the history of BOPCO, that had originally come from a BLM regionwide analysis of where the top of the Cherry Canyon was. It's something that we've used -- something that I've used ever since I've been with BOPCO.

Q. Very good.

Now to -- let's see -- the experience of the Poker Lake Units 347H area. Well, excuse me. Let me take that back. We're looking at the Delaware. I'll take that back. It's the 121H area; the two horizontals go east-west.

A. Right.

Q. You stated that Devon had injected and then at the request of BOPCO had shut in?

A. That is correct.

Q. Has there been any injection after that request?

A. Yes. When we finished drilling the well, they -- they resumed injecting into that well.

Q. And have we seen any impacts on --

A. No, we haven't. Because during the completion of the wells in questions here, those -- that part of the well where we saw those water effects, we did not complete. In fact, in the 121, where we took the water flow, that locality is behind seven inches of cemented casing.

Q. But we have not seen any impacts in any other part of the lateral after reinjection started?

A. Not definitively, no.

EXAMINER GOETZE: Well, I have no further questions for this witness.

At this point let's take a 15-minute break.

MR. FELDEWERT: Mr. Examiner, I do have two more questions, if I may.

EXAMINER GOETZE: We're getting questions on questions on questions. We've got to stop at some point. Let's see what you have to say.

RECROSS EXAMINATION

BY MR. FELDEWERT:

Q. Just following on Mr. Goetze's question about the Devon well resuming injection, that's at 8,000 feet in the Lower Brushy Canyon?

A. That's correct.

Q. Are you also aware, Mr. Pregger, that -- are you aware of BOPCO's Poker Lake Unit #98?

A. #98?

Q. Which is a saltwater disposal well operated by BOPCO?

A. I'm not, right off the top of my head.

Q. You're not familiar with the injection operations of that well?

A. No, I'm not.

Q. All right.

MR. FELDEWERT: That's all the questions I have.

EXAMINER GOETZE: Very good. Let's take a break. Come back in 15.

(Break taken, 10:00 a.m. to 10:18 a.m.)

EXAMINER GOETZE: Mr. Larson, you ready?

MR. LARSON: I'm ready, Mr. Examiner.

EXAMINER GOETZE: Mr. Feldewert, ready?

MR. FELDEWERT: Yes, sir.

EXAMINER GOETZE: We're back on record.

And we're going to do a little bit of procedural difference here. Once you've done your directs, we will ask questions and then come back for your redirects, give the opportunity for our questions to be included in this discussion. Going back and forth is just getting to be too much of a carry-on.

MR. FELDEWERT: Okay.

EXAMINER GOETZE: We'll let you folks have the final say.

At this point I think we're done with this witness.

MR. LARSON: Actually, I think I have a couple on the follow-up questions.

EXAMINER GOETZE: Well, let me see -- (laughter).

MR. LARSON: You'll have your chance.

EXAMINER GOETZE: So are we revisiting this witness again?

MR. LARSON: Just for a couple of questions on Exhibit 13.

EXAMINER GOETZE: Okay. The witness is under oath.

Mr. Larson, continue.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Mr. Pregger, I direct your attention to the Cotton Draw Unit there in Section 2 on Exhibit 13.

A. Uh-huh.

Q. Were there several Devon saltwater disposal wells in that area?

A. Yes. Devon had two Delaware saltwater disposal wells in that area.

Q. And did BOPCO file an application against Devon regarding water intrusion from those wells?

A. Yes, they did.

Q. And how has that case revolved?

A. That case was revolved by a meeting with Devon and talking to them about the effects that their wells were having on our wells on the east side of the Poker Lake Unit there.

And we brought to -- we brought this

subject to their attention particularly in light of the fact that they had drilled a Lower Brushy Canyon horizontal well between these two disposal wells that never made anything but water. Even though it's surrounded by our productive well, their well in between those two disposal wells made nothing but water. We talked to them, and we showed them the influence that their wells were having on our wells and that we would like to see them get out of the Devonian -- excuse me -- get out of the Delaware injection in that area. And based on the conversation we had with them, they decided to go and drill Devonian saltwater disposal wells in that area and plug those two Delaware disposal wells.

MR. LARSON: That's all I have.

EXAMINER GOETZE: Mr. Feldewert?

RECROSS EXAMINATION

BY MR. FELDEWERT:

Q. Mr. Pregger, with respect to that Cotton Draw area, where were Devon's saltwater disposal wells?

A. They were in Section 2.

Q. No. I mean in terms of depth.

A. In terms of depth, they were in the Cherry Canyon.

Q. What portion of the Cherry Canyon?

A. I do not have that information with me at this time.

Q. Where were your producing wells that were being impacted?

A. They are on the east side of the Poker Lake Unit.

Q. What formation?

A. Lower Brushy Canyon.

Q. In the Lower Brushy Canyon?

A. That is correct.

Q. What was the distance between the two wells? Less than a mile, wasn't it?

A. Which two wells?

Q. What's that?

A. Which two wells?

Q. Between the disposal wells and your producers.

A. Depending on which ones you pick, it's about a mile to a mile and a half.

Q. Is there someone that's going to be here today that can talk about your Poker Lake Unit 398, which was BOPCO's saltwater disposal well?

A. I would say if -- if there was someone, it would be the engineer, who would be speaking next.

Q. Do we know if he's going to testify -- I ask your knowledge about that because apparently we don't have an employee, unless you know something about it.

A. I do not know the specifics about that well at this point in time.

Q. You know that it was disposing into the Lower Brushy Canyon, correct?

A. I cannot tell you that.

MR. FELDEWERT: That's all the questions I have.

EXAMINER GOETZE: Very good. We're done with this witness.

Thank you.

Your next witness?

MR. LARSON: Call Mr. McGregor.

CARY A. McGREGOR,

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

DIRECT EXAMINATION

BY MR. LARSON:

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

A. My name is Cary McGregor.

Q. And where do you reside?

A. Austin, Texas.

Q. And what is your business affiliation?

A. I'm a managing director with FTI Platt Sparks in Austin.

Q. And what is your educational background?

A. I graduated from the University of Texas with a bachelor of science in petroleum engineering in 1984.

Q. And what's been your experience in the oil and gas business since you got your P.E. degree?

A. Well, since I've had my P.E. degree, prior to graduating, I worked with Platt Sparks and have worked at Platt Sparks for the last 30 years.

The general categories of the type of studies we do are reservoir engineering studies, field development studies, studies of secondary recoveries. Waterfloods is a lot of our work. We move from reserves to evaluations, evaluations for acquisitions, divestitures for other -- for other entities and other reasons. A large part of my experience is I've worked with the Texas Railroad Commission for the last 30 years, which involves, you know, recommendations for the appropriate field development rules, unitizations, recoveries associated with those.

There are many applications that are related to -- that's this type of work or related to injection wells. So there are very many injection-for-disposal-well applications that I've been involved with over the years both to recommend injection and to protest injection in certain areas of the formations. Another part of the practice involves all of that type of work, but very often it can be a lease-related issue or a lease dispute.

Q. And did you hear Mr. Morrison's testimony about BOPCO hiring a third party to evaluate their analysis of the cause of the water intrusion that's the subject of this case?

A. Yes, sir.

Q. And did you take the lead on that with Platt Sparks?

A. I did.

Q. And you mentioned doing work with the Railroad Commission. Have you ever testified at an examiner hearing in front of --

A. I have testified at well over 100.

Q. And have you ever been qualified as an expert witness in a state or federal court proceeding?

A. Yes, I have, many times.

MR. LARSON: Mr. Examiner, I move for Mr. McGregor's qualification as an expert in petroleum engineering.

MR. FELDEWERT: No objection.

EXAMINER GOETZE: Very good. You are so qualified.

Proceed.

Q. (BY MR. LARSON) Mr. McGregor, I first direct your attention to a document marked as Exhibit 14. Could you identify it for the record, please?

A. Exhibit 14 is a well test versus time chart. This is for the Poker Lake Unit 401H well. On the vertical axis, we have the daily rates, barrels of oil per day, barrels of water per day, and we also show psi. Those three entries go with the legend that's on the horizontal axis.

The horizontal axis is time. And the green is the barrels of oil per day. The blue is the barrels of water per day, and the purple diamonds, those are the pump inlet pressures for the submersible pump. So those are the three data parameters that I have plotted on this chart for the 401H well, which is a Lower Brushy Canyon completion.

Q. And was Exhibit 14 prepared at your direction and under your supervision?

A. Yes, sir.

Q. And would you summarize the timelines of the well tests performed on the 401H well from the date the well went on production until the date it stopped producing oil?

A. Well, if you start on the leftmost portion of the chart, in December of 2012, the 401H well began production, approximately 450 barrels of oil per day, around 2,000 barrels of water per day. And you can see from the pump inlet pressure, it was approximately in the range of 2,500 to 3,000 psi.

As we now move forward in time, the well -- you can see that the well, from December 2012 through March of 2014, produced for approximately 16 months, and the trend that you see -- you can see oil declining from 450 barrels of oil per day to 87 barrels of oil per day in March of 2014. And that's also on one of the callouts. It's the very first callout on the vertical axis where it shows March 24th. So we've moved from 450 barrels of oil per day to 87 barrels of oil per day over those 16 months.

Similarly, you see a decline in the water production from, you know, 2,000-plus barrels of water per day down to 1,000 barrels of water per day. And similarly, the pump inlet pressure, you can see that that trends from around 3,000 pounds to, on March 24th, 800 pounds.

So the purpose of all that is this is a depletion type reservoir, the Lower Brushy Canyon. This is a typical trend that you would expect to see. You can see just prior to March 24th that the oil had begun flattening out in that 87-, 90-barrel-a-day range. And the important part -- one important part of this plot is if you just look forward at the rest of the history for the well, that after March 24th, 2014, none of these parameters are on trend anymore. The oil collapses to zero. The well goes to 100 percent water. You can see the water production. Rather than declining, it now begins to increase up to -- if you look at the very -- from March 24th all the way to the end point, you know, it's up around -- up to 3,000 barrels of water per day.

And also significantly on the pump inlet pressure, we've gotten it down over that 16-month period to 800 pounds, and you can see a significant reversal in trend on pump inlet pressure. So there has been an extraneous source of energy that this well has encountered that has stopped all of its oil production. It's gone to 100 percent water, and the pressure in the wellbore has increased significantly.

Q. And what is the significance of the April 28th, 2014 date you have as a callout on this exhibit?

A. Well, the first -- the first two callouts that are, you know, down in the -- the March 24th showing 87 barrels of oil per day and then the next callout of April 28th, 2014, in the yellow box where it says "100 percent water rate," those are the two tests that we have. The 87 barrels of oil per day is the last test we have showing oil, and then about a month later, on April 28th, that's the first test that we have that shows 100 percent water. Because this graph is not allocated production. What I asked for on this graph is actual well-test data for the 401H well.

Q. And what did BOPCO do after it received the April 28 well test?

A. Well, there are a number of things. I mean, obviously you have a -- you have a very good Lower Brushy Canyon oil well that's gone to 100 percent water. So there was a lot of, you know, team effort and thought beginning to try to understand the problem.

So once that well test was made, there was -- they kept the well on test from April 28th until May 13th, at which time the well was shut in. So during that window, what they did is they continued producing the well during that week or two. They saw the bottom-hole pressure continued increasing. They saw that the well continued on a 100 percent water production. So they were confirming that well test during the next two -- you know, is this -- is that day representative of what's happened to our well?

So it was, in part, to do that. And then during that period, they also began gathering water samples to help understand the fluid production that was being experienced in the well during that period of time.

Q. After the water samples were taken, what was the next step that BOPCO took?

A. Well, the next step is they shut the well in on May 13th, pulled the pump. And they ran into the hole throughout the vertical section to do an MIT, a mechanical integrity test, to determine is there a hole in the casing somewhere that would be the inflow or potential source for extraneous water, and there was not.

The next effort they made was on May 21st, they ran a production log survey. And this is a very long lateral -- it is a very difficult process to run a production log, you know, in a lateral well that's, you know, close to 8,000 foot of lateral. So they ran the production log, and the purpose of the production log was to identify where's the water coming from.

The results of that analysis showed that the water entry point was very close to the toe, about four sleeves back. I believe it's 13,191. And the results of that analysis, which we'll also cover, shows there were exit points. There was significant cross-flow -- subsurface cross-flow identified in the well, because the well was shut in.

So after the production log was run and they identified where the water inflow was occurring within the wellbore, their next step was to isolate it. The original -- the attempts were -- they wanted to isolate stage four, which is the stage that was identified from the production log as being the entry point, and produce it and obtain some water samples and understand the character of that portion of the wellbore.

However, they weren't able to do that after a number of attempts, so what was done is they isolated stages four and five, which would also -- you know, basically one through five, those were isolated, and returned the well to production to try to reestablish the oil production from the remaining portion of the wellbore from stage five on through stage 19. There are 19 stages.

Q. And what results did BOPCO get after it put the well back on production?

A. Well, that is the area -- if you look at the -- if you look at the chart, the most southern callout, where it says "July 11th of 2014" and it's pointing to a vertical line, this -- from July 11th, 2014 until, as you can see in the next callout as you move to the right, on October 26th, 2014. So during -- during those three months, stages four and five had been isolated. And you can see from the well-test data that all it produced was water. They continued producing 100 percent water during those three months.

At the end of that time period, being October 26th, what you can see is -- so during that time period, the pressurized water, disposal water -- the pressurized disposal water had nowhere else to go. It couldn't cross flow. So during that period of time, that interval is isolated.

From October 26th, 2014 forward and thereafter, BOPCO went back into the well, drilled out all of the plugs to return the entire well to production and effectively began to dewater or capture -- act as a capture well the pressurized disposal water that had watered out the well.

Because during -- during this time period -- and we have exhibits for that. During this time period, the breakout water continued to move to the south and to the west and impacted their 392H well next in sequence and then the 393H well in sequence. And because of that, in part, it was a very deliberate action to go drill out those plugs and begin capturing as much of that water as they could to try to, you know, keep that water from further impacting the next two wells down the line and see if they could reestablish oil production in the 392 and 393.

Throughout this entire time period, from -- basically from the point of the callout of April 28th of 2014 when the well went to 100 percent water, Bass has moved more than 150,000 barrels of water since that period of time and spent on the order of $1.6 million in order to try to study this problem, understand this problem and try to reestablish oil production in the 401H, the 392H and the 393H.

Q. Did you hear Mr. Morrison's testimony that the well had rebounded somewhat in terms of oil production?

A. Yes.

Q. Now, we show here on this Exhibit 14 that there was zero oil produced as of October 26th. Are there more recent tests that show oil production?

A. Yes.

And actually on that callout as far as -- the current oil rate is shown in the same box with the October 26th, but October 26th is when they drilled out the plug to return the well -- the entire wellbore to production. And the current oil rate in November of 2014, the last one I had, until just yesterday, was no oil. The well was still producing 100 percent water, but as of literally this weekend, on December 4th, the well began to produce oil.

MR. FELDEWERT: I'm sorry. Which well was that?

THE WITNESS: The 401H well.

So since April, for the last nine months, we have not produced any oil. But as of this weekend, the well began producing oil, and the well has remained on test. So from December 5th, 6th and 7th, which are the three days -- actually four days. December 4th, 5th, 6th and 7th, the oil has ranged from 21 to 30 barrel of oil per day now in the 401H well and producing an associated amount of water ranging from 2,011 to almost 2,400 barrels of water per day. So currently, the well is producing, based on the last four days that we have, 25 barrels of oil per day, almost 2,200 barrels of water per day at a water-oil ratio of 87 to 1.

So, you know, the good news is the efforts have led to some reestablishment of oil production in the ~~401H well. As you can see from the data itself,~~ the well is still producing significantly more volumes of water than it had prior to the water breakout. It's at significantly higher pressure than prior to breakout and at a significantly higher water-oil ratio.

Q. (BY MR. LARSON) Is there anything further you'd like to relate with regard to Exhibit 14?

A. Well, you know, $1.6 million is, you know, a lot of effort and a lot of time in order to bring this well on as a capture well to try to remediate the next two wells down the line. You know, it is incurring, you know, great expense to move this much water. To continuously move this much water even as they're establishing the oil production, there is significant volumes of water that are having to be moved in order to reestablish the production that has been established to date.

Q. And just following up on that, did BOPCO put a new pump on the well?

A. Yes. When they made the -- took the action to drill out all the plugs in the well and bring the well back on to production, as part of that, they -- they utilized a much larger pump that they put in the well, so they could capture and move large volumes of pressurized water.

Q. And was the cost of the pump included in your $1.6 million figure?

A. I believe so.

Q. And are there ongoing costs, as you said, in terms of all that water?

A. Yes. There are ongoing costs. I mean, certainly 25 barrels a day and moving 2,200 barrels a day is not an economic proposition.

Q. I'd next direct your attention to the document marked as Exhibit 15. Could you identify that for the record, please?

A. Exhibit 15 is a four-page exhibit. These are water samples taken by Martin Water Laboratories, Inc. It's an independent -- they're independent of BOPCO, and they do all or a majority of the water sampling that's done in this area for BOPCO.

The water analysis -- the dates -- the dates are shown. You know, if I do kind of a layout here, the purpose of this exhibit, what we're going to show, is I've culled out the 401H well on each of these pages so that it could be contrasted to the other wells that show up on this analysis, and the other wells are Lower Brushy Canyon wells, also. So it was to -- it was to have, you know, a metric -- a standard with which to compare these water analyses we're now getting for the 401 well.

So the 401 well has been culled out either with yellow highlighting and then a red box around it. And any other wells that aren't under that are our standards for Lower Brushy Canyon.

So in this particular exhibit, if we look at the first page, the upper portion of the exhibit where it shows number one, number two, number three and number four, those were the four samples that were taken. And then they lay out, as you move from left to right on the exhibit in the lower portion, each one of those. Number one, number two, number three, number four correspond with the legend right above it. So the sample number one is for a sample taken on May 2nd, 2014, which is after -- if you recall in the prior chart, the well had gone to -- had already gone to 100 percent water, the 401H well had. And as for the 401 well -- the other three samples are for the PLU's Poker Lake Unit, for the 409, the 411 and the 412 wells.

Q. And did Martin Water Laboratories analyze the water samples at BOPCO's request?

A. Yes.

Q. And to the best of your knowledge, is this document a true and correct copy of Martin Water Laboratories' water sampling data?

A. Yes, it is.

Q. And could you go into a little more detail about what these comparisons of the water samples tell us?

A. The two primary markers that I was looking at is the specific gravity, which is the very first line item, you know, on the chart of the analysis. And the specific gravity for samples number two, number three and number four -- those are the Lower Brushy Canyon wells, 409, 411 and 412 -- is 1.182 to 1.1865. That is Lower Brushy Canyon water. That is a very identifiable and significant signature for Lower Brushy Canyon water.

That is in contrast to the water specific gravity for the 401 well, which is lower, much lower, 1.15. And when we flip through the exhibits, we'll see that relationship will hold that Lower Brushy Canyon water generally ranges from 1.8 to 1. -- a little less than 1.21. And that is much different than the waters above and actually below the Lower Brushy Canyon, so it's a good signature.

I also looked at the total dissolved solids, which is about two-thirds down the page. And for the baseline wells, samples two, three and four, you can see it's 300,000 plus in total dissolved solids. And for the 401 well, it's, you know, much less than that. It's 247,000. So it's lighter in specific gravity. Its chlorides are lower. It is not native Lower Brushy Canyon water that's being produced and sampled from the 401 well.

Similarly, the next pages of the exhibit, we're moving forward in time. The second page, those are all for the 401 well, taken July 19th through July

22nd. You can see the specific gravities, 1.145, in that range, total dissolved solids around -- less than 250,000. And if you just contrast that with our first page, we're 300,000 plus for the native LBT wells, and 1.18 plus for the specific gravity. You can see that it's not changing.

Third page -- yeah. Third page, we have the 401 well sample taken September of 2014 versus another Lower Brushy Canyon for the Poker Lake Unit 422, which is at 1.195. You know, higher than the 1.85, closer to 1.2. That's native Lower Brushy Canyon water versus what we're experiencing in the 401 well, 1.67 in this instance. The total dissolved solids in this particular sample is up. It's very close to 300,000. The 422 is at 350,000.

The last page, similar comparisons. We have 1.2 versus samples three and four, 1.16. The total dissolved solids for the 401 well on these late October samples are down more in the range of 250,000 versus, you know, 300,000 plus. So throughout this period of time, the 401 well water characteristics have not changed. They still show that they are -- it is not native Lower Brushy Canyon water.

And if you look back at the first page, you know, not so much the absolute values, but if you look at the sulfate, which is about four line items above the total dissolved solids, just the character you can see is significantly different, also.

Q. I'll next direction your attention to the document marked as Exhibit 16, and would you please identify that for the record?

A. Exhibit 16 is a chart of Lower Brushy Canyon water specific gravity for a large group of wells. On the vertical axis, we have specific gravity going from 1.14 to 1.22. And then we have time on the horizontal axis from December of 2012, and the last samples shown on this are November of 2014.

The wells that the samples are taken from are shown in the legend on the right-hand side. And the way this exhibit is set up is we have three wells that have been impacted. We have the 401, and then it -- sequentially then it moved to the 392 and 393. So those are the first three on the legend on the right-hand side, and those are all red. If you see a red marker, that's one of the three wells that have been impacted. And so what we're going to see is the character, how it has changed in each of those welds over time. The remaining wells are all within the same peer group. They're all Lower Brushy Canyon producers. They're all BOPCO producers, and I believe -- if you refer back to

Mr. Pregger's Exhibit Number 11, which was the Poker Lake Unit 401H injection area location map, all of these Lower Brushy Canyon laterals are the wells -- the 401 well is where I'm pointing in the map (indicating), and it's the northeast portion of the Poker Lake Unit. Those are the peer group that these water analyses are taken from that are shown on this chart.

Q. Mr. McGregor, was Exhibit 16 prepared at your direction?

A. Yes, sir.

Q. And under your supervision?

A. Yes.

Q. I just wanted to get that in for the record. Please continue.

A. So the red box that's shown on here -- it's shown on the top -- identifies the range of specific gravities from 1.18 to 1.205. And the reason for that is that is a very good marker for the range of native Lower Brushy Canyon water. And if we start the most -- the earliest one we have is the red square, which was December 18th of 2012. That is the 392 well. It's one of the wells, as we'll see here shortly, that was impacted. But it was producing native Lower Brushy Canyon water early on in its life.

Similarly, the next red we see is the red triangle. That's for the 393 well. It came above 1.18. That's also one of the wells that has been impacted by the disposal water operations. And it was showing native Lower Brushy Canyon water.

And then significantly, on January 17th of 2014, the Poker Lake Unit 401H well, which is the well we looked at its history, for that well, it's red, but we also did a black outline around the diamond so it's easier to see. That was prior to the 100 percent water that we identified in April of 2014. And you can see that well was also producing native Lower Brushy Canyon water with a specific gravity above 1.19.

The callouts that are shown, there are three of them in the lower portion. We show -- the first one is April of 2014, April 28th, 2014, and that was the first test that we had that showed 100 percent water for the Poker Lake Unit 401H well. So we've shown that as a benchmark.

You can see that right -- you know, when I said part of what they did -- the reason they kept producing is so they could gather additional data, and part of that data was water samples. You can see there are three water samples taken just after the April 2014 date, and all of those are significantly out of the range for native Lower Brushy Canyon water.

So we have an oil well that went to 100 percent water. We have water samples that both prior to the -- prior to the event showing that it was producing native Lower Brushy Canyon water above specific gravity at 1.19, and then subsequently the water samples were telling us it's no longer native Lower Brushy Canyon, down to the 1.15 to 1.16 range.

The next callout is the Mesquite, when Mesquite shuts in their injection. That's July 23rd of 2014. And there you start seeing -- that's when you start seeing the red squares, which is the Poker Lake 392H well, and the red triangles, which is the Poker Lake 393H well. And you can see -- if you compare those to the early test that we had for those two wells back prior to September 2013, both of those were, you know, well above 1.18. Now the water samples are being obtained from those wells, and we see their production has been impacted, is down 1.15.

As we move forward to the next callout -- so between July 23rd of 2014 and the next callout of October 26th 2014, that callout is when the 401H, they drilled out all the plugs, put in a bigger pump and began using it as a well to dewater the pressurized disposal water in the area.

Between those two periods of time, you can see that as water samples were continued to be taken on both the 392 and 393 -- and we'll show those wells have reestablished some of their original production -- that the water samples started cleaning up, also. And so right around November 2014, we're now seeing specific gravities for those two wells well within the range of what appears to be Lower Brushy Canyon water, although the wells still produced a lot more water than they ever did prior to the breakout in those wells.

Q. Now I'll next direct your attention to the document marked as Exhibit 17. Would you identify that for the record, please?

A. This is a portion of the production log that was made on the 401H well. This was after the well had been shut in on May 13th of 2014, and this production log was run on May 21st. And I've pulled four pages from the report to show the key events, the key analysis that I take away from this log.

Q. Would it be fair to say that the full report is voluminous?

A. It's more than four pages.

Q. And do you know if this analysis was done at BOPCO's direction?

A. Yes. I do know that it was done at BOPCO's direction as part of their resources in trying to determine where's the water coming from. Since the well has gone 100 percent water, this is part of that water, in trying to understand and then remediate the problem.

Q. And to the best of your knowledge, is this a true and correct copy of the portion of the analysis that you selected?

A. Yes.

Q. And did you prepare the annotations that appear on Exhibit 17?

A. I did.

Q. What purpose are your annotations, sir?

A. One, to help me remember dates and for the rest of the group to remember dates.

But it was -- it was important, the results of this, to show when the well had been shut in. That wasn't a date that showed up in the report itself. It just shows the date of the survey as May 21st. And then the analysis summary that was shown in this exhibit, I took that verbiage and annotated it onto the plot so that we could associate it with the production log profile on the last page of the exhibit.

Q. Was the 401H shut in when the production log was run on May 21st?

A. Yes. It had been shut in for over a week at the time that log was run.

Q. And looking at page 3 of Exhibit Number 17, there is a heading there, "Analysis Summary." How did ProTechnics summarize its analysis of the log data?

A. Well, ProTechnics, this is one of their subsidiaries. They're related to CoreLab. And they run these type of tests. And as part of that, you know, they have a group of experts that analyze these things, and they put a summary. And so what this summary shows -- there are two points to it.

The first is -- what the production log shows is there was a major inflow at 13,169 feet to 13,173 feet. And based on the spinner, that flow is 1,520 barrels per day. So we're talking about a shut-in well that's producing 1,520 barrels per day. And when I say producing, I should say cross-flow. It's a subsurface cross-flow. It's moving from this inflow (indicating), and then as shown in point number two in this summary, it's saying where that is exiting.

So we have -- we have high-pressure water that's moving into the wellbore and then invading or cross-flowing into other portions of the lateral, because the lateral had been depleted over the last 16 months, invading other oil-bearing portions of the well. And they identified three exit ports from the log, and the last one was at 10,148, 10,152, where 1,270 barrels per day had exited. So at that point -- from that point forward on the lateral, there was -- there was no additional flow. And those points, those specific intervals and the rates, are shown what's on the last page. I brought over -- those are my callout boxes to point those out.

Q. I'll next ask you to direct your attention to the document marked as Exhibit 18, and would you identify that for the record?

A. Exhibit 18 is a fracture orientation map. This was taken from Mr. Pregger's --

Q. Is it Number 5?

A. -- Exhibit Number 5. So this is the same map that Mr. Pregger showed, which has -- there are 12 samples on here that was part of that analysis. There were nine of the red FMI data, and then there were three samples of microseismic data that were done by Pinnacle.

And on this map, we have collectively taken the information from -- these FMI data and microseismic data, those numbers are posted on here, but the range of those -- we know that the range was north -- 45 degrees east to north, 65 degrees east, that that's the range we saw from those analyses on the direction of fracture propagation.

From the production log, we're able to fix where the pressurized disposal water was entering the wellbore, so that gave us a fix at 13,171 to begin from. So at that point, what I've added to Mr. Pregger's exhibit is a range of fracture propagation, so it's a cone, if you will, of where fracturing -- the direction of the fracture should be or fracture network.

And, you know, what that shows is from that point, as we move back to the Section 11 and Section 12 group of injection wells, they certainly fall in line with the direction of fracture propagation that you would expect from the stress orientation analysis that we have, which is significant.

So that group of wells shows up as being not only an identifiable source of water injection and pressurized water, but it also fits with the point of the entry into the 401H well.

Q. I'd next direct your attention to the exhibit -- holding on to Exhibit 18 for a second, you mentioned that the blue area of your cone points to the 401H?

A. It begins at the 401H, that's correct.

Q. Is it going the other direction? What's the distance of those lines?

A. As we move to the south and to the west, the significance is that the performance data, it fits a sequence. So in other words, the next well that was impacted by the disposal water is the 392, which falls, you know, within that line of fracture propagation, and then the 393 well was impacted, which -- so they fall in line with the fracture propagation orientation. And that is the sequence of events. That's actually how it occurred in our wells. And I'll have the other two production plots which we'll talk about, in addition to the 401, and we can see from the well tests when each of these events happened in each of the wells. So it fits timing and sequencewise with the direction of fracture propagation.

Q. If we look at the well designated as 393H, if we were moving to the west and south there, what would be the next BOPCO well -- horizontal well in that progression?

A. After the 393H?

Q. Yes. Do you understand my question?

A. Well, it's more can I read the well?

Q. Would it be the 394?

A. I believe -- I believe the 394 is the well that was next in line. I was just looking to see if I could actually see that.

Yes. If we look back at Mr. Pregger's Exhibit 11, the 394H well is the next well that you would be watching for as the next well in line to potentially be impacted by the extraneous water.

Q. Now we'll move on to Exhibit 19. Was this document prepared at your direction or under your supervision?

A. Yes.

Q. And what is this document intended to depict?

A. Similar to the Poker Lake 401H chart, this is the same format. It is the production well test versus time. Again, on the vertical access, we have the daily oil, water and pressure measurements from the pump inlet pressure. You can see the well originally came on December 2012 at around 650 barrels of oil per day, roughly around 1,500 barrels of water per day and around 3,000 pounds pump inlet pressure.

The trend that we see now, over the next 16 months, is similar. This is what you would expect of a Lower Brushy Canyon. Your oil is declining. It begins to flatten out as you get around March of 2014. You can see it begins to flatten out. Similarly, your water production is decreasing, from 1,500 barrels a day to, you know, well below 1,000, and the pump inlet pressure from 3,000 pounds down to, looks like, around 200 pounds. And so that was -- that's what you would expect from a typical Lower Brushy Canyon decline. And this is the next well on our map. It's the next one after the 401H well that's in line.

The callouts that are shown -- if you look at the tan one up at the top, we have the oil rate prior to breakout, about 61 barrels of oil per day, and then in November of 2014, we're at 57. So we've reestablished oil production in this well to similar -- you know, hopefully it's going to be similar or better. The water production is still significantly higher. So if you look at the -- the callouts, again, these are benchmarks. The first one on the left we show -- in the 401, the last oil on that one was at 87 barrels of oil per day on March 24th, 2014. And you can see at that point in time, the 392 had not been impacted yet. It was still continued -- from that point forward, it was still continuing its typical decline.

The next callout we show when the Poker Lake Unit well was shut in on May 13th. We're still continuing decline. You can see the pump inlet pressure is still declining. The water is still declining.

And then, you know, I think it's significant that once the -- the next callout, which is in the upper portion, on July 11th of 2014, that's when they set the bridge plug to isolate stage four primarily. That was the purpose. It ended up being isolated. So now that high-pressure water has nowhere to go. It can no longer cross-flow into the other portions of the lateral.

And very shortly after that, you can see that there is a reversal in all of our established trends. The oil which is shown in green, you know, collapses down less than ten barrels per day. Your pump inlet pressure begins to increase quite rapidly associated -- correlating with that, as does your water production. And you can see that since -- and that occurred in pretty rapid fashion.

And then the last callout, that's when Mesquite shut their disposal wells in. And those are -- two of the five wells are up in Sections 11 and 12. They shut that in in July 23rd of 2014. And you can see that as they continued to produce this well, they were producing it at a high -- high pump inlet pressure, high water rates. The oil rate is recovering, and it was able to turn the corner. In other words, we can see that we've -- we've arrested -- the pump inlet pressure increased, the increased water. But since the Mesquite well shut-in, it was able to turn a corner, which is another -- I think another important piece of evidence that there is a correlation between that area and this well.

Q. Is the pressure still elevated in the PLU 392?

A. The pressure should be around 200 pounds, and it's very elevated. It's still up around -- probably around 600 psi, and they're still producing very significant volumes of water.

Q. And does that indicate to you that there is still high-pressure extraneous water coming into that well?

A. Yes. I believe there is.

Q. Even after the Mesquite wells were shut in on July 23rd of this year?

A. I believe so. I mean, it's still recovering. This well is not back to trend at all. And it's been on, you know, since -- since July through November, you can see what the trend is, and it's still at an elevated pressure. It doesn't just stop and drop back down to 200 pounds, which is where it had been prior to being impacted.

Q. Moving on to Exhibit Number 20, was this document prepared at your direction and under your supervision?

A. Yes.

Q. And it looks very similar to the previous exhibits we've seen which address the 401H and the 392H.

A. Yes.

It's the same format well test. This well is better than 392. This is a well that came on around 800 barrels of oil per day. We have the same -- the same decline trends that you would expect of a Lower Brushy Canyon. Then you see the reversal in those trends, when you had the water breakout into the well and the collapsing of the oil production.

This well was producing 160 to 170 barrels of oil per day prior to the breakout, and currently it's around 90 barrels of oil per day. So it has recovered some of its prior oil production. It's still significantly underachieving where it was prior to breakout, but it has reestablished oil production.

Q. And do we still see elevated pressures after the Mesquite well shut-in?

A. You see elevated pressures and elevated water production, yes, you do, and then lower oil production than what had been occurring prior to the breakout.

Q. Anything else you'd like to tell us regarding Number 20?

A. It has a water-oil ratio. The well originally was around 4 to 1, and now, currently, it's 136 to 1 as a water-oil ratio.

Q. And I'm next directing your attention to Exhibit Number 21. Was this document also prepared at your direction and under your supervision?

A. Yes.

Q. And what are you intending to illustrate with this graph?

A. Exhibit 21 is a graph of the disposal rate in barrels of water per day on the vertical axis, on the left, versus time. This is an aggregate of all five wells up in Sections 11 and 12 that covers the entire time period. It begins in 1994, and it goes through -- the data it goes through is July of 2014, that we found had been filed to date.

So we run through the callout boxes. The first one shows from 1994 through August 1st of 2014, because our data goes through July, that within those two sections, within that area, there's been 22.9 million barrels of water cumulative injection. And during the most recent 12 months that we have on here, they were injecting close to 15,000 barrels of water per day.

The other annotations in the lighter yellow color are annotations for various wells. So, for example, the first one, October 24th of 2006, that's when the SDS 11-1 well was applied for and was approved for a pressure increase as a surface injection pressure, from 902 pounds to 2,200 pounds. And you can see that

that has occurred for all of the wells in Section 11 and Section 12. At some point in time, the formation would not take the amount of water they were trying to dispose of at those surface-injection pressures, which led to a request to increase those.

The timing of all of those increases -- at the very bottom of the exhibit, we show when the Poker Lake Unit 401H comes on production, in December of 2012, compared to those dates. And you can see that really for four of those wells, they all just -- right after that date or just a month prior to that or September of 2012 in the Lotos, all of those wells had gone in and were changing their injection operations by getting and achieving increased surface-injection pressures.

Notably the very last one that was approved here was October of 2013, and in that one, they allowed up to 3,170 pounds as a surface-injection pressure.

Q. And what is the cumulative total of produced water injected into the Delaware Mountain Group by the Chesapeake, Mesquite, Chevron and OXY SWD wells since 1994?

A. It's 22.9 million barrels of water.

Q. And on to your final exhibit, which is Number 22, would you please identify this document?

A. Exhibit 22 is a well configuration,

well-completion exhibit for each of the saltwater disposal wells in Sections 11 and 12 that were shown on the total injection plot on the prior exhibit. And it shows for each well what its -- the interval that was being injected into, when the pressure increases were approved. And then for each well -- so, for example, on OXY's Federal #1, which is the first well on the list, in the very last line, it shows that that well has cumulatively produced -- injected 9.1 million barrels of water, and over the last 12 months, it has averaged around 1,510 barrels of water per day.

Because there are only two of those injections wells that are still injecting, the other one being the Chevron, which is the third item on here, the cumulative injection for that well was 2.8 million barrels of water. And its average over the most recent 12-month period that we have is 1,364 barrels of water per day. So we don't really know what they're currently injecting after July of 2014, but that's what they're currently injecting based on the data that we have.

Q. So based on that 12-month average ending in July, what would be the cumulative total for Chevron and OXY on a monthly basis?

A. Well, the cumulative would be around 12 million barrels. The total injected water over the 12-month average would be around 3,000 barrels of water per day.

Q. That's what I meant, those two --

A. Around 3,000 barrels of water per day.

Q. And how many barrels of non-native water is BOPCO currently producing from the 401H?

A. Approximately 2,200 barrels of water per day is the total production for the 401H. As of this weekend, the last four days that we have, it's around 2,200 barrels of water per day.

Q. And directing your attention back to Number 22, are the perfs for the Chevron and OXY SWD wells higher than the bottom depths of the Mesquite injection zones?

A. Yes. The perforated intervals are higher than the open-hole intervals in the Mesquite wells.

Q. And does that fact have any significance to your opinion that water injected from the OXY and Chevron wells has impacted and continues to impact BOPCO's 401H, 392 and 393?

A. Well, the answer is -- the answer is I believe that injection in this Delaware Group from the wells on Section 11 and Section 12 are impacting the production operations of the 401H, the 392H and the 393H.

Q. And based on all the data you've analyzed, are you able to designate a specific well in Section 11 and Section 12, the cone area that you had on your exhibit -- a specific well that's impacted BOPCO's producing wells?

A. No. We cannot point to a single well. What we know is that there has been fracture propagation from this group of wells (indicating) through the 401H to the 392H and through the 393H. So there's a fracture or a fracture network that the door is open. It's a path, and I don't believe that path -- it won't go away once it's been opened up.

Q. In your opinion, can Chevron and OXY continue to inject water into their SWD wells in Sections 11 and 12 without continuing to negatively impact BOPCO's 401, 392 and 393 wells?

A. No. I don't believe they can.

Q. And in your opinion, would continued water injection by Chevron and OXY impair BOPCO's correlative rights and result in the waste of the hydrocarbons?

A. Yes.

MR. LARSON: Mr. Examiner, I'll move the admission of Exhibits 14 through 22.

EXAMINER GOETZE: Mr. Feldewert?

MR. FELDEWERT: No objection.

EXAMINER GOETZE: Exhibits 14 through 22 are so entered.

(BOPCO Exhibit Numbers 14 through 22 were offered and admitted into evidence.)

EXAMINER GOETZE: Mr. Feldewert, would you be adverse to a break at this time for lunch and continuing with your cross after lunch?

MR. FELDEWERT: I would not be adverse to that.

EXAMINER GOETZE: Okay. Let's take a break. Let's try to get back here by 1:00, seeing how this is Santa Fe and the service is always good and it's this time of the year.

(Break taken, 11:29 a.m. to 1:03 p.m.)

EXAMINER GOETZE: Let's go back on the record.

Upon departure, I was going to leave the opportunity for questions with Mr. Feldewert and falling back into old habits. We're going to go ahead, as Examiners, and do our questions, and then give you the opportunity, and then we can do the full circle and get done with this witness.

We'll start with Mr. Jones. If you have questions, fire away.

CROSS-EXAMINATION

BY EXAMINER JONES:

Q. Good afternoon, Mr. McGregor.

A. Good afternoon.

Q. This sort of seems like one of these types of reservoirs that if you exceed a certain pressure, then you get communication through the fractures. Do you see it that way?

A. I think I may view it a little more, that once you exceed frack pressures, you start creating geometry. You start creating a fracture that will begin to propagate and then potentially, you know, a network. I'm sure it's not linear. But that's how I would visualize it.

Q. So these disposal wells, are they seeing frack pressure? Did you look at those step-rate tests that were run for the injection-pressure increases on those wells? And do you have any comments about that?

A. Yes. I could make a few comments on those step-rate tests. You know, I've looked at a number of the vast well records, and the instantaneous shut-in pressures generally seem like they were 800 pounds after a fracture simulation, fresh water. And my estimate for the fracture gradient would be about .54, .55, you know, somewhere in that range.

And then on the step-rate tests, there was one for Mesquite. Subject to check, I think maybe it was for the Bran well, where they went from 0 to 7,000 barrels of water per day plus but only had 11 psi pressure increase over that. So I have some cause for concern it wasn't already above frack gradient from the get-go. Eleven pounds doesn't seem to fit with that range of injection unless you have fractures you're fracturing.

The most recent one, the OXY one which was on my Exhibit 21, on that step-rate test, which was October of 2013, what was ultimately approved was a surface-injection pressure of 3,170 pounds. So I look at that as being on the extreme end. It's well above .54.

You know, when I make an estimate of that, if I assume 1.1 specific gravity or 1.2 specific gravity for the type of fluids that are going to be disposed of, that would give me a head, a range, from 2,357 to 2,580. So that's a head. And that was to -- I went to the top of their interval of 4,962 for that calculation. And then I added to that 3,170 as the permitted surface-injection pressure, and that gives me 5,651 psi. Divide that by the 4,962, and that gives me a gradient of 1.14 psi per foot. And I'm not sure how you go above, basically, 1.0, which is your lithostatic gradient.

So I think maybe the analysis of that step-rate test, there is -- something, I believe, is wrong. But at the end of the day, I think 1.14 is -- is above fracture gradient. That would be how I would, you know, visualize that one on that extreme.

And very likely the reason, you know, for all these increases in recent times is because they couldn't take the normal fluids that they've been injecting over this time, so they had to move those fluids. They had to increase their pressures because the formation wouldn't take it.

Q. So this area that you looked at is -- this phenomena would be limited to this area, or from what you saw, would this condemn injection into the whole Delaware Mountain Group or for areas where production is in the lower part of the Mountain Group?

A. That's a pretty -- pretty broad question, you know. But I guess the way I would start framing that answer is it certainly should be a consideration and a concern of the Commission. The number of incidences that we've seen just in this area -- and there is a lot of research and science, but there were a number of breakouts. And I think it was Exhibit 13 of Mr. Pregger's. That would show -- you know, all the red outlined areas, all of those were some form of an incident of breakouts. The examples that we've seen, we saw Lower Brushy Canyon to Lower Brushy Canyon. We saw up in the upper portion of the Delaware Group coming down 2,000 feet into the Lower Brushy Canyon. You know, we see the kicks. So, you know, there's not just a single instance. It's a number of instances that give you pause. The formation -- there is no confinement. There is no confinement being recognized.

The other thing that was at least apparent to me is from BOPCO's point of view, which I agree with, you can see they made their analysis -- I don't know how large the area is, though, Mr. Examiner, when you say the whole Delaware Group, but in this range, they spent about $100 million to move to Devonian. You know, we have to protect the oil reserves here. They've made a significant investment.

My experience with injection, you know, whether it's an operator or a commercial operator, they want to go as shallow as possible, you know, as least expensive as possible, and all that makes sense. But here we have a number of instances that we see that the Delaware Group, there doesn't appear to be confinement. And I think the case that, you know, I went over, that's a large distance, you know, the three miles, but that doesn't surprise me. I've seen large distances before. Just in one of the examples here, it was 4,000 feet. The vertical interval, you know, we've shown 2,000 feet.

But there is no doubt we've experienced that, you know, right here. It's not even a hypothetical. It went over a long distance from east to west, and it traveled -- because the rates they're injecting at are above the fracture gradient, pathways are being created, and that pressurized water wants somewhere to go. And it goes along the fracture propagation direction. So that's a long way of saying there's -- well, and there are a number of operators, I guess, that would add to that, also. On that exhibit,

Mr. Examiner, on the particular instance down here which has been referred to as the Devon, even Devon looked at the data, and they shut their Delaware wells in and moved to the Devonian. They're also moving to the Devonian. Mesquite looked at the data, and they shut their wells in.

So there's a lot of -- besides the science and other people reviewing the science, there's a lot of acknowledgment that injection in the Delaware Group is something that needs to be -- if not stopped in this area, it needs to be reconsidered carefully.

Q. With the pressure limited -- would you say limiting the pressure in these wells would be adequate instead of just having injection authority revoked only?

A. That would certainly be the right direction, Mr. Examiner, but the way I visualize this is there's been a fracture network. It's already been created, and there is already a pathway down onto the Poker Lake Unit.

And then if you refer back to Mr. Pregger's Exhibit 12, which is the cross section that runs through all of the injection wells and over to the 401 well, you can see that the Mesquite wells are open-hole completions. The Heavy Metal is open hole, Bell Canyon, Cherry Canyon, Upper Cherry Canyon. And the Bran well is open hole from, you know, mid-Bell Canyon into just the uppermost portion of the Brushy Canyon, and also it's TD.

And there is hydraulic communication between this whole group of injection wells, you know, laterally. I mean, there is lateral communication into the Mesquite wells because they're open hole. So I think -- I don't think you can allow continued injection in this area.

Q. Have you worked on Delaware waterfloods like down in Loving County, some of those drilling-core type waterfloods? Obviously, you wouldn't recommend a waterflood in the Delaware out here, I take it?

A. Well, you know, if you're doing a managed waterflood, a certain spot where you're putting in certain volumes and taking out equivalent volumes to stay -- so that you have sweeps and stay below a fracture gradient, then yes, I would recommend --

Q. You might get a lot of water through the gradient?

A. You might, or you might have to move in relatively low volumes, you know, stay within the fracture gradient pressure, .54, so you can have 300 pounds at the surface.

Q. You said this was a depletion drive reservoir. And in that water breakthrough, you didn't see any oil swept in front of that at all through that -- that seems to imply that that big fracture was there from the get-go and it was saturated with water from the beginning.

A. The truth is I don't know. I don't know whether it was induced and created or it enhanced an existing fracture. I don't know that I could say one way or the other. I think that's certainly plausible, but I don't know that that's the answer, Mr. Examiner.

Q. Okay. So you've got this production log, and it's showing coming in about four feet an interval there, an incredibly short distance that it's invading that wellbore. And even the exit area's in the shallower -- at least measured depth portion or kind of small fracture area is also maybe -- so there's no cement issues here, then? You've looked at -- it's your cement on the BOPCO wells, and you also looked at the cement on the OXY-Chevron wells and the TD of their wells inside were plugged -- inside plugged? Did they give you information like that?

A. I can't say that I asked for that information, Mr. Examiner. I did not look at cement tops, do any kind of volume factors to make a calculation and look at cement. I did not do that work.

What I will say, on the 401H well, it's an open-hole packer log with sleeves. And you're correct. It almost seems like there's definitely a fault or a fracture network that hit right there in the range of that sleeve, and then over the next, you know -- it went about 2,000 -- 3,000 feet until it started cross-flowing over the next 800 feet into the various --

Q. The water qualities that you compared with were native Brushy Canyon, Lower Brushy waters. What do the waters in the Cherry Canyon look like? In other words, does this -- do they look like what it was doing before? I mean, after the sweep broke through, were you seeing waters that looked just like Cherry Canyon waters, or were you seeing waters that looked like a conglomeration of what they were projecting?

A. In the 401 well and the 392 and 393?

Q. Yeah.

A. You could see that it was lighter. You know, it dropped down from the 1.8 -- between 1.18 to 1.2, you know, which is where they should be. So it's a mix. I mean, there's been a lighter water, lower chlorides, you know, which result in lower specific gravity, lower TDS. And the samples that I've looked at, really there is -- above the Lower Brushy Canyon, you know, it's 1.0 to -- on specific gravity -- maybe to 1.1. Somewhere there is a gradation, but when you get to the Lower Brushy Canyon, it's, you know, 1.18 to 1.2. Then as you move over -- I saw samples from Avalon and Bone Spring, and it's lighter. So the signature for native Lower Brushy Canyon I think is a pretty good signature. And I don't know that -- I don't think the water -- you know, it appears like a mix to me. It's a mix.

Q. While they were running that production log and while they had their wells shut in or BOPCO wells, that well shut in, did you see pressure at the surface that would almost be equivalent to the pressures that were going on in the disposal wells? In other words, some kind of pressure communication. Can you say anything about that? Do they have to run a lubricator when they run their --

A. Actually, I don't know how that -- how that was run. I mean, the well was shut in. Everything was cross-flowing. I think the production log itself was showing -- the pressure during the logging was 1,500 to 1,900 pounds, and we could see that the pressure did increase significantly on each of the producers.

Q. But it was cross-flowing, so you wouldn't maybe see it at the surface anyway?

A. Right. That was my point on that.

Q. What about vertical wells? Did they see any breakthrough on vertical wells production that might have been producing from any of the Delaware intervals? And did this happen -- did anybody else complain that came to you guys? Has this solely affected the BOPCO horizontal wells?

A. Well, the Lower Brushy Canyon -- the unconventional resources, that's only been a play from 2010, 2011 forward, so I wouldn't really expect people to have lots of issues or, you know, breakthroughs on wells -- a resource that wasn't being developed yet. I'm not certain that that would be -- I'd have to ask the team that has a little more experience on those type of issues to answer your question.

You know, I do recall -- I know Mr. Pregger talked about at least Devon recognized some -- no production right around the two wells they were injecting versus all the wells around there being productive, but it doesn't answer your question of a vertical well. I don't really know the answer to your question other than I think timing is some consideration of why you've only seen things more recently.

Q. The ramp-up in the volumes going into those disposal wells was relatively recent, wasn't it?

A. Yes. And I think that ramp-up in the volumes, which I believe it was -- Mesquite is the ramp -- I don't think Chevron and OXY have really changed their volumes much. But I think the -- like when we looked at the cross section. There's communication -- hydraulic communication. And because of the additional pressure, you know, that was going into the formation, I think that's why -- it's very plausible that's why they had to come in. Even though they're trying to move the same volumes, they're having to increase their pressure and increase their pressures and get the pressure exceptions.

Q. And this microseismic that Mr. Pregger was talking about, can you comment any on that, on the lateral distance that they measured on the frack job or of the vertical distance, if they saw any kind of movement of rocks while the frack job was going on?

A. I've looked at -- I've seen a lot of microseismic and been involved in a lot of projects with some really good teams that that's all they've looked at.

Specifically here, I have only, in talking to the team, asked those type of questions, because microseismic, my experience has been generally it's always going to show a much larger area than what you can actually prop, you know, for your volumes. But I really didn't look at that as part of the analysis. My understanding was it was a couple hundred feet up and down and maybe -- I don't know -- 300,000 feet or so. But that would be a better question for Mr. Pregger.

Q. Okay. There is a reservoir out there of oil, though, that is stratographically confined, and now the confinement is broken. Is that what you're saying basically? In other words, there's -- it's not -- it's not isolated from some vast water? Almost analogous to a waterdrive reservoir that if you produce it for a while, here comes the water, and that's about all you can do?

A. Yeah. I look at the unconventional resources. Generally you drain what you can impact with your fracture simulation and then what you're able to prop above about .2 psi -- I mean two pounds per square foot. That's kind of the range. You can prop that much, and that's the effective rock volume that you're going to drain.

You know, all of these wells, you know, the three wells that I showed, there's mobile water from the get-go, but I think you only drain what's being impacted. And if it's a tight, unconventional resource, that effectively whatever your effective prop length is going to be, that's what you're going to drain.

I think what I'm trying to say is that the injection -- with the amount of injection just in Sections 11 and 12, I believe that it's exceeded the fraction gradient, and, therefore, whether there was already some natural fracture system there that has allowed it to be enhanced, you know, because now your high-pressure water is moving in, or whether it's all induced, I don't know which it is, Mr. Examiner. But I think that pathway is there for just the water to move. It's going to seek out -- now that the pathway is there, it's going to seek out a lower pressure, and Bass is moving, you know, over 2,000 barrels of fluid per day to try to dewater it. And so anything -- putting it back in where you know there is a pathway, it's unwinding all the resources and the effort that they're putting in to try to reestablish the oil production.

Q. Could you see this fracture swarm or fault through any kind of seismic -- 3D seismic? In other words, could you have foretold what was going to happen here before it actually happened with some sort of --

A. That's a hard question. I don't know. I don't know. If it was -- and it's very plausible these are -- the majority are induced, and so I suspect until that happened, you wouldn't have seen anything. But I don't know the answer to that question, Mr. Examiner.

Q. Those are all my questions.

EXAMINER WADE: I don't have any questions.

EXAMINER GOETZE: No questions?

CROSS-EXAMINATION

BY EXAMINER GOETZE:

Q. A couple of questions on Exhibit 11. We have the 400H horizontal. What is the situation with that well, and why did we not include that in the discussion?

A. Well, that's a good question, Mr. Examiner. You know, where the 401 is -- I mean, we've been watching the 400 closely to see if it becomes impacted to the extent of the other wells, so, you know, we could bring that forward. That evidence is not there.

In the 401H, Mr. Examiner, it hit at 13,191 at the toe, on the fourth sleeve back. And the toe is -- the black dots are the surface locations, the way the map is structured, so the toe is up in the most, you know, northwest portion almost touching the unit line up there. And it appears that the fracture is just -- went north of the 400 well, and it tied into the 401H well there at the very end. Where it ties in at, Mr. Examiner, if you look at the cone --

Q. Exhibit 18?

A. Yes.

The cone -- I mean, that's the point of the water entry in the well, and so it is -- you know, it is at the -- you know, it's running at the very toe, the very end of the 400H well, and we just didn't see -- we haven't seen it. So that's the answer.

Q. So are we stating that pretty much we have a very finite fracture system that is appearing and staying open? Are we looking at a synergistic effect of having all these wells together in one location?

A. I think the synergistic effect may have just been everyone's been bumping up their surface-injection pressures and moving a lot of water, and that allowed the movement to, you know, accelerate and go there. It's very localized where it hit the 401H well, you know. The production log tells us, you know, where it hit, and it just passed -- we're watching the 400H but haven't seen the evidence to bring it forward. That's a good question. What I will say is where water is entering the 401H is at the very toe of that well.

Q. And with regards to the 393H and 392H, we're seeing more of a wide spread as opposed to finite interaction as with the 401H?

A. There haven't been production logs around those wells to know --

Q. Okay. So we don't have any information?

A. No. They've kept those -- we've taken water samples, which on that analysis, you can see it has recovered somewhat as the oil production has been reestablished.

Q. And let's see. Your study didn't include anything to the northeast of these clusters? I'm sure that's out of your purview of your --

A. That's correct.

Q. -- investigation.

Okay. And was any water sampling taken for the Mesquite wells for background, just out of curiosity?

A. I asked for that, and it's my understanding we don't have any -- you're talking about for the disposal water?

Q. Yes. Yes.

A. The team wasn't able to obtain any.

Q. And the testimony presented is that the two other wells are producing -- the water being produced -- water being produced was re-injected, or are they from other sources?

A. For the --

Q. The OXY.

A. We don't -- I'm sure we're going to hear that. I don't know. But what -- what -- what I do know is the water is lighter from the Delaware Group other than the Lower Brushy Canyon. And similarly, for the Bone Spring, the Lower Brushy Canyon is the 1.2. So other than their water coming -- being injected into -- their wells being only Lower Brushy Canyon, so it's 1.2 and, therefore, couldn't have lightened up, the water samples that we saw when we had the water breakthrough, then I don't think it's going to -- it's going to matter. But I don't know where their water is coming from.

Q. And one last question: With regard to open hole versus cased perforated intervals in the Delaware Mountain Group, is this a good indication or suggestion that maybe open hole is not an ideal situation for this type of completion for disposal?

A. I think it is certainly a consideration, because you can see where -- you know, in this instance, if there was a statement that, you know, our wells aren't creating any fractures, just those over there. But if they're open hole and you're in hydraulic communication with them -- I think that may be the point you're driving to -- then -- then yes. Case -- cased hole would probably be a better way to go about it and a grassroots well, also, versus a re-entry or a completion, a conversation of a well that was initially Lower Brushy Canyon and then came up the hole. I think that would be another consideration in this area where we can see the large number of breakouts that have occurred.

Q. That answers my question -- my last question.

EXAMINER GOETZE: I turn the witness over to you.

MR. FELDEWERT: Okay.

EXAMINER GOETZE: Proceed.

CROSS-EXAMINATION

BY MR. FELDEWERT:

Q. Mr. McGregor, do you have Exhibit 12 in front of you?

A. I have all the exhibits. I don't know if -- let me find it.

Q. This cross-section map (indicating).

A. Yes.

Q. I just want to ask a couple of questions on this. Now, the Chesapeake well that they show on here is open hole. That's not a factor. That's been plugged for quite some time, right? I'm not sure why they show it on here, but that's not an active well?

A. Well, we showed it on here because these are all the injection wells in Sections 11 and 12. There is a high concentration of wells.

Q. But that well seen there, that's not impacting anything?

A. As of today, that's -- that's correct.

Q. Then as you look at this and you keep lumping Chevron and OXY's well with Mesquite's well, there is a difference as reflected on here, and that's that Mesquite's Bran well is certainly going to be injecting open hole into the Brushy Canyon, correct?

A. Well, we know that there is an open hole into the very upper portion of the Brushy Canyon. That doesn't necessarily -- that means, you know, all the water or some portion of the water is going out that portion --

Q. Did you analyze that?

A. -- but it's not --

I've looked at some of the records that are associated with these wells.

Q. But it's completed into the upper portion of the Brushy Canyon and has the open-hole injection?
A. Yes.
Q. But it's now been shut in?
A. Yes.
Q. Now, with respect to the Mesquite well, did you examine the wellbore diagram for that well?
A. I believe I've seen the wellbore diagram. I don't know what you -- so I think maybe I've seen that.
Q. Are you familiar with -- let me ask you a general question. In terms of cement plugs, which they show here at 6,140 -- do you see that?
A. Yes.
Q. -- did you examine the condition of that cement plug?
A. In what way? What do you mean?
Q. Did you examine it in any way?
A. I think that's the way to ask the question for sure.
No, I did not.
Q. So you don't know if it was good seal or a bad seal in the -- injecting?
A. You know, seals can change over time. Generally -- well, I shouldn't say generally. Sometimes an operator will test that prior to converting the well

to injection, but I don't know if that was the case here. So I don't know that answer.

Q. They can crack, right, cement plugs? They can fail?

A. Yes.

Q. And if that plug was not holding when they're injecting water, there is no barrier from 6,140 all the way down to 8,300. Is that how you would read that, I mean if we're trying to figure out where the water's coming from?

A. Yes.

Q. You have an open hole all the way down to 8,300 in the very zone in which the Poker Lake Unit is producing?

A. Yeah. It would be -- there would a hole with mud in it.

Q. Are you aware that the Division orders reflect that Mesquite was injecting as deep as 7,050?

A. Which well?

Q. For the Heavy Metal well.

A. No. I would have to see those records, and we would, you know --

Q. I want you to take a look at the package that I put up there on the table and look at Exhibit Number 3. And Exhibit Number 3, Mr. McGregor, is comprised of two documents. The first one is Order IPI-435, which was issued April 22nd, 2013 by the Division, and two pages in, there is the original order for the Mesquite well that was issued March 29th, 2011, SWD-1269. Do you see that?

A. Yes.

Q. Have you looked at those before?

A. I have seen the orders. I don't know that I saw these specifically, but --

Q. Did you ever look at the injection depths that are referenced on these orders?

A. I believe we did and made a check, but if there is a particular line item you want me to look at.

Q. Look at the first page, the most recent order issued by the Divison, April 22nd, 2013. Again, after analyzing all the data that's been submitted, the second paragraph permits disposal by open hole from 4,415 down to 7,050.

A. Yes.

Q. That's signed by Jami Bailey on the second page.

A. Okay.

Q. So she's looking at this and injection is down at 7,050.

If I go to the original order issued March

29th, 2011, under the first page: "It is therefore ordered that" -- do you see that?

A. Yes.

Q. Second-to-the-last line: "Open hole from 4,415 to 7,050," signed by Mr. Dan Sanchez.

So at least according to the Division, they're looking at records indicating injection down to 7,050.

A. I didn't see the second -- your second reading of the interval.

Q. I'm sorry. If we go to the third page of the exhibit, which is the first page of Order Number SWD-1269 --

A. 1 of 3. Okay.

Q. -- see the heading: "It is therefore ordered that"?

A. Yes. I was looking at the paragraph on the next page that says "it is therefore ordered that." Yes, I see it, and I see the depth.

Q. 7,050.

A. Yes, I see that.

Q. Let me ask you this: If they're injecting at 7,050, Mesquite, as the Division records reflect and I look at your Exhibit Number 4, which is the type log --

A. Okay. That was Mr. Pregger's exhibit, 4. Is that what you're referring to?

Q. Sure. You've read type logs before, right?

A. Yes.

Q. If they're injecting at 7,050, which is what the Division records reflect or indicate, they're down in the Brushy Canyon; are they not?

A. 7,050 feet, if they're injecting to that depth, then yes, that would put them in the Upper Brushy Canyon, similar to the Bran well.

Q. Okay. Actually lower than the Bran well?

A. Lower than the Bran well.

Q. And if I look at this Exhibit Number 12, there's absolutely no barrier between 7,050 and 8,300?

A. Well, if this diagram needs to be corrected, then we could always say this diagram doesn't show any barrier. My experience -- I don't know New Mexico's rules well enough to speak to it. I do know in my practice that when a regulatory body will adopt something, then they'd have some confinement somewhere in the wellbore schematic that would say that they're going to be able to confine the injection to that interval.

I've also seen and experienced where they will adopt an interval -- they'll allow adoption of an interval that they could inject into, but the operator doesn't utilize that entire interval based on where they set a packer or set a plug.

Q. You don't know one way or another, do you?

A. What I'm saying is what I do know is you can't just look at the sentences that you're reading to me and know without an investigation into those other two instances. But I would suspect that the Commission saw some form of confinement before they would adopt this interval or would have required it as a special condition to the permit.

Q. Because they looked at the records, right, that were submitted? They looked at the wellbore diagrams that were submitted. They looked at the information that was submitted twice, the Division did, and said they were injecting down to 7,050.

A. Okay.

Q. So maybe there is some kind of confinement. I don't know. It's not reflected on your Exhibit Number 12. And you haven't looked at it, have you?

A. What I've said is if this exhibit is wrong, if this cement plug should be 7,050, there should be a packer there or some form of confinement, then I would -- I'll research that.

Q. But we have no debate here that the Bran well, unlike the Chevron and the OXY wells, is open hole down into the Brushy Canyon?

A. It's in the very uppermost portion of the Brushy Canyon. It is open hole from the middle of the Bell Canyon to the Upper Brushy Canyon.

Q. Which would place that open hole in the Bran well, if I did my math right, which is questionable, over 1,000 feet below the lowest Chevron perf; is that right? 6,740 --

A. Yes, over 1,000 feet.

Q. Okay. Now, did you analyze the wellbore diagrams for the OXY or Chevron wells?

A. I have seen wellbore diagrams that were put into the record and --

Q. Are you aware that they have two mechanical plugs in their wellbores, each of these does?

A. Two mechanical plugs. This is the wellbore schematic as I'm aware of it that you're looking at, the cross section exhibit here.

Q. My question to you is: Are you aware that OXY and Chevron each have two mechanical plugs in their wellbores to isolate their injection zone?

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

Q. Would you agree with me a mechanical plug, say, for example, a cast-iron bridge plug, provides more security than a cement plug?

A. Generally, yes.

Q. Would you agree with me that a retrievable bridge plug generally provides more security than a cement plug?

A. Generally, each of them would have to be tested at different points in time because they can -- they can all fail --

Q. Did you do --

A. -- depending on the injection pressure that they're --

Q. Did you do you a Hall Plot analysis of the zone reflected on Exhibit 12 in which OXY is injecting?

A. No.

Q. Did you do a Hall Plot for the zone as reflected on Exhibit 12 in which Chevron is injecting?

A. They're injecting into two zones. The answer is no.

Q. Did you do an injectivity analysis of either of those zones?

A. No. That's -- I did not do that.

Q. Would you agree with me that those are tools that are utilized to ascertain whether the fluids are actually remaining within the injection zone, whether there is confinement?

A. It's a tool that shows the change in

injectivity and the skin associated with the injectivity. I don't know that it will tell you whether you're confined or not.

Q. Aren't you -- aren't you familiar with the different curves that have out of those --

A. You can have different --

Q. -- analyses?

A. You can have different shapes that might tell you different things.

Q. And one shape will tell you if you've got a leak, right?

A. It could.

Q. One shape will tell you if you've got a fracture -- a fractured environment?

A. It depends upon the test -- the testing. What were the conditions of the test? When they started the test, were they already above the frack pressure gradient? You know, it's dependent upon a lot of -- a lot of items. I would have to see the data and the analysis that was done that you're speaking to.

Q. But at least you and I can that agree that's a tool that can be utilized?

A. Yes. That's a tool.

Q. Did you -- looking at your Exhibit 21 --

A. Yes, sir.

Q. -- you show here -- you have an answer here for -- I think you referenced it in your testimony. In November of 2013, OXY's SDS well received approval for a pressure increase up to 3,170?

A. Yeah. But that was in October of 2013.

Q. I'm sorry. Thank you. October 2013.

A. Yes.

Q. Why did you put that on there? Why is that important?

A. That they're increasing -- it tells you that the formation won't take the fluids that they're trying to inject into the formation under the current permitted pressures. I think it's a plausible answer. And also I thought it was important that the actual increases that were, you know, requested and approved, for example, that one, 3,170, when you look at, you know, just plausibility tests, what kind of gradient does that result in. And it's one psi per foot. I thought that was an important reason. And I also thought that it was --

Q. You think that -- you think that --

A. I also thought that it was important --

MR. LARSON: Let him finish, please.

A. I also thought it was important because the timing of when the Poker Lake Unit 401H well began production, in December of 2012, and all of these increase requests are after that.

Q. (BY MR. FELDEWERT) Do you believe that that pressure is above the fracture gradient?

A. Which one?

Q. The 3,170.

A. Yes, I do.

Q. What pressure would remain below the fracture gradient?

A. Well, it depends upon the -- I believe the fracture gradient is around .54 psi per foot. So you pick a --

Q. What would that translate to for OXY's well, roughly? You don't have to be exact.

A. If we assume it's 5,000 feet and do half of that at .5, it would be 2,500 pounds.

Q. I'm sorry?

A. It would be 2,500 pounds at the bottom hole. It would be -- for surface-injection pressure or for the bottom hole? The bottom hole would be .54 psi per foot --

Q. What would be the surface?

A. -- which would be around 2,500 pounds, and that depends on the weight you have in there.

Q. Produced water -- what would -- you said 2,500 at the bottom hole?

A. It would be about a 200-pound surface-injection pressure.

Q. 200?

A. Uh-huh, on the numbers that I used as estimates.

Q. Are those your estimates?

A. (No response.)

Q. Did you look at the permeability of the Lower Brushy?

A. No. I think I've inquired about it and know that it's very tight. It's less than a millidarcy, I believe. Maybe less than a half for the water permeability.

Q. So less than 0.5 millidarcy?

A. .5.

Q. .5.

So 0.5, right?

A. Yeah. That would be -- that would be subject to check. I didn't really look at that.

Q. But that's the permeability that you understand to be in the Lower Brushy Canyon?

A. Well, that's what I just said. If I had to give you a number off the seat of my pants, I would say it's probably in that range, but I would need to research that. It wasn't something that was part of my direct analysis.

Q. Did they tell you how much time it took for BOPCO to experience a pressure decrease at the 401H following the shut-in of Mesquite's injection wells in July of 2014?

A. I don't know if anybody told me that. That was part of the reason that I plotted the performance data.

Q. Do you know how long it took for BOPCO to experience a decrease in pressure -- or a difference in pressure at its Poker Lake Unit 401H well following the shut-in of Mesquite's injection operations on July 23rd, 2014?

A. Well, you can see from the 401 graph, if you want to look at that one.

Q. No. I'm asking: Did they report to you how long it took them to notice a pressure change at the Poker Lake Unit 401H well following the shut-in of Mesquite's disposal operations in July of this year?

A. I don't understand your question. I don't know who would -- who would report it. I mean, the report would have to be based on data.

Q. I mean, did it take 6 hours? Did it take 12 hours? Did it take 24 hours? Did it take 48 hours? Did it take -- how long did it take to notice a change in the pressure once Mesquite shut in its wells?

A. And a change in pressure, you know, that's associated with a particular drawdown, particular volumes of withdrawals. You can see that once they turned the well back on after July 23rd, you can see that just by moving volumes from the field, from the reservoir, that the pump inlet pressure began to decline. It declined from about 2,000 pounds to -- I'm estimating a number -- maybe 1,200 pounds or so. And then it looks like maybe it was -- maybe it was leveling out. I don't know. So it was during that window, from the time they shut in and they reactivated the well --

Q. What exhibit are you looking at, sir?

A. I'm looking at Exhibit 14.

You know, and at that point in time, that pressure decreased. You know, it happened very, very -- it began declining in trend until it started to level out at 1,100 pounds. But during that point in time, you know, that pressure decrease that you're seeing, the zone was isolated. Stages four and five were isolated at that point in time. So that is the pressure decrease that's -- you know, it's associated with the rest of the entirety of the wellbore that was currently open at that period of time.

Q. So if I look at your Exhibit Number 14, there's a line that goes up from 7/2014. Do you see that?

A. Yes, I do see that.

Q. That is the date that Mesquite shut in its injection operations?

A. Well, Mesquite --

Q. Right?

A. 7/23, is my understanding.

Q. Okay. 7/23.

And at that point, according to that line, this reflects that there is an immediate drop in your purple line, right?

A. When you turn these wells on and begin producing them, that's -- you know, that's a natural -- natural decline you would expect to see. And during that period of time, the decline you're talking about, stages four and five were isolated. So you're not even producing. That decline you're seeing isn't -- isn't related to where the water-entry point is.

Q. So you don't see any significance in the fact that you have a decline on your pressure line following the Mesquite shut-in on 7/24/2014? Is that what you're saying? You don't see any change?

A. I'm trying to answer your question. And you're asking did it -- did it -- you know, how soon did it decline? If you look at the data, it's declining. It started to level out.

Q. But we have a decline almost immediately on 7/24/2014.

A. Well, generally that's what happens when you put a well on production, is it's going to make a decline.

Q. And there's also -- you don't deny that you had some oil production occur at that point in time?

A. Well, what it shows is it was four days of oil production that was reported from two barrels a day, and there was one day where they reported a little bit above 20 barrels a day. So there was -- if there was oil production, it was reported. And you can see that after those four days, when they brought the well back on to reestablish production from the remaining part of the wellbore, that it wasn't isolated. The production went to 100 percent water again other than those four tests.

Q. Now, with respect to the water that was seen here in your PLU 401H, we look at Exhibit 12 and see that Mesquite was injecting directly into the Brushy Canyon. Are you aware, Mr. McGregor, that there was a period of time in which BOPCO itself injected water directly into the Lower Brushy Canyon area?

A. I know that BOPCO, like other operators, was injecting into the Delaware Group, so yes, I know that's true. And that was one of the examples that Mr. Pregger showed, also.

Q. My question was, specifically, that they were injecting over 8,000 feet into the Lower Brushy Canyon. Were you aware of that?

A. BOPCO's injection?

Q. Uh-huh.

A. I know that they've injected into the Lower Brushy Canyon.

Q. Did they share with you what was going on with the PLU 498 SWD?

A. It's something that we've looked at.

Q. Let's move to your Exhibit Number 18.

A. 18?

Q. Uh-huh.

Now, keep 14 out, please, but I want you to go to Exhibit Number 18 now.

A. Keep 14 out.

Okay. I have them.

Q. Mr. Goetze asked you about a couple -- or at least one well that exists between -- the Poker Lake Unit producing well exists between the Mesquite injection well and that Poker Lake Unit 401H that he was talking about and the Poker Lake Unit 400. Remember that discussion?

A. Yes, I do.

Q. I want to go the other direction, and I want to go down to Section 30, which is only a mile away. And you see a little triangle in Section 30? It's kind of hard to see. It's up in the northwest corner. Do you see that?

A. I haven't seen it yet. I may have to get a larger map.

Q. Well, I wish I had a larger map. I don't.

A. Or you could just point it out to me.

Q. I'll represent to you that on this map, in the northwest quarter of Section 30, there is a triangle and there is a number 98 above that.

A. Well, I know where the 98 well is.

Q. Okay. That's where it is, right?

A. The 98 well is -- yes. That's where it is.

Q. Okay. And that -- if you extend those lines out, that's actually what you called your zone of influence?

A. Yes. Yes.

Q. Particularly that 45 degrees to the northeast, zone of influence?

A. I don't know about particularly. It would fall in the cone. It would fall in that range.

Q. And were you aware that they alleged -- were

you aware, Mr. McGregor, that they were injecting saltwater -- or water as deep as 8,000 feet --
A. I believe --
Q. -- from [sic] that well?
A. I believe for a period of time that's -- that is likely true.
Q. Did they tell you the amount of water that they had injected through that disposal well at 8,000 feet?
A. No.
Q. How about 9 million barrels? Did they tell you that?
A. I have seen the injection history for the well, and that probably sounds about the right order of magnitude. And they also told me that the well was shut in in August of 2013.
Q. I'm sorry. When was that?
A. August of 2013.
Q. Okay. So it was injecting over 8,000 feet directly into the Lower Brushy Canyon at least until August of 2013?
A. I don't know that it was always injecting in the Lower Brushy Canyon. I know there was workovers on the well, so I haven't allocated the volumes between the two. But I have acknowledged to you that yes, there was some -- I believe there was some injection in the Lower

Brushy Canyon, in addition to the Upper Delaware.

Q. Now, Mesquite is a commercial producer -- or a commercial injection operator, correct?

A. Yes.

Q. And as I understand your testimony here today, particularly on your Exhibit 15, is that BOPCO, at least in their Poker Lake Unit 401 well --

A. Let me find Exhibit 15, please. Which one is it?

Q. Exhibit Number 15 -- I'm sorry -- is your water analysis.

A. All right. I've got it.

Q. Got it?

And your point here is that based on your analysis, this is not what you saw in the Poker Lake Unit wells, and that's your typical Brushy Canyon water?

A. Yes.

Q. Now, with respect to your analysis, it looked to me like you did a spot sample of various wells in 2014?

A. Well, if you combine Exhibit 15 and Exhibit 16, there was a lot more than a spot sample. There were 15 wells. They were all but peer grouped relating to the 401H. They were all Lower Brushy Canyon wells, and I would not call that a spot sample check. It covered a large period of time, also.

Q. And your point is that the water you were seeing at that time before Mesquite shut in was not Lower Brushy Canyon water -- or not Brushy Canyon water?

A. I didn't correlate that to before or after Mesquite shut in.

I mean, there's more than just the water-sample data, you know. There is the performance character, all the work that was done on the wells to isolate and come to an understanding of this. But the water-sample analysis just supports the whole understanding of the water breakout.

And the point of the water analysis is there is a bright line on what Lower Brushy Canyon native water looks like from this peer group of wells. And once -- once the water breakout was identified -- and when I say identified, I mean the oil production went to zero. And when we began taking samples, the water sample, you know, confirmed there was some form of extraneous water that was entering and had lightened it. The chlorides went down. The specific gravity went down. The sulfates looked different than all of the other Lower Brushy Canyon wells and looked different than what this well was originally producing, which on Exhibit 16, that's these first three red points, were prior to water breakthrough.

Q. Let's go to that, Exhibit 16. You've already been through this.

A. I was trying answer your specific question. You said as a sample -- spot sample, and I was saying no, it's not a spot sample.

Q. Gotcha.

Okay. So let's go to Exhibit 16. Do you see the entry down there, "7/24/2014," at the bottom of your axis?

A. Yes.

Q. That's the date either on or after Mesquite shut in their injection wells, correct?

A. It's not on. I mean, the yellow callout shows the date the Mesquite well was shut in was July 23rd.

Q. If I'm looking at this, what I want to focus on, if I understand it, are the red squares, right?

A. There are red squares, and those go with the Poker Lake Unit 392H well, which was --

Q. And the triangles go with 393?

A. Yes.

Q. And then the PLU 401 is diamonds?

A. Red diamonds with a black outline, so red, red, red.

Q. So if I'm looking at this and I see that

7/24/2014 timeline and if I'm reading this correctly, what you're saying is that over a period of time the water quality came back into what you call your normal range?

A. I'm saying the specific gravity is moving back into the normal range where it's heading in the right direction. Specific gravity is indicating that those wells are producing something that looks much more like the Lower Brushy Canyon water that they initially were producing.

Q. And you'll agree with me that you see that trend after Mesquite shut in its saltwater disposal well?

A. Yes. That does happen after the well is shut in.

Q. Would you agree with me that, you know, the terms of water flow from these type of injection wells, that they will generally move downdip of the source?

A. No. I think I would look at the -- in a general statement about that is in a conventional reservoir, you'll have water underlying the oil, which will underlie, you know, natural gas.

I think the more appropriate general statement to make is that high pressure will seek out low pressure and will move along the weakest minimum stress to get there if it's creating a fracture, but high pressure to low pressure.

Q. And if I go back to -- so will you agree with me it will also move downdip?

A. Well --

Q. Water flows downhill, right?

A. Well, it has a higher potential, so it needs to move down. It goes from high pressure to low pressure whether it's updip or downdip.

Q. Did you look at any of the wells that were offsetting the Chevron and OXY injection wells to see if there were any -- immediate offsets to see if there were any impacts from OXY and Chevron over time?

A. No.

Q. And going back to Mr. Goetze's point here about the wells around the Poker Lake Unit 401H, you already mentioned the 400H, and you indicated you hadn't analyzed there. Isn't there also --

A. Whoa, whoa, whoa. Excuse me. You said I didn't analyze it? Which well are you talking about?

Q. The 400H.

A. I don't think that's what I said.

Q. It's not in any of your analyses, is it?

A. Well, no. But if you heard what -- the question I was asked is we haven't -- the well doesn't appear to have been impacted based on its production characteristics such that we would have included it. So it's similar to -- I believe it's the 394, which is the next one in line, that they haven't been able to confirm the 100 percent saturation of water breakthrough in that well, so it's not part of the analysis that I'm putting forward right here. We're saying it's not impacted at this point in time.

Q. If I look at your Exhibit Number 5 --

A. Which number?

Q. The Delaware Mountain Group fracture orientation map.

A. And I apologize. I've been moving my exhibits around, and they're not in a stack.

Q. There's another well between the 401H and the Poker Lake Unit 392. Do you see that?

A. I haven't found the exhibit yet, but I'll find it in a minute.

Q. Or if it's easier, go to Exhibit 18.

A. Oh, yeah, Exhibit 18.

Q. See where you have the Poker Lake Unit 401H identified and then the Poker Lake 392?

A. Yes.

Q. And there is another well between there.

A. Between 392 and 393?

Q. Between 392 and 401H.
A. Yes. I see there's a well laid in there, and it's just south of where the red lines cross, the 45, 65 degrees. Is that you're talking about?
Q. Yeah.
Have you seen any impact in that well?
A. No.
Q. Do you have an understanding, Mr. McGregor, of what the current water-oil ratio is in the Poker Lake Unit wells in the Brushy Canyon in general?
A. In the Lower Brushy Canyon?
Q. For the Poker Lake Unit producing wells in the Lower Brushy Canyon, do you have any idea what the typical water-oil ratio is for those wells?
A. Typical being before a water breakout? Is that what you mean by typical? Or after the water breakout, because we're over 100 now?
Q. What did you see before the water breakout?
A. All right. Well, early on, for example, in 392H, it was 3 to 1. 393 was at 2-and-a-half to 1.
Q. My question to you is: What is the typical water-oil ratio in the Lower Brushy Canyon in the Poker Lake Unit for the producing wells?
A. Well, between these three wells, it hangs from 2-and-a-half to 4.1 when they came on production.

Q. What are you looking at?

A. Exhibit 14, Exhibit 19 and Exhibit 20, which is the well performance -- well deliverability production test data for the 401H, the 392H and the 393H.

Q. Now, the 392H, which is Exhibit Number 19, I don't see a line for the indication of the water-oil ratio.

A. Well, no. I thought you were asking me what it was. I didn't say there is a line on here. But there is water production posted on here and the oil production is posted, and you divide the two and that gives you water-oil ratio.

Q. Did you plot the water-oil ratio?

A. I have seen plots of the water-oil ratio. I can make the calculation for different points in time right off of this thing.

Q. But you have not plotted it on here?

A. No. What's plotted on here is the daily oil, daily water and the pump inlet pressure.

Q. And to put these two exhibits in perspective, if I look at Exhibit 19, you have on here a red line, 7/24/2014. Do you see that? And you have a yellow box that says --

A. No. I don't see the red line at 7/24/14.

Q. I'm sorry. You have a red line, I guess, that's associated with the yellow box that says "7/23/2014."

A. Yes, I see that.

Q. That's the Mesquite shut-in?

A. Yes.

Q. And immediately following the Mesquite shut-in, you see a gradual increase in oil production?

A. Yes.

Q. And it's back on your typical productive trend that you testified to for oil in this particular well; is that right?

A. No. That's not what I said.

Q. Well, you see the trend on here?

A. I do. And that's why I was wondering if we're looking at the same trend or not.

Q. You don't see that by October of 2014, it's back on near the typical trend?

A. Which trend are you looking at? Are you looking at the oil, the water or the pressure? I mean, we've experienced -- we're producing a lot more water, a lot higher pressure than we've ever had.

Q. I'm looking at the green triangles, which is the oil.

A. Okay. Well, you didn't say that until just now. And the answer to your question is it has -- it has -- the oil production has been reestablished, and I've pointed that out on the tan box on the upper, right-hand corner.

Prior to the water breakout in the well, in June of 2014, the average for the well was around 61 barrels of oil per day. As of November 2014, to your point, since Mesquite shut their well in -- and it's a combination of Mesquite shutting their well in and also the dewatering that's gone on in the 401H. But during that period of time, the oil has increased. The water sample analysis has gone in the right direction on the specific gravity, and they're within four barrels of oil per day between the two. However, we're still at a very high pressure and producing, you know, a lot of water, so there is still a lot of work to be done on this well.

Q. Pressure is the purple line?

A. Uh-huh.

Q. And that's trending downward, correct, after the Mesquite shut-in?

A. Yes, which was another point. For it to be able to do that, that helps correlate the Section 11 and 12 area with this -- with this area, that when you shut off production and you stop a flow, it helps tie the relationship.

Q. And since the Mesquite shut-in, the water is trending downdip [sic]?

A. It is.

Q. Now, do you know how much volume of water was injected by Mesquite over a period of time between when they came online in 2011 or 2012 and then ceased injection in July of 2014?

A. Yes.

Q. How much?

A. I think that's on my Exhibit 22, which is the Sections 11 and 12 disposal well history. The Mesquite well -- and it's in the first line, Mesquite Bran SWD #1 -- it's the fourth well in the west -- has cumulatively produced from August -- injected from August 2012 to August 2014, which it was shut in prior to that, 5.3 million barrels of water.

Q. That was the Bran?

A. Excuse me?

Q. That was the Bran?

A. Yes.

And the Heavy Metal well, 2.7 million barrels of water.

Q. So that would be over 9 million barrels of water?

A. No. No, it wouldn't.

Q. I'm sorry. 8 million.

A. It wouldn't be over 8 million either. It would be 8 million on the dot.

Q. I'm sorry. 8 million.

Do you have any idea how long it would take to recover from that large volume of water?

A. I don't understand your question.

Q. Well, I mean --

A. Who is recovering? What are we recovering?

Q. Well, I mean, you've seen some recovery in your wells. Do you have any idea how long it's going to take BOPCO to recover from that amount of water being injected into the Brushy Canyon by Mesquite? It could take a while, right?

A. Well, it's going to take them a lot longer if they have to keep cycling 3,000 barrels a day that continues to be injected up there. It's going to take them a long time. I don't know how long. That's an analysis that -- it's going to take -- it's in progress. There's work going on. The model does things to address those type of questions.

Q. But we've only had four months, essentially, since Mesquite shut in their well, right?

A. Yes.

MR. FELDEWERT: That's all I have.

EXAMINER GOETZE: Mr. Larson?

MR. LARSON: I would request a short break, Mr. Examiner.

EXAMINER GOETZE: Let's go ahead and have a break. Let's come back in about 15, and we'll pick it up.

MR. LARSON: Thank you.

(Break taken, 2:21 p.m. to 2:38 p.m.)

EXAMINER GOETZE: We'll go back on the record.

And, Mr. Larson, it's your witness.

MR. LARSON: I have a couple of questions on redirect, Mr. Examiner.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Mr. McGregor, you were questioned by Mr. Feldewert about the PLU 98, BOPCO saltwater disposal well. And remind us where that well is located.

A. If you look at my Exhibit 18, it's the -- actually -- it's to the west -- to the south and the west of the 401, 392, and then go to 393 and then go south and west of that, and that's where the 98 well is.

Q. And if I recall your testimony from this morning correctly, it is your opinion that the flow of water was from the northeast to the southwest?

A. Yes. That is -- the flow of the water is from

Sections 11 and 12, you know, into the northeast, and it has moved on down to the south and west. So the direction of flow is from the northeast to the southwest.

Q. And the Hearing Examiner asked you a question about the PLU Number 400. Can you venture a guess why that well may not have been impacted, where the 401 well right next to it was?

A. It's -- well, my answer -- what I hoped that I expressed to the Examiner was that the end point -- I believe it's an induced fracture system, and it is narrow enough that it hit at the toe of the 401, so it's just past the toe of the 400. And because of that -- because it's not a broad fracture network, it appears to have gone from high-pressure disposal water from the northeast, moved along the fracture propagation orientation towards the southwest and hit at the toe -- the very toe of the 401H, and it missed the 400.

Q. Thank you, Mr. McGregor. That's all I have.

EXAMINER GOETZE: Very well. We're done with this witness.

At this point do you have any other witnesses?

MR. LARSON: I do not.

EXAMINER GOETZE: Mr. Feldewert, this is

your opportunity to present your case. Who will be your first witness?

MR. FELDEWERT: Call our first witness, Mr. Jarrod Sparks.

EXAMINER GOETZE: Very good. Thank you.

WILLIAM JARROD SPARKS,

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

DIRECT EXAMINATION

BY MR. FELDEWERT:

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

A. My name is William Jarrod Sparks. I work for Chevron, and most recently I've been employed in the capacity as a reservoir engineer and team lead for the Delaware Basin.

Q. And how long have you been team lead in the Delaware Basin?

A. I've been a team lead specifically for the last two years, and I've been a reservoir engineer working the Delaware Basin since January 2011.

Q. And you're talking about the Delaware Basin in New Mexico here?

A. New Mexico and Texas.

Q. And how long have you been with Chevron?

A. I've been with Chevron since June 2008, right out of school.

Q. Have you testified before the Division previously?

A. I have not.

Q. Why don't you outline your educational background, please?

A. So I have a bachelor of science in petroleum engineering from the University of Texas at Austin, and I have an MBA from the University of Houston, in 2012.

Q. So you received your MBA while you were working with Chevron?

A. Yes. I did it at night.

Q. And you mentioned that you've been with Chevron since you graduated. Before you became the reservoir engineer in the Delaware Basin, what were your responsibilities at Chevron?

A. I was a production engineer working the San Juan Basin. I lived in Farmington for about eight months doing workovers. I managed dewatering for the coal bed methane fields that I operated. And I worked there from -- I was there for eight months, then came back to Houston and then still worked coal bed methane type sands from June 2008 until October of 2010. And then I had a small stint on a special project in the

Panhandle from October 2010 until January 2011.
Q. And since that time you've been focused exclusively on the Delaware Basin?
A. That's correct.
Q. Are you a member of any professional affiliations?
A. I'm a member of the Society of Petroleum Engineers. I've been so since 2004 when I started in college. And I'm awaiting the results of my certification test for the Texas Board of Professional Engineers.
Q. So you took the test?
A. Took it in October, eight to ten weeks.
Q. Are you familiar with the applications that were filed in these consolidated cases?
A. Yes, I am.
Q. And have you conducted a study of the wells in the area that's in question?
A. Yes, I have.
Q. Mr. Sparks, were you part of a team of geologists and engineers with Chevron that worked with the counterparts at OXY to examine BOPCO's allegations?
A. Yes.
MR. FELDEWERT: I would tender Mr. Sparks as an expert witness in petroleum engineering, petroleum

production and petroleum reservoirs.

EXAMINER GOETZE: Mr. Larson?

MR. LARSON: No objection.

EXAMINER GOETZE: He is so qualified.

Q. (BY MR. FELDEWERT) Now, Mr. Sparks, I'm going to cut down a little bit on what we were initially going to do. I want to briefly introduce Chevron and OXY's Exhibit Number 1. Is that a timeline of events that were put together in preparation for this hearing?

A. Yes, it was.

Q. And a lot of this has already been addressed. OXY's well has been producing since 1994 -- I'm sorry -- injecting since 1994?

A. Yes.

Q. And Chevron's well has likewise been injecting since November of 2007?

A. Yes.

Q. And it wasn't until January of 2012 that Mesquite began their injection into the much lower zones that we're talking about here today; is that right?

A. Their disposal into the Bran and the Heavy Metal began January 2012.

Q. And then this finally reflects that initially BOPCO filed its application against Mesquite, and then eventually filed an application in September to revoke the authority of OXY and Chevron?

A. That's correct.

Q. If I turn to what's been marked as Chevron Exhibit Number 2, it contains 48 slides. Does that reflect the analysis that was conducted by the team that you were a part of for this area in question?

A. Yes, it was.

Q. What analysis contained within these slides will you be addressing here today?

A. So I'll discuss generally how the SWDs were configured, how we came up with the disposal zones. We have a structure map, a cross section, for the SWDs and a regional cross section. I could also talk about the wellbore construction for the OXY and Chevron wells, including cement bond logs. And then we'll also have the wellbore diagrams for the two Mesquite SWDs. And then we'll also look at the production of the BOPCO wells in question and some nearby Chevron wells that are producing from the Brushy Canyon.

Q. Now, the first few slides is just kind of an area of -- we can skip through that, right?

A. Yes.

Q. Slide four of Exhibit Number 2 is just an outline of the zone we're talking about, and we've had discussion about that already.

A. Uh-huh.

Q. I'd like to go to slide number five. Does this contain general information on the injection wells that are at issue for the Examiners?

A. Yes, it does, the four wells in question in Sections 11 and 12 of 24 South, 31 East.

Q. We've been through a number -- we've already been through the injection intervals.

A couple of questions I've got on here is that there's a lot of reference here to the pressure that OXY -- the pressure increase that OXY obtained up to 3,170. Do you recall that?

A. Yes.

Q. What has been the actual injection pressure that has been utilized for OXY?

A. So the average injection pressure for 2014 has only been around 1,250.

Q. With respect to the Chevron well, the Lotos 11 Federal, what has been the average injection pressure for that particular well?

A. The average injection pressure has been about 1,000 psi.

Q. So both of these have been injecting their pressure below that approved by the Division?

A. Yes.

Q. And the injection rates have actually been amended twice by the Division for OXY and once for Chevron; is that right?

A. That's correct.

Q. And each time did the Division examine the wellbores in the area in question, and were there step-rate tests to support those pressure increases?

A. Yes.

Q. Then we go down to the Mesquite wells. At the bottom, we show the interval for the Bran saltwater disposal well. Do you see that?

A. Yes.

Q. And you were here for the Bran testimony and the debate about how deep that well has injected?

A. That's correct.

Q. Now, it shows here a pressure -- permitted injection pressure of 1,450.

A. Yes.

Q. Were you able to ascertain from the filed records what Mesquite was injecting -- what pressure Mesquite was actually injecting for the Bran well?

A. We were not able to ascertain exactly, but looking at the reported pressures to the NMOCD, the Bran was reported at 325. But it has been reported at 325 since the very beginning and has never fluctuated.

Q. Do you have a familiarity with the volume of water that was injected by Mesquite in its Bran well at this low pressure?

A. Yes.

Q. And how does that relate to the volumes that have been approved and that were injected by OXY and Chevron corresponding to --

A. The rates at which Mesquite was injecting were several thousand barrels a day above both Chevron and OXY.

Q. Now, we also then have the information on the Heavy Metal well, and, again, you show a question mark by the average injection pressure?

A. Yes, sir. That's the same story as the Bran. It's -- we don't know exactly what it is, but that's what was reported to the NMOCD. And it's been a constant 300 ever since day one.

Q. And you have reflected on here the injection interval that Mesquite -- or that the Division approved for the Heavy Metal?

A. Yes.

Q. All the way down to 7,050?

A. Yes.

Q. And you also have -- then you have an area of an additional open hole from 7,050 to 8,300. Do you see that?

A. Yes.

Q. Is that what we talked about previously today about the absence of any kind of apparent barrier between the 7,050 lower injection zone in the bottom of that Mesquite well?

A. Yes. It does provide the uncertainty as to why 7,050 was noted.

Q. Or the uncertainty as to how deep they're actually injecting?

A. Yes.

Q. Or actually were injecting, I should say.

If we then go to the wellbore diagrams we talked about, does that begin on slide six?

A. Yes, it does.

Q. We'll first address the OXY well. Does it confirm the data that's shown on slide five?

A. Yes, it does.

Q. And does it identify the plugs that are in place to confine the injection of the water to these zones that are perfed?

A. Yes.

Not in well file

Q. What do we see here? What does RBP mean?

A. So an RBP is a retrievable bridge plug. OXY went in during some well operations in February of 2010 and they actually found that retrievable bridge plug set at 4,923, therefore abandoning or isolating out the perforations below that.

Q. And in addition to that, did you also have an opportunity to examine the cement bond log for this particular well?

A. Yes, I did.

Q. Look at slide number seven. Does that reflect the analysis?

A. Yes, it does.

Q. And what does it show with respect to the cement bond log for this particular well?

A. So for this well, the cement bond log shows good cement throughout the injection interval.

Q. And in your opinion as an expert in petroleum engineering, are you confident that the water that OXY is injecting through these perforations reflected on Exhibit [sic] Number 6, is that water staying within that zone?

A. Yes.

Q. Then if I go to slide eight, is that the wellbore diagram for the Chevron well?

A. Yes.

Q. And it reflects the data, again, that we saw on slide five --

A. Yes.

Q. -- where their lowest perforation is down to 5,632?

A. Yes.

Q. And does it reflect that there is a bridge plug in place to isolate the perforations?

A. There are actually two cast-iron bridge plugs that have been set to isolate the perforations of injection from the Lower Brushy Canyon.

Q. That's reflected in the CIBP on this diagram?

A. Yes, sir.

Q. Did you also look at the cement bond log records for this well?

A. Yes, I did.

Q. Is that reflected on Exhibit [sic] Number 9?

A. On slide nine of Exhibit 2.

Q. Thank you.

A. Yes.

Q. And what's your conclusion having examined that cement -- the cement bond log for this well?

A. This CBL shows good bond through the entire injection zone.

Q. And based on your opinion as an expert in petroleum engineering, are you confident that the water that Chevron is injecting through the perforations shown

on slide eight are staying within those zones?
A. Yes.
Q. We then move to slide ten of Exhibit Number 2. That's the wellbore diagram for the Bran well?
A. Yes.
Q. There's been a lot of talk about that. That's the open hole down to 6,740?
A. Yes.
Q. Which is over 1,000 feet lower than the lowest Chevron --
A. That's correct.
Q. Then if I go to the Mesquite Heavy Metal well, which is a slide 11, wellbore diagram, this is the well that commenced injection in January 2012?
A. Yes.
Q. And you have identified in here the reported injection interval based on the Division records?
A. That's correct.
Q. And you also indicate in here having examined that there is an open hole down to 8,300?
A. So the well was originally drilled down to 8,543. They plugged back. This well was actually abandoned and then re-entered by Mesquite, and they drilled out all the way to 8,300.
Q. And there is nothing to indicate that there is

any kind of a cast-iron bridge plug or retrievable bridge plug or anything else to isolate that zone?

A. There is no record of any kind of mechanical plug.

Q. There's been some discussion here about the potential of a cement plug in this well. And do you recall a depth of about 6,140?

A. Yes, sir.

Q. First off, are you familiar with cement plugs?

A. Yes.

Q. Do they sometimes fail?

A. They can fail. And just as Mr. McGregor -- both -- both cement plugs and mechanical plugs can fail, but cement plugs tend to have more failures than mechanical plugs.

Q. And in looking to the well records here for the Mesquite wells, did you observe any instances where the cement plugs had actually failed in these open holes?

A. Yes. We have two indications. So on the Mesquite Bran well, this was also an abandoned well that Mesquite re-entered. When Bran tried to set the original cement plug, they were unable to tag their first plug. They did pump a secondary plug. They were able to tag it at 3,970. When Mesquite came in to re-enter the well, they expected to see that plug at

3,970. That plug did not exist at all.

Q. Is that reflected on slide 12 of Exhibit Number 2?

A. Yes.

Q. Under the "Notables"?

A. Yes.

Q. Now, this is for the Bran well, right?

A. That's correct.

Q. Then if you turn over to slide 13, what does this reflect with respect to the well records of the Mesquite Heavy Metal well?

A. So when Mesquite came in, they had drilled down to 8,300. They tried to set a cement plug around 6,300 feet. They waited four hours, tried to tag it, but they were unable to, just like they had seen -- or Bran Oil had done with the previous saltwater disposal. They pumped a second cement plug of only 50 sacks. Both were only 50 sacks. They did tag it at 6,140. That's where that's coming [sic].

The question I have, though, is -- you know, the Bran well pumped 190 sacks for a cement plug, and they were unable to find it when Mesquite re-entered the well. How likely is -- a 50-sack plug in an open hole that is already not tagged the first time, how reliable is it that that cement plug is still there?

Q. So that's why you've depicted on slide number 13 a questionable cement plug?
A. Correct.
Q. You heard the testimony earlier that nobody's confirmed whether that cement plug actually exists or not?
A. Unless Mesquite or BOPCO talked with Mesquite that they actually went down and verified, upon the breakthrough, that that plug was still in place, I would question that it is still there.
Q. And if that's the case, that it's not there, then we have an open hole in this particular injection well all the way down to 8,300?
A. That is correct.
Q. But what we do know for sure, based on the Bran well, is that that is injecting open hole down to 6,470 into the Brushy Canyon, correct?
A. That's correct.
Q. Below whatever limestone barrier exists between the Cherry and the Brushy?
A. That's correct.
Q. And is there -- there was a question from the Examiners about, you know, the distinction between open-hole injection and perforated injection. What's -- what's the -- basically, what's the problem?

A. So one of the basic problems with injecting open hole is you don't really have good isolation. You can't necessarily tell exactly where your disposal is going. You can run a production log and maybe get some indications.

With the perforations, you have a mechanical way to know your water is going through that interval, unless you have a poor cement job that could articulate water down the back side, but the cement logs in this case indicate good bond. So I have no reason to think the water is not injecting exactly where it's supposed to be.

Q. Now, if I turn to slide 13 -- I'm sorry -- slide 14 of Exhibit Number 2, which is really a repeat of slide five, it shows that there is a cross section done, B to B prime. Do you see that?

A. Yes.

Q. It's on the left-hand side of this exhibit.

A. That's correct.

Q. These are the four disposal wells; is that right?

A. That's correct.

Q. Go to slide 15 of Exhibit Number 2. Does this depict the conditions of the various disposal wells based on the information that you could glean from the records?

A. Yes, it does.

Q. And it essentially identifies where each of these disposal wells are producing or were producing with respect to the three members of the Delaware Formation, right?

A. Correct.

Q. Did you then have an opportunity to create a more regional cross section that would show the injection zones here in relationship to the producing areas?

A. Yes.

Q. And if I turn to slide 16 of Exhibit 2, does that contain the wells that were utilized to treat that regional cross section?

A. Yes. That is our C to C prime.

Q. And that includes wells down to the Poker Lake Unit?

A. Yes.

Q. As well as wells between the Poker Lake Unit and the Mesquite injection area?

A. Yes. We pulled in an additional well in between one of the control points and one also because it falls within the cone that BOPCO had presented to Chevron and OXY at individual meetings.

Q. If we turn to what's been marked as slide 17 of Exhibit Number 2 --

MR. FELDEWERT: And, again, Mr. Examiners, the numbers are in the upper, left-hand corner of each one of these slides, in case you missed it.

Q. (BY MR. FELDEWERT) -- does this provide an indication of the distances between various injection zones and the producing area reflected in the Poker Lake Unit?

A. Yes. Now, I will note that the Poker Lake Unit 401H is a horizontal well, so the production interval that's noted there is actually the TVD of the lateral. So they have stages along their lateral length, but given that this is just a cross section, the TVD was the best way to indicate where they were producing from.

Q. Now, this cross section that you've created, does it also reflect the limestone barriers that were discussed in the article we brought up when Mr. McGregor was testifying?

A. Yes, it does.

Q. And does it show the barrier that exists between the Bell Canyon -- Lower Bell Canyon and the Upper Cherry Canyon?

A. It shows that there is some sort of a lime noted with high resistivity, and that coincides with what was presented in the report from the University of Texas.

Q. And then does it also reflect a similar barrier between the Lower Cherry Canyon and the Brushy Canyon?

A. Yes.

Q. And is that reflected in this cross section?

A. Yes.

Q. And does this indicate that both of Mesquite's disposal wells, which are now shut in, actually penetrated through that barrier?

A. The Bran most definitely penetrates into the upper portion of the Brushy Canyon. You know, as we noted before, the Heavy Metal, there is some question, but based on what was reported, you know, on the most recent regulatory papers, it's 7,050, which would be into the upper portion of the Brushy Canyon.

Q. In your opinion, Mr. Sparks, are Chevron and OXY's saltwater disposal wells potentially injecting into the Brushy Canyon producing zone?

A. No.

Q. And why is that?

A. Because they are isolated through perforations with good cement. The relative location of the two, the OXY and the Chevron saltwater disposal well, they would have to go three to three-and-a-half miles and then down, over 2,000 feet, to get to the production interval in the BOPCO well.

Additionally, to say they're connected to the Bran and Heavy Metal would be counterintuitive given that the preferred fracture orientation, as everyone has communicated, is northeast to southwest. And these wells are located northwest from those two disposal wells, which would be perpendicular to that fracture orientation.

Q. And in contrast, are the Mesquite wells -- or were they potentially injecting into the Brushy Canyon producing zone?

A. Yes.

Q. Primarily because they're below that limestone barrier?

A. They do not have the same isolation that Chevron and OXY do.

Q. Now, did you -- in light of BOPCO's allegations, did you study the impact on the Poker Lake Unit wells when Mesquite shut in these two injection wells? I guess there is some debate on whether it was July 24th or July 23rd. Do you know the date?

A. Well, so they -- the problem is understanding that days are 24 hours. So the request was sent to Mesquite on the 23rd. Mesquite did shut their wells in, but as was reported by Mr. Morrison this morning, they said it was late that evening, which means that you wouldn't really see the effects until, essentially, the 24th, if you think of that as the end of the 23rd, beginning of the 24th. That's probably where the confusion is coming from.

Q. So we'll just say the end of July. Okay?

A. Sure.

Q. So I don't get crossways here.

If I turn to what is slide 19 of Exhibit Number 2, does it identify the four Poker Lake Unit wells that BOPCO raised the concern about when they met with you in October?

A. These were the four wells that were identified to us in our meeting and what was requested of us that we were impacting in their motion.

Q. And when I look at what BOPCO filed in this case before the hearing today and I look at their motion to consolidate and for a continuance -- have you read that?

A. Yes.

Q. Are you aware of the fact that in paragraph five of that motion, they represented to the Division in October and I quote, "BOPCO continues to experience a precipitous drop in production from each and every one of its Poker Lake Unit wells that have been impacted by produced water intrusion." Do you remember that?

A. Yes.

Q. And it was after Mesquite had shut in their saltwater disposal well?

A. Yes.

Q. And they went on to say: "Three months after Mesquite stopped injecting produced water, the negative impact on BOPCO's Poker Lake Unit producing wells remains." Is that right?

A. That's correct.

Q. In your analysis, has there been -- does BOPCO continue to experience -- to use their words -- "a precipitous drop in production" with each and every one of these four wells?

A. I would say that they have not seen a precipitous drop in each of the wells. They have noticed a precipitous drop in one well.

Q. That would be the 401H?

A. That it is still -- it is still significantly down.

Q. Now, if I look then at slide 20 -- work backwards, shall we?

A. Sure.

Q. If I look at slide 19, they have their wells in

order. We'll go from the 394 and work backwards?
A. Yes.
Q. Did you analyze the data that was reported by BOPCO about this well to the Division?
A. Yes. All of the production data here are the monthly tests that were reported to the NMOCD.
Q. By BOPCO?
A. Yes.
Q. And you had available to you three months of data, correct, since the Mesquite shut-in?
A. The last period of information that I had was the production reported for September.
Q. And on slide number 20, you identify, as they've done on some of their slides, a Mesquite shut-in date?
A. Yes.
Q. And in looking at the parameters that you've identified here, which is oil production, gas production and water production, for the 394H, did you say any kind of a precipitous drop either before or after Mesquite shut in?
A. I do not see anything that is precipitous.
Q. Now, you also charted on here, did you not, a water-oil ratio?
A. Yes. The purple triangles, those are noted as

the water-oil ratio, and just as McGregor had identified, it is simply the water divided by the oil.

Q. And what has been, roughly, the water-oil ratio of the Poker Lake 394H since it came online in July of 2014?

A. The water-oil ratio before Mesquite shut their wells in was around 8 to 9 to 1, and even since the injection has been stopped, it's still around 8 to 9 to 1.

Q. And is that consistent with the water-oil ratios that Chevron and OXY have seen in their producing wells in this area?

A. I can't speak to OXY's producing wells, but Chevron's producing wells that are directly near the two saltwater disposal wells in question, they have seen a water-oil ratio hover around 10 to 1.

Q. With that in mind, if I then move closer to the 401H, I get to slide 21, Exhibit 2?

A. Yes.

Q. And that's the Poker Lake 393?

A. Yes.

Q. And, again, using the available data on the Division's Web site reported by BOPCO, did you graph the production of this well history since it came online in April of 2013?

A. Yes.

Q. What do you observe with respect to the trending of the water production, the gas production and the oil production in this particular well?

A. We do see the oil production start to decline. It's hard to tell if it's a slightly higher decline than what you would have normally seen. The gas definitely dropped off, but the gas has been rebounding since Mesquite has shut their wells in. You did see the influx of water. Now, if that's -- remember, 393 was partially caused by BOPCO setting the plug in their 401H well, diverting some of that extraneous water to their wells. But they are seeing the water fall back in line with where I would expect it to be at this point.

Q. And you see a trend with respect to the water-oil ratio?

A. Yes. The water-oil ratio did increase. It has started to flatten off and actually started to fall back on about 9 to 1, which is a little bit higher than it had seen, but it falls in line with what I have seen in other Lower Brushy Canyon wells.

Q. And I think it's intuitive for you engineers, but not so much for anyone else in the room. The water-oil ratio will gradually go up over time as you produce more oil, right?

A. Yes. In the Lower Brushy Canyon, the longer the well is online, you will see the water cuts naturally increase.

Q. Then if I go to what's been marked as slide number 22, is that the production here for the Poker Lake Unit 392H well since it came online in November of 2012?

A. Yes.

Q. What do you observe with respect to the trending of the oil production, the gas production and the water production?

A. Again, the gas fell off considerably, but since Mesquite has shut their wells in, their gas production has climbed almost back to trend. Their water did increase as you would expect, and it is declining as of the last month's data. The oil also fell off, but since Mesquite has shut in, that oil looks to be recovering. And you can see that in the water-oil ratio in that it's coming back down from the July 2014 date.

Q. And has there been any continuation of a precipitous drop in production after the Mesquite shut-in?

A. I don't see a continuance of precipitous drop. I see that there was an effect and that it is recovering.

Q. And finally, when I get to the Poker Lake Federal #1 well, that's reflected on slide number 23?
A. Yes.
Q. And what does this show you over time since it came online in November of 2012?
A. So you definitely see the oil, gas and water following a pretty steady trend, and there was a breakthrough of some sort between April and May. As the last reported oil and gas for the well prior to Mesquite's shut-in was April, you do see that after the shut-in, there was some oil recorded and some gas, but water-oil ratio is still considerably high. I think as Mr. McGregor had pointed out, it was well over 100, and I agree with that. But the last data point shows that though the water is still high, it's moving in the right direction.
Q. Now, did you examine what was going on in the Mesquite wells in April and May when this drop is shown here or this water volume [sic] is shown on slide 23?
A. I guess I don't understand your question.
Q. Was there any change in the rate of volume of water that Mesquite was injecting into its wells in April or May of 2014?
A. No.
Q. But this does reflect that something happened,

right?

A. Yes. Something most definitely happened.

Q. And do all of these slides indicate that there is an apparent -- appears to be some recovery in the Poker Lake Unit wells since the Mesquite shut-in?

A. Yes.

I'm also excited to hear that over the weekend it was reported that the oil is recovering in the 401H. That would actually put it well above even the most recent point that I had received from BOPCO's submission to the NMOCD.

Q. Did you get an understanding of where that -- of the amount of oil that they were seeing?

A. I think what they reported earlier today, the most recent, was about 20 to 30 barrels of oil today.

Q. If you put a dot -- when was that? Did they say when that production occurred?

A. I can't remember exactly. They said over this past weekend.

Q. So would that be in the November or December production?

A. That would show up on the December production, but there is usually a lag when that's reported and received. So we probably won't see that show up for December until probably February or March of next year.

Q. And that level of production, where would that be on these lines that you have on here? Is it above the 100 axis on the left-hand side?

A. Yes. These are monthly numbers. So if they were at 30 barrels of oil a day for a 30-day month, that would put them at 900 to 1,000 barrels of oil a day -- or 900 to 1,000 barrels for the month.

Q. So that would be a marker that could be drawn in right below that 1,000 line?

A. Yes, sir.

Q. Somewhere around November or December?

A. Yes.

Q. As part of your study, did you also examine the regional dip in this area?

A. Yes, I did.

Q. If I look at slide 24 -- I have to write that in in the upper, right-hand corner.

So slide 24, does that reflect the wells that are utilized in the cross section to determine the regional dip in this area, the Delaware Formation?

A. Yes.

Q. And if I then turn to slide 25 of Exhibit Number 2, is that the corresponding cross section over this area of interest?

A. Yes, it is.

Q. And what does this reflect with respect to the regional dip in this area for the Delaware Formation?

A. It shows that there is a small dip to the east, so you are shallower to the west and deeper to the east.

Q. And if I then take a look at slide 26, does that provide a structure map over this same area of interest as reflected in slide 25?

A. Yes, it does.

Q. Confirming the shallowing as you move to the east?

A. Yes. And it indicates that the saltwater disposal wells in question are downdip from the -- for the Brushy Canyon, it is downdip from the BOPCO producing wells.

Q. Now, you also identify on here -- I'm sorry -- on the next slide, slide 27, keeping this in mind, you identify some offsetting Chevron producing wells?

A. Yes, the Todd 2 State #3, and the Sotol A Federal #3 and the Cactus 16 State #2. And they were selected because of the general orientation that was provided by BOPCO. Those are that same orientation from the OXY and Chevron saltwater disposal wells.

Q. Now, these three wells that you identify here on slide 27, are they producing from the Lower Brushy Canyon?

A. Yes, they are.
Q. And do they offset your Chevron and OXY producing wells 45 degrees to the northeast?
A. From the -- the Chevron and OXY SWD wells, but not from the Heavy Metal and Bran SWD wells.
Q. And then you also have the availability of a producing well to the southwest between your OXY and Chevron saltwater disposal wells and the Poker Lake Unit wells in question?
A. Yes.
Q. Why is the location of the offsetting Chevron wells important? I mean, what would you normally see if there was an issue?
A. Well, if the induced fractures are occurring from Chevron and OXY at the orientation that has been provided through the FMI and the microseismic, I would expect to see some sort of water influence in our two producing wells and the Chevron Cactus 16 State #2. And I would expect to see it before I saw it at Poker Lake.
Q. Because two of the wells are downdip, right, in the northeast?
A. They are downdip. And as Mr. McGregor pointed out, water does tend to go downhill, but it is a pressure. But these two -- these two wells to the northeast, they've been online since the mid-'90s, so I

would expect that their pressure, relatively speaking, is actually lower than what Poker Lake is seeing, the BOPCO Poker Lake wells.

Q. And then with respect to the Cactus well, if the well were creating an issue, you would expect to see it first in the Cactus well because it's actually between your disposal wells and the Poker Lake Unit?

A. I would expect that if there was an influence from OXY or Chevron's SWD wells, I would see it in that well.

Q. Has Chevron observed any impact to its producing wells directly offsetting the Chevron and OXY saltwater disposal wells?

A. I have not seen a noticeable impact.

Q. If I turn to slide 28 of Exhibit Number 2, is this the production history since January of 2012 for the first well to the northeast, the Todd State #3?

A. Yes.

Q. And what do you observe with respect to the oil, the gas and the water and the water-oil ratio?

A. So what I see is the oil and gas seem to be on trend. I wouldn't say that there is any negative impact. The water-oil ratio is high, but it is not anything higher than what we have actually seen historically for this well in this area.

Q. And is what's reflected on here -- this well's been producing for quite some time, right?

A. Since the mid-'90s.

Q. And it would be hard to put all that data on here and show it, but is the data reflected on here since January 2012 similar to what you see for prior production years in terms of trending?

A. Yes. The trend does not seem to have changed from the dates not represented here.

Q. And with respect to the water-oil ratio, for this particular well, it appears to be on trend? Is that what you said?

A. Again, when you have a well that's been online for a long period of time, you do expect the water-oil ratio to go up. The water-oil ratio that we've seen historically, it fluctuates depending on when we do well work, you know, getting the well back online, but it's not anything higher than what I've historically seen.

Q. Then going to the second well to the northeast reflected on slide 29, do you see -- what do you observe here with respect to the trending of the oil and the water and the water-oil ratio?

A. So what I see is that the oil is still on trend, the water is on trend. The water-oil ratio is -- you know, it fluctuates. These are very low oil volumes, so any little blip can really change your water-oil ratio. That's why you see it oscillating, you know, between four to ten. But historically, if you look at where the water-oil ratio has oscillated, you know, being between four to ten is very typical for this well.

Q. And with respect to these wells to the northeast, were they all producing before Chevron commenced any injection operation in this area?

A. They have been producing since the mid-'90s, and the Lotos well has been injecting since 2007. But they were not producing before OXY's disposal in 1994.

Q. And finally, going to the Cactus well to the southwest of the OXY and Chevron disposal area --

Let me ask you one other question back on slide 29. You didn't have any gas line out here. Is that because it's not recorded?

A. I'm not 100 percent sure. These are all wells that we received from Chesapeake. The gas that was reported early on in the life was very low, and very likely it's just not being metered. But we have not reported any gas on it.

Q. Then if I go to that well in the southwest on slide 30, you have some data on gas here, but it's limited, correct?

A. Correct.

Q. What do you observe with respect to oil and water and the water-oil ratio on this well southwest, between the Poker Lake Unit and your injection well?

A. So you see that the water and oil are on trend, except for September '13. You see we definitely lost some oil and water. We lost our pump in the well. We had to go do some well work. We have brought the well back online. We did shorten the stroke length on the pumping unit, which is why you have not seen the oil get 100 percent back to wherever it was at. Again, these are very low volumes, so you're looking at around one to two barrels of oil a day. But the fortunate part is that the water-oil ratio is actually slightly better than it was before the well downtime.

Q. So in these disposal operations, OXY's SDS and Chevron's Lotos, if they were having some kind of an impact on production in the Brushy Canyon, would you expect the water-oil ratio in the Cactus State #2 to go up?

A. I would expect it to go up just like we saw in the Poker Lake Unit 401H, and I would also expect that -- given the pressure that BOPCO saw in their wells, at these low rates, I would expect my well to be watered out.

Q. In your opinion, as an expert in petroleum engineering, do you see any evidence of a negative impact on Lower Brushy Canyon production from OXY and Chevron's disposal operations in the Bell and Cherry Canyon?

A. No, I do not.

MR. FELDEWERT: That's all the questions I have.

EXAMINER GOETZE: Mr. Jones?

CROSS-EXAMINATION

BY EXAMINER JONES:

Q. Hello, Mr. Sparks.

A. Hello.

Q. That well that dropped off on the water-oil ratio, could that be due to some scaling?

A. We have not noticed any scaling, but we did have paraffin in the well.

Q. And speaking of that water-quality rationale that Mr. McGregor was showing, do you have any comments about that?

A. So the comments I would have is we have taken some water analysis in our wells, more specifically -- or most recently our disposal well, and the specific gravity, the total dissolved solids, the chlorides, the sulfates, they all fall in line with what BOPCO is seeing before the breakthrough. In fact, the water that Chevron is disposing, almost all of it is Lower Brushy Canyon or Cherry Canyon water.

We did look at historical water analysis, and, you know, it's hard to tell that -- I have this disagreement on what native Brushy Canyon water is. I'm not sure there has been an official study on what native water is. We do see similar trends to what Mr. McGregor provided. But the water that they introduced as native Brushy water, there have been deeper wells than the Brushy Canyon at the Poker Lake Unit that BOPCO has been disposing water from. They themselves were disposing water into the Lower Brushy and the Delaware sand through the Poker Lake Unit. You could raise the question that they may have already contaminated, and we have no real indication of what native water is.

Q. Okay. So you're saying that the waters that Mesquite was using were different than the waters that you're disposing of?

A. Absolutely. With Mesquite being a commercial disposal, they're disposing anything and everything. It could be laced with completion fluids. It could be, you know, very shallow water, very deep water. It could be from all over the place, and it's most definitely different than what Chevron's disposing.

Q. Isn't it true that it would be most likely Bone Spring water?

A. There is a good indication it would be Bone water just because that's what the primary development has been in the Delaware Basin. Yes.

Q. If you draw a ten-mile circle around their wells, considering they have to truck the water in, the production from that ten miles, what is that?

A. It would more than likely be a majority of the new water or the majority of the water being Bone Spring. But there has been historical deep production all around those two commercial disposal wells that Mesquite has. So there could be some portion that is from Morrow, Atoka, much deeper formations.

Q. I'm not seeing a hyperbolic decline or not a real strong hyperbolic decline in those new horizontal Brushy Canyon wells. So that indicates to me that there's some issues about it not being such a highly fractured reservoir. What do you think about that?

A. You know, I can't -- I can't speak to it specifically since I'm not a geologist. All I can tell you is the Lower Brushy Canyon has to be fracked, and they have to pump prop in. If there were fracture swarms, I would expect that you may not need to frack it.

Q. Well, it does -- the profiles that Mr. McGregor showed, there are obviously some big fractures down there.

A. Yes.

Q. So I guess my question is: Why isn't the matrix more fractured to exhibit more of a hyperbolic decline on the production plots? And that's something --

A. I don't know. I could definitely look into it.

Q. Those gas wells that you're showing on this cross section, some of those are old Morrow wells, right?

A. Yes. They were used just as control points.

Q. And they have cement circulating across the zone of injection, or are there any bradenhead issues with those wells?

A. I did not look at those wells specifically for that, but -- I can't answer that.

Q. And this stress direction you were talking about earlier, do you agree with BOPCO's analysis of stress direction in the Brushy?

A. I agree that we have seen, through microseismic, that there is a preferred orientation that's somewhere along a 45- to 65-degree angle. We've seen that elsewhere in the Delaware Basin, so I can't say I disagree with that.

Q. Do you think it extends up into the Cherry and the Bell the same direction?

A. I don't know, but I would think that there is a possibility that that could be the case.

Q. On your disposal wells, I saw on one of the exhibits that there was a plug that was pushed down in that well.

A. In which well?

Q. It would be either one of the -- the Chevron well or the OXY well. It was a plug that was pushed down, the Lotos 11 Federal #2. It says the cast-iron bridge plug initially set, and then it was pushed down to 6,793.

We usually try to write these disposal permits to have a 200-foot interval between their lowermost injection and your plug inside your wellbore, but I noticed you don't have that here. It may not have been written that way, because you could have corrosion inside the casing and you didn't show a production profile -- or an injection profile. Are you going to show one later, or do you have one?

A. No. I was not planning to show one later. Again, these were actually from Chesapeake. We acquired this well in October 2012 from them. We have not gone in and done any well work since then.

Q. What about any follow-up testing on these two wells?

A. Chevron has not done any follow-up testing on these.

Q. What about a Hall Plot?

A. We have done a Hall Plot, and that actually will be presented later.

Q. Okay. That's all I have.

EXAMINER GOETZE: Very good.

And you have no questions, Counsel?

EXAMINER WADE: No questions.

EXAMINER GOETZE: Mr. Feldewert, are you going to admit these later on, when you get through?

MR. FELDEWERT: I plan on it.

EXAMINER GOETZE: Okay. Very good.

CROSS-EXAMINATION

BY EXAMINER GOETZE:

Q. Who did the cross sections?

A. So I had one of my geologists do the cross sections.

Q. So he's not here, so we won't ask any questions.

But so far it looks comparable between interpretations both by BOPCO and Chevron.

EXAMINER GOETZE: I have no further questions for this witness, and I'll give it to Mr. Larson.

CROSS-EXAMINATION

BY MR. LARSON:

Q. Good afternoon, Mr. Sparks.

A. Good afternoon.

Q. I'm handing out Exhibit Number 23. Pardon my handwriting. I know you're just now seeing it, Mr. Sparks, but would you identify for the record what that document is?

A. It looks like it is a sundry notice for the Heavy Metal 12.

Q. And I direct your attention to page 4 of Exhibit 23, and do you see some handwriting on there? It says: "Called Daniel Sanchez on 6/12."

A. Uh-huh.

Q. And just above that, it says: "Saltwater disposal commenced 1/23/2012. Injection to ... 6,140."

A. Yes. I see "plugged back TD 6140." Yes.

Q. Do you have any reason to disagree with that?

A. I don't have any reason to disagree with that from this sundry. That 6,140, that's the questionable cement plug.

Q. Have you tested the plugs in the OXY SDS

Federal #1? I know that's not your well, but I think you're speaking for OXY here as well. Do you know if those plugs have been tested?

A. I don't know to what extent they have fully tested. I know that they have gone down and tagged that plug. It is there. And they have to perform their MIT.

Q. How about Chevron? Have those plugs been tested?

A. We have not done any well work to go in and test the plugs, but we had to do an MIT in order to convert to injection.

Q. Did Mesquite do the MIT?

A. They did.

Q. What do you consider to be an effective frack barrier?

A. An effective frack barrier to me would be anything that prevents -- it would prevent anything that the rock possibly shifting, you know, something that you might see in a microseismic. I would definitely think an effective frack barrier would be anything that -- some type of seal that would prevent hydrocarbons from naturally flowing through it. And that's about as much as I could say to the seal itself.

Q. Can you speak to the issue of what stress contrast we need to have to be an effective frack barrier?

A. I cannot speak to that.

Q. Your attorney spoke about a study done by the University of Texas.

A. That was a study that was referenced by our geologist and the engineering group of OXY and Chevron.

Q. And was that the basis for their belief that there are frack barriers within the Delaware Mountain Group?

A. Yes. And that was -- we have every reason to believe that it was a very good study. I think Mr. Pregger also addressed that he believes if it came from the University of Texas, that he believes it.

Q. Can you cite us to any particular part of that study?

A. I can't remember exactly what page it is at this point.

Q. Is it your opinion that the Mesquite open-hole wells are not communicating with the OXY and Chevron SWD wells?

A. Yes.

Q. And what's the basis for that opinion?

A. The majority of that analysis is because we don't see -- as you'll see when we get to the Hall Plot, we don't see any type of response from when Mesquite shut their well in that we would expect to see if we were communicating with them. I would also expect that given that we're at a different orientation, it would be odd that if they propagated the frack in the natural stress fracture, that they also propagated the second frack that was perpendicular to the preferred stress orientation.

Q. Do you agree that the three BOPCO producing wells, the 401, the 392 and the 393, have been influenced by injection in Sections 11 and 12?

A. I believe that BOPCO has seen a negative impact in the 401H. I believe that the negative impact they saw in the 392 and 393 were both self-inflicted by trying to isolate that water. That water, though, is extraneous, and I believe it is coming solely from the Mesquite SWDs.

Q. And you use present tense there. Mesquite shut in those wells in July.

A. Correct.

Q. Where has that water come from in the last four or five months?

A. Well, though they are not injecting, they injected, I think, as Mr. McGregor pointed out, well over 7 million barrels of water in only two years -- less than two years. Whereas Chevron, we've not even injected 7 million barrels since we've injected, period. It's a lot of water, and there's going to still be a lot of water, especially when you're only pulling of the extraneous water about 1,000 barrels.

Mr. McGregor pointed out that right now they're seeing about 2,000 -- 200 barrels of water a day, but the Brushy Canyon makes water. Before the breakthrough, they were still making around 1,000 barrels of water a day. So the extraneous water is really only 1,000 barrels if your ESP is only moving 2,000.

I believe you have -- Baca [sic] has gone in to run a 4,000-barrel-a-day ESP. So if my math is right, that would still be 3,000 barrels of water a day.

And if the two Mesquite wells were injecting approximately 15,000 barrels of water a day, that means that for every day they were injecting, BOPCO would need to be producing five times as long to recover that 40,000 barrels of water per day that's extraneous. So I think if the math goes into it, as Mr. McGregor addressed, it will probably take a long time for that water to be removed from the system.

Q. Thank you, Mr. Sparks.
A. You're very welcome.

EXAMINER GOETZE: Mr. Feldewert, any

follow-up?

MR. FELDEWERT: No.

We'll call our next witness.

EXAMINER GOETZE: Very good.

THOMAS CLIFFORD,

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

DIRECT EXAMINATION

BY MR. FELDEWERT:

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

A. My name is Thomas Clifford. I am a reservoir engineer at Occidental Petroleum.

Q. How long have you been with Occidental Petroleum?

A. I've been with OXY a little over four years now.

Q. And have you had the opportunity to previously testify before this Division?

A. No, I have not.

Q. Why don't you provide the Examiners with your educational background?

A. I graduated with a bachelor's in petroleum engineering from the University of Texas; graduated May 2010.

Q. And what has been your work history since you started -- did you start with OXY in 2010?

A. Yes, I did.

Q. What has been your work history since you started with OXY?

A. I was a production completion engineer for three years, September 2010 through January of this year. January of this year until now, I've been a reservoir engineer.

Q. And when you were a production completion engineer, what were your areas of responsibility?

A. Pretty much entirely the Delaware Basin in New Mexico.

Q. And has that been the case for your entire career at OXY?

A. Yes, aside from six months in Texas, Delaware Basin.

Q. Are you a member of any professional affiliations?

A. I am. I am a member of the Society of Petroleum Engineers, have been so since August 2008, six years.

Q. Are you familiar with the applications that have been filed in these consolidated cases?

A. Yes.

Q. And were you part of a team of geologists and engineers at OXY that worked with your counterparts at Chevron to study BOPCO's allegations?

A. Yes, I was.

MR. FELDEWERT: We'd tender Mr. Clifford as an expert witness in petroleum engineering and petroleum production.

EXAMINER GOETZE: Mr. Larson?

MR. LARSON: No objection.

EXAMINER GOETZE: The witness is so qualified.

Q. (BY MR. FELDEWERT) Now, going back to Exhibit Number 2, which is in front of you, what analysis contained within these slides are you going to be addressing today?

A. I'll be addressing the Hall Plot analysis and the injectivity analysis.

Q. And I believe the Hall Plot analysis is slide 32 of Exhibit Number 2; is that right?

A. Yes.

Q. First off, if I go to slide 33, does that discuss the Hall Plot meaning and methodology that's used?

A. Yes, it does.

Q. And what, essentially, does a Hall Plot analysis do?

A. It gives you an idea, a snapshot of either historical or current injection conditions in a saltwater disposal well.

Q. Now, did BOPCO inform you when you met in October that they had observed a pressure change at their Poker Lake Unit well following the shut-in of Mesquite's injection wells in July?

A. Yes.

Q. Did they tell you how quickly they had observed a pressure change at their Poker Lake Unit?

A. I believe they told us six hours.

Q. Six hours?

A. (Indicating.)

Q. Did you examine the injection characteristics of Chevron and OXY's saltwater disposal wells before and after Mesquite shut in its injection wells in 2014?

A. Yes.

Q. And did you observe any pressure or other changes in your injection wells after Mesquite shut in its injection wells?

A. No, we did not.

Q. What does that tell you as an engineer?

A. That tells me that OXY and Chevron's wells are not hydraulically communicating with either Poker Lake or Mesquite.

Q. If I then turn to what's been marked as slide 34, is that the beginning of the Hall Plot analysis of the OXY well?

A. Yes.

Q. And slide 35, does it provide the daily injection rates and daily pressure rates from this well since February of 2008?

A. Yes, it does.

Q. And would you just tell us what all the dots and lines mean right here?

A. The blue dots are the daily injection rates. The red dots are the daily injection pressures. The dotted orange line, although it looks red on this chart -- the dotted line is our permitted injection pressure. You can see the uptick there in October of 2013 from 2,200 to 3,170 psi. The vertical line is the Mesquite shut-in on July 24th, 2014.

Q. Now, this change in injection pressure that you note on here in September -- roughly September 2013, was that approved after you submitted certain information to the Division?

A. Yes.

Q. Did that include step-rate tests?

A. Yes.

Q. Do the orange dots on here reflect the actual injection pressures that the company has been utilizing?
A. No, it does not.
Q. What does -- what does that show? That's the surface [sic]?
A. Yes, the little red -- red-orange circles on the plot.
Q. So it looks to me, based on the data, that the company has always been injecting well below its approved injection, right?
A. Yes.
Q. Have these injection rates been fairly consistent over time for this well?
A. Yes. The trend doesn't appear to change over the time periods shown here.
Q. And why is it that the company -- that the pressure rates have not increased over time?
A. We didn't have the additional need. We've been injecting all the water we need to in this SWD. So --
Q. In terms of the dateline here when Mesquite shut in its well, did you observe any pressure changes in your well following the shut-in of the Mesquite well?
A. No.
Q. Does the data indicate you have maintained the previous trends that you had seen in this particular

well?

A. Yes, it does.

Q. If there was some kind of a fracture network that connected OXY's disposal well with the Mesquite disposal wells, what would you see on the right-hand side of that July 24th dateline?

A. The blue dots would be in the same place. All the red dots would come down. We would have the injection rates because that's all the water we need to dispose, but our injection pressure would drop because we're no longer competing for hydraulic space underground and on the subsurface.

Q. In utilizing this data on here, on slide 35, would you then conduct a surface oil plot analysis?

A. Yes, that's correct.

Q. And is that reflected on slide 36?

A. Yes, it is.

Q. Would you please -- before we get to the data, would you explain the legend that is inserted on kind of the middle, left-hand side of this? What does that tell us?

A. So the solid line that you see here from little A to capital A in the top right is an injector well under normal conditions. It's injecting into a closed tank, large reservoir but sealed, and you're eventually increasing pressure over time.

Any deflection to the north, or vertically, such as capital B would be wellbore plugging or hydraulic communication with possibly another injector. It's resistance to injection. So it could also be considered as, you know, subsurface hydraulic communication with another injector well.

Any deflection to the right would indicate either a fracture or injection out of zone. As seen on the legend in the top, left-hand side of the chart, capital B, or you could even say C, would be a fracture. The well's been -- you know, you've induced the fracture network or induced the fracture, and it's becoming easier to inject one barrel of water or the volume of water specified.

Q. Okay. So this provides your benchmark to this analysis in looking at the curve and the data, correct?

A. Yes.

Q. Then on the left-hand side of this exhibit, have you plotted the trending line for the OXY well?

A. Yes, we have.

Q. And on the right-hand side of this exhibit, is this a close-up of the trending line using just the data from 2014?

A. Yes.

Q. And what do you observe with respect to the data line here that you've got both in the left and the right?

A. The shape of the curve is concave upward, which reflects either capital D or capital A in the legend. It's either injection into a normal container or a normal reservoir, or it's a wellbore that's plugging up.

Q. So you would have reduced injectivity over time?

A. Yes. Yeah, because you'd expect that with a typical injector well.

Q. Is that what this concave upper thin line reflects?

A. Yes.

Q. If you had a fractured network or were connected to some fractured network, what would that trending line be doing?

A. You'd see an inflection point to the right, so it would have a -- at some point in time, you would have a shallower slope. It would fall off to the right.

Q. And you also plot on here the Mesquite shut-in date?

A. Yes.

Q. Do you see any change in your trending line following the Mesquite shut-in date?

A. I don't see any significant change. It's following a concave up trend.

Q. And if you were somehow hydraulically connected to the Mesquite injection zones, what would that line be doing to the right of the dateline?

A. It would look similar to capital B in the legend. It would fall off to the right because we would no longer be hydraulically communicating and competing for space -- for space in the reservoir.

Q. Now, if I then to turn to slide 37, is this downhole plot analysis using the same data that we saw on slide 35?

A. Yes, it is.

Q. What's the difference between your surface-hole plot and your downhole plot?

A. The only -- the primary difference is you assume a reservoir pressure, or if you have -- in the downhole pressure gauge, you obtain a reservoir pressure, and you take the delta pressure as on the vertical axis versus on the surface-hole plot, it's just surface-injection pressure.

In this case we corrected for down hole, and it becomes your pressure drop across the perforations, essentially. It's your inside the wellbore injection pressure minus your reservoir pressure outside the perforations.

Q. So you have a different vertical axis, then, correct?

A. Yes.

Q. Where did you obtain your average pressure?

A. The average pressure was taken from the Sandia report, which we'll refer to in a couple of slides. It's a report done by a company called Sandia out of Farmington, I think, and it was done by the Department of Energy. And the WIPP [sic] site is about 12 miles further northwest of here. And they obtained some reservoir pressures from the Bell Canyon, so we used the same hydraulic gradient to come up with a reservoir pressure for OXY's well.

Q. And then looking at the insert on the left-hand side of slide 37, does that provide your benchmark for analyzing the slope of the data line here?

A. Yes. We're taking the last portion of the data, which would reflect the current injection conditions, and calculating an injectivity that is based on the slope of that line, and that's how our well is injecting at this current point.

Q. And using that index here as a benchmark, that would indicate to you whether you have a fracturing near the well or a normal disposal environment, right?

A. Yes.

Q. In analyzing the data, what did you observe with respect to the trending line for this downhole Hall Plot?

A. It's the last six years of history we have here showing primarily the linear trend. There is no clear deflection to the right. If anything, there is a slight deflection steeper -- a steep slope, which indicates what we're plugging.

Q. So does that indicate that there is any leak in the reservoir in the area you are injecting?

A. It does not.

Q. Does it indicate there is any fracturing in the area -- in the part of the reservoir you are injecting?

A. No, it does not.

Q. Then you also, on the right-hand side -- in both of these, you also had the Mesquite shut-in dateline. Do you see that?

A. Yes.

Q. Did you observe any change in the slope of your line following the Mesquite shut-in?

A. No. It's primarily a linear trend.

Q. And if you were hydraulically connected, again, would that line drop off?

A. Yeah. The slope would become more shallow. It would be a lower slope.

Q. Before we leave this particular slide, as part of your analysis here that you're going to get into next, your injectivity analysis, did you create -- or did you develop the injectivity index for the OXY well?

A. Yes, I did.

Q. And which number on slide 27 will you be using later?

A. We'll be using 0.92 barrels of water injected per day per psi as the injected index on the OXY SDS Federal well.

Q. And that's the data for 2014?

A. Yes. That's current conditions.

Q. Now, OXY's well has been injecting into this particular zone since 1994; is that correct?

A. Yes.

Q. In your opinion, is there any evidence of a hydraulic communication between OXY's saltwater disposal well and Mesquite's recent SWD wells in nearby Poker Lake Unit?

A. No, there is not.

Q. If I then go to slides 38 through 41, is that the same type of analysis for Chevron's saltwater disposal well?

A. Yeah, it is.

Q. I think we can move through these a little more quickly.

Slide 39, is that historical data for the Chevron well?

A. Yes, Chevron injection data.

Q. And did you observe, based on the data, any change in the injection pressures following the shut-in of Mesquite's wells in July of 2014?

A. No.

Q. When using this data, did you create your surface Hall Plot as reflected on slide 40?

A. Yes, I did.

Q. And do you see the same results that you called out for the OXY disposal?

A. Yeah. It's a concave up trend. It either indicates capital D [sic] or capital A in the insert, which is typical injection in normal conditions or while we're plugging.

Q. So no indication of a leak in the injection zone or some kind of a fracture network?

A. No indication from this plot.

Q. And did you see any change in your trajectory line after Mesquite shut in in July?

A. No major -- no change. It's continuing a concave upward trend.

Q. Does slide 41 reflect the downhole plot analysis?
A. Yes, it does.
Q. And do we see a similar result as we saw for the OXY disposal well?
A. Yes. It's a linear trend. It's either a typical injection under normal conditions or -- yeah. It's a linear trend the last two -- two to three years of injection history.
Q. And do you see any impact on that linear line following the shut-in of the Mesquite well in July of 2014?
A. I do not. It's linear. If anything, it's slightly continuing in a somewhat concave upward trend, which, according to the insert, indicates wellbore plugging, which you -- also going back to the surface Hall Plot -- plugging.
Q. Now, Chevron has been injecting in this particular zone that you've analyzed here since 2007?
A. Yes, that is correct.
Q. And do you observe any evidence of a hydraulic communication between Chevron's injection zone and Mesquite's recent saltwater injection wells there by Poker Lake Unit?
A. No, I do not.

Q. There was some discussion during BOPCO's case about existence of non-native water in the Brushy Canyon.

A. (Indicating.)

Q. Were you here for that?

A. Yeah. I heard that.

Q. Are you familiar with the water that Chevron has been and OXY have been injecting into their disposal wells?

A. Yes, I am.

Q. What's the source of that water?

A. Brushy Canyon. We have -- Chevron has one Morrow well. OXY has two Bone Spring well and one Morrow well. Aside from that, it's 90 to 95 percent Brushy Canyon wells.

Q. So is there any way, if that's the case, that Chevron or OXY could be contributing to the non-native water that BOPCO claims it sees in the Poker Lake Unit well?

A. It would be hard to understand the differences in water as seen at the Poker Lake Unit after the breakthrough. If OXY and Chevron are both injecting Brushy Canyon water, why would it look any different at Poker Lake than it does a mile or two northeast?

Q. Okay. Now, before I leave slide 41, you also calculated the injectivity index for Chevron's well, correct?

A. Yes, I did.

Q. And you did that for 2014?

A. Yes.

Q. Is that 1.67?

A. 1.67 barrels of water injected per day per psi. Is the Chevron Lotos 11 Federal #2 SWD injected index.

Q. And are you going to use that number in your injectivity analysis?

A. Yes.

Q. Let's go to the second portion of your case, which the cover on that is slide 42.

And does slide 43 provide us with kind of an overview of what an injectivity index analysis does?

A. Yes, it does.

Q. Essentially, what does it do?

A. It's a ratio of the volume of water injected over the pressure drop or the delta pressure. It's a relative measure. You can compare SWDs right next to one another and see which ones are doing better than others, which ones have better injectivity.

Q. And can you identify the permeability of the injection zone doing this kind of analysis?

A. Yes. You can rearrange Darcy's equation and back out a permeability estimate.

Q. You get to do that Darcy's analysis, Darcy's law?

A. Yes.

Q. If I then go to slide 44, does that contain the injectivity index analysis for OXY's disposal well for a period of time since March of 2008?

A. Yes, it does.

Q. And it provides, essentially, the historical injectivity?

A. Yes, over the last six years.

Q. What does the yellow line reflect on here?

A. The yellow line on the plot is a rolling 50-day average, so it's just to try and correlate a trend through all the data points. Each data point is representative of one day of injection over the last six years.

Q. Now, if that yellow line is going up or that yellow line was trending up, what would that mean?

A. If the yellow line is trending up, that means you're getting more injectivity. You're injecting more barrels per day per psi than were given -- permitted to. So for every one psi, if you have an injectivity index of one, it's one barrel of water per psi. If your yellow line is increasing to two, that means you've got two barrels of water injected per psi, so it's increasing injectivity.

Q. Did you observe any change in that yellow line in that 50-day average after Mesquite shut in?

A. It fluctuates, as you can see in the history over the last four years. It's cyclical. And it's following the same trend. It's been decreasing over -- it indicates that it's a closed reservoir.

Q. And if it wasn't a closed reservoir and somehow connected to the Mesquite SWD well, would you expect that yellow line would start trending up after Mesquite shut in its well?

A. It would, because we're not competing for core space. We're not competing for hydraulic space in the reservoir. So we would, therefore, be able to inject more, so your injectivity index would be higher.

Q. Did you utilize, then, this data to calculate the permeability of the zone into which OXY has been injecting since 1993?

A. Yes.

Q. Turn to slide 45. Does that contain your analysis of the permeability of OXY's injection zone?

A. Yes, it does.

Q. What did you conclude from this analysis?

A. The apparent reservoir permeability is 2.29

millidarcies based on this calculation and the current injection --

Q. And what does that indicate in terms of the type of system into which you were injecting?

A. It appears to be matrix permeability.

Q. Is there any evidence, given this permeability, of a fractured system or a fractured network?

A. No.

Q. It's kind of a benchmark. If you were -- if OXY was injecting into a fractured network, what type of permeability would you see from your analysis?

A. You'd see about 150 millidarcies of permeability.

Q. And you're seeing 2.29?

A. That's correct.

Q. Does slide 46, then, provide the same type of -- the beginning of slide 46 -- provide the same type of analysis for Chevron's injection rate?

A. That's correct.

Q. Again, you have your historical data on slide 46?

A. Yes.

Q. And you have your yellow line that tracks your historical trend?

A. Yes.

Q. And did you observe any change in that historical trend following the shut in of Mesquite's well?

A. No. It's following -- it's within range of the total history that we have here since 2012.

Q. And did you then utilize this data in the injectivity index of 1.67 to calculate the permeability of the zone in which Chevron is injecting?

A. I did.

Q. Is that reflected on slide 47?

A. Yes.

Q. And what did you conclude from your analysis?

A. We came up with 2.40 millidarcies for reservoir permeability over the injection interval.

Q. I'm sorry?

A. Over the injection interval.

Q. And, again, what does that indicate in terms on the nature of the interval in which Chevron has been injecting since 2007?

A. It appears Chevron is injecting into matrix permeability.

Q. Is there any indication of a fractured system?

A. No.

Q. If I go to slide 48, does the first half of the top part of this slide identify the Sandia report that you referenced for purposes of determining your average reservoir pressure?

A. Yes.

Q. And the bottom part of this, does it provide the Examiners with some benchmarks with which to weigh the permeability of the OXY and Chevron injection zones with other types of injection zones?

A. Yes.

Q. You talked about if you were tied to a fractured system, you would see 150 to 155 millidarcies?

A. Yes.

Q. As opposed to the 2.29 and 2.4 that you calculated for Chevron's well?

A. Yes.

Q. Now, you did a calculation here based on the permeability that would have to be in effect for BOPCO to see a quick response to the Mesquite shut-in?

A. That's correct. Uh-huh.

Q. What type of permeability did you calculate would have to exist for BOPCO to receive such -- see such a quick response in its Poker Lake Unit well from the shut in of the Mesquite well?

A. Based on the distance, for a 24-hour time period, you've got to see the pressure drop and the pump intake pressure zone for the Poker Lake 401, it would be a permeability of 900 millidarcies in that fracture system. If they're talking six to eight hours, you can increase that factor to well over one darcy permeability within that fracture system.

Q. In your opinion, are the zones into which OXY and Chevron are injecting through perforations, is that the same type of zone as to which Mesquite was injecting via open hole?

A. Absolutely not.

Q. In your opinion, is there any indication that OXY and Chevron's saltwater disposal wells are hydraulically connected to Mesquite's recently shut-in disposal wells?

A. No.

Q. And in your opinion, is there any indication that Mesquite's recent injection activities have created a conduit by which OXY and Chevron's operations are somehow impacting the Poker Lake Unit?

A. Based on the Hall Plot, no.

Q. That's all the questions I have.

EXAMINER GOETZE: Mr. Jones?

CROSS-EXAMINATION

BY EXAMINER JONES:

Q. So on those Mesquite wells, does anybody really know what the injection pressure is that we're under?

A. We asked them for the data, and we never got around to obtaining it from them.

But, you know, if you wanted to assume that they're actually injecting at 325 psi, you estimate bottom-hole pressure based on frictional calculations and hydrostatics, and then you know their surface-injection rates. Their injectivity index is 15 or higher relative to ours.

So based on the data that we have from the NMOCD Web site, it appears that their injection is much higher than ours, and they've got a much higher injectivity index than us, which indicates there's something different. It's a totally different system than what OXY and Chevron are injecting into.

Q. We know they've got more wellbore exposed, right?

A. Yes.

Q. Can you tell us again how much disposal volume they were putting in? You're putting in around 3,000 in one of these wells, right, one of these Chevron wells?

A. Yeah. In the OXY, we're putting in about 2,000 a day, and Chevron, I think it's about 1,000 a day.

Q. And how much was Mesquite putting in?

A. Combined, they were putting in 15,000 a day.

Q. 15,000?

A. I believe so.

Q. Total for both wells?

A. Yes.

Q. I didn't see where anybody put an injection time clock for all saltwater disposals together and showed them on the same plot, but you just answered that question, I guess.

But your well did require a pressure increase?

A. Yes.

Q. So you just had more volume you needed to put in, or is it just reaching the -- just naturally going to need it?

A. We figure we may need it sometime in the future, but we've still got almost 1,000 psi buffer room with the previous approved permanent pressure of 2,200. We asked for it thinking that we're going to have an aggressive drilling program moving forward, and this would help us handle the water injection. But at this point, we don't really see much need for it.

Q. What kind of pump do you have on these two wells, the OXY and the Chevron well?

A. I believe we have an H pump on the OXY well. I would have to defer to Chevron for the Chevron well.

Q. H pump, you said, or what kind?

A. Or not an H pump. I'm sorry. A --
Q. Triplex?
A. -- triplex pump. Yes.
Q. And how do you limit the pressure on it? Do you have a Murphy switch, or do you have some -- on your well to keep it from overpressuring? It's not overpressuring, right, at the volume you're putting in?
A. No.
Q. And are you trucking in your volume to -- for these wells?
A. I believe -- I believe some is piped, and some is also trucked in.
Q. From remote -- remoter -- further-away wells that's being trucked in, I take it?
A. Yeah, from 45 miles or so.
Q. I didn't see a site security diagram for the well site. Do you have a chart -- do you keep charts on these two wells to show the pressure behavior with time?
A. I don't have them with me, and I haven't --
Q. But you do keep them?
A. I believe so. I believe we show [sic] it out in the field.
Q. When's the last time that TD was checked on these two wells, somebody gone in and -- dipped in and checked the plug -- where the plug's at?

A. On OXY's well, we ran a wireline tag and an injection log a week before Thanksgiving, so it must have been November 22nd, November 21st, somewhere around there.

Q. So you ran an injection log?

A. Yes. And all of our injections show we went shallower, and there is no injection going deeper, and there is a plug there.

Q. Why did these two wells -- both of them, I think, if I'm correct, show the lower zone was plugged back. Why was that?

A. I wouldn't be able to speak for it because it appears that happened before OXY acquired from Pogo in 2008. Our first work or operation was February 5th, 2010, where we ran into figure out what was in the well, and we found that plug there at 4,923, I believe it was. So we have no record of how that plug got there. It was something Pogo had done prior to OXY. And then in our system we have the perforations listed, and they are -- they do agree with our injection log.

Q. Do you keep a Nolo [sic;phonetic] analysis program? You're a production engineer now, right?

A. I'm a reservoir engineer now.

Q. I can tell from this (indicating) that you're a reservoir engineer. But even as a reservoir engineer, do you have a Nolo [sic] analysis program on hand that you keep your reservoir or your perfs, your well wellbore or your --

A. Yeah. We keep track of them in LOWIS, which is life-of-well information system.

Q. Oh, okay.

A. I believe that's the acronym for it.

Q. And the scaling tendency -- you see a scaling tendency in these waters?

A. We see -- as for injection water, we see typical values that BOPCO's claiming prior to the Mesquite invasion.

Q. Calcium carbonate or --

A. We haven't really had any scale issues that I know of, that I'm aware of, but we have -- we have sulfates. We have chlorides. But we don't have any other components, really, that cause, you know, any issues for us.

Q. Do you filter the water, what goes in?

A. I believe so, but I do not know the answer to that.

Q. You graduated pretty recently from school. You probably had a lot of rock mechanics; is that correct?

A. Yes, sir.

Q. This stress direction that everybody was talking about from the FMIs and I guess from the results of microanalysis -- microseismic, I think, from those frack jobs confirming that, do you agree with the azimuth of the fractures?

A. Yes.

Q. What about the dip?

A. I don't know. I haven't seen the microseismic data, so I don't know, really, the orientation of the fractures. I just know from a vertical standpoint the direction of the -- between 65 and 45 degrees, but I'm not aware of the dip.

Q. Is the dip -- is the dip a function of the properties, or is it a function of your pressure regimen?

A. I would have to defer that question to a geologist.

Q. No more questions.

EXAMINER WADE: No questions.

EXAMINER GOETZE: Very good.

CROSS-EXAMINATION

BY EXAMINER GOETZE:

Q. On your downhole Hall calculations, you assume a skin factor of zero. Is that reflective of what the well is right now as far as being cleaned out and -- you state we don't have any type of accumulation. That's been verified, correct?

A. At this point we don't have any way to correlate, so to keep OXY and Chevron on par with one another, we just left the skin factor at zero.

Q. Then your calculation for the 900 millidarcy, is that a summation of both Mesquite wells injecting cumulatively?

A. No. That's -- it was independent of rate. We took the data point between the two Mesquite wells and then calculated the distance -- or from a map, the distance of the Poker Lake 401, and that was one of the inputs in the calculation.

Q. Very good. Thank you. I have no more questions.

EXAMINER GOETZE: Mr. Larson?

CROSS-EXAMINATION

BY MR. LARSON:

Q. Good afternoon, Mr. Clifford.

A. Good afternoon.

Q. You rendered an opinion about the water in the injection zone. Have you done any sampling of that water? Do you have any test data to look at?

A. For OXY and Chevron?

Q. Yeah.

A. We have it, but we don't have it with us. We have done tests. And as Jarrod alluded to, we've done some tests on our saltwater disposal historically. We also have tests from around our field, water that is --

Q. And how would you define the term "hydraulic communication"?

A. I guess the easiest way for me to define that would be if you increase -- it would be connection between two points via some kind of conduit, basically a straw [sic]. If you have two balloons on either side and you squeeze one balloon, you have a balloon in place and vice versa. However, you just translate that into --

Q. And the two open hole Mesquite wells, were they open in the Cherry and Bell Canyon Formations?

A. Yes, I believe so.

Q. And are the Chevron and Mesquite wells injecting into the Cherry and Bell Canyon? I'm sorry. I misspoke. OXY.

A. OXY and Chevron?

Q. Yes. It's late in the day.

A. Was that also in your previous question, OXY and Chevron?

Q. No. This is a separate question. Are Chevron and OXY injecting into the Cherry and Bell Canyon Formations?

A. OXY is injecting into the Bell Canyon. Chevron is injecting into the Bell and Cherry.

Q. Do you know what Darcy's law is?

A. Yes.

Q. Would you explain that, please?

A. I haven't looked at it in a couple of years. It's a relationship between pressure and rate. It's a function of viscosity. It's a function of formation volume factor. It's a function of your wellbore radius and the formation radius or your radius investigation. It's a function of skin and your reservoir height. And it's a calculation.

Q. Does it also include formation permeability?

A. Yes.

Q. And can water from Chevron and OXY's injection flow, via Darcy's law, to Mesquite's wells through a fracture that has been created?

A. Will you repeat the question?

Q. Sure. Can the water that's been injected by Chevron and OXY's flow, via Darcy's law, to Mesquite open-hole wells or a fracture of Mesquite's wells has been created?

A. You could say that the water could flow in any direction. So it could flow to the northwest. It could flow to the southeast. It could flow to the northeast.

It's the preferential direction of flow, which according to the fracture analysis by BOPCO, it appears to be northwest to southeast based on the fracture orientation.

Q. Could we not say there is a hydraulic connection between the water injected into the Bell and Cherry by OXY and Chevron -- open hole Mesquite wells?

A. Not at this point. We haven't seen any change in the Hall Plots to validate that. We have four months of data prior to Mesquite shutting in, and we haven't seen any change in the slope of our charts.

Q. What about Darcy's law? That doesn't apply?

A. Over time.

Q. So what you're saying is you don't have enough data at this point to say?

A. I guess you can say that. We don't have enough data at this point. We have four months of data. We haven't seen any change. BOPCO had one day and they saw change.

Q. Is it possible that there is a hydraulic connection?

A. Not at this point, not from the evidence we've seen from the Hall Plots.

Q. Do you know what the frack gradient is in the Delaware Mountain Group?

A. It appears to be .54, .55.
Q. Are you familiar with the step-rate test that was done on the SDS 11 SWD well?
A. I'm familiar.
Q. And what was the bottom-hole pressure that was shown on the step-rate test?
A. I haven't seen the actual report itself in quite sometime, so I couldn't answer that question.
Q. Would it surprise you if I said it was in the range of 3,200?
A. You'd expect the pressure to increase with time.
Q. What's the depth of injection on the OXY SWD well?
A. Let me go back to one of the exhibits.
MR. FELDEWERT: Exhibit 5 -- slide five.
THE WITNESS: Slide five? So.
OXY's SDS 11 Federal well injected 4,510 and 4,822.
Q. (BY MR. LARSON) What gradient is that?
A. I'm sorry?
Q. What gradient is that?
A. What do you mean?
Q. I'm sorry. Could you repeat the depth you said?

A. 4,510 to 4,822. It's on slide five.
Q. What is 3,200 divided by 4,822?
A. I don't have a calculator up here.
Q. Less than one?
A. 32 divided by?
Q. 4,822.
A. 4,822? Yes, less than one.
Q. Is it greater than .54? And I understand you don't have a calculator.
A. Yes.
Q. I can't do that in my head either.
A. It appears that it is.
Q. That's all I have, Mr. Clifford. Thank you.
EXAMINER GOETZE: Mr. Feldewert?
MR. FELDEWERT: I'd move the admission of OXY and Chevron Exhibits 1, 2 and 3.
EXAMINER GOETZE: Mr. Larson?
MR. LARSON: No objection.
EXAMINER GOETZE: Exhibits 1 through 3 are entered.
(OXY and Chevron Exhibit Numbers 1 through 3 were offered and admitted into evidence.)
EXAMINER GOETZE: And we also have a late BOPCO entry exhibit? Are you going to enter that?
MR. LARSON: Thank you, Mr. Examiner. I

move the admission of BOPCO Exhibit Number 23.

EXAMINER GOETZE: Mr. Feldewert?

MR. FELDEWERT: No objection.

EXAMINER GOETZE: Very good. Exhibit 23 by BOPCO is also entered.

(BOPCO Exhibit Number 23 was offered and admitted into evidence.)

EXAMINER GOETZE: Any closing statements by you gentlemen?

MR. LARSON: I would request a short break to huddle with my team, and when I say short, I mean short.

EXAMINER GOETZE: Well, let's give you until -- give you 12 minutes.

MR. LARSON: Very good. I appreciate it.

(Break taken, 4:27 p.m. to 4:38 p.m.)

EXAMINER GOETZE: Let's get back on record, and let's go ahead and do closing statements, if you so wish.

We'll start with you, Mr. Larson.

CLOSING STATEMENT

MR. LARSON: Thank you, Mr. Examiner.

In BOPCO's applications, we're not arguing that OXY and Chevron have acted in violation of their SWD permits or the OCD's regulations. What we are alleging is that three of BOPCO's producing wells have been impacted by water injected by Mesquite until July of this year and currently Chevron and OXY.

I believe we've put on substantial evidence that there is a communication between the open-hole Mesquite wells and the Chevron and OXY wells, that there is no fracture barrier that would prevent water from flowing northeast to southwest, as Mr. Pregger established with his fracture orientation.

And we would ask that the Division enter an order revoking the injection authority granted to OXY and Chevron.

We've worked out a deal with Mesquite. Mesquite has agreed to the revocation of their authority, and Devon, on the other side of the Poker Lake Unit, has also agreed to no longer dispose in the Delaware Mountain Group and dispose in the Devonian.

And given BOPCO's plans for continued horizontal well development in the Lower Brushy Canyon, we think the days of the injecting produced water into the Delaware Mountain Group should end.

EXAMINER GOETZE: Mr. Feldewert.

CLOSING STATEMENT

MR. FELDEWERT: Here's what we know: Mesquite was injecting into the Brushy Canyon. Could be as low as 8,300 feet, depending if that cement plug held or not, something we don't know.

We do know that OXY and Chevron are not injecting into the Brushy Canyon. They're injecting into the Bell Canyon and the Upper Cherry. Period.

What we do know is that Mesquite has agreed that they're the problem. They've agreed to shut in their well, their two injection wells. What we also know is that we've seen recovery at the Poker Lake Unit wells since the Mesquite shut-in. Given the volumes that they injected, Mesquite injected, it's going to take a while. It's going to take a while, but we're seeing recovery.

What we don't see -- remember I asked at the beginning? We don't see any evidence of any hydraulic connection between those deeper Mesquite injection wells and OXY and Chevron's shallower disposal wells. None. We don't see any evidence that Mesquite is in the same disposal environment as OXY or Chevron. In fact, we see just the opposite. OXY and Chevron are in a different disposal zone. We don't see any evidence -- no direct evidence whatsoever that OXY and Chevron are sending the water into the Lower Brushy Canyon that is somehow impacting the native water. They're not sending any water into the Lower Brushy

Canyon. And we don't see any evidence that OXY and Chevron are injecting into a fractured network.

I don't know how you get around the Hall Plot analysis or the injectivity analysis. That's what those things, as I understand it, are supposed to do, give us an indication of whether we have a problem.

So I don't see any evidence of any impact on the Poker Lake Unit from the OXY or Chevron injection operations and absolutely no basis to even consider suddenly revoking this injection authority that they've had since 1993 for OXY and 2007 for Chevron. It's just not there.

EXAMINER GOETZE: Very well, gentlemen. With no additional testimony or exhibits to be entered, Case 15231 and Case 15219 are taken under advisement.

And this is the end of Docket 37-14, Examiners Hearing today, December 9th.

Thank you very much, ladies and gentlemen.

(Case Numbers 15231 and 15219 conclude, 4:42 p.m.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner Hearing of Case No. ______ heard by me on ______________

______________________, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
COUNTY OF BERNALILLO

CERTIFICATE OF COURT REPORTER

I, MARY C. HANKINS, 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.

Mary C. Hankins

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