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

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

ORIGINAL

DE NOVO APPLICATION OF CAZA PETROLEUM, INC. FOR A NONSTANDARD OIL SPACING AND PRORATION UNIT AND COMPULSORY POOLING, LEA COUNTY, NEW MEXICO.

CASE NO. 15437
(De Novo)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

COMMISSIONER HEARING

November 10, 2016

Santa Fe, New Mexico

BEFORE: DAVID R. CATANACH, CHAIRMAN
PATRICK PADILLA, COMMISSIONER
DR. ROBERT S. BALCH, COMMISSIONER
GABRIEL WADE, ESQ.

This matter came on for hearing before the New Mexico Oil Conservation Commission on Thursday, November 10, 2016, 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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INDEX

INDEX (Cont'd)

INDEX (Cont'd)

EXHIBITS OFFERED AND ADMITTED

(9:11 a.m.)

CHAIRMAN CATANACH: Okay. Next order of business today is Case Number 15437, which is the de novo application of Caza Petroleum, Inc. for a nonstandard oil spacing and proration unit and compulsory pooling in Lea County, New Mexico.

At this time I will call for appearances.

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

MR. LARSON: Good morning, Mr. Chairman, Commissioners. Gary Larson, from the Santa Fe office of Hinkle Shanor, for Legacy Reserves, L.P. I also have three witnesses.

MS. MOSS: Good morning, Commissioners. Kathryn Moss for the Commissioner of Public Lands appearing at this time because we just found out about this matter and had not received notice as we should under the rules about the OCD hearing or any notice of this hearing.

CHAIRMAN CATANACH: Ms. Moss, what is -- what do you intend to do at this hearing?

MS. MOSS: We object to this hearing proceeding altogether. We can't participate in any meaningful manner. Since we didn't receive notice, we

have been deprived of participation from the very onset.

CHAIRMAN CATANACH: Mr. Bruce, would you like to address that?

MR. BRUCE: Well, I've never sent notice to -- whether the BLM or the State Land Office. We're force pooling Legacy, obviously. We're not force pooling the State.

CHAIRMAN CATANACH: Ms. Moss, what notice are you referring to? I'm not aware that we have a rule that requires direct notice for compulsory pooling to the State Land Office.

MS. MOSS: Because in this case, where Caza is requesting to drill into state minerals, which are partly unitized, we read the rule that we receive notice. Caza, actually -- although I'm not sure Mr. Bruce would object to that because I believe notice is required under these circumstances. It may not be what is generally done, but the rule does require it.

CHAIRMAN CATANACH: Which rule are you referring to?

MS. MOSS: 19.15.4.12(A)(1).

CHAIRMAN CATANACH: Do you have a copy of that?

MS. MOSS: Yes, I do.

COMMISSIONER BALCH: Mr. Wade does.

MS. MOSS: May I approach?

MR. BRUCE: They've got it.

CHAIRMAN CATANACH: Mr. Larson, do you have any statements in regard to this?

MR. LARSON: I do not.

CHAIRMAN CATANACH: Ms. Moss, are you just requesting the ability to participate in the case?

MS. MOSS: I'm sorry. We would not be able to participate in any way that's meaningful at this point because I found out about this a little after 5:00 yesterday. So there would -- I could not possibly be prepared to participate in a way that would represent -- I could not participate in a way that would be meaningful to the Commissioner without proper notice or certainly more notice than I received in this case.

CHAIRMAN CATANACH: I think what we're going to do is go into executive session and decide what we're going to do with this request.

MS. MOSS: Thank you.

COMMISSIONER BALCH: I would so move.

CHAIRMAN CATANACH: Oh, do I have a motion to go into executive session?

COMMISSIONER PADILLA: So moved.

COMMISSIONER BALCH: And seconded.

CHAIRMAN CATANACH: All in favor?

(Ayes are unanimous.)

(Executive Session, 9:16 a.m. to 9:38 a.m.)

CHAIRMAN CATANACH: Do I have a motion to go back into regular session?

COMMISSIONER PADILLA: So moved.

COMMISSIONER BALCH: And seconded.

CHAIRMAN CATANACH: All in favor?

(Ayes are unanimous.)

CHAIRMAN CATANACH: I will state for the record that during the executive session, we discussed the motion from Ms. Moss to continue the case, and that was all we discussed.

We also went over the notice rule, and we have determined or we've -- yeah. We decided that pursuant to 19.15.4.12(A)(1), we don't believe that the Land Office is entitled to notice in this case. Historically, we don't believe it's been done in the past. And so that issue is set aside.

What I would put forth now is a vote on Ms. Moss's motion to continue the case. I'll put forth a vote on that at this time.

COMMISSIONER BALCH: I would vote no for a continuance.

CHAIRMAN CATANACH: I would also vote no to the continuance.

COMMISSIONER PADILLA: I would vote yes to the continuance.

CHAIRMAN CATANACH: The motion to continue is denied at this time by a vote of two to one.

I would also like to make a statement that we would allow SLO to participate in this hearing, whether it be by statement or other means that they want to participate.

MS. MOSS: Thank you very much.

CHAIRMAN CATANACH: At this time we'll proceed.

MR. WADE: Can we clarify if the State Land Office would like to cross-examine witnesses, participate in that manner, or would you like to give a statement?

MS. MOSS: I think we will be fine with a statement.

MR. WADE: Okay.

MS. MOSS: Thank you for asking.

CHAIRMAN CATANACH: Thank you, Ms. Moss.

Can I get all the witnesses to stand and be sworn in?

(Mr. Brown, Mr. Nickerson, Mr. Sam, Mr. Roberts, Mr. McKamey and Mr. Darden sworn.)

MR. BRUCE: Commissioners, before we begin, I'd like to substitute Exhibit 2 in your packages with a revised Exhibit 2. I previously sent this over to Mr. Larson, and I don't believe there is an objection to the substitution.

MR. LARSON: No objection.

JOHN E. "JAY" BROWN,

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

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. John E. Brown, The Woodlands, Texas.

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

A. Caza Petroleum, land manager.

Q. Did you previously testify before the Oil Conservation Division?

A. Yes, I have.

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

A. Yes, they were.

Q. You have not previously testified before the Commission, have you?

A. No, I have not.

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

A. I have a bachelor's of business administration from the University of Texas in petroleum land management.

Q. And who have you worked for and how long have you worked in the business?

A. I've worked for about 42 years in the business as a landman. I've worked for, gosh, Amoco Production Company, Saxon Oil Company. I would have to think about that.

Q. A number of companies?

A. Eight different companies, Pacific Enterprises, Zinke & Trumbo, Texas Meridian, to name a few.

Q. And how long have you been at Caza?

A. Six-and-a-half years.

Q. And does your area of responsibility at Caza include some portion of New Mexico?

A. Yes, it does.

Q. And are you familiar with the land matters involved in this case?

A. Yes, I am.

MR. BRUCE: Mr. Chairman, I'd tender Mr. Brown as an expert petroleum landman.

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Mr. Brown is so qualified.

Q. (BY MR. BRUCE) Briefly, Mr. Brown, what is Exhibit 1?

A. The area in yellow represents Caza's New Mexico's state oil and gas lease, VB1758, covering the east half --

Q. Wait a minute. Exhibit 1.

A. Oh. Oh, oh. Sorry.

Q. Just briefly, what is that?

A. This Exhibit 1?

Q. Yes, that Exhibit 1.

A. Okay. This is an area locator map showing Section 19 of the section in question. Caza's state oil and gas is outlined in blue, and the proposed 160-acre project area for the proposed 7H well is indicated in yellow.

Q. And is Section 19 all State of New Mexico land?

A. Yes, it is.

Q. And Legacy owns the northwest quarter of the section?

A. Yes, it does.

Q. Now let's move on more to Exhibit 2.

A. Okay. Exhibit 2 shows Sections 19 and 18. Again, in Section 19, the east half of the southwest quarter in yellow reflects Caza's leasehold of their state oil and gas lease. The northwest quarter is a state oil and gas lease held by Legacy, OG-5588-0002. And the west half of Section 18 is two BLM leases that are also owned by Legacy.

On this plat are shown three wells that Caza has drilled, in the solid black lines, the 2H, the 3H and the 4H wells. They have a proposed permitted 1H well that is shown in the dashed symbol and two Legacy wells shown as wells 59H and 62H, which traverse the entire west half of Section 18 and the northwest quarter of Section 19, with the surface location down in the southwest quarter.

Q. What is the name of Caza's well?

A. The Igloo 19 State 2H, 3H and 4H wells, and the proposed well is the 7H.

Q. And the 7H covers the -- the proposed well unit is the 7H, in the west half-west half of Section 18?

A. Yes, it is.

Q. Who do you seek to pool?

A. Legacy Resources, Legacy Reserves.

Q. And in the proposed well, Caza and its working interest partners own around 50 percent, correct?

A. That's correct.
Q. And Legacy would own 50 percent?
A. Correct.
Q. And that's shown on Exhibit 3?
A. Yes.
Q. What is Exhibit 4?
A. Exhibit 4 is the well proposal, dated -- Exhibit 4 is Caza's well proposal, dated November 5th, 2015, indicating the location and the depth of the proposed well. And attached to it is a then-current AFE showing drilling, completion and total well cost.
Q. Will a subsequent witness discuss the AFE cost?
A. Yes, he will.
Q. Now, besides -- then move on to Exhibit 5. What is that?
A. Exhibit 5 is an email regarding the Igloo 19 7H well from me to Clay Roberts, landman at Legacy, and this was a follow-up to our well proposal just trying to suggest that we might work out matters and avoid the hearing.
Q. Have you had other discussions, emails and -- with representatives of Legacy?
A. We've had various conversations -- phone conversations and email correspondence in which Caza has proposed drilling -- obviously, our proposed well is a

one-mile lateral -- mile-and-a-half laterals, two-mile laterals. And we have even suggested that Legacy do operate these wells, but we have not received any favorable response from Legacy.

Q. In the west half of Section 19, currently how many wells would Caza like to drill?

A. Oh, at least four.

Q. And which Bone Spring zones would be tested?

A. The 2nd Bone Spring and the 3rd Bone Spring.

Q. And will a subsequent witness discuss why a stand-up well is proposed?

A. Yes, he will.

Q. In your opinion, has Caza made a good-faith effort to obtain the voluntary joinder of Legacy in Caza's proposed well?

A. Yes, sir.

Q. And was notice given to Caza of the original OCD hearing?

A. You mean Legacy?

Q. Legacy.

A. Yes.

Q. And is that reflected in the Affidavit of Notice marked Exhibit 7?

A. Yes, it is.

Q. And -- Exhibit 6.

A. Exhibit 6. Yes.
Q. And what is Exhibit 7?
A. That's a list of offset operators to whom notice was given and the acreage that they control.
Q. And was notice given to those offset operators, as required by the Division?
A. Yes, it was.
Q. And that's reflected in Exhibit 9?
A. No. I believe it would Exhibit 8.
Q. Exhibit 8. I'm getting ahead of my numbers here.
A. Yes.
Q. What -- what overhead rates does Caza propose?
A. We would like 7,500 drilling and 750 operating.
Q. And are those costs fair and in line with the costs -- operating costs charged by Caza and other operators in this area for wells of this depth?
A. Yes, they are.
Q. And are those the costs that are in the JOA with the other working interest owners --
A. Yes.
Q. -- in Caza's lease?
A. Yes.
Q. Do you request that these rates, if the application is granted, be periodically adjusted as

provided by the COPAS accounting procedure?

A. Yes, we do.

Q. And does Caza request the maximum cost plus 100 percent risk charge to any owner that goes nonconsent in the well?

A. Yes, we do.

Q. And finally, what is Exhibit 9?

A. Exhibit 9 is a letter from Yates Petroleum to the director of the OCD supporting Caza's proposal and urging its approval.

Q. And are there also attached letters from ABO, MYCO and Sharbro?

A. Yes, other associated Yates companies.

Q. Those are or were the working interest partners in this section?

A. Yes. They're co-owners on the lease, working interest owners.

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

A. Absolutely.

Q. And were Exhibits 1 through 9 prepared by you or under your supervision or compiled from company business records?

A. Yes, they were.

MR. BRUCE: Mr. Chairman, I'd move the admission of Caza Exhibits 1 through 9.

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Exhibits 1 through 9 will be admitted.

(Caza Petroleum, Inc. Exhibit Numbers 1 through 9 are offered and admitted into evidence.)

MR. BRUCE: Pass the witness.

CHAIRMAN CATANACH: Mr. Larson.

CROSS-EXAMINATION

BY MR. LARSON:

Q. Good morning, Mr. Brown.

A. Good morning.

Q. When did Caza acquire its interest of the southwest quarter of Section 19?

A. We acquired that through farm-out a couple of years ago. I don't have the date.

Q. 2014, somewhere in there?

A. Could be.

Q. And who gave you the farm-out?

A. Yates Petroleum and associated companies.

Q. And at the time Caza took the farm-out agreement, was it aware that the acreage in the

northwest quarter of 19 was part of the federal unit?

A. Yes.

Q. Was Caza aware that Legacy filed a notice of staking for its 59H well, which I believe appears on your Exhibit -- Exhibit 2?

A. Were we aware of it when?

Q. When you filed your application for pooling.

A. I don't believe we were.

Q. Has Caza obtained the written consent of the Commissioner of Public Lands for its proposed well?

A. No.

MR. LARSON: That's all I have, Mr. Chairman. I pass the witness.

COMMISSIONER BALCH: Good morning, Mr. Brown. I don't have any questions for you. Well, just one.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. The 59H and the 62H wells, those long horizontals going south into the northwest of that unit, what formation are those in?

A. I believe they're in the 2nd Bone.

Q. 2nd Bone. Thank you.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. Mr. Brown, the target interval in the Igloo well is the 2nd Bone Spring, also?

A. In the 7H?

Q. Yes.

A. Yes.

Q. Do you know, Mr. Brown, if that is a standard well location?

A. I believe it's a nonstandard location. I don't have the plat in front of me.

Q. You believe that is a nonstandard location?

A. Can I get -- I have the well permit in my briefcase.

Q. Well, we can ask a subsequent witness, if that's --

MR. BRUCE: Okay.

Q. (BY CHAIRMAN CATANACH) So there is an existing JOA for the acreage in Section 19, Mr. Brown?

A. Yeah. For our state lease, yes.

Q. And that's basically with you and the Yates entities?

A. Yes.

Q. Okay. Is there anybody else in there beside --

A. No.

Q. So what would your interest be in the southwest quarter; do you know?

A. Caza's net interest? It's 70 percent. We would have 30 percent -- Caza would have 30 percent in the full west half-west half.

Q. 30 percent?

A. Yeah, because it would be diluted by the Legacy interest.

Q. But 70 percent in the southwest quarter or the east half of the southwest -- or the west half of the southwest quarter?

A. It's throughout the lease.

Q. Okay.

CHAIRMAN CATANACH: Questions?

COMMISSIONER PADILLA: I do, actually.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Mr. Brown, when did Caza become aware of the APD files for the 59H and 62H if not before the pooling application?

A. Shortly after the pooling application.

Q. That's my only question. Thank you.

MR. BRUCE: I did have one follow-up, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. BRUCE:

Q. If Caza's application was granted, Caza would have to get a communitization agreement signed by the Commissioner, correct?

A. Correct.

Q. But at this point, is there any reason to file that since the application has not been granted?

A. No.

Q. Thank you.

CHAIRMAN CATANACH: Thank you.

MR. LARSON: I have follow-up questions.

RECROSS EXAMINATION

BY MR. LARSON:

Q. Mr. Brown, is Caza aware of the OCD Regulation Number 19.15.16.15(3)(A) [sic], which --

A. Not by numerical reference.

Q. How about if I read the rule to you?

A. Okay.

Q. "No project area may be designated that lies partly within and partly outside of a federal exploratory unit or participating unit if the project area includes state trust land, without the written consent of the commissioner of public lands."

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

MR. LARSON: That's all I have.

CHAIRMAN CATANACH: What was the cite on that, Mr. Larson?

MR. LARSON: It's 19.15.16.15. And I think it's .3(A), but I may be incorrect about the subsection.

CHAIRMAN CATANACH: Thank you.

REDIRECT EXAMINATION

BY MR. BRUCE:

Q. Is it your understanding that the northwest quarter of Section 19 is not in a Bone Spring-participating area in the unit?

A. That's my understanding.

MR. BRUCE: That's all I have.

CHAIRMAN CATANACH: This witness may be excused.

RANDY L. NICKERSON,

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

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. Randy L. Nickerson, Houston, Texas.

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

A. Caza Petroleum, LLC. I'm the chief operating

officer. I'm also basically the -- exploration group.

Q. Do you have a technical background?

A. Yes, I do.

Q. Have you previously testified before the Commission?

A. Not this Commission, no.

Q. Could you summarize your educational and employment background for the Commissioners?

A. I've got a bachelor of science in geophysical engineering from Colorado [sic] School of Mines. And then I also have all the graduate work done for a master's in geophysics at the School of Mines. I just didn't get the thesis done. I've been in the industry 36 years working for various companies. I've been with Caza for the last five years as either chief operating officer, vice president of exploration.

Prior to that, I was working for Sanchez Oil & Gas for nine years as their chief geophysicist, vice president of exploration, and I've worked for Coastal, North Central Oil, Gulf Oil and Dominion.

Q. And does your area of responsibility at Caza include southeast New Mexico?

A. Yes.

Q. And are you familiar with the geologic and geophysical matters related to this application?

A. Yes, very much so.

MR. BRUCE: Mr. Chairman, I tender Mr. Nickerson as an expert geophysicist.

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Mr. Nickerson is so qualified.

Q. (BY MR. BRUCE) We've got a number of exhibits to go through, Mr. Nickerson, so let's try to be fairly brief with each of them.

What is Exhibit 10?

A. Exhibit 10 is a net sand count through the 2nd Bone Spring Sand. And the net sand count is determination from multiple log properties such as a -- basically, it's a gross sand within -- between the top of the 2nd Bone and the bottom -- the base of the 2nd Bone.

Q. You show a fault on here. Could you address that?

A. Yeah, there is a fault. We've drilled and encountered that fault in the 3 and the 4H. And, actually, part of the later exhibits, in Legacy's exhibits, and the prior ones, we have calibrated through the wells in the area.

Q. Were you able to drill and complete the 3 and

4H wells?

A. Yeah. In the -- in the 4H, we didn't see a -- with the fault, and I think one stage in the 3H, we saw a little bit of a --

Q. So it's very minor?

A. Very minor fault, roughly about a 35- to 40-foot throw, and we've got a 400-foot section, so really inconsequential to production and our completion.

Q. And does this plat show that the 2nd Bone Spring Sand is fairly uniform across the entire mapped area?

A. Yeah. I mean, it basically thins to the north -- northwest and thickens a little bit to the southeast, but yeah, it is fairly continuous.

Q. What is Exhibit 11?

A. Exhibit 11 is basically taking the net feet I have in Exhibit 10 and taking the average porosity of each -- and calculating it up. I come up with a hydrocarbon -- or pore volume feet. So it kind of gives you where our tank -- our reservoir tank holding all the oil out there.

Q. And, again, the numbers are fairly uniform across there?

A. Yeah. Once again, there is a little bit of thinning to the south, and it thins to the northwest.

But through the area in question, it's uniform or consistent.

Q. And what is Exhibit 12?

A. Exhibit 12 is take -- took all the sand and porosity that I've taken from the prior two maps. I've calculated saturation on it, and so convert that to basically a hydrocarbon for volume or oil in place.

Q. Looking at the 2nd Bone Spring --

Well, let's move on to one more. Exhibit 13, what does that show?

A. 13 is a cross section that I -- basically, I land on top of the 2nd Bone Spring Sand. It shows the whole interval on there. Anything you see from yellow to a goldenrod color is what we're calling the sand, with a saturation curve on the fourth tract on the right for each well. There is a porosity curve, both density and neutron porosity and cross porosity I used and then the resistivity. And then I summarize the production down below, and then you can see the red lines is where the laterals encountered each of these zones across there. And that cross section is listed on the maps.

Q. Which direction does this cross section go?

A. It basically -- on the right is our Igloo 2H. That's to the northeast, and then it moves to the south, maybe slightly west.

Q. Okay. Basically, on the these plats, is the 2nd Bone Spring Sand fairly uniform across all of Section 19?

A. Yes, it is.

Q. And in your opinion, will each quarter-quarter section in the proposed well unit contribute more or less equally to production?

A. Basically, it will, yes.

Q. And based on your drilling in the east half of Section 19, do you believe the 2nd Bone Spring Sand has a very good potential in the southwest quarter in the west half of Section 19?

A. Yes, it does. I mean, we've got a well that we've been flowing back on it and producing oil at very good rates. And just to the south -- south on it, you've got several Cimarex Chief wells. And if you average them up, we're talking 5-, 600,000 barrels of oil each.

And also if you look on the exhibit out here, on the bottom part, I've got hydrocarbon pore volume coming across there, and we're very comparable to the Cimarex Chief State -- Chief 30 State #1, which is 30025 40406. And it's showing about 20.7 hydrocarbon four feet and showing about 20.6. And our forecast on that is almost 900,000 barrels of oil.

Q. Is that reflected on Exhibit 14, which is just a cross section of your 4H and the --

A. Yes, it is.

Q. -- and the Cimarex Chief?

A. Uh-huh.

And it also shows the line of the 10 percent porosity on it, which most of the Chief is below 10 -- very -- very little above 10 percent porosity.

Q. Very little?

A. Yeah. Like maybe 20 feet.

Q. But it's still -- your estimate is it will produce about 900,000 BOE?

A. Yes, because all intervals will be contributing to all the sands.

Q. And what is Exhibit 15?

A. Exhibit 15 is all the 2nd Bone wells within the area. We've taken the first four years of production on it on a monthly basis, put them across there. The red is actually the average of all of them. The gray is our type curve. And our type curve -- there's a few of the wells that were in the thinner part of the hydrocarbon pore volume. We took out of our type curve -- very bottom curve out there, which is that kind of orangish one. We tried to do a half lateral what we would project the production on, and what we based our

economics on that.

Q. So if you couldn't drill a 160-acre north-south well and you had to drill an 80-acre well to develop the southwest quarter, production would be substantially less?

A. It would be -- yes. Yes, it would. And it would be uneconomic on today's prices.

Q. Finally, what is Exhibit 16?

A. Exhibit 16, I'm just kind of coming in with trying to relate my hydrocarbon pore volume out and to a point where I can actually get oil in place, if I have all the factors there where I estimated oil in place, and come up with a reasonable recovery factor. Which, if you really look in there, we're probably getting, at best, a 5 percent recovery factor out of the 2nd Bone using 160 acres, at least 200 feet of thickness, 8 percent porosity and 40 percent water saturation.

And, you know, a 5 percent recovery factor in this tight of rock is pretty consistent and some of the best rocks in the Gulf Coast, which I've worked before, that have a good water drive -- 25 to 30 percent, with three times the saturation and -- better perm.

Q. In this area, you're looking at 5 --

A. Yeah. Somewhere from 5 to 8 percent is

probably a reasonable recovery.

Q. Okay. Let's look at the 3rd Bone Spring now. What is Exhibit 17?

A. Exhibit 17 is a net sand within the 3rd Bone Spring under the same type of analysis that I did prior for the 2nd.

Q. And the 3rd Bone Spring Sand is continuous across the mapped area?

A. It is very continuous, especially the Basal part, which is the best contributor to it.

Q. And if you look at Section 19 and adjoining sections, the thickness is fairly -- relatively similar?

A. Yes, it is.

It does, you know, thin a little bit to the, you know, east, so it thickens to the west. But within the area in the map we used, it's very consistent.

Q. And what is Exhibit 18?

A. 18 is the pore volume I calculated based on the same methodology I did prior for the 2nd, which is showing pretty consistent pore volume. Matter of fact, we get a little bit of thickening down in the southwest quarter relative to some of the wells to the north, which are really outstanding 3rd Bone wells.

Q. And Exhibit 19?

A. Exhibit 19 is a -- pore volume -- calculated hydrocarbon pore volume, and I mapped that out in a similar method, which, once again, has relative context of what's going on in 18 and 19, showing very consistent thickness in that southwest quarter.

Q. Now, there is a well in the east half of Section 18 to the north. Has that well been drilled?

A. In the --

Q. In the --

A. -- east half-west half, yes, the Concho Blue Jay well, which is, the last five-digits, 42338. Yes. It's been producing, and I believe in -- it's averaged -- produced like 121,000 in three months. So it's outstanding, one of the best wells out here. And, actually, if you look -- and I used their well log -- it's got some of the thinnest hydrocarbon pore volume out here.

Q. It's one of the best wells?

A. To date, yes, it is. And you'll see on a curve -- a couple curves coming up, it's outpacing everything out there.

Q. Okay. So based on that, again, you believe the 3rd Bone Spring will be highly -- has a high potential in Section 19?

A. Oh, absolutely. We've drilled two wells into

it. One well we believe will either push 500,000 barrels of oil, in that #2H. And then the 3H is starting to kick in now at 5 percent of the load, and we've produced -- I believe it was almost 300 barrels of oil yesterday.

Q. And those are the wells in the east half of 19 --

A. Yeah.

Q. -- that Caza has drilled?

A. Yes.

Q. What is Exhibit 20?

A. Exhibit 20 is basically taking a cross section from south to north, south on your left, north on your right. It goes through some -- some -- wells in the south, comes into the Chief well, which is the closest one to our southwest quarter that we're looking in Section 19 to the Blue Jay well. So basically the two wells on the right are basically a lay-down to what we expect to see in laterals in the west half of 19.

Q. Okay.

A. And they're pretty comparable. You can see, out of them all, the Blue Jay has got 7.1 feet hydrocarbon pore volume. The Chief State has got 9.3, so we do thicken. As we go to the west half, we can see where their lateral is. And as I say, in 180 days, it's

produced 145,000 barrels of oil equivalent, just an outstanding well.

Q. And your estimated EUR is about ten times that amount?

A. Yes, it is.

Q. And down to the south, COG's -- COG wells are quite highly productive, too?

A. Yeah. And probably your first one is the Stratosphere, and it's also -- but yeah, they've got very good wells through there.

Q. And what is Exhibit 21?

A. 21 is just really showing what we believe that we're going to see in the west half of 19, but I went to the Chief State well through the Blue Jay well. I also mention and show where the 10 percent porosity is. We have very little 10 percent porosity in the Chief State #3H, just a little bit in the Blue Jay. But, once again, the 10 percent thing really is an irrelevant number because it's the number of oil in place, and you get to it. And you can see by the production of the Blue Jay that that fits.

Q. Based on these exhibits, on the 3rd Bone Spring -- in your opinion, is the 3rd Bone Spring continuous across the west half of Section 19?

A. Yes, it is.

Q. And in your proposed 7H well -- well, in any Bone Spring well unit in the west half, would each quarter-quarter section contribute more or less equally to production?

A. Basically, it will.

Q. What is Exhibit 22?

A. 22 is all the wells within the strip that are consistent hydrocarbon pore volume, what we're looking at. The API, once again, is listed on the right. You can see the Blue Jay well is the one that's, you know, still increasing. Last month it produced like -- I think it was 52,000 barrels of oil. The line in red is our type curve, what we believe we will get out of it. The black is the average of all the curves on there, and then the blue type curve below is what we think that half lateral -- which, you know, we model that, and we believe that would be an uneconomic well at today's prices.

Q. And over on the right -- I saw this on the 2nd Bone Spring, too -- that the GORs are pretty low.

A. The GORs in the 3rd are lower than the 2nd. The 2nd is probably in the 1,300, if I remember right. In the 3rd, you're around 11- to 1,200. And then this is also all the statistics and how we've gone through it, proper loading [sic], all the way down to EUR of oil

per vertical section.

Q. And finally, on the 3rd Bone Spring, what is Exhibit 23?

A. 22 or 23?

Q. 23.

A. 23. Basically I did a volumetric recovery factor to see whether a 160-acre unit would produce out of the 3rd Bone, very similar to what I did on the 2nd Bone. I'm looking at about 190-foot thickness of the sand, which is what the Blue Jay well -- I'm taking an average of 9 percent porosity, 40 percent water saturation, all consistent out there, which comes up -- ultimately says I'm getting about 500 -- or 8.3 million barrels of oil in place. And if we can get, you know, 7 percent on the high side, we'd be getting to where our type curves are, which is about 560,000 barrels of oil.

Q. Again, there is high potential for the 3rd Bone Spring in the west half?

A. What's that again?

Q. There is high potential for --

A. Oh, absolutely. It will be outstanding.

Q. Now, you've taken some of your 2nd and 3rd Bone Spring maps and put additional data on them. What is Exhibit 24?

A. 24 is the structure map on top of the 2nd Bone

Spring, and it's showing the 90-day barrel of oil equivalent out of the 2nd Bone, the first 90 days of continuous production listed by the OCD. And it's just showing the high concentration of very good wells due south of Section 19.

Q. And what is Exhibit 25?

A. 25 is the same map except now it's at 180 days' cumulative production.

Q. And, again, there is some fairly substantial numbers of production?

A. Yeah. You're seeing wells, you know, probably the average of the section to the south, of 100,000 barrels of oil in the first 180 days. And these are at, basically, generation one fracs out there, where probably if they were generation three, we would be getting more bang for the buck.

Q. You hope to do better?

A. Uh-huh.

Q. What is Exhibit 26?

A. Exhibit 26 is the 3rd Bone Spring structure map, and I've got the 180-day cumulative production.

Q. Again, there are some pretty large numbers there.

A. Yes. Uh-huh.

Q. And over in the east half-east half of Section

19, that is the Caza Igloo 2H?

A. That's Igloo 2H, yes.

Q. And pretty substantial numbers for that well?

A. Yes. It's a very good well.

Q. What is Exhibit 27?

A. 27, I took the structure map and I bubbled it, did a bubble map on our projected EURs, which just shows a pretty good consistency from east to west. Obviously, as you get a little bit to the west, there are some very good wells, but we're right in the trend of very strong-producing wells.

Q. And the best well is the -- what is the name of that well?

A. That's the Concho Blue Jay --

Q. The Blue Jay well.

A. -- but it does have the least amount of production -- you know, days on production.

Q. In the Bone Spring, is there a preferred orientation?

A. In the 3rd Bone, there is definitely a preferred one, north-south. There's been several conferences that I've been at and looked at that there was a two-to-one difference between drilling north-south in the 3rd Bone in this direct area versus east-west.

Q. So in other words -- of course, looking at the

development Caza's already done in the east half, you can't drill an east-west well completely within Section 19.

A. Correct.

Q. But you wouldn't want to do that anyway --

A. No.

Q. -- even if the section is undeveloped?

A. No. I would say the east-west wells perform way below -- you know, there is an exception to every rule out there, but overall, east-west wells on this trend have underperformed.

Q. Down below in Section 30 are the Chief wells, the Cimarex Chief wells.

A. Uh-huh.

Q. And I noticed those are lay-downs. What type of wells are those?

A. Those are 2nd Bone wells and a little bit more perm within the 2nd Bone Spring, which, basically, there is not a big difference in the 2nd Bone as there is in the 3rd Bone. 3rd Bone, there is definitive --

Q. There is a stand-up well unit in the west half-east half of Section 30. Is that a 3rd Bone Spring test or proposed?

A. That's a -- that's a proposed 3rd Bone Spring well that Cimarex has just either -- they're building

the location or just getting ready to drill.

Q. But they also --

A. And that'll be a 3rd Bone well per OCD.

Q. And they -- and they are drilling that as a stand-up well --

A. Yes.

Q. -- stand-up well unit?

A. Uh-huh.

Q. What is Exhibit 28?

A. 28, we definitely think the 1st Bone is very -- has strong potential out here. There's a couple of wells just to the west out there in Section 23 that have produced really decent 1st Bone production. We feel it's a depth of one or two more laterals outside of the -- 2nd that we're talking about. So basically just did a sand isopach, and this is everything greater than 8 percent porosity. We just haven't gotten down to the hydrocarbon pore volume yet out here. But it's showing that we've got a nice thickness coming through the area on it.

Q. Okay. Now, if Caza can't drill a stand-up -- let's just talk about the 3rd Bone Spring at this time -- stand-up well units, will its acreage in the southwest quarter be stranded?

A. Yes.

Q. Do you have -- have you calculated the magnitude of the reserves that would be lost if it cannot --

A. In a very conservative manner, between the 1st, 2nd, 3rd Bone Spring Sand, with two laterals each, we would be about 1.5 million barrels of oil and associated gas.

Q. And you just mentioned the 1st Bone Spring. What are Exhibits 29 and 30?

A. Well, 29 was the 1st Bone Spring map.

30 is just a cross section that's going through it. It's showing where the well to the west in section -- I believe it's in 23, the Cimarex Lynch 23 4H targeted the upper part of the 1st Bone Spring. It had pretty comparable, maybe a little bit thicker, hydrocarbon pore volume than our Igloo 2H. And it produced 168 -- 168,000 barrels of oil in two years each, and it had a very high gas content. But it's the type of well that we think we could target out here with -- especially with the new-generation fracs.

Q. So that's shown on Exhibit 30.

And, again, Exhibit 29 is what, a sand isopach?

A. That was a sand thickness map of sand count of greater than 8 percent porosity.

Q. That's the 1st Bone Spring sand and continuous --

A. Yes, it is. Matter of fact, we've got a nice thick coming right through the east half of 19 all the way over into where the Lynch well is. Yes.

Q. Were Exhibits 10 through 30 prepared by you or under your supervision?

A. Yes.

Q. And in your opinion, is the granting of Caza's application in the interest of conservation and the prevention of waste?

A. Absolutely. Yes.

MR. BRUCE: Mr. Chairman, I tender Exhibits 10 through 30 into the record.

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Exhibits 10 through 30 will be admitted.

(Caza Petroleum, Inc. Exhibit Numbers 10 through 30 are offered and admitted into evidence.)

MR. BRUCE: Pass the witness.

CHAIRMAN CATANACH: Mr. Larson.

CROSS-EXAMINATION

BY MR. LARSON:

Q. Good morning, sir.

A. Good morning.

Q. Direct your attention to Caza Exhibit Number 10.

A. Okay.

Q. And Mr. Bruce questioned you about the fault that appears on this map?

A. Yes.

Q. And you mention Legacy's OCD hearing exhibits, and I don't think I caught the --

A. They -- they had a north-south fault just to the west of here. We definitely encountered the wells [sic] in the second and third laterals, in the 3 and 4H, and we believe it extends down to the -- to the southwest quarter. We believe we see it in some of the Chief wells and potentially the Stratijack [sic; phonetic] well down in 31.

Q. Would I be understand -- would my understanding be correct that you disagree with the fault designated by Legacy?

A. My understanding, with the data that I have, there is a slight movement to what I have here. Yes.

Q. And what control support do you have for the --

A. I have both the laterals that we drilled in the east half of 19, and we've also -- in the Chief -- I believe it's 40406 -- we see the fault cut there and actually -- you know, so you've got a fairly good trend through there, and you see hints of it also in 4082 -- 40872 well.

Q. And when did Caza drill the Igloo 3H and 4H wells?

A. We just completed those wells. The 3 -- or the 4H, we probably have 12 days' production each, and the 3H we've got probably ten days' production.

Q. So those were drilled during the pendency of this case?

A. Yes.

Q. I next direct your attention to Caza Exhibit Number 15. Does your exhibit include the Cimarex Chief 2nd Bone Spring wells in Section 30?

A. It includes all four of them. There is 40406, 40872. I forget the other APIs on it, but they're all on here. Yes.

Q. And have any of those Cimarex wells performed better than your type curve projection for the one-mile 2nd Bone Spring lateral?

A. The one that's closest to our -- well, actually, the -- the section -- the one -- the second

from the -- in the north half of the south half of 30 has definitely performed better and also the very northern one, the closest one to our section.

Q. And will those Cimarex Chief Bone Spring wells be economic in today's world?

A. Absolutely.

Q. Has Caza considered the possibility of drilling vertical wells down into Section 30?

A. Not at this moment, no.

Q. Would it be possible to drill a 1st Bone Spring well from your acreage in Section 19 into Section 30?

A. We'd have to go through the same situation with Cimarex, you know, and they'd be the one -- they control that acreage down there, but yeah. I mean, the 1st Bone, you could drill a north-south through there. Yes.

Q. Do you know who owns the acreage in Section 24, in the west?

A. 24 to the west? I believe BTA might hold part of that.

Q. Have you considered the possibility of drilling an east-west well, either BTA voluntarily joining or filing a pooling application?

A. Well, I think the biggest problem of drilling an east-west well like what you're speaking of is the 3rd Bone. You're going to strand a lot of oil, which is

not as economic. If you look at -- a lot of the different data out there points toward a fracture trend that goes northeast-southwest. The 3rd Bone is a very tight reservoir. You need to be able to intersect and have -- you know, transverse faults going across your wellbore to get increased production. So that's why you have two exhibits. So north-south is really what you need to do.

Q. What about a 2nd Bone Spring east-west into Section 24?

A. 2nd Bone, you could probably do something on that, but I can't speak to that.

Q. And moving back into Section 30, have you looked at a potential 3rd Bone Spring north-south well?

A. Well, I'd say that part of it is Section 30 has pretty well been drilled up, and you've got a proration unit set up by Cimarex, which makes it a tougher situation to try to do that.

Q. Has Cimarex drilled 3rd Bone Spring wells?

A. They've got one ready -- that's getting ready to drill right now, which we mentioned in the west half of the east half of 30.

Q. But nothing in the west half-west half of 30?

A. No -- no 3rd Bone Spring Sand wells, no.

Q. Direct your attention to Caza Exhibit Number

27. Did you include any Legacy Reserves wells in the bubble map?

A. Yes. There are several of them.

Q. And how do they compare with other wells in that area?

A. Our mile-and-a-half long laterals are comparable, but not as good as the Blue Jay or Concho wells to the north, which is -- I think it's Black Pearl. Some of their mile laterals are comparable to what our mile-long lateral is.

Q. Next direct your attention to Caza Exhibit 21.

A. If I can find it.

MR. BRUCE: Randy -- Randy, here. Use this.

THE WITNESS: Okay.

Q. (BY MR. LARSON) Are you there?

A. Yes, I am.

Q. At the top there, your heading shows "Cross Section B - B prime - 3rd Bone Spring Sand." And if you'll backtrack to Exhibits 18 and 19 --

A. Oh. It should be saying "A to A prime." That's a typo. Our fault.

Q. I was going to ask you if B to B prime appeared on 18 and 19.

A. No, it didn't. It -- the -- yeah. That's a

typo. The 3rd Bone is going to list A to A prime on the maps. And the one on Exhibit 24 is just going from the north of the first well in A prime on the map down to 40872, which is the Concho -- or the Cimarex 30 #3H.

Q. And I believe you testified that you believed it would be uneconomic to drill an 80-acre lateral in the southwest quarter of 19?

A. Yes.

Q. What kind of recovery would you expect from an 80-acre lateral?

A. Well, first of all, because of the setbacks that are going to be required by -- you know, 330, 330 on each side, we were looking at -- and 45 percent of what a mile lateral would be.

Q. And could you roughly give me a number, a total?

A. Well, let's say if I'm looking at 550,000 barrels of oil, out of the third on that and I'm taking 40 percent of that, you know, I'm going to say 250,000 barrels of oil.

Q. Do you have an idea of what the drilling cost of an 80-acre well would be?

A. An 80-acre well is going to be -- what we'd do is we'd definitely put more stimulation in it, so it would still be up in the 5 million range each.

Q. And you mentioned Caza's drilled, I believe, three north-south wells in the east half of 19?
A. Yes.
Q. And are those all 2nd Bone Spring?
A. There's two-thirds and one is --
Q. Would it be possible to drill an east-west 1st Bone across the south half of 19?
A. We could do it, but then ultimately we're going to have to -- want to go up to the northeast quarter, the ones there, and that's going to strand the reserves there.
Q. That would be your choice, though, wouldn't it?
A. Not to strand reserves.
Q. Well, you're choosing to do north-south --
A. Well, no, I understand. But part of it is is that we can't put full-length laterals across, whether it's 1st, 2nd or 3rd Bone. We're going to be stranding reserves, which, by secondary [sic] calculations, is about 1-and-a-half million barrels of oil.
Q. I don't know if I follow you. Could you do a 160-acre lateral in the south half of the 1st Bone?
A. Yes, you could, but then you're going to strand -- you're not going to have laterals up in the northeast quarter.
Q. 1st Bone laterals?

A. 1st Bone, yes.

Q. And what is the purpose of your Exhibit Number 32?

MR. BRUCE: Which number?

MR. LARSON: 32.

MR. BRUCE: That's not his exhibit.

THE WITNESS: That's not my exhibit.

MR. LARSON: Oh, I'm sorry. You're right. I jumped ahead.

Pass the witness, Mr. Chairman.

MR. BRUCE: Do you want to ask or should I ask?

CHAIRMAN CATANACH: (Indicating.)

REDIRECT EXAMINATION

BY MR. BRUCE:

Q. Which exhibit do you have directly in front of you there?

A. 24.

Q. 24. That is simple enough. Let's assume no wells have been drilled in Section 19 --

A. All right.

Q. -- and you weren't allowed to drill into the northwest quarter of Section 19. Wouldn't that ultimately mean that either the northeast quarter-quarter of the southwest quarter would be

stranded acreage?

A. Correct. Yes.

Q. Because, I mean, you could drill, as Mr. Larson suggested, 1st and 2nd Bone Spring wells east-west in the south half, but it would still leave the northeast quarter?

A. Yes.

Q. And same thing: You could drill 1st and 2nd Bone Spring wells in the east half, but it would strand the southwest quarter?

A. Correct.

Q. And wouldn't you drill --

A. A north-south -- or east-west.

Q. You wouldn't -- you wouldn't drill on east-west in a 3rd Bone Spring well?

A. No, you would not.

Q. Because the reserves are 50 percent less than drilling them stand-up?

A. Yes. Uh-huh.

MR. BRUCE: That's all I had, Mr. Chairman.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. So I guess in the south half of Section 19, you could conceivably drill 1st Bone Spring and 2nd Bone Spring?

A. 2nd Bone, we can't drill, no, because we have a well in the west half of the east half, that 19 State #4H, which is now producing.

Q. So you'd be limited in the south half to the 1st Bone Spring?

A. 1st Bone would be the only thing -- you could drill east-west in the 1st Bone, but then you'd strand the northeast quarter.

Q. Is there any thought to drilling a traverse -- transverse well to diagonally intersect that acreage?

A. Then we're going to have -- you're not going to get the full drainage of what you're going to get out there because you're taking one lateral and you're going to maybe get a 30, 40 percent extra section. But you're going to lose the other part, so on the edges, you're going to be stranding reserves.

Q. Have you explored any options of drilling that southwest quarter in conjunction with acreage in Section 30?

A. We have not approached Cimarex on that because we already know that they've got production allocation units from their 2nd Bone wells out there.

Q. Possibly the 3rd Bone Spring wells in the west half of Section 30 if you did a mile and a half?

A. If you can make -- you'd have to make a deal

with Cimarex on that, but then we've still got to figure out what we're going to do with the 2nd Bone without stranding reserves in it.

Q. So right now what you're proposing in the west half would be two 2nd Bone Spring and two 3rd Bone Spring?

A. And ultimately two 1sts.

Q. So a total of six wells?

A. Uh-huh.

Q. Do you know what the status is of the acreage in the south half of Section 24 to the west?

A. I believe -- I believe BTA has part of it, and I believe EOG has part of it.

Q. That looks to be undeveloped as well?

A. Fair to say, once again, the 3rd -- we're going to have problems with the 3rd there because you're going to want to go east-west. And you still have to make a deal there, and we might be back pooling a unit down the road with that.

Q. So 3rd Bone Spring, if you drill east-west, you're going to recover -- did you say half?

A. About half, from what I've seen, yes.

Q. Would that still be an economic well?

A. Well, no. I mean, basically that's coming in -- we took that 45 percent of our type curve for

drilling a short lateral, and it really wasn't economic, and you're going to have higher drilling costs.

Q. What would your recovery be in the 1st Bone Spring for a north-south well?

A. We're looking probably -- the closest analog there is probably a little over 400,000 barrels of oil, and then probably the GOR is about 2-and-a-half -- or 2,500. So it's going to be 480 or something like that BOE, off-the-top-of-my-head math.

Q. Has there been any discussion with Legacy about drilling a two-mile lateral?

A. We have submitted proposals that we'd gladly go with a two-mile-long lateral through there. Yes. And there are wells to the west and south of there that have overperformed on two-mile laterals that Concho has drilled.

Q. That's all my questions.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. I just have a few. So there are no 1st Bone Spring anywhere in the south half of 19 that are producing?

A. No. In the section just to the west, there are vertical 1st Bone Spring wells.

Q. Okay. And you said that there is a 2nd Bone --

the 3H is a 2nd Bone?

A. The 4H is a 2nd Bone and produces 600 barrels a day.

Q. Which negates east-west production in the 2nd Bone?

A. Yes. Yes, it does.

Q. This may be a question for one of the other witnesses. Do you have any idea if a unitized production federal unit to the north is being discussed?

A. I think that you'll have to ask somebody else on that one because I don't have it off the top of my head.

Q. It seems like there are some options out here. They may not be -- they all have their challenges. Can you give us a little insight as to why Caza is -- why this is the optimal option for Caza?

A. Well, to date, there has been nothing drilled in the northwest quarter of 19. And so it seems the easiest road to get something drilled would be either a mile-long lateral or a two-mile-long lateral from 19, going from the south to the north, whether we operate the mile or Legacy operates the two-mile.

You know, the 2nd Bone, we've already drilled our well there, so one way or the other, we're going to strand something. So, you know, we still

believe that there is a slight preference in the 2nd Bone north-south, but not as much and not as significant. But still I'd rather drill north-south wells. There is no way I can drill down in Section 30 because Cimarex already has that.

Q. So as an overall position, you would have thought that going into the federal unit was --

A. Yes.

Q. I mean, I can see the geologic point to doing that, but it seems like it would --

A. Well, it's state land to the north there.

Q. Right.

A. So it just seemed like -- once again, you know, I think a long -- a two-mile-long lateral would be a great possibility. I mean, there are -- Concho has their Sage [sic; phonetic] wells to the west and their Osprey wells to the south, and we're not talking three or four miles, five miles away. And those are outstanding wells. You know, if you compile all that in there, I think it would be the most economic proposal. You're not stranding.

Q. I think the upcoming testimony will be interesting to see what the -- what the unitized formation there is, the target of that, that federal -- federal unit, just to see if there is some way that that

kind of proposal could work out if it's not conflicting and causing --

A. My understanding --

Q. -- a big land problem.

A. Yeah. My understanding is it should be, but, once again, I'm not the landman.

Q. Okay. Thank you.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. Good morning, Mr. Nickerson.

There are some 80-acre wells that look like they have AFEs around 5 million for completion?

A. Yeah. Our latest AFEs were -- you know, when we submitted the first one out -- and, once again, Tony will be the better one to answer that, which is our next witness. But our latest wells were right at 5.4 million with today's cost and up -- up on the fracs.

Q. And for the 160s?

A. The 160s are going to be from 5-ish. But we definitely, you know, do everything we could with the frac to enhance the chances of making an economic well. So it's still in the 5 million range. You know, if you look out there when we drilled the 4H -- or the 3H, it took us two extra days to drill the back half of that lateral, so it's two days of drilling. And so then you

come to the simulations, water, proppant, and we've got to upload enough to try to counteract, you know, to maximize what we can do.

Q. Have you looked at the possibility of doing more laterals in that interval on the 80-acre length? So instead of putting -- you know, basically you're increasing your spacing.

A. When you're --

Q. Do you use pilot holes, or do you drill each one direct?

A. We have -- we drilled a pilot hole on the 3H. We didn't on the 2H or 4H. No, you would not do that because there is still enough perm in the rock out there. When we drilled our -- fracked our 3H, we shut in our 2H, and we felt the effects of the 2H. When Concho did their Blue Jay well, we felt the effects on it. So we're basically telling you that the 160 -- or, you know, your 160 got a mile-long lateral is the right spacing.

Q. But it seems like the majority of your drilling cost is the vertical section?

A. Correct, you know, pipe and the -- correct.

Q. So if you just put more laterals in, you might be able to mitigate that expense?

A. Yeah. But, see, if you have to put more

laterals in, you're just going to be knocking each other off. The spacing is not going to allow that.

Q. Okay.

A. Because -- I was going to say, from the 3rd or the 2nd, you will -- on a frac, you will get -- hit the next well, and we'll impact that.

Q. So you're proposing 1st, 2nd and 3rd Bone Spring wells --

A. Yes.

Q. -- north-south into the northwest quarter of Section 19?

A. Yes.

Q. But there's already two 2nd Bone Spring wells coming into that 2nd from the north?

A. In Section 19, there is not.

Q. What are those wells -- what are the --

A. The only --

Q. -- 59 and 62H?

A. The only wells that are producing right now in Section 19 in the east half-east half is Igloo 19 State #2H, which is the 3rd Bone well. In -- in the west half of the east half -- yeah. On the west half of the east half, we have the 3 and 4H.

Q. But there are existing well permits to access that section?

A. Yes, by -- submitted by both Legacy and Caza.
Q. The 58H and the 62H --
A. Correct.
Q. -- are the Legacy proposals?
A. And -- and we've got the -- if I remember right, it's 5, 6 and 7H -- 5H, 6H, 7H, 8H.
MR. BRUCE: Mr. Chairman, if I may, there were permits. They've been canceled.
CHAIRMAN CATANACH: I'm sorry. Which have been canceled?
MR. BRUCE: Caza's. Caza had some APDs, and they got canceled.
CHAIRMAN CATANACH: For the east half?
MR. BRUCE: For the west half.
CHAIRMAN CATANACH: For four wells?
MR. BRUCE: Two or four. I don't remember.
CHAIRMAN CATANACH: So there is no --
MR. BRUCE: There is no existing APD -- Caza APD in the west half.
COMMISSIONER BALCH: But there are two existing Legacy APDs?
MR. BRUCE: That is correct.
COMMISSIONER BALCH: 59 and 62?
MR. BRUCE: That is right.
CHAIRMAN CATANACH: Do you know why they

were canceled?

MR. BRUCE: Because of the OCD regulation.

CHAIRMAN CATANACH: Are you talking about conflicting with the other two spacing units?

MR. BRUCE: No. No. Since Caza owns no interest in the northwest quarter of Section 19, there was an existing pooling order, so they were canceled.

CHAIRMAN CATANACH: Okay.

Q. (BY COMMISSIONER BALCH) So if you're successful with your forced-pooling application, Legacy would have to change the length of those laterals proposed, 59H and 62H?

A. Yes.

Q. Thank you very much.

CHAIRMAN CATANACH: Anything further?

MR. BRUCE: No, sir.

MR. LARSON: Nothing further.

CHAIRMAN CATANACH: The witness may be excused.

ANTHONY B. SAM,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name for the

record?

A. Yes. Anthony B. Sam.

Q. S-A-M?

A. Correct, S-A-M.

Q. Where do you reside?

A. I reside in Midland, Texas.

Q. And who do you work for?

A. I work for Caza Petroleum, Inc.

Q. And what is your job there?

A. My job is -- title is VP of Operations.

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

A. Yes, sir. I am a petroleum engineer in technology, degree from Oklahoma State University in May of 1982.

Q. And have you worked for several companies in the business?

A. Yes, sir. I have worked for Chevron U.S.A. in Midland, Texas, southeast New Mexico; for Sendero Petroleum, Inc., King Operating, Falcon Bay Energy and Caza Petroleum.

Q. How long have you been at Caza?

A. I'm a founding member of Caza Petroleum. I started Caza in 2002 forward, so since that point.

Q. And does your -- as an engineer, are you responsible for petroleum engineering and operational

matters for southeast New Mexico?

A. Yes. I am responsible for the oversight of all drilling and completion operations for Caza Petroleum in southeast New Mexico and ongoing production operations.

(Mr. Wade exits the room.)

Q. And over the years, have you also done reservoir engineering?

A. Yes, sir. I have done some reservoir engineering calculations while -- particularly while with Chevron U.S.A. in standard units within southeast New Mexico and West Texas.

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

A. Yes, sir.

MR. BRUCE: Mr. Chairman, I tender Mr. Sam as an expert petroleum engineer.

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Mr. Sam is so qualified.

Q. (BY MR. BRUCE) Let's start with Exhibit 31. What is that?

A. Exhibit 31 is a days versus time, a rate time curve for the Concho Blue Jay Federal 1H well that is located in Section 20 of -- I'm sorry -- it's located in

Section 18, 20 South, 35 East, Lea County.

Q. And this is the well that Mr. Nickerson mentioned?

A. Correct. Correct.

Q. This immediately joins Caza's acreage?

A. That is correct. Immediately north.

Q. Is this the best well in the immediate area?

A. It's the best current well in the immediate area. Yes.

Q. You hope to drill better?

A. Absolutely.

Q. Is there a 2nd or 3rd Bone Spring?

A. This is a 3rd Bone test, drilled by Concho north-south over the area. The best month production to date was -- averaged 1,861 barrels of oil per day, which is, you know, roughly greater than 60 barrels per hour of oil.

Q. And does this support -- is this part of the support for Caza's request for stand-up well units?

A. Yes, sir. It strongly supports a north-south 3rd Bone test to take advantage of the reservoir conditions within the immediate area. Caza's current 3H well that we drilled and completed north-south, within the first 12 days, we are currently flowing back 16 barrels of oil per hour under test, with less than 5

percent of low water recovery at 1,500 psi on the surface. So I believe that our 3H also exhibits that north-south 3rd Bone Spring Sand drilling is the most efficient in that area.

Q. Early on, it shows quite high capacity?

A. Correct. Correct.

Q. Just for information, how long have you been developing engineering -- how long has Caza been developing engineering and geologic data on this area?

A. We began looking at southeast New Mexico and acquiring acreage in 2011 through 2012. We drilled our first horizontal lateral 3rd Bone in southeast Lea County in 2013. We've drilled now -- we've drilled 20 horizontal wells in southeast New Mexico to date, completed. Eighteen of those were ongoing wells that were going through completion on the other two. We participated in another 18 wells as a nonoperator partner within southeast New Mexico. So all told, 36 total wells since June of 2013.

Q. And if Legacy would drill a two-mile lateral, a proposed well, you would -- would Caza hand over operations to them?

A. Absolutely. Legacy has proven that they have the ability and operational skills to drill a mile-and-a-half well. There are two-mile wells within

the area that Concho has drilled that prove that it is a viable alternative to a mile or a mile-and-a-half well.

Q. You said you've been looking at data out here since 2012 or so, and you built a database on that?

A. Yes. We have a pretty extensive database with over 2,000 wells now, all the horizontal wells drilled in southeast New Mexico. Within that database, we've gathered not only initial rates and frac volumes, but we looked at frac techniques, staging lengths, perf sizes, spacing and overall volumes of fluid pumped. And we've used that database to continue to correlate and be more concise on EUR calculations for new wells to be drilled.

Q. Okay. And so you're pretty confident that all of Section 19 is highly prospective in the Bone -- multiple Bone Spring zones?

A. Absolutely. I think we've proven that fact with our latest recent wells, the 2nd Bone north-south 4H well, which, in the latest well test, is flowing back 24 barrels of oil per hour after 6 percent recovery of load, which I would anticipate improving, continuing, and the 3H that I mentioned at 16 barrels of oil to date.

Q. On the proposed 7H well, the proposed west half-west half unit, will the first take point and the final take point be at orthodox locations under the

Division's regulations?

A. They would, yes, for standard.

Q. And some questions were asked about the timing of drilling. When was the first well in the east half-east half of Section 19 -- I think that's the 2H well?

A. That's correct. The Igloo --

Q. When was it drilled?

A. The Igloo 19 2H was drilled in October of 2014, fracture stimulated and completed in November of 2014.

Q. So it's been producing for a couple of years?

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

Q. And that was well before -- long before the 7H well was proposed by Legacy?

A. Yes, sir.

Q. When you drill these wells, how many completion stages does Caza put in a one-mile lateral?

A. Well, normally within a one-mile lateral, we are looking at 150-foot stage length now in comparison to looking back at points as much as 300-foot stage lengths. We are down to 150-foot stage lengths, meaning 40 -- 40 minimum stages for a one-mile lateral.

I might interject that what we've seen to be as important beyond the stage length is the sand concentration per linear foot of lateral length, and

that has vastly improved. In November of '14, for the Igloo 19 2 well, our total job was 3.4 million pounds of proppant over 39 stages. We just pumped, in the Igloo 19 3, 6.5 million pounds over that same lateral length. And the EUR calculations and type curve -- type curves indicate that the overall EUR is going to be much better for the loaded wells with 1,500 to 2,000 pounds per linear foot versus the 800 to 1,000 that was just looked at in 2014 as being sufficient for the wells.

(Mr. Wade enters the room.)

Q. Mr. Sam, I'm handing you one of the land exhibits, Exhibit 4, which has the AFE for the proposed 7H well. I'm going to hand that to you. Did you prepare that AFE?

A. Yes, I did.

Q. And at the time it was made -- what were the drilling and completed well costs?

A. The total drilling and completed cost was 5.019 million at that time.

Q. Okay. Was that -- was that fair and reasonable and in common with those charged by Caza and other operators for wells in that depth in this area?

A. Yes, sir. It is fair and reasonable.

Q. And what has happened to drilling costs since that AFE was proposed?

A. Well, overall, we've -- in comparison to the 3H and the 4H wells that we have just drilled and completed, the actual drilling cost has come down, but as I stated earlier, the goal on the completion side is to decrease the stage length, which means there are more stages to be pumped and to increase your sand concentration. So the completion side has increased over the time period when this AFE was prepared.

Q. And let's skip over Exhibit 32 for a moment and go to Exhibits 33 and 34. What are those?

A. Exhibits 33 and 34 are updated AFE costs at this time, taking into account the number of stages that we discussed per lateral and the increase of sand concentration for a 2nd Bone, being 5.261 million, and a 3rd Bone, 5.369 million at this time.

And I might interject that these are both without pilot holes drilled. The Igloo 19 3H, which we have drilled and completed to date, we drilled a pilot hole with that. Total drilling and completion costs to date is about 5.56 million, for the need of a pilot hole, so just for comparison sake.

Q. And because of its recently drilled wells, Caza has a pretty good handle on well costs?

A. Yes, sir. Yes, sir. Absolutely.

Q. Are the costs set forth in Exhibits 33 and 34

fair and reasonable?

A. Yes, sir. They are fair and reasonable costs in Exhibit 33 and 34.

Q. And what is Exhibit 32?

A. Exhibit 32 is a display of our estimates of recovery for a 2nd and 3rd Bone well north-south, 80-acre spacing within the southwest quarter of Section 19. There are recovery factors in the range of 40 to 45 percent of a mile-long lateral that we've had experience with under our type curve analysis and review.

The overall AFE cost is not significantly less. It's less than $100,000, less than a normal mile lateral simply because we decreased the spacing further on our predicted completion cost and increased our loading to try and get the most proficient recovery that we can for that 80-acre lateral in the southwest quarter of 19.

Q. And in your opinion, would 80-acre laterals in the Bone Spring be economic, be worth drilling?

A. 80-acre laterals in the southwest quarter of Section 19, 2nd, 3rd or 1st Bone are not economic for Caza to drill at this time with the current pricing standards and do not meet our minimal rate of returns for the corporation.

Q. I see the rate of return is only in the 1 to 2

percent range.

A. Correct.

Q. I don't think many people would be drilling with that rate of return.

A. No, sir.

Q. Were Exhibits 31, 32, 33 and 34 prepared by you or under your supervision?

A. Yes, sir.

Q. And in your opinion, is the granting of Caza's application in the interest of conservation and the prevention of waste?

A. In my opinion, we would be preventing waste in the southwest quarter of 19 if we were granted a one-mile lateral for the application that we've submitted.

Q. And just a couple of final questions. Did you work with Mr. Nickerson in looking at the reserve numbers in this section?

A. Yes, sir. We've looked -- we've looked in detail over the entire area that includes our database information that we've recovered, and with six potential wells within the Bone Spring 1st, 2nd and 3rd being drilled on the west half of Section 19, it's our opinion that there is 1.5 million barrels approximately that would be left stranded in the southwest quarter without

the ability to drill one-mile laterals.

In addition to that -- it hasn't been mentioned to this date -- the Wolfcamp is currently ongoing in the immediate area, potential, also. So it has not been produced within 19 at this point. But if that's added in to the calculation, it could be as much as 2 million barrels, in my opinion, that would be left stranded in the southwest quarter of 19.

Q. Thank you, Mr. Sam.

MR. BRUCE: Pass the witness.

Oh, could I move Exhibits 31 through 34 into the record?

CHAIRMAN CATANACH: Any objection?

MR. LARSON: No objection.

CHAIRMAN CATANACH: Exhibits 31 through 34 will be admitted.

(Caza Petroleum, Inc. Exhibit Numbers 31 through 34 are offered and admitted into evidence.)

CHAIRMAN CATANACH: Let's take a five-, ten-minute break here.

(Recess 11:07 a.m. to 11:20 a.m.)

CHAIRMAN CATANACH: Mr. Larson, it's your witness.

CROSS-EXAMINATION

BY MR. LARSON:

Q. Good morning, Mr. Sam.

A. Good morning.

Q. I'd like to follow up on a question Chairman Catanach asked you. He was inquiring about the drilling cost of an 80-acre lateral, and I believe you responded approximately $5 million; is that correct?

A. I believe I responded within $100,000 of a lat- -- a normal one-mile lateral, yes, which would be 5.1 to -- on a 2nd Bone well, 5.1 to 5.25 on a 3rd Bone well, yes, sir, with today's AFE costs.

Q. So if I understand you correctly, it would be approximately $100,000 difference between an 80-acre lateral and a 160-acre lateral?

A. 100- to 150,000, yes, sir, depending on the depth, whether it's a 2nd Bone or 3rd Bone well and that the primary reason for that, as I stated, was even decreasing the stage length further than 150-foot down to 75-foot stages, increasing your concentration because you're pumping more stages over that length. So it's more in the completion, not the drilling side that the cost increases take place for an 80-acre. You're not saving a dramatic number of dollars on the drilling side, but you are spending more on the completion side,

in our opinion, on an 80-acre well.

Q. Has Caza drilled any 80-acre laterals in this area?

A. No, sir. We would not economically drill any 80-acre locations within the immediate area.

Q. And you mentioned that an 80-acre lateral in the southwest quarter of 19 would not be economic at current prices. Is there a price at which it would become economic?

A. I have not done those calculations, but I'm certain that with higher hydrocarbon pricing, all wells, whether 80-acre, 160 or 320s, would be economic. Yes, sir.

Q. Is there any technical or engineering reason why you couldn't do an 80-acre north-south lateral in the southwest quarter?

A. There is no technical reason that we would be unable to drill and complete an 80-acre lateral in this area, but it would be uneconomic to our standards so we would not attempt that.

Q. Now I'll direct your attention to Exhibit Number 32.

MR. LARSON: This time I got it right, Jim.

Q. (BY MR. LARSON) Do the reserves in this economic projection reflect improved recovery using a

frac proppant concentration of 152,000 pounds per foot?

A. 1,500 pounds to 2,000 pounds per foot loading for a lateral?

Q. Yes.

A. Yes, sir. They do, in our opinion, represent the reserve recovery for 2nd and 3rd Bone test well for an 80-acre lateral unit with loading 1,500 pounds to 2,000 pounds per linear foot.

Q. And I'll backtrack one exhibit to Number 31. And this is the Concho Blue Jay Federal #1H well?

A. Yes. Yes, sir.

Q. And what does this exhibit show as the GOR for that approximately?

A. Gas-to-oil ratio is approximately 2.25 million per 1860 -- around 1,100 or so.

Q. And if you go back to Exhibit 32, it shows the 3rd Bone Spring well to have a GOR of 0.87; is that correct?

A. That's 875 mcf over the life of the well. The initial GOR and the end-of-the-life GOR are separate numbers. This is -- this is -- the Blue Jay current GOR -- GOR does not represent lifetime GOR for the well, as would the EUR recovery that I'm showing within my estimated economics.

MR. LARSON: Pass the witness.

CHAIRMAN CATANACH: Mr. Commissioners?

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. So it wouldn't be economic to do 1st and 3rd Bone Spring in a lay-down, so we're really just talking about the 2nd Bone Spring being stranded reserves, right?

A. Could you be more concise on a lay-down, sir?

Q. You could do lay-down wells for 1st and 3rd Bone Spring in your own acreage?

A. No, sir. We could not do a lay-down for the 1st or the 3rd Bone Spring within our acreage position. We have two 3rd Bone Springs running north-south currently.

Q. Okay. Those are 3rd Bone Spring?

A. That's correct.

We have one 2nd Bone Spring running north-south. It would be uneconomic and not meet our standards for recovery to drill a 1st Bone or a 2nd Bone well on an 80-acre spacing.

Q. Has Caza approached Legacy on the two-mile-long laterals?

A. Yes, sir. We have approached them with a proposal that we would agree to leave them as operator to drill a two-mile lateral across the southwest quarter

of Section 19, which would alleviate stranding over 1.5 million barrels of recovery to the State. Yes, sir.

Q. Any sort of response on that?

A. Their response was negative, that they did not agree and would not go forth with that.

Q. Thank you.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. So what could you do in the south half that would be economically viable, in the south half of Section 19?

A. Without the ruling that we're asking the Commission at this time, we could not drill any wells, 1st, 2nd, 3rd Wolfcamp, on an 80-acre lateral that would meet -- we could not drill.

Q. But I'm talking about a mile lateral on the south half. Is there anything you could do?

A. Oh, a mile lateral. Yes, sir. We -- we could drill mile laterals north-south.

Q. No. I'm talking about east-west in the south half.

A. No, sir. We -- we could not develop our acreage overall with program economics knowing that half of the wells that we would drill east-west would be uneconomic and not meet our standards.

Q. So even a mile-long lateral in the south half would be uneconomic?

A. No, sir. I did not say that. Our project, overall project, drilling the wells on the south half of 19, one mile, but when you add back in the north half drilling on 80-acre spacing, it doesn't meet the standards for development of the acreage and recovery to the State, in our opinion.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. So earlier we were talking about the conflict with the 2nd Bone Spring wells and the 3rd Bone Spring well that exists in the east half of 19, but there isn't currently 1st Bone Spring development in Section 19, correct?

A. No, sir. There is no 1st Bone development in Section 19. There is 1st Bone vertical development directly west and southwest of 19.

Q. So are you saying that east-west 160, 1st Bone Spring development in the south half of 19 would not fit your parameters for your drilling program?

A. No, sir. I'm saying that the overall development of all of our acreage within 19 does not meet the economic standards to drill one mile plus 80-acre or half-mile locations to develop all reserves,

including 1st, 2nd or 3rd Bone.

Q. So when you say that the 1.5 million barrels estimated -- barrels that would be stranded in the absence of this application being granted, theoretically, the 1st Bone -- 1st Bone Spring could be produced with east-west even though it doesn't fit your parameters for complete development?

A. Theoretically, but not economically.

Q. Okay. And you said that if you added in the Wolfcamp in this area, you're talking somewhere in the neighborhood of $2 million of stranded reserves?

A. Yes sir.

Q. Have you approached anyone about Wolfcamp development to date for a similar kind of project, or have you limited --

A. No, sir. It's completely internal numbers and review of Caza's existing wells offset information but -- and also the ongoing development of the Wolfcamp within Lea and Eddy Counties.

Q. Is there any reason you won't be able to develop the Wolfcamp in absence of a pooling order?

A. The same reason for the 1st, 2nd and 3rd Bone. Overall, in our opinion, without the ability to drill one-mile laterals over Section 19 in a north-south direction, we wouldn't be able to develop any of the

reserves under the southwest quarter economically at this time.

Q. Have you approached Legacy or COG about Wolfcamp development yet?

A. No, sir.

Q. Okay. That's all I have. Thank you.

A. All right. Thank you.

RECROSS EXAMINATION

BY CHAIRMAN CATANACH:

Q. Just one more. If there was a two-mile by Legacy, would you participate in that well?

A. Oh, yes, sir. We would gladly participate as a good owner and allow Legacy to operate the wells that were drilled across the southwest quarter.

Q. Thank you, sir.

MR. BRUCE: Can I do a follow-up?

REDIRECT EXAMINATION

BY MR. BRUCE:

Q. I'm going to Exhibit 2 -- Caza Exhibit 2. I just want to clarify one thing -- couple things. So far you've completed three wells, correct?

A. Yes, sir, in Section 19 and Section 18.

Q. And the 2H is what Bone Spring zone?

A. It's a 3rd Bone Spring producing well.

Q. And the 3H well?

A. Yes, sir. The 3rd Bone Spring -- the 3H is producing out of the 3rd Bone Spring interval.

Q. And the 4H well?

A. 4H is a 2nd Bone-producing well at this time.

Q. So there is no way to develop the south half in the 2nd Bone Spring or in the 3rd Bone Spring with a mile lateral?

A. With a one-mile lateral, east-west direction, there is -- it is not -- we are not capable of doing that in the 2nd or 3rd Bone.

Q. Looking at Section 19, you can conceivably drill one-mile 1st Bone Spring laterals in the south half?

A. Yes, you could.

Q. But that would strand, at this point, the northeast quarter in the 1st Bone Spring?

A. That's correct.

Q. Just one final thing you mentioned. The 3H and the 4H well, one of them was unrecoverable -- 16 barrels an hour and --

A. Double load, yes, sir.

Q. Do you expect that total to go up?

A. Absolutely. We're within 5 to 6 percent of load water recovery at this time, less than ten days of flowback on both wells.

Q. So you expect that those wells to get closer to the top productivity in the Blue Jay well?

A. There is a distinct possibility that the 3H could reach those levels. And by that, I mean we are -- we are -- with these two wells, we are attempting a particularly different type of flowback. The normal flowback operations that we've used in the past is three to five barrels per minute after frac initially until we see a trace of hydrocarbon, and we increase the choke over time.

What we're doing is we're using Halliburton's caliber flowback system that they input spider pressure technology on the wellhead trying to control your bottom-hole and flowback pressure. We are currently 1964 at both wells, after recovery of the hydrocarbon oil and gas rates, we're talking. We've limited our sand flowback in comparison to the 59 and 62H, which was the offset well. And we're doing fewer steps in opening our choke and maintaining the choke over a long period of time. So we believe what we're doing is we're efficiently unloading the entire lateral at higher flowing bottom-hole pressure than we would under normal flowback situations.

Q. Thank you, Mr. Sam.

MR. BRUCE: That would be all I have.

CHAIRMAN CATANACH: The witness may be excused.

MR. LARSON: Mr. Chairman, I have a couple of follow-up questions.

CHAIRMAN CATANACH: I'm sorry. Go ahead, Mr. Larson.

RECROSS EXAMINATION

BY MR. LARSON:

Q. Staying with Exhibit 2 -- do you still have that in front of you?

A. Yes, I do.

Q. -- did Caza drill the 4H well in the southwest quarter of 19?

A. We drilled the 2H well in the east half-east half, and the surface location is at the northeast of the northeast of 19.

Q. And prior, had Yates drilled Section 19?

A. No, sir. Yates had not.

Q. And what was the spud date on the 3H?

A. The spud date of the 3H was September the 7th. September 7th of this year is the day, I believe, sir, we drilled the 3H and the 4H back-to-back with a walk-in rig, same pad site. Both wells were drilled within the proposed date and time. We were successful in getting both of those wells drilled within a 45-day

period.

Q. Since Caza initially filed its pooling application, has it requested that Legacy not move forward with its development of the 59H and 62H?

A. Yes, sir.

MR. LARSON: That's all I have.

CHAIRMAN CATANACH: Okay. This witness may be excused.

THE WITNESS: Thank you.

CHAIRMAN CATANACH: I think we'll take a lunch break.

MR. BRUCE: Until 1:00?

CHAIRMAN CATANACH: Until 1:00, yes.

(Recess 11:36 a.m. to 1:01 p.m.)

CHAIRMAN CATANACH: Let's go back on the record at this time.

And I believe that -- Jim, were you done with --

MR. BRUCE: Yes, sir.

CHAIRMAN CATANACH: Okay. So we'll turn it over to Mr. Larson at this time.

CLAY ROBERTS,

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

MR. LARSON: Mr. Chairman, a couple of

things before I start with Mr. Roberts. First, I've handed out a set of exhibits which are identical to the exhibits in our prehearing statement. We did them on a better printer to make some of the colors stand out better, but they're exactly the same.

CHAIRMAN CATANACH: Okay.

MR. LARSON: And secondly, you asked me a question about the citation of the OCD rules regarding written consent to the Commissioner of Public Lands, and I kind of fumbled that because I had a typo in my notes. It's 19.15.16.15(E), as in easy, (4).

Lastly, I'd liked to introduce the gentleman sitting to my left, Craig Sparkman, petroleum engineer of Legacy Reserves.

DIRECT EXAMINATION

BY MR. LARSON:

Q. Good afternoon, Mr. Roberts.

A. Hi.

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

A. Clay Roberts.

Q. And where do you reside?

A. Midland, Texas.

Q. By whom are you employed and in what capacity?

A. Legacy Reserves as a landman.

Q. And what is the focus of your responsibilities as a landman for Legacy?

A. My primary focus is on Legacy's operated properties in Lea County, New Mexico.

Q. And do those responsibilities include the federal lease units?

A. Yes, they do.

Q. Are you familiar with the land matters that pertain to Caza Petroleum's application?

A. Yes, sir.

Q. Have you previously testified at a Division hearing?

A. Yes, sir, I have.

Q. Did the Examiner qualify you as an expert in petroleum land matters?

A. Yes, sir.

Q. I take it you have not testified at a Commission hearing before?

A. Correct.

Q. Would you briefly summarize for the Commissioners your educational background and your professional experience in the oil and gas industry?

A. You bet. In 2010, I received a bachelor's degree from Lubbock Christian University in education. In 2012, I received a master's degree in organizational

management also from Lubbock Christian University. And in 2012, I began my career in Legacy's land department.

MR. LARSON: Mr. Chairman, I tender Mr. Roberts as an expert in oil and gas land matters.

MR. BRUCE: No objection.

CHAIRMAN CATANACH: Mr. Roberts is so qualified.

Q. (BY MR. LARSON) Would you please identify the document marked as Legacy Number 1?

A. Yes. It is what I call the Lea Unit Acreage Contributions map.

Q. Did you prepare this document?

A. Yes, I did.

Q. And what is the area on the map that is outlined by the red-dashed line?

A. The red-dashed line represents the boundaries of Legacy's Lea Unit.

Q. Is the Lea Unit a federal exploratory unit?

A. Yes, it is.

Q. And when did the BLM approve the unit?

A. This unit was approved November 10th of 1959.

Q. And who is the operator of the unit?

A. Legacy Reserves operates this unit.

Q. And what percentage of the unit is federal acreage?

A. So on the map, the federal acreage is represented in yellow. It represents 93.75 percent.

Q. And also State of New Mexico acreage in the unit?

A. Correct. The northwest quarter of Section 19 is included in the unit, so it's 160 acres of the total unit. It's 6-and-a-quarter percent.

Q. And who is the state lessee in the northwest quarter?

A. Legacy Reserves.

Q. What is the extent of Legacy's leasehold?

A. Legacy owns that 100 percent.

Q. And does Exhibit 1 also identify the other ownership in this federal Lea Unit?

A. Yes, sir, it does.

Q. And what are those interests?

A. Finley Resources owns roughly a 5 percent working interest in the unit. Hammond Oil & Gas owns a 1.9 -- excuse me -- 1.95 percent working interest, and then Concho Oil & Gas owns 1.68 percent working interest.

Q. Would you next identify the document marked as Exhibit 2?

A. Yes. That's a GIS map that represents Legacy's current development plan of the Lea.

Q. Was this exhibit prepared by Legacy's GIS -- GIS expert under your direction and supervision?

A. Yes, sir, it was.

Q. And what is the exhibit intended to depict?

A. So what it depicts is Legacy's full-scale Bone Spring development plan, with currently targeting the 1st, 2nd and 3rd Bone unit wide.

Q. And I'd direct your attention to the boxes near the bottom of the exhibit, numbers 3, 5, 7, 9, 11 and 12. What do those depict?

A. Those are the multi-well pads that Legacy plans to drill these wells off of.

Q. And are pads number 11 and 12 located in the west half-west half of Section 18?

A. 11 is going -- well, 11 is located in the west half-west half of 19, and then pad 12 is in the east half of the west half of 19 as well.

Q. Would you generally describe Legacy's development plan for the unit?

A. Yes. So Legacy has identified these 12 pads. Legacy will drill three wells off of each one of these pads targeting the 1st, 2nd, and 3rd Bone Spring.

Q. And looking at the wells identified in Section 12 of the unit, are those one-mile laterals?

A. In Section 12?

Q. Yes.
A. Yes, sir. Those are one-mile laterals.
Q. Why did Legacy drill those one-mile laterals in Section 12?
A. So Legacy has drilled and will continue to drill one-mile laterals in Section 12, and that's solely due to the restrictions of the unit boundary.
Q. And focusing on the acreage addressed in Caza's application, how many north-south mile-and-a-half Bone Spring horizontal wells in the northwest quarter of Section 19 and the west half of Section 18 are included in Legacy's development plan?
A. Legacy would drill six wells.
Q. And when did Legacy commence discussions with the BLM about well-pad locations for those six wells?
A. So Legacy's initial meeting with the BLM occurred May 15th of 2015. We met them at the BLM Carlsbad field office.
Q. And were there different well pads initially proposed by Legacy?
A. Absolutely. In an attempt to minimize our surface disturbance, Legacy originally proposed that all of these wells -- all of these locations be built along the northern edge of Section 13 and into Section 18 on that northern section line.

Q. And what was the BLM's response to those proposed locations?

A. The BLM identified some sand dunes along those proposed locations, and in order to protect the habitat of the lizard, they would not approve those locations as we originally proposed them.

Q. And so you moved them down into Section 19?

A. Yes, sir. All locations unitwide were then moved to the exterior of the unit boundaries to accommodate the BLM's request.

Q. And when did BLM approve the well pads identified as 11 and 12 on Exhibit 2?

A. Yes. Those wells were approved at an on-site meeting with the BLM on October -- excuse me -- August 6th of 2015.

Q. And has Legacy constructed those well pads?

A. Yes, we have.

Q. And does Legacy have BLM-approved APDs for any of the wells in the northwest quarter of 19 and the west half of 18?

A. Legacy has one APD -- APD approved for each pad, one for pad 11, which would be the 59H, which is the 3rd Bone Spring target, and then one for the number 12 pad, which is the 62H, also a 3rd Bone Spring.

Q. Is this the first time Legacy has opposed an

operator drilling a horizontal well that would include acreage in the Lea Unit?

A. No, sir, it's not.

Q. Would you next identify the document marked as Exhibit 3?

A. Absolutely. Exhibit 3 is a letter dated March 30th, 2011. It was written by Pat Darden, a Legacy engineer. The purpose of this letter was to protest an APD that was filed with the BLM by Mewbourne Oil Company. The significance of this is Mewbourne's well had a surface-hole location in the southeast quarter of Section 14. That would be on the western edge of the Lea Unit. And then the bottom-hole location of their APD was inside the unit boundaries in the northeast quarter of Section 14.

Q. And is Exhibit 3 a true and correct copy of Mr. Darden's letter?

A. Yes, it is.

Q. And Mr. Darden will testify later today?

A. Yes, he will.

Q. And had the BLM alerted Legacy that Mewbourne had filed the APDs?

A. Yes, they did.

Q. Did Mewbourne withdraw the APDs?

A. Yes, sir, they did.

Q. And did they then file alternative APDs?
A. Yes, sir. They then just filed half-mile APDs to develop the southeast quarter of Section 14.
Q. Would you next identify the document marked as Exhibit Number 4?
A. Yes. Exhibit Number 4 is a Lea Unit Bone Spring horizontal development map. It's a stick map that indicates the current status of every well Legacy plans to drill in the Lea Unit to develop the Lea Unit inside the boundaries, to stay within the unit boundaries.

The black lines represent wells that Legacy plans to drill. All the red lines are wells that Legacy has drilled to date, and then the green lines indicate wells that Legacy has approved APDs for.
Q. And did you prepare Exhibit 4?
A. Yes, sir, I did.
Q. And these are the same wells that appear on your Exhibit 2?
A. Yes, sir.
Q. Is Legacy planning to develop each of the three benches in the Bone Spring Formation?
A. Yes, sir.
Q. And has Legacy put its drilling of the 59H and 62H wells on hold since Caza filed its pooling

application?

A. Yes, sir, we have.

Q. Were those wells originally scheduled in Legacy's 2016 drilling schedule?

A. Yes, sir. The 62H would have been spud almost immediately after the chicken stipulations went off in June, so roughly -- the first well we actually did spud after the chicken stips was June 29th of 2016, so that would likely have been our first target.

Q. And is Exhibit 5 prepared by Legacy's geology witness, Mr. McKamey?

A. Exhibit 5? Yes, sir, it was.

Q. And how would Legacy's completion of the 59H, 60H and 61H wells affect the royalties that would be paid to the State of New Mexico?

A. So as soon as Legacy drills and completes a well in the northwest -- that includes acreage in the northwest quarter of Section 19, the State would then be -- or this acreage would then be included in the Bone Spring participating area for the Lea Unit, at which point the State would be entitled to their proportionate share unitwide -- from production unitwide.

Q. And did you hear the testimony by Caza's witnesses this morning about their proposal that -- and I assume that Caza would drill the two-mile well and

Legacy would operate it?

A. Yes, sir. I did hear that.

Q. And did Legacy give serious consideration to that proposal?

A. Yes, we did.

Q. And from a land perspective, what problems would a two-mile lateral cause for Legacy?

A. It would be a timing issue. You know, Legacy already has permits in place, locations built. It would be an issue of getting those new locations approved, which, in this case, took us three months to get pads 11 and 12 approved, and then would also be -- you know, there would be a permitting -- amending permits, which, in this case, it took us four months to get these permits approved.

Q. And what would happen to the two multi-well pads that are marked as number 11 and 12 on Exhibit 2?

A. They would never be used.

Q. So Legacy would lose its investment in those well pads?

A. Yes, and likely have to make further investment to remediate the land.

Q. In your opinion, does Caza have options for developing its acreage in the southwest quarter of 19?

A. Yes, sir, I believe so. And just to lay some

of that out, I believe that Caza has the opportunity to partner with Cimarex to the south in Section 30. Exhibit 5 indicates that Cimarex has only drilled 2nd Bone wells in an east-west fashion in Section 30, so I believe that Caza could partner 1st and 2nd Bone -- excuse me -- partner with Cimarex to drill 1st and 3rd Bone Spring wells, including the southwest quarter of 19 and the west half of Section 30. And, further, to address the 2nd Bone Spring, they could partner with BTA to the west and drill a lay-down -- lay-down 2nd Bone Spring wells.

Q. In your opinion, did Caza foreclose the option of drilling east-west one-mile laterals in the south half of 19 by drilling the two Igloo wells that were discussed this morning?

A. Yes. I believe it was the 4H, was their 2nd Bone Spring that they drilled and completed recently. I believe that that limited their options to fully develop the south half of Section 19, you know, in an east-west fashion.

Q. And could Caza still drill a one-mile east-west 1st Bone Spring in the south half of 15?

A. Yes, sir, they could.

Q. What is your understanding on the BLM's position regarding Caza's application in terms of

operation of the well?

A. It is my understanding that the BLM -- or that the BLM would require that the unit operate, in this case Legacy, operate any well that produces unit acreage.

Q. In your opinion, would Caza's proposed well unreasonably interfere with Legacy's long-standing development plans for the Lea Unit?

A. Yes, sir.

Q. And in your opinion, would the granting of the application cause waste and impair the correlative rights of Legacy and the other interest owners in the Lea Unit?

A. Yes, it would.

MR. LARSON: Mr. Chairman, I move the admission of Exhibits 1 through 5.

MR. BRUCE: No objection.

CHAIRMAN CATANACH: Exhibits 1 through 5 will be admitted.

(Legacy Reserves, LP Exhibit Numbers 1 through 5 are offered and admitted into evidence.)

MR. LARSON: And I'll pass the witness.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Mr. Roberts, looking at your Exhibit 1 --
A. Yes, sir.
Q. -- if I understand your testimony, the northwest quarter of Section 19 is not currently in a participating area for the Bone Spring?
A. Correct.
Q. And if you'd move on to your Exhibit 2, Caza prefers to drill all of its Bone Spring wells, 1st, 2nd, and 3rd Bone Spring, with stand-up units; is that correct?
A. Your question is Caza wants to drill north-south wells?
Q. Does Legacy prefer to drill all of its Bone Spring wells north-south?
A. Yes, sir.
Q. Now, I notice that well pads 11 and 12 --
A. Yes, sir.
Q. -- are on Caza's acreage. Was Caza ever notified of the filing of those APDs or even before Caza? I forget exactly when it was done. Yates Petroleum Corporation, I believe, may be the record title owner of the lease?
A. To my knowledge, they were not.
Q. And those well pads, when were they built?
A. They were built when the NMOCD order came down.

I don't know the date that that order came down.

Q. Okay. But after this forced-pooling application was initially filed?

A. Correct. Yes, sir.

Q. And then, you know, regarding the letter that Mr. Darden wrote to the BLM, if you'll turn to Exhibit 5 and you look at the southeast quarter of Section 14, that states that Mewbourne's permits expired?

A. Right. Correct. They never did drill those half-mile laterals.

Q. You said Caza should -- I don't want to put words in your mouth, but basically you're saying Caza should look for the 3rd Bone Spring to drill south into Section 30?

A. I believe that they could drill the 3rd Bone Spring south into Section 30. Yes, sir.

Q. Okay. If Cimarex has plans to drill its own wells in Section 30, that would complicate that, wouldn't it?

A. It would be the identical situation to what we have now --

Q. Thank you.

A. -- with -- with the exception of they would not be drilled into an exploratory unit.

Q. Okay. Well -- and one other thing. Regardless

of what happens in the southwest quarter of Section 30, if Caza's forced to do something else, then the northeast quarter of Section -- I mean -- excuse me -- Section 19, then won't acreage in the northeast quarter of Section 19 be stranded?

A. If they partner with Cimarex in 30, in the west half of 30?

Q. No, no. No, no.

You're saying they should drill east-west. So they have to drill 1st and 2nd Bone Spring east-west, especially 1st Bone Spring wells east-west, in Section 30 -- in 19 -- excuse me. I'm getting mixed up. That would strand the northeast quarter; would it not?

A. I do not know what is in Section 20 to the east, but you could reasonably possibly partner with the operator of that section. I do think that Caza prefers to drill their first and all wells north-south, but they have stated that 2nd Bone Spring lay-down wells are a possibility. So for the 1st and 3rd, they have a very good option of partnering with Cimarex going south into Section 30. So I would say that the 1st Bone Spring north-south wells are still very much a possibility.

Q. Thank you, Mr. Roberts.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. Mr. Roberts, what is the participating area currently within the unit?

A. So currently it is -- it's about 1700 acres. It does not include any of Sections 18 or 19.

Q. And that's in the Bone Spring, right?

A. Correct. Yes, sir.

Q. And is it all lumped together in one Bone Spring PA regardless of the 1st, 2nd or 3rd?

A. Correct. Yes, sir.

Q. So for the surface location in Section 19, did you need to -- why did that take so long to get approved? That's on a state lease, right?

A. Correct. It was just BLM wanting to make sure that no habitat was adversely affected by -- by our operation.

Q. With regards to the Mewbourne application, you referenced they were not trying to force pool the acreage?

A. To my understanding -- and I looked for previous applications. I never found where they had submitted an application to force pool their acreage with, like, our acreage in the northwest quarter of Section 14. It may have been -- they may have withdrawn

the APD prior to coming to that point once they realized they were drilling across the unit boundary.

Q. So do you know why those wells in the southeast quarter were never drilled?

A. I do not know why.

Q. Do you know what those were -- were those targeting -- do you know what zones those were targeting?

A. According to the letter that Pat Darden wrote, it was the 3rd Bone.

Q. Has Legacy drilled two-mile laterals in the Bone Spring?

A. No, sir, we have not.

Q. Is that an issue?

A. More of a technical issue, and I think we'll provide some testimony on that later.

Q. So if this application is approved and the northwest quarter is developed in the Bone Spring, that will be included in the PA for the unit?

A. Yes, sir.

Q. So how does that affect -- how does that adversely affect your company?

A. Well, I think in our testimony that we'll provide later, I think there is -- we believe that our acreage in the northwest quarter is better. The rock is

better than what Caza would be contributing in the southwest quarter.

Q. A new wrinkle?

A. Yes, sir.

Q. The investment in the well pads, how much is that? Do you have a figure?

A. Yes. It's about $200,000 a pad. That includes surface damages and the construction of the pad.

Q. So your statement that approval of the application would impair Legacy's correlative rights is based on the geology?

A. Correct. Yes, sir.

Q. Okay. I have nothing further.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Just a couple. Is it safe to say the existing PA for the Bone Spring -- the existing unit PA is basically following the western edge of Sections 18 and 19 down because that's the nondeveloped acreage so far?

A. Yes, sir.

Q. So everything else in the unit has been dedicated to that PA?

A. I believe so, yes, sir.

Q. The locations for pads 11 and 12, I believe, the two that are in that Section 19, those are on -- is

that State surface or is that State --

A. That's -- that's fee surface.

Q. Fee surface.

A. Yes, sir.

Q. So you said you have to go through the BLM process because you're going to penetrate BLM minerals?

A. Yes, sir.

Q. Is there any existing production other than Bone Spring in the unit? Are there any other PAs?

A. Yes. There -- there is a Morrow participating area. And I believe the Devonian was finally plugged out or we're no longer producing the Devonian, so that one ceases to exist.

Q. Does Legacy have any plans to, say, develop the Wolfcamp or something else in that unit?

A. Possibly. I would -- I would let our future testimony speak to that.

Q. That's all I have. Thank you.

A. You're welcome.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. Good afternoon, Mr. Roberts.

A. Hi.

Q. So until the new wrinkle was thrown in about 3rd quality rocks, it seemed like I've gotten from your

testimony that the main reason not to participate was additional permitting time and then the fact you had already built the two pads.

A. And there are also allocation issues that the BLM would require a separate tank battery be built for wells that are -- that cross unit boundaries.

Q. So a little more on the surface of construction?

A. Absolutely.

Q. I can't tell from the map exactly where the sand dunes end, but it looks like you could drill -- or it looks like you could put pads at the south end of unit eight -- Section 18 without being on the sand dune?

A. Possibly.

Q. So one possible development scenario is mile-long laterals, and mile-long laterals to the south --

A. Right.

Q. -- which I think is where Caza explained it, to propose in the absence of two-mile laterals.

A. Which we plan to address in future testimony as far as the economic impact that that would have.

Q. So something that's really important for us is -- correlative rights is one of two things we have to protect. The second thing is waste. And waste, as

you're probably aware, is defined for us as leaving resources undeveloped that could be developed. So we run into a situation where you're starting to intermingle [sic] these three different wells in a number of different directions. And for me, in my mind, to prevent waste, we want to develop each of those horizons to the extent possible and leave no quarter of that left undeveloped. So your company's ability to produce your resources is very important. That's the correlative rights part. But the prevention of waste part is the collaboration of every company that's involved in the development.

A. Correct.

Q. Thank you.

A. So to just address -- you know, you've got wells running east and west and north-south.

Q. Yeah.

A. Cimarex has already -- you know, they drilled lay-down 2nd Bone Spring, and they've permitted north-south 3rd Bone Spring. So I think it's a viable option.

Q. Well, I think they may be a better partner, perhaps, and I think their development scenario is potentially viable. What it does to the other quarters of the section -- I believe it's -- what's below 18?

25, it looks like. Whatever's going to happen down there would be perhaps a repeat of this same issue with another company.

A. You're talking -- what -- what were you --

Q. Well, if you develop the -- Section 30, northwest quarter in the manner you described for Bone Spring 1 and 3, then you may end up with other issues, other stranded quadrants, if you will, in Section 30.

A. I would suggest that they drill one-and-a-half-mile laterals to include all of Section 30 in the 1st and 3rd.

Q. Well, that may be a viable solution. But we won't know that until or if Caza's application fails and then they try and work an agreement with that other company.

Thank you.

A. Uh-huh.

CHAIRMAN CATANACH: Anything further of this witness?

MR. LARSON: Just a couple of follow-up questions.

CHAIRMAN CATANACH: Oh.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Are you aware of any Cimarex APDs for

north-south laterals in the 1st Bone Spring and the west half of Section 30?

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

Q. And are you aware of any APDs for the 3rd Bone Spring stand-up wells in the west half of 30?

A. I'm not aware of any.

Q. Does the BLM have to approve any and all surface locations for a well that penetrates federal minerals?

A. Yes, they do.

MR. LARSON: That's all I have, Mr. Chairman.

CHAIRMAN CATANACH: Okay. This witness may be excused.

KEITH McKAMEY,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Good afternoon, Mr. McKamey.

A. Good afternoon.

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

A. Keith McKamey.

Q. Where do you reside?

A. Midland, Texas.
Q. By whom are you employed and in what capacity?
A. Legacy Reserves as geology manager.
Q. And what is your focus of your responsibilities as the geology manager at Legacy?
A. As the geology manager, I develop, prospect and drill and complete all locations that we submit and propose for drilling for any reserves.
Q. Have you previously testified at a Division hearing?
A. I have.
Q. And were you qualified as an expert in petroleum geology?
A. I was.
Q. And what is the extent of your experience in the Permian Basin in southeast New Mexico?
A. I've had 38 years of experience, 35 of which have been in the Permian Basin, three years of which was overseas as a consultant, international consulting. Specifically in the Lea Unit, I've drilled 16 of the 18 horizontal wells in the Lea Unit.
Q. And are you familiar with the geology issues pertaining to Caza's application?
A. Yes, sir, I am.
Q. And you're obviously also familiar with

Legacy's developmental unit?

A. Yes, I am.

MR. LARSON: Mr. Chairman, I tender Mr. McKamey as an expert in petroleum geology.

MR. BRUCE: No objection.

CHAIRMAN CATANACH: Mr. McKamey is so qualified.

Q. (BY MR. LARSON) Referring your attention to Exhibit 5, what do you intend to demonstrate with this exhibit?

A. I generated this exhibit to give you a color idea of all the producing laterals, the horizontal wells, as well as the vertical wells. All the vertical wells are in the circles, and each color represents a Bone Spring interval -- production interval. And in the laterals, the stick color, also indicates the producing intervals that the wells are producing from.

In addition to that, I have text along the lateral that indicates the TVD landing interval for the well, as well as the 30-day IP. In addition to that, I've got faults drawn, and these faults were drawn from seismic 3D.

Q. And are the brown lines on Exhibits 5 and 10 intended to depict those faults?

A. Correct, they are.

Q. Would you identify the document marked as Legacy Exhibit Number 6?

A. Exhibit 6 is the Lea Unit #31H type log. For simplicity, this is one of the very first wells that we drilled with a vertical pilot hole on. So it identifies all the individual producing intervals in the 1st, 2nd and 3rd Bone Spring. And I'll go over those.

This LAS log is broken up into three different segments. The farthest one on the left is the 1st Bone Spring interval, and the bracket at the top is a typical landing interval in the first Bone Spring. The middle segment is primarily the 2nd Bone Spring. The top part of it has been a landing interval, but it hasn't been as good as the bottom part where I've got it bracketed as the 2nd Bone Spring landing. The farthest segment on the right is the 3rd Bone Spring interval. At the top of it is the carbonate section. At the bottom of it is the sand section. And I want to call your attention to the red-bracketed interval. It's what we call the 3rd Bone Spring landing interval for the unit. That is Legacy's landing interval. That's an average of 12.2 percent porosity for that interval.

And the curves on the log, the far-left curve is a gamma ray, which is a geocolumn shaded. The second column is all the porosity curves. That would be

neutron, density and sonic, as well as a PD. And the third column on that log is a resistivity with the heavy gas curve superimposed on it.

The thing that I want to point out about the 3rd Bone Spring landing interval is it's about -- oh, about 75 feet from the top of the Wolfcamp. We have observed in more than one well -- but in the 31H, we drilled below where I've got the arrow pointed as a frac barrier. So we went outside of our window on the 31H while we were drilling the lateral, and in that frac stage, we could not initiate frac. So we know that's a frac barrier. Anytime we get below that shale strainer, we cannot initiate frac and stimulate the 3rd Bone Spring window that we intended to.

What's important about that is the Blue Jay well. The Blue Jay well was drilled after our first hearing. It came in as a good well. I couldn't figure out why, so I started checking into it. And they landed the 3rd, their -- the Blue Jay well about at the bottom of that red line, where it says "54 feet," at about 10,990. So they were only about 20 feet from the top of the Wolfcamp in that Blue Jay well. We ran frac models on the Blue Jay well, and all their frac models indicated that the frac went down into the Wolfcamp section.

I mapped 1 foot of pay in the 3rd Bone Spring in the Blue Jay well, so I couldn't figure out why it was such a good well until the frac models told me that there was a good chance that the Wolfcamp was contributing to that well.

So that's a little bit of twist on the 3rd Bone Spring. They definitely landed their well in the 3rd Bone Spring, and we think they drilled the well, the entire length of the lateral, in the 3rd Bone Spring, but it was only about 20 foot from the top of Wolfcamp. And the models that we got indicated that the frac likely went down and captured some of that Wolfcamp reserves.

Q. Did you prepare Exhibit 6?

A. I did.

Q. And how is this type log germane to your testimony?

A. It identifies the landing interval of the 3rd Bone Spring and how closely we are to the top of the Wolfcamp and the position of each one of those landing intervals.

Q. Would you next identify the document marked as Exhibit 7?

A. Exhibit 7 is the 3rd Bone Spring Shale structure. It is the shale stringer right at the top of

our pay zone. It is identified on the type log on the exhibit before.

Again, I want to call your attention to the -- the -- the nose. It plunges kind of south-southeast to the Lea Unit. It's a fairly gentle dip, anywhere from 125 to 150 feet per mile. If you look at the top of Section 13 or even the bottom of Section 13, it's about the dip rate. And in order to honor contour interval and the time map that we created through seismic, we ended that structure right there at the fault to honor that.

Q. And did you also prepare this exhibit?

A. I did.

Q. And what does Exhibit 7 tell you about the structure of the 3rd Bone Spring Shale in Caza's proposed project area?

A. The 3rd Bone Spring that we have drilled to date is on the uphill side of the fault. The Blue Jay well and I would expect that the Caza well, the #3H, have both been built on the downturn side of that major fault. If you'll look at the subsea interval, the subsea text that I put below each well is about 343 feet difference in the northeast of 24 compared to the Blue Jay surface location, which is in the southwest, southeast of 18.

Q. And that's our segue into the next exhibit. Would you identify that, Exhibit Number 8?

A. Exhibit Number 8 is the 3rd Bone Spring net feet pay isopach map. All three Bone Spring intervals, the depositional environment, is a submarine canyon fan, and the net feet pay is the best depiction of the boundaries of that unit.

So the contour interval on this is a 25-foot contour interval. Our cutoffs were 10 percent. And I used -- you know, you always have an option in geology of which sonic or -- which sonic or which density or which neutron type of porosity curve to use in your net feet pay isopach. Sonics are always a little bit more optimistic than density, but we always use density in most cases. Density gives you secondary porosity, whereas a sonic gives you primary porosity. So where there are two numbers for every well, I used the blue number, which is the density porosity. Net feet pay isopach is greater than 10 percent.

Q. And did you prepare Exhibit 8?

A. I did.

And I would, if you don't mind, Gary, kind of point out some key wells.

In the northeast of 24, there are some pretty high net feet pay wells, 31 feet. In the

southeast part of 24, it's only 11 feet. So you'll see a quick degradation of the reservoir as you go south. That same net feet pay value as you go east was measured in the Blue Jay as 1 foot. So you'll see a degradation of the pay as you go east. In the northeast, in 25, it's zero. In the southeast -- in the southeast of 24 is about 11 feet. So it's our opinion that the rock quality is much better in the unit north and west of Caza's acreage than it is in Caza's acreage in the south and east. It definitely degrades there.

Q. And could you summarize your interpretation of the net pay for the 3rd Bone Spring in the west half-west half of Sections 19 and 18?

A. As you'll see, I drew a zero-foot contour line trying to honor the data. My control points, you can see, in the northeast of 25 is zero and the northwest of 30 is zero, and in the west half -- I'm sorry -- east half of 18 is 1. And yet the southeast of 24 is 11. So maintaining the same contour interval, it's very easy to draw a zero-foot contour line very near the section line of the southwest quarter of Section 19.

Q. Would you next identify the document marked as Exhibit 9?

A. Exhibit 9 is the same style, net feet pay isopach only in the 2nd Bone Spring interval.

Q. Did you also prepare this exhibit?
A. I did.
Q. And what is this exhibit intended to depict?
A. It shows you that the depocenter or the thick isopach -- thickness of the 2nd Bone Spring Sand, which is the best part of the reservoir, is located in Section 13, which is within the unit. The rock quality there in the unit is -- appears to be much, much better than it does as you go south and east in the 2nd Bone Spring.
Q. And what is your interpretation of the pay interval in the 2nd Bone Spring in the northwest quarter of Section 19 and the west half of Section 19?
A. Again, I want to point out the values which I used to map. So the key wells in the northeast of 24, there is a 26-foot pay well. In the southeast of 24, there is a 9-foot pay well. So it definitely degrades as you go south. The well in -- let's see -- northeast of 25 is 16 feet, so it begins to increase as you go into Section 25. And, in fact, in 30, you've got two vertical well logs that give you 55 feet and 29 feet. So it increases as you pass the south half of 25. Increases it to be better in the 2nd Bone Spring.
I might add that Legacy, before they drilled any of their 2nd Bone Spring wells and we drilled -- one, two, three -- four now, we did a study

on whether or not their direction orientation made any difference, and I did two studies. I did a regional study which included 1,620 square miles, which is basically the north half of the Basin, of 2nd Bone Spring laterals. There were -- of the east-west laterals, there were 333 2nd Bone Spring lay-down laterals. North-south laterals, there were 318. So the industry doesn't make a distinguish -- distinguishing feature about which orientation is better.

So then I went to a little bit more local area. I did a 2-and-a-half-mile -- square-mile area, which includes only 20 South, 34 East and 27-35 East [sic], and there are eight wells in each type of orientation. There are eight wells in the east-west orientation. A 30-day IP of those eight wells is 633 barrels. A 180-day cum of those same east-west laterals is 70,805. Now, for the north-south wells, there were eight of those. The 30-day IP was 511. A 180-day cum was 68,414. So from this study, we assume that there was not any preferred orientation difference in regards to production. They were just about dead even either way you went.

Q. Directing your attention, again, to Exhibit 9, what's your interpretation of the net pay interval in the southwest quarter of Section 19?

A. I think the 2nd Bone Spring is -- the rock quality is a lot less in the southwest quarter of 19 compared to the northwest quarter of 19 and the west half of 18. So I think there would be an unequal allocation for a two-mile lateral or even a one-mile lateral in the west half-west half if we include Caza's acreage.

Q. And you talked about the 3rd Bone Spring and the 2nd Bone Spring. Have you done a similar exercise for the 1st Bone Spring?

A. That happens to be the next exhibit.

Q. That would be Exhibit 10?

A. Yes, sir.

Q. And did you prepare this document?

A. I did.

So the 1st Bone Spring is very similar to the 2nd and 3rd. It is a submarine canyon fan. It is oriented north-south. You map it with a net feet pay, is the best map to identify the boundaries of the reservoir. The thick there is right there in Section 13, and it thins as you go south and east of the unit.

Q. And what's your interpretation of the net pay in the southwest quarter of Section 19 in the 1st Bone Spring?

A. In the southwest quarter of 19, it looks like

that there is somewhere between zero and 25 feet of pay in the 1st Bone Spring. Northwest of 19, it looks like it is a little better. It can be as much as 30 feet of pay. And the west half of 18, it could be as much as 50 feet of pay based on contour interval.

I might point out a few key wells to kind of branch out to all of my text here. The northeast of 24, there's 54 feet of pay. That's that blue number. In the southeast of 24, there is 48. So both of those are pretty even. As you get into the northeast of 25, it's 21 feet of pay. And then 30, there's 28 and 11 feet of pay, so you can see it's a little bit -- degrades as you go east. Up there in 18, there was 21 feet of pay in the Blue Jay well. And in the Igloo 2H, they did run a log through the 2nd Bone Spring section and the 1st Bone Spring section. I can measure 16 feet of pay there. There appears to be some net feet pay in the 1st Bone Spring in the southwest quarter.

Q. Do you have Caza's exhibits in front of you there?

A. I do.

Q. I'd like to refer you to the pore volume and hydrocarbon pore volume maps. These are Caza Exhibits 11, 12, 18 and 19.

A. So on Exhibit 12 -- there are a couple of

things that are usually unique about industry standards when you're doing mapping to evaluate the boundaries of a reservoir. First of all, you want to -- you want to use a type of mapping system that you honor all control points that you have. Caza has 19 control points in 44 square miles, and it's the same 19 points for every map. They have omitted all of the deep wells in the unit with the exception of one, and that's in Section 13.

I did net feet pay isopaching, which identifies the reservoir and the reservoir boundaries. I had 35 data points in 12 square miles. I had 2.9 data points more than they did.

One of the things I want to point out about net pay volume maps, they're very good if you have lots of control. If you don't have a lot of control, then you're basically open to contour interpretation, is probably the best way to put that.

I want to call your attention to the well in the west half -- I'm sorry -- east half-west half of 31. I believe Caza already gave testimony that that was a thin well. Well, that's one of the smallest net pore volume points that they have, and yet that's the best 2nd Bone Spring well that they identify on Exhibit 25.

So, typically, the type of mapping system that you use, the industry standard is that your points

should fit your map. If you're trying to identify a reservoir and the reservoir boundaries, all points should fit your map. With that point being 12 and one of the lowest pore -- hydrocarbon pore volume points on the map and yet being the best well, that doesn't fit.

Q. In your opinion, does Exhibit 12, as well as Caza Exhibits 11, 18 and 19, have sufficient control points to identify the boundaries of the reservoir in the area Caza has mapped?

A. That's right. Please --

Q. I'll restate my question.

A. Would you please restate the question?

Q. Sure. In your opinion, do the Caza maps have sufficient control points to identify the boundaries of the reservoir in the area Caza has mapped?

A. Caza's map does not have enough control points to identify the boundaries of the reservoir.

The Legacy map identifies every control point that you have in the area that is deep enough to penetrate all the points, and, therefore, honor -- you know, use those as data points to honor your map.

Q. And looking again at Caza Exhibit 12, what well on that map is the most productive?

A. That's the well on the east half-west half of 31.

Q. And what is that well's hydrocarbon volume?

A. 12 feet.

Q. And staying with Caza Exhibit 12, as well as Caza Exhibit 26, in your opinion, does the fault designation on Exhibit 12 contradict contours on Exhibit 26?

A. Yes. If you would turn to Exhibit 26, I'll try to illustrate what that means. Exhibit 26 is a structure map in the 3rd Bone Spring. Typical industry standard is that you maintain a contour interval where you have good control, and you carry that contour interval all the way to the edge of a fault. If -- assuming there are faults in that horizon or map. If your contour interval starts to get thin or narrower, that's where the placement of the fault is normally put if you only have well controls as your data points.

Caza testified that the fault is east of the Blue Jay well, which is in Section 18. In fact, the major fault that we've identified on 3D is west of the well, and it's identified on all of my exhibits, as it runs kind of north -- southwest-northeast through that well.

Q. And referring next to Caza Exhibits 19 and 27, do you believe there is a similar contradiction between the hydrocarbon pore volume on Exhibit 19 and the

contour shown on Exhibit 27?

A. Yes. The Blue Jay well is a 7-foot hydrocarbon pore volume with data points, according to Caza's hydrocarbon pore volume calculations. Yet they refer that to be, on their own Exhibit 27, as the best well in the field. Again, the data doesn't seem to match the predicted EURs.

Q. When Caza made a proposal to Legacy about drilling a two-mile lateral in Sections 19 and 18, did you look at that proposal from a geologic perspective?

A. I did. I did.

I'll ask you to flip back to my structure map, which is Exhibit Number 7. If we were to drill a two-mile in the west half-west half of 18 and 19 in the 3rd Bone Spring, the portion that's in the southwest quarter of 19 would be downthrown 350 feet. To be able to steer that portion and get back up on the upthrown side would be 350 feet in the lateral that would create too many doglegs and create a problem for steering, as well as completion and drilling.

Q. And do I understand you correctly that where you have located the fault, that would create serious engineering and technical problems in drilling a two-mile lateral?

A. That's correct.

Q. In your opinion, do the pay intervals in each of the Bone Spring benches increase as you move north from southwest quarter of Section 19 into the west half-west half of Section 18?

A. That's correct.

Q. And given that Caza proposes to drill a horizontal well in the west half-west half of Section 19, do you believe that the pay would be similar across the producing lateral of Caza's proposed well?

A. If -- let me make sure I understand your question. If it's a one-mile lateral or --

Q. Yes. We were talking about the two-mile proposal. I'm back to their application.

A. Okay. So if it's a one-mile lateral, I think it would be unequal allocation in the 3rd Bone Spring interval because the control points I have very near their acreage is very near zero. So their contribution to that one-mile lateral would be very little.

Q. And what about the other two benches of the Bone Spring?

A. For the 2nd Bone Spring, it would be very near zero, and the 1st Bone Spring, there would probably be a little bit of contribution from Caza's southwest quarter.

Q. And in your opinion, would there be an

equitable allocation of revenues in Caza's proposal?

A. Inequitable allocation.

Q. And in your opinion, would the granting of Caza's application impair the correlative rights of Legacy and the other Lea interest owners?

A. Yes, I do.

MR. LARSON: Mr. Examiner, I'd move the admission of Legacy Exhibits 6 through 10.

CHAIRMAN CATANACH: Any objection?

MR. BRUCE: No objection.

CHAIRMAN CATANACH: 6 through 10 will be admitted.

(Legacy Reserves, LP Exhibit Numbers 6 through 10 are offered and admitted into evidence.)

MR. LARSON: I'll pass the witness.

CHAIRMAN CATANACH: Mr. Bruce.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Let's start with your Exhibit 7, Mr. McKamey. It seems to me, when you're looking at the west half of the west half of 18 and the west half-northwest of 19, looks like some of your wells are going to cross that fault, too.

A. No, Jim. In fact, we plan to drill that whole

well on the throw side of the fault. That's just a platting issue.

Q. Didn't you testify in the original hearing on this matter that yeah, there is a fault there, no big deal?

A. No. My testimony was that I did not have a 3D. And the fault trace that I put on my map in the first hearing was from public data. I've since gotten 3D and know exactly where that fault is.

Q. And looking at -- well, I don't care which one -- Exhibits 8 and 9 or both of them, you draw a zero line, that Caza has three existing wells there and apparently excellent wells. So your zero line on those plats, 2nd, 3rd Bone Spring, is meaningless, isn't it?

A. No, it's not, because if you look at the southwest quarter of 19, if you look right across the acreage boundary into the southeast of 24, that's a very thin well. It's only 11 feet. If you look southwest to the northeast of 25, it's zero. Now, I think that the 3H and 4H did encounter some rock quality up in the northeast quarter of 19. I think that's where they've gotten their production.

Q. You also have a -- looking to the south in Section 30, you also have a zero line going through there. And would you agree all of the Cimarex wells in

the 2nd Bone Spring of Section 30 are pretty good wells?

A. They are good wells.

I might also point out that there is not a value that you can put on the north half-north half of 30 because there is no vertical pilot-hole log. In fact, there could be some net feet pay there, just no data point to honor it.

MR. BRUCE: That's all I have, Mr. Examiner -- I mean Mr. Chairman. I do it every hearing. Sorry.

CHAIRMAN CATANACH: You do it every time.

COMMISSIONER PADILLA: Demerit.

MR. BRUCE: Habit.

CHAIRMAN CATANACH: Mr. Balch, why don't you take off?

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. Good afternoon, Mr. McKamey.

A. Good afternoon.

Q. I'm a geophysicist. I'm going to talk about your sonic data. And I'll just remark that every time somebody talks about seismic data, they never show it to me. Very disappointing.

Anyway, you're saying the throw is about seven times higher than what Caza was claiming on that

fault, 350 versus 40 to 50 feet?

A. Uh-huh.

Q. That's based on seismic?

A. Both seismic and well control. I pointed that out on Exhibit Number 7. The closest downthrown -- downdip well in our unit is the northeast to 25, 7,344, and then the Blue Jay well, 7,687. So that's 344 feet right there.

Q. Do you have -- did you get a sense of the timing of that fault?

A. I -- I know that it affects the 2nd Bone Spring interval, but not much. We have encountered the fault -- the east-west fault on the north side of our unit through steering, and we see in the MWD gamma ray about a 15-foot offset.

Q. At the 2nd Bone Spring?

A. At the 2nd Bone Spring.

Q. So primarily lower or --

A. 2nd and 3rd.

Q. 2nd and 3rd.

A. Correct.

Q. So it doesn't affect the 1st at all?

A. Probably doesn't. If so, very minimal. We can't notice it. We can't see a 15- to 20-foot throw in seismic, but we can sure see 350-foot throw.

Q. That's rather dramatic.

I mean, kind of based on your testimony, I got the feeling that that northwest quarter is not all that special.

A. Of 19?

Q. Yes.

A. In which zone?

Q. Well, I think it might be only, really, in the 3rd Bone Spring, according to your map.

A. It looks like it has an average of 20 feet in the northwest quarter of 19 for the 3rd Bone Spring and maybe an average of 18 to 20 feet in the 2nd Bone Spring in the northwest quarter. So I think it'll contribute to the lateral. I don't think it'll contribute as much as the west half of 18 as a prospective, but I think that it will contribute, in my opinion.

Q. But compared to the parts of the well in Section 18, that other mile. It's not to scale.

A. In 18?

Q. In Section 18. You're drilling your laterals a mile and a half north -- south to north.

A. Right. Uh-huh.

Q. And that first half mile is going to be worse than the other mile?

A. That's correct. It won't be as good, but it

should contribute.

Q. And it seems like Caza needs some wells in the 2nd Bone Spring -- I'm sorry -- yeah -- 2nd Bone Spring in the east half of Section 19, enough to encourage them to drill the next two wells in the west half.

A. I'm sorry. I didn't quite follow you. Would you mind repeating that?

Q. In Section 19 --

A. Yes, sir.

Q. -- east half --

A. East half.

Q. -- two horizontal wells --

A. Right.

Q. -- three horizontal wells.

A. Yeah.

Q. The 2nd --

A. And two-thirds. Uh-huh.

Q. Two-thirds.

Production of those wells was sufficient for them to want to do the same thing in the west half.

A. Uh-huh.

Q. Those are both -- I think all of those wells would not be very good, based on your map.

A. Well, if you'll notice, I did honor, in the 2nd Bone Spring, the 31 foot of pay, and this is Exhibit

Number 9.

Q. Pulls it out. Yes.

A. Yeah. There is 31 feet of pay in the Blue Jay well, which is west half-east half of 18, and 53 feet of pay in the 2H well that Caza drilled. So I do think there is 2nd Bone Spring on the north end there. I think it's very thin and very near zero in the southwest quarter. That's really my distinction in the 2nd Sand.

Q. And in part of the section -- or in part of the Lea, you want to drill a mile and a half?

A. Uh-huh.

Q. Looks like you could easily stay on either side of that fault.

A. I could -- I could do it either way. I could drill on the downthrown side or the upthrown side.

Q. If you were to add that extra half mile to the south, you'd only have to cross the fault once or the well that would be furthest west?

A. That's right. That's probably true.

Q. So maybe it's not terribly complicated. You're making one jump instead of several jumps to try and cross over it more than one time.

A. Except for the dogleg to jump 350 feet would be too much to get your pipe down.

Q. I know you're not the petroleum engineer

drilling guy, but there was some testimony earlier that there is barely any more money to drill an extra half mile.

A. Is that -- are you asking is that the case with Legacy?

Q. Yeah.

A. We have drilled both a mile and a mile and a half, and there is a difference. And I'll let Pat Darden testify to that later because he's got a full exhibit to show that.

Q. Great. Thank you very much.

A. You're welcome.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. Just a couple, Mr. McKamey. In the northwest quarter of 19, you've stated there is about 20 feet of net pay in the 3rd Bone Spring?

A. 3rd? It looks like it should be an average of about 20 feet. Yes, sir.

Q. And in the 2nd, it's 18 to 20?

A. Net pay, yes, sir.

Q. What would you estimate to be the 1st?

A. The 1st in the northwest quarter, it would be somewhere on average of 16 to 18, probably.

Q. So moving to the southwest, how would you

characterize that in terms of the three intervals in terms of the net pay for, say, an average?

A. Southwest of 19?

Q. Yes, sir.

A. For the 1st Sand in there, an average would be somewhere about the same, 15, 16, 17 feet. For the 2nd Sand in the southwest of 19, very near zero, because I don't have any wells that tell me that there is porosity offsetting it. And in the 3rd, very near zero.

Q. So would that same -- if they can apply to the southeast of 19, does that increase --

A. The southeast of 19 doesn't look as good in the 1st Bone Spring. But I might add, I don't have any control points east for the 1st. The control points I have are north and south, basically. For the 2nd Bone Spring, I don't have any control points east, but I do have control north and south. And it looks like the southeast of 19 would be very near zero for the 2nd Sand, and for the 3rd Sand, very near zero as well.

Q. So then it's your opinion that those three producing wells in the east half are getting most of their production from the northeast quarter?

A. Yes, sir.

I do think that it's a possibility that the 3H well that they recently drilled may have also fracked

into some Wolfcamp interval if they targeted the same interval that Blue Jay did -- that Concho did on the Blue Jay well.

Q. So based on your geologic opinion, what are the prospects of drilling east-west wells in the south half of Section 19?

A. I think they have quite a few possibilities. For -- let's start off with the 3rd Sand. The 3rd Sand, the preferred orientation is north-south. I do not deny that. Most of the wells have been drilled that direction. If they chose to drill 3rd Sand in the southwest quarter of 19, they can pool the west half of 30 and do a mile and a half.

For the 2nd Sand, you can go north, south, east or west, but they have the option of pooling with the south half of 24 and making a mile-and-a-half lateral in the southwest of 19.

I might point out that if they hadn't already drilled their 4H well, they could have gone the entire length of the south half in a lay-down, and then if they wanted to drill a 2nd Bone Spring up in the northeast quarter of 19, they could have pooled with Section 20 just to the east of it and done a lay-down on that.

As far as the 1st Bone Spring, they have

options to go east-west for a mile and a half into the south half of 24 or north-south into the west half of 30 and pool with offset operators there. And that would be outside the unit, so there wouldn't be any conflict with the -- with the unit.

Q. So it doesn't sound like, in your opinion, any of the options would be limited to just the south half of Section 19.

A. They could drill a 1st Bone Spring in the south half of 30 for a full mile. And had they not already drilled the 4H, they could have drilled a full mile in the 2nd Bone Spring. But they chose to do that after the first hearing, limiting their own options at this hearing.

MR. LARSON: Mr. Chairman, excuse me, a point of clarification.

Did you mean Section 30 or Section 19?

THE WITNESS: Section 19.

Q. (BY CHAIRMAN CATANACH) So what would be your opinion be if they did drill a 1st Bone Spring in the south half of 19? Would that be a good well?

A. I think that would make a well. And they have the option of going a full mile and a half down into the west half of 30, or they could drill an east-west lateral in the south half of 19. And half the lateral,

looks like it has net feet pay of average anywhere from 15 to 17, 18 feet.

Q. So in the 2nd and 3rd, you don't see any potential drilling in the east half or south half where they already drilled some east-half wells?

A. Yeah. They've already limited that option to do that.

Q. So really any other option would still require them to combine their acreage with some other acreage?

A. Exactly.

RECROSS EXAMINATION

BY COMMISSIONER BALCH:

Q. And every formation there, you have their acreage being the worst part.

A. Yes, sir, I do.

Q. So not many people would be inspired to partner in that case?

A. That's exactly why we don't want to. We don't want to have their rock quality combined with ours.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Mr. McKamey, so you think it's not only probable but very realistic that all the production in the 3H and 4H is coming from the northwest of 19?

A. Probably the north half of their laterals, yes,

which would be the northeast of 19.

Q. Do you think that that area is productive enough to make some good wells and essentially turn 160s into 80s and make them productive?

A. Obviously, it is good enough. They've testified they've got a very good well. I don't doubt that. You know, I'm a geologist so I have to use the data that I have, and the data quality shows that the rock quality deteriorates as you go through -- southwest quarter.

Q. Your comparative analysis is kind of interesting, about the 2nd Bone Spring horizontals in the area, 330 west, 318 north -- north-south. Is there any reason you picked the 2nd Bone Spring, or did you do any other comparative analyses on the 1st and 3rd, or did conventional wisdom kick out the 3rd? What was the thought process on that?

A. They had three or four exhibits by Yates people that said that the preferred direction is north-south, and I don't think it's that way. I think it can be as good east-west as it could be north-south.

Q. You said earlier that you agreed with them as far as the 3rd Bone Spring going north-south is preferable there.

A. It seems to be the preferential.

Q. What about for the 1st?

A. You know, there's not any 1st Bone Spring wells drilled in the area. We have drilled two, and Cimarex drilled one offsetting us. They're all north-south. So we don't have comparison for an east-west. So really the only data points we have are north-south in the 1st Sand.

Q. Okay. That's all I have. Thank you.

A. You're welcome.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. A couple of follow-up questions, Mr. McKamey. So I take it that your location on the fault differs from Caza; is that correct?

A. Yes, sir, it does. It's very possible that Caza did see a fault in the drilling of their well. I would submit it's probably a splinter fault, and subseismic -- I can't see it on seismic, but we can definitely see the one I've illustrated.

Q. So would you describe the one they encountered as a minor fault?

A. Yes, sir, I would.

MR. LARSON: That's all I have.

RECROSS EXAMINATION

BY MR. BRUCE:

Q. But if Caza's application was granted, they could -- based on any of your exhibits with the location of the fault, it could drill wells on the downthrow side of the fault?

A. Okay. Jim, if you would clarify for me, for the one-mile lateral, you're talking about on the west half of 19?

Q. Yeah.

A. If it was granted, I think that they -- in the west half stand-up, if it was granted, I think they could definitely make a 1st Bone Spring lateral. I show rock quality to be about the same.

Q. No. That's not what I'm asking.

A. Okay.

Q. Just pick out -- let's say Exhibit 9. It doesn't really matter. I'm just talking about the fault that you have on your plat.

A. Yes, sir.

Q. They could drill their west half-west half wells all on the downthrow side of the fault, correct?

A. They could, yes. In the 2nd? Yes, they could. Just remember the 2nd Sand isn't offset much by the fault. It's probably not affected that much.

Q. But same thing with the 3rd Bone Spring, they could also drill their well completely to the east of the fault?

A. They could drill. As a matter of fact, their 62 location is on that --

Q. Thank you.

MR. BRUCE: That's all I have.

CHAIRMAN CATANACH: This witness may be excused.

MR. LARSON: Mr. Chairman, may we have a five-minute break before I start with Mr. Darden?

CHAIRMAN CATANACH: Good idea.

(Recess 2:24 p.m. to 2:37 p.m.)

CHAIRMAN CATANACH: We'll call the hearing back to order and turn it over to Mr. Larson.

DONALD PATRICK DARDEN,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Good afternoon, Mr. Darden.

A. Good afternoon.

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

A. Donald Patrick Darden.

Q. And where do you live, sir?
A. In Midland, Texas.
Q. And by whom are you employed and in what capacity?
A. I'm employed by Legacy Reserves, and I am a senior engineer advisor.
Q. And what is the focus of your responsibilities as a senior engineering advisor?
A. I watch over the operations in Lea County, New Mexico and oversee and help some of the under-engineers as well.
Q. And does your focus include Legacy's development in the Lea units?
A. Yes, sir.
Q. Have you previously testified in a Division hearing?
A. Yes, sir.
Q. And did the Examiner qualify you as an expert of petroleum engineering?
A. Yes, sir.
Q. Have you testified in a Commission hearing?
A. Commission hearing?
Q. (Indicating.)
A. No, sir, I have not.
Q. And given that, would you briefly summarize for

the Commissioners your educational background and professional experience?

A. Yes, sir. I received a petroleum engineering degree, my bachelor of science, in 1983 from Texas Tech University. From 1983 to 1987, I worked in various -- with various companies, very difficult times, as most of you-all probably remember, as an engineer during that time. In 1987, I went to work for Occidental/OXY Petroleum and worked ten years for them, from '87 to '97, and then I went to work for XTO Energy from '97 to 2007. And in 2007, I came to work for Legacy Reserves and have been there ever since.

Q. Are you a registered professional engineer?

A. Yes, sir.

Q. In the state of Texas?

A. State of Texas, uh-huh.

MR. LARSON: Mr. Examiner, I tender Mr. Darden as an expert in petroleum engineering.

MR. BRUCE: No objections.

CHAIRMAN CATANACH: Mr. Darden is so qualified.

Q. (BY MR. LARSON) Mr. Darden, you heard some from Mr. Roberts and Mr. McKamey about Legacy's consideration of Caza's proposal to do a two-mile lateral; is that correct?

A. Yes, sir.
Q. Were you part of that team that analyzed --
A. Yes, sir, I was.
Q. And from an engineering standpoint, how did you assess the possibility of doing a two-mile lateral?
A. Okay. There were several legs to that, first one being from a drilling and completion point, a two-mile lateral is much more difficult. When you're getting in another half mile, you require a bigger drilling rig, probably heavier pipe, as you're going to have to probably -- you will encounter higher pressures on the toe end of that lateral to initiate a frac. We do see some difficulty in mile-and-a-half laterals. So we would anticipate seeing those magnitude greatly.

You're going to have issues with completions. And like I said, the drilling, you're going to have to have a bigger drilling rig, have a bigger pipe, and you just see some things happen in that -- at that extra half mile out that we don't anticipate -- we don't encounter in a mile-and-a-half lateral.

Beyond that, I did do a study -- the second leg of this tool would be a study on the wells in the general area of two-mile laterals in the Bone Spring. And there are none in the, you know, immediate area.

There are four down to the -- six miles to the south that Concho has drilled, and there is one that I found 15 miles to the west.

I'm going to talk about the study I did to the south because it's the closest, and there were four wells drilled there by Concho. It's the Osprey lease. One of the things I noticed about the #1H -- Osprey #1H, it was drilled as a two-mile lateral, but the completion interval was only a mile and a half. They started pretty far back from the toe, what I'll call your first take point, the toe. They started almost a half mile back. So I don't know why they did that. They might have anticipated some issues with getting that fracture initiated. I don't know what happened, but I did notice that they did not have a full two-mile complement on that.

The other three wells did, and I generated a type curve on that. And the type curve for those three wells --

The other thing is, to go back to the drilling and completing, your cost will go up significantly because of the issues of having larger equipment and because of higher pressures, fracture. So I did look at that.

I generated a type curve on a two-mile

lateral in the 2nd Bone Spring Sand, and I used a cost of $7 million and saw a 30-day IP. These three wells combined to a type curve of 600 barrels of oil a day and 600 mcf a day, which gives us a 700 MBOE per day equivalent rate. My EUR calculations were 383 MBOs, plus 61 MBOE equivalent of gas, a six-to-one ratio, to give me about 445 MBOEs. At those costs, the rate-of-return hurdle is okay. It's 32.62 percent rate of return, one year, nine-month payout.

What was significant to me was I did not see an advantage as far as MBOEs. Your EUR was not -- in some cases, it was lower than wells you're seeing in the mile and a half. It might be the area. Don't know. But it will be more difficult and more complicated to drill a two-mile lateral.

Q. And in your opinion, did Legacy give serious consideration to Caza's proposal to do a two-mile lateral.

A. Yes, sir. We did a pretty thorough study.

Q. And Chairman Catanach asked Mr. McKamey a question about the difference between drilling a half-mile lateral and a mile lateral, and he punted it to you. So I'm going to ask you to answer that question.

A. Okay. Could you repeat the question?

Q. The question was what's the difference between the completion cost between a half-mile lateral and a mile lateral?

A. Okay. I believe that we are drilling mile-and-a-half laterals, 5.5 million, and with a mile and a half versus a mile --

Q. No. A half mile and a mile.

A. Oh, okay. I have not looked at the cost of a half-mile lateral. I know what we are drilling mile laterals for, which is $4-and-a-half million. And I would say it would probably be in the range of 3-and-a-half to 3.75 million. The significant cost is on your completion.

Q. I direct your attention to Legacy Exhibit Number 11 and ask you to identify it.

A. Exhibit 11? Did we want to discuss Exhibit 4 first?

Q. Sure.

A. I can skip to 11 if you want me to.

Q. Well, you know, I think other witnesses have covered Exhibit 4, so let's go ahead and move on to Exhibit 11.

A. Okay. Will do.

Okay. Exhibit 11 is a stick diagram that shows the west half -- west half-west half of Sections

19 and 18. It shows Legacy's current development plan versus Caza's proposal.

Q. And what is the comparison in Exhibit 11?

A. It shows that Legacy and their current development plan, which has been discussed at length today, I think, by several others, is that our plan is to drill one-and-a-half-mile laterals initiating in the southwest -- the northwest quarter of Section 19 going all the way up to the north end of Section 18. We would drill a 1st Sand, 2nd Sand and a 3rd Sand, Bone Spring Sand, in the lateral of each one of those, in that west half of the west half.

It compares -- with Caza's proposed application for the west half of the west half of Sections 18 and 19, it shows their proposal to drill three mile-and-a-half -- mile laterals starting in the southwest quarter of Section 19, coming up into the northwest quarter of 19. And they would drill -- ultimately drill 1st Sand, 2nd Sand and the 3rd Sand as well in that. And if that is permitted, Legacy will be required to change their development plan to drill three one-mile laterals in the -- in Section 18 also in the 1st Sand, 2nd Sand and 3rd Sand of the Bone Spring.

Q. So in your top box under Section 18, those would be Legacy mile laterals?

A. Yes, sir. That would be a Legacy mile lateral.

MR. LARSON: Mr. Chairman, I may have misinterpreted your question. Are you looking at the difference of a half mile and a mile or a mile and a mile and a half, the cost difference?

CHAIRMAN CATANACH: Probably a mile, mile and a half.

MR. LARSON: Okay.

THE WITNESS: Do you want me to elaborate on that?

Q. (BY MR. LARSON) I would.

A. Okay. The difference that we're seeing is a million dollars, is what we're seeing. We're going from 4.5 million for -- we're going from 4.5 million for a mile lateral to 5.5 million for a mile-and-a-half lateral. Is that clear?

Q. Yes.

MR. LARSON: Does that answer your question?

CHAIRMAN CATANACH: Yes.

Q. (BY MR. LARSON) At the bottom there of Exhibit 11, the blue box, the designation of a tank battery, has that battery been built?

A. No, sir.

Q. And why is it showing --

A. The reason to show this tank battery is if this order is allowed -- and this has been discussed earlier -- there will have to be another tank battery constructed and built and put into service because of the wells that are initiating outside of the unit. And that is required because of the allocation -- or what the allocation -- production --

Q. Would you next identify the document marked as Legacy Exhibit 12?

A. Yes, sir. Okay. Exhibit 12 is -- we're going to refer back to Exhibit 11 when we talk about Exhibit 12 -- is the parameters for what we discussed in Exhibit 11 for the mile-and-a-half laterals versus the one-mile lateral in the west half of the west half of Sections 19 and 18.

Q. Could you explain what those costs factors are?

A. Exactly. If you look at the left side of this page, that's Legacy's current development plan for the west half-west half of Sections 19 and 18. Our current development plan is to drill three one-and-a-half-mile laterals, one in the 1st, 2nd and 3rd Bone Spring Sand. Our initial drill, complete capital investment and cost for those one-and-a-half-mile laterals is $5.5 million each. We show no additional facility cost. And a total investment, therefore, would be $16-and-a-half million

for that mile and a half -- those three mile-and-a-half laterals.

If you look over on the right-hand side, this is Caza's proposed application for the west half-west half of Sections 19 and 18. They are proposing one one-mile lateral in the 3rd Bone Spring Sand, and at full development, there would be six one-mile laterals, referring back to the -- three of those in the south end would be the Caza laterals, and then three in the north end would be Legacy's laterals.

The initial drilling, complete capital investment for a one-mile lateral as presented in Caza's AFE is $5.2 million. We would have to do a reallocation of our Legacy tank battery that would increase -- tank battery that is allocated to, the increase would be $157,000 there, and we would have to build additional roads to the -- to the new locations or pads that we would have to drill -- drill off of for the mile laterals on the north end. And then the sump cost that we have on our location, the 59H, has been $200,000. Our total investment there would be $31.7 million. That increases Legacy's and their partners' drilling and complete costs by $15.2 million.

Q. And could you state the basis for your reallocation of tank battery cost of the $157,000?

A. Sure. I'd love to do that.

Can we go back and look at Exhibit 2? Go back to Exhibit 2 because I can explain it to you a lot easier. If you've got Exhibit 2 pulled up, this has been explained quite well in earlier testimony. But if you'll look in the south end of this picture, this diagram, you'll see the black square that says "South Battery." And then you'll see the well drill pads 3, 5, 7, 9, 11 and 12, which the well pads have been discussed earlier. But the south tank battery has already been constructed by Legacy Reserves. It has been in service now for a month, six weeks, whenever we brought our first well on in the south end.

And the way this battery -- it cost approximately $950,000 to construct this battery, and it was sized on assuming every well on these drill pads would go to that battery, and the cost was allocated per well on the AFE for that $950,000.

If you take out the three wells, it will have to be -- if Caza gets their ruling, then three wells will be taken out of that on an allocation basis, and that has to be -- that $157,000 is spread out over all the other wells remaining in that battery.

Q. And on Exhibit 12, you have a sump location cost of $200,000. Is that for the multi-well pad?

A. That is for the multi-well pad, which would be pad 11, and we've already constructed that pad. That cost includes construction, surveying, damages and other associated costs.

Q. And if Caza's application were granted, would you lose that $200,000 investment in that well pad?

A. Yes, sir. It would be considered a sump cost. And Clay did bring something up good, too. We would have to remediate that pad.

Q. The surface?

A. Yes, sir, which would probably be a significant cost that we did not include.

Q. And are there additional economic impacts to Legacy based on Caza's proposed well?

A. Yes, sir, there is.

Q. Put those up on the whiteboard?

A. Yes, sir. I'd like to.

Q. Maybe we should bring in Exhibit 13 first.

A. Okay.

Q. Would you identify that, the document marked as Exhibit 13?

A. Yes, I can. Exhibit 13 is similar to Exhibit 11. This shows -- this is taking into consideration the west half of Section 19 and 18, not just the west half of the west half. So this would be at full development.

So you're seeing -- on Legacy's current development plan on the left-hand side of the page, everything is -- is what happens here.

So we would -- we would drill -- our current plan is to drill six laterals in that mile-and-a-half -- mile-and-a-half lateral, two in the 1st, two in the 2nd, two in the 3rd.

If you go over to the right-hand side, this is Caza's proposed application in the west half of Sections 19 and 18. They would be drilling six wells, six one-mile laterals, in the southern portion of this diagram, two in the 1st, two in the 2nd, two in the 3rd. And then Legacy would be required, because of the change in plans -- in our development plan, to drill one-mile laterals. It's depicted in that north part of that diagram, two in the 1st, two in the 2nd, two in the 3rd Bone Spring Sand.

Q. And does this scenario depict and is Exhibit 13 assuming BLM authorization of new multi-well pads for one-mile laterals?

A. I'm sorry. Repeat your question.

Q. Does your scenario assume BLM authorization of new multi-well pads for mile laterals?

A. Yes, sir.

MR. LARSON: Mr. Chairman, Mr. Darden would

like to use the whiteboard.

CHAIRMAN CATANACH: That's fine.

THE WITNESS: Okay. You-all have seen this diagram earlier. I've just taken this, and I want to show you something. This is as proposed -- and I'll kind of show -- I'm going to go ahead and draw in full development, since we've gone over that. So that would be six more mile-and-a-half laterals -- I mean mile laterals, which takes us to a total of 12.

So what I want to show here is that there is economic impact to Legacy on drilling the one-mile laterals versus the mile-and-a-half lateral. The distance from here to here to here to here, these are each 330 feet. That's the stand-back requirements for a well.

That 330 feet for three wells -- well, actually, if you take 330 feet and you get it into an acre, that is 20 acres per well that is lost from this 660. So if we are not allowed -- this is a one mile. I'm sorry. There's the unit boundary right there. So we'd be drilling one-and-a-half-mile laterals. We're going to lose that 660 feet, at a minimum. That 660 feet converts to 20 acres per well slot. If you have three wells per slot, 240 acres times 20 is 60 acres, and if you take this at full development, double that,

that's 120 acres. We consider that stranded acreage. And that's getting into the really good quality reservoir, as per Keith's geology. So that would be 120 acres that we would find stranded, and that does have an economic impact on us significantly.

Q. (BY MR. LARSON) And what would be the impact or loss of reserves in terms of barrels?

A. Per well -- we have not gone through the economics yet. So could we wait and do that during the economics?

Q. Yeah.

A. That way it will be easier for you-all to understand when we have that diagram up.

Let me go through Exhibit 14 to get us up to this full -- the impact that it affects Legacy with.

CHAIRMAN CATANACH: Before you do that, would you just identify the exhibit for the record?

THE WITNESS: Yes. Exhibit 14 is the parameters -- the development parameters at full development. If you look at the -- this is very similar to Exhibit 12 except at full development. If you look at the right-hand -- left-hand side, Legacy's current development plan for the wells in Sections 19 and 18, would be six one-and-a-half-mile laterals, one in the 1st -- two in the 1st, two in the 2nd and two in the 3rd

Bone Spring Sand.

Our initial drilling and complete cost or investment for a mile-and-a-half lateral would still be 5.5 million, no additional facility cost, for a total investment of $33 million. That's six times 5.5.

Right-hand side to Caza's proposed application for the west half of Sections 19 and 18, they propose one one-mile lateral. In the 3rd Bone Spring, full development, there would be six mile -- six mile laterals on the south end of -- or the west half of Section 18 and six one-mile laterals on the -- in the west half of Section 19. Those in Section 19 are Legacy wells, and the ones in Section 18 would be Caza's wells.

The initial cost to drill those wells would be 5.2 million per well, Caza's AFE cost. And then the reallocation of the tank battery doubles because you're taking three more wells out of that previously described cost of the already built battery. The road cost, two locations, doubles, 250 and 125. And then the sump location cost is $400,000, which is double. It's 200,000 per location, per pad, which brings us to a total investment of 63.4 million, and that increases labor -- DMC cost by $30.4 million.

Q. (BY MR. LARSON) I'll next ask you to identify the document marked as Exhibit 15.

A. Yes, sir. Exhibit 15 is projected one-and-a-half-mile type curve. The one-and-a-half-mile type curve shows the anticipated only gas and water that would be produced for a mile-and-a-half lateral in the 3rd Bone Spring Sand. And we'll use this in our economic evaluation here in just a minute.

Q. And would you identify Exhibit 16?

A. Exhibit 16 is a projected type curve for a one-mile lateral in the 3rd Bone Spring Sand. It too shows the oil, gas and water production anticipated for a one-mile lateral in the 3rd Bone Spring Sand. And we'll use this in our economic comparison of the well.

Q. So would I be correct to say that Exhibits 15 and 16 provide the basis for your economic parameter exhibits that are 17 and 18?

A. Yes, sir.

Q. And would you identify Exhibit 17?

A. Exhibit 17 is the economic parameters that Legacy uses for their mile -- mile -- mile-and-a-half and mile laterals.

If you look at the left-hand side of the page of the 7,500-foot lateral, we're projecting our production as per the type curve that we described earlier. We used the NYMEX strip dated 10/27/16. We had an operating expense built on the economics of

$18,000 per month for the first two years and then $5,000 for the remaining life of the project. We use an oil differential of minus $3.84. We included a saltwater disposal cost of 30 cents per barrel. We assumed a 100 percent working and a 75 percent net revenue interest, and we use a drill and equip cost of $5.5 million per well.

If we look over on the right-hand side, for a mile lateral, 5,000-foot lateral, we used a projected type curve, the rate from that as shown in the earlier exhibit, same NYMEX strip, 10/27/16, same operating expense of $18,000 per month for the first, second -- first two years, and then for the remainder of the life, we used $5,000 per month. Same oil differential at minus $3.84, same saltwater disposal cost of 30 cents per barrel, same working interest of 100 percent, and rate is 75 percent. And we use Caza's investment to drill and complete the well of $5.2 million.

Q. And what's your interpretation of the comparison between a 7,500-foot lateral and 5,000-foot lateral, which Caza proposes to develop?

A. Well, the cost per lateral length is much less on a mile-and-a-half lateral versus a mile lateral, $300,000 only more. And that might have to do with operational efficiencies. I'm not sure. But from an

economic standpoint, it will talk about Exhibit 18, which is the economic results that we use. Exhibit 17 was the input for that. On a 7,500-foot lateral, we show an oil EUR of 811,000 barrels of oil, a gas EUR of 1.327 mmcf, gives an ultimate -- estimated ultimate recovery of 1.033 MBOEs, which generates a bulk [sic] barrel of oil equivalent of 138 and generates a rate of return of greater than 100 percent.

The 5,000-foot lateral generates an oil EUR of 529 MBO, a gas 865 mmcf, estimated ultimate recovery of 673 MBOEs or BOEs per foot of 135 and rate of return of 52 percent.

So from an economic standpoint, we said it's more lucrative to drill a 7,500-foot lateral.

Q. And in your opinion, is it more economically efficient to drill a 7,500-foot lateral?

A. Yes, it is.

Q. And does a 7,500-foot lateral more effectively produce reserves?

A. Yes, sir.

Q. Going back to your diagram on the whiteboard, can you quantify the amount of reserves that would be lost as a result of the stranded acres you put in your diagram on the whiteboard?

A. Sure. Okay. On a mile-and-a-half lateral --

sorry, guys -- show EUR of 1.033. Okay. A mile-and-a-half lateral has a 240-acre proration unit, is what it has. If we lose this 20 acres -- let me jump over here -- 20 into 240 equals about 8 percent. That 660 feet is a loss of 8 percent of that -- of that lateral, which translates into 83 MBOEs per well. So if we have to go to this type on the development plan, we're going to strand 20 acres per bench and we will lose 83 MBOEs per well. And it may be more if we have to put our well pad right here and we have to drill. It takes us 400 feet to get to 90 degrees. And that will significantly even more affect our EUR.

Q. And you don't have 100 percent discretion on where you put a well pad, do you?

A. No, we don't. Just depending upon the BLM.

Q. I now direct your attention to Legacy Exhibit 8, which is Mr. McKamey's net isopach map for the 3rd Bone Spring.

A. Okay.

Q. Are you there?

A. Yes, sir.

Q. What did Mr. McKamey show as net pay in the northwest quarter of Section 19?

A. Northwest quarter of Section 19?

Q. Yes.

A. It's about 20 percent.

Q. And what does he show for the net pay in the southwest quarter of 19?

A. It's shown to be less than one, zero, but we call it one because of the Blue Jay well.

Q. And based on those net pay figures, have you done a volumetric analysis --

A. Yes, sir, I have.

Q. -- of the allocation of reserves of Caza's project?

A. Yes, I have.

Q. And what was the result of your analysis?

A. What I found was -- let me get my notes here. Okay. I found that if Caza is granted the ruling, that there will be an unequal allocation of reserves in this mile lateral.

Q. Have you broken it down into percentages based on --

A. Yes, I have. Assuming a 20-foot net pay for Legacy Reserves in the northwest quarter of Section 15, we would contribute 614 MBOs. If Caza contributed 1 foot in the southwest quarter of Section 19, they would contribute 31 MBOEs. Legacy would be contributing 95 percent of the reserves, while Caza would be providing or contributing 5 percent of the reserves.

And that's an extreme --

Q. Did you also run the numbers on Caza contributing based on a 7 net pay in the southeast quarter?

A. Yes, I did. If Caza contributed 7-and-a-half net feet, they -- their contribution -- Legacy's contribution stays at 614 because we're just assuming using a 20-foot net pay. If their pay was 7-and-a-half feet, they would contribute 232 MBOEs. Legacy would be contributing 73 percent, and they would be contributing 27 percent, which is an unequal allocation.

Q. So in your opinion, would there be inequitable allocation of reserves if Caza's application is approved?

A. Yes, sir.

Q. In your opinion, would the granting of the application negatively impact Legacy's development plans in the northwest quarter of Section 19?

A. Yes, sir.

Q. And in your opinion, would the granting of the application cause waste and adversely impact the correlative rights of Legacy and other interest owners in the unit?

A. Yes, sir.

Q. And were Legacy Exhibit Number 11 through 18

prepared by Legacy's engineering department under your direction and supervision?

A. Yes, sir.

MR. LARSON: Mr. Chairman, I move the admission of Exhibits 11 through 18.

MR. BRUCE: No objection.

CHAIRMAN CATANACH: Exhibits 11 through 18 will be admitted.

(Legacy Reserves, LP Exhibit Numbers 11 through 18 are offered and admitted into evidence.)

MR. LARSON: And I pass the witness.

CHAIRMAN CATANACH: Mr. Bruce.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Just a few questions, Mr. Darden. When you're talking about Concho's two-mile-long horizontal wells --

A. Uh-huh.

Q. -- when were they drilled?

A. Let me grab my notes here.

I need to get down to the individual -- first production on the Osprey 20 State Com 1H was 3/2015. The 2H was 7/2015. So anywhere from 3 to 7/2015.

Q. Just briefly, on Section -- on Exhibit 12 --

excuse me. Are you aware that a location road has already been built out to these proposed wells?

A. Yes, sir. It's shown in Exhibit 2. Yes.

Q. No. I'm talking regarding Caza's proposed wells to the south, that a new location road has already been built for those roads?

A. I'm not aware of that. But in my evaluation, it does not play into that.

Q. Now, on the board, in your calculations -- first of all, the very last thing you did was drill a proposed well location in the southwest quarter-southwest quarter of Section 18, and you said you might lose additional footage of lateral by doing that. Well, why not drill to the south in Section 19, like off-lease, just like your proposal is now? Your proposal for the one-and-a-half-mile laterals has well locations in the southwest quarter of Section 19; is that correct?

A. Yes, sir. Let me look at this exhibit real quick.

Okay. The reason we're not going to do that -- we don't want to do that is because we would prefer to have our -- prefer to have our toe in the medial part of the reservoir. You could have -- you could have probably less pay in the -- net pay with the

toe at the -- in there on the south end.

Q. My question, though, is: Why can't you drill -- if you were forced to drill one-mile laterals in Section 18 --

A. Uh-huh.

Q. -- you could move the well location south to Section 19; could you not?

A. Are you talking about starting up here (indicating)?

Q. No, no, no. To the south in Section 18.

A. Oh, right here (indicating)? We could do that?

Q. Yes.

A. Well, we have a 330 stand-back on each side of that because that changes the minerals --

Q. Not for the surface locations, you don't need that.

A. We still have to be 330 feet from here (indicating).

Q. Okay. But you're not talking surface location. You're talking that 330 feet?

A. That's right.

Q. Okay. I understand what you're saying. But your well locations for the proposed mile-and-a-half laterals are not on Lea Unit acreage?

A. That's right. But our first take point will be

330.

Q. Sure. Sure. That's what everybody shoots for. You could get an unorthodox location, minimize the distance?

A. We could attempt to, yeah.

Q. But if Caza was forced to drill -- and they don't want to do it. But if they were forced to drill 80-acre stand-ups, they would also lose that same 330 feet on each edge, correct?

A. Yes, sir.

Q. They would be facing the same problem?

A. Uh-huh.

Q. And your figures on economic results are all based on -- or your allocation, the way you say that, Caza's acreage wouldn't contribute as much value as Legacy's, is all based on Mr. McKamey's geology?

A. So are you talking about volumetrics?

Q. Yes.

A. Okay.

Q. Is that correct?

A. Yes, sir.

Q. Looking at Exhibit 18, would -- ignore this case.

A. Let me get to 18.

Q. Okay. Sorry about that.

A. Okay.

Q. Forget this case. If Caza had to drill a one-mile lateral, would it drill that well at the rate of return of 52 percent?

A. Would Caza?

Q. No. With anyone.

A. Yes, sir.

Q. Even if it was just solely Legacy, you would drill that well at 52 percent?

A. Yes.

Q. And drilling a two-mile lateral would completely minimize those gaps -- those 330-foot gaps for everyone; is that correct?

A. Uh-huh.

MR. BRUCE: That's all I have, Mr. Chairman.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Just a few questions, Mr. Darden. You touched on the idea of possible lack of future permission for moving those multi-well pads, and I know that we mentioned the sand dune lizard earlier in testimony. Do you have any reason to believe that the BLM is not going to allow moving those well pads?

A. Yes, sir. We have had -- we have had time

for -- we have picked a location and have had to move them significantly. And I believe that there might have been some of the interior of the unit that they required or preferred that we would move out because of the sand dunes. So there is a reason to believe that we might not get locations approved where we want to be.

Q. Does changing the surface location from the southern edge, as Legacy's proposed with the 59 and 62 --

A. Uh-huh.

Q. -- to the northern side, just swapping the toe and the heel, have any effect on the operational efficiency?

A. As far as the operational efficiency, no.

Q. What kind of cost would you incur by doing that if your locations are now further away from the tank battery?

A. That would -- I'm sorry. You're right. We would have to build another tank battery or --

Q. Or gathering system?

A. It's not -- yeah. It's a good operational practice to have flowlines that far, and it would be difficult going through the whole unit because of --

Q. Because of the sand dunes.

A. -- the BLM's -- their scrutiny on surface use,

I guess is the best word I would say. It would be difficult to get a mile-and-a-half flowline.

Q. Safe to say you've got some regulatory uncertainty trying to swap that out?

A. Exactly.

And on the north end, too, I think there might be some issues. They're trying to get locations up there, too. It's an unknown up there, too.

Q. Okay. You talked about the Concho Osprey wells.

A. Uh-huh.

Q. Did you do a type curve for those?

A. Yes, I did. That's what my -- do you want to see that?

Q. If you've got it, sure. The basic reason I ask is because you've talked about operational difficulty overriding the additional benefit from a two-mile lateral --

A. Yes, sir.

Q. -- basically?

A. Yeah. I used a $7 million drill cost on this, which we had a million dollar like we're seeing now on a mile and a half. And I used all the other parameters, of $18,000 a month, 5,000 for the two first years, $5,000 -- saltwater disposal cost. Everything else

is --

Q. Okay. So this is what you base the testimony that two-mile laterals are operationally efficient compared to the --

A. Well, they are, because your rate of return goes from 100 on a mile and a half to, essentially, 33 percent.

Q. Okay.

A. And I really think what's eye-opening is, you know, you don't drill another 2,500 feet -- I'm sorry -- another half mile and don't complete it. So something happened on that well that they didn't complete it. I haven't talked to Concho about that, but I can only assume. It's pretty tough getting a frac initiated on a 7,500-foot lateral.

Q. And those were all drilled about a year, year and a half ago?

A. Yes, sir. And I haven't seen any more locations staked for two-milers on either one of those areas, either to the south or to the west.

Q. Disregarding Caza's AFE -- which is what you used for all these economics, correct, for the proposals -- how significant do you see the difference being between a mile and a mile-and-a-half lateral as far as the EUR goes and Legacy's operations? Are you

doing any more mile laterals? Let's put it that way.

A. We will do some more. If you'll go to Exhibit 2 -- and this is one thing I wanted to explain through my testimony, is that we do have some mile laterals and mile-and-a-half laterals. The way the unit boundary is configured, the maximum distance is 2-and-a-half miles. So you can't do -- we'd have to do two miles and a half mile. We'd have to do two mile-and-a-halves or three; two one-miles and one half-mile.

So the best and most efficient way to produce the reserves out here is to drill mile-and-a-half laterals where you can and to drill mile laterals where you can. We will be drilling more mile laterals in Section 12, and they're probably depicted on Exhibit 4, which shows that we have plans for some mile laterals in Section 12. We have some APDs approved, and we have some planned that the APDs aren't approved yet.

Q. Do you have any APDs for two-mile laterals --

A. No.

Q. -- anywhere?

A. Not in New Mexico.

Q. Okay. Does it for me. Thank you.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. Mr. Darden, you testified with regards to the

3rd Bone Spring Sand. You quantified those, the differences in the northwest quarter and the southwest quarter, 95 percent compared to 5 percent for Caza's --

A. In volumetrics?

Q. Yeah.

A. Okay.

Q. Did you do a similar calculation for the 2nd and the 1st?

A. I did not.

Now, our type curves for a 2nd is almost identical to a 1st on our reserves. They are close to showing -- they have a little more gas in the 2nd than the 1st -- I mean the 3rd does. The 3rd and 2nd are identical. We have not done one on -- I've not done an evaluation on the -- volumetrics on the 1st. But the 2nd is very, very similar to the 3rd.

Q. To the 3rd?

A. Yeah. But I can -- if this will help, I did it on a two-mile lateral in the 3rd Sand. I haven't run economics or we haven't -- we haven't -- not economics. I did, because I did the type curves here, but we have not applied to drill a two-mile lateral anywhere in the state of New Mexico.

Q. Okay. When you were talking about the 3rd Bone Spring, you mentioned the 1 foot in the southeast

quarter, but then you mentioned the 7-and-a-half foot. Where did that come from?

A. That came from -- Keith and I, the geologist, talked about it, and, you know, there was no way for me to do a comparative with the mapping that they presented. They did not give an isopach map. They gave pore volume. So I just used a 7-and-a-half percent.

Q. Let me ask you this. Right now, on these horizontal wells, you're talking about a straight-acreage allocation basis. Have we thought about doing an allocation based on productive acres somehow? I mean, could we drill a mile well and allocate based on what we believe would be the productive acreage within those two 160s?

A. Well, I haven't looked at that. I mean, I could look at it.

Q. Well, I mean, you're looking -- you're talking about the same thing when you're saying the 3rd Bone Spring Sand and your acreage would contribute 95 percent of the reserves, and theirs would contribute 5 percent of the reserves.

A. Uh-huh.

Q. Is it a solution to allocate based on that type of calculation, to allocate to each 160 tract based on the reserves?

A. Well, we think it shows a great imbalance in allocation, unequal allocation.

Q. So I guess your economics on drilling mile-and-a-half -- so six mile-and-a-half wells versus 12 one-mile --

A. One-mile, uh-huh.

Q. -- laterals. How much more is that going to cost your company in those two scenarios?

A. It would be -- let me get to that exhibit.

That's a full development?

MR. LARSON: 14.

THE WITNESS: Exhibit 14?

MR. LARSON: The other one is 12. 12 and 14.

THE WITNESS: Yeah. At full development, we're showing $30.4 million. It increases Legacy's cost by that much. Now, on a true basis cost, I think we would have to -- six of those wells would be 100 percent Legacy, and then 50 percent of those wells would Legacy on the -- six on the south -- on the 12 -- six on the south end. So that would be -- take another -- take -- off this total cost, take off 15 million, I guess. Does that sound right? Let me do the math.

Q. (BY CHAIRMAN CATANACH) I was a little confused by that, because you'd only be paying half of the cost

of the well.

A. Yeah. You'd be paying half of -- yeah. Half of 30 million would be 15.

Q. Okay. Theoretically, those Legacy wells -- lower your AFE cost based on --

A. Yes, it would.

Q. -- 4-and-a-half-million?

A. Yes. It would be $700,000 less. It's still a big impact.

Q. That's all I have.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. So no two-mile laterals in New Mexico. I'm guessing there are some in Texas for Legacy?

A. Yes.

Q. What's the longest lateral that you have in your entire --

A. It's two-mile laterals. We just recently started drilling them, much shallower depth, not near as deep, 6,000 to 7,000 true vertical depth. The rock is not as hard.

Q. In unconventional -- so I go and talk to people at BOPCO, Chevron, EOG and other companies that are operating in the potash area. They have no choice but to drill very long laterals, in some cases

two-and-a-half miles.

A. Uh-huh.

Q. But two miles is what they figure to be their sweet spot. It keeps getting better up to that point with current technology. Two is better than one-and-a-half, better than one, much better than half-mile.

A. Yes. But I would say if all rock were alike, that would be true, but it's not, even within this study area.

Q. That's pretty much my next question. With all rock being alike, the ultimate way to develop all of this acreage would be with two-mile laterals?

A. Or longer. But I just -- at this depth, it's very hard to initiate a frac, especially in the 3rd. The 3rd Sand is so much -- it's a lot tighter.

Q. A lot of people are doing it in the Wolfcamp, deeper, adding more pressure.

A. Yeah. In Texas?

Q. No. In New Mexico.

A. New Mexico. I can't speak to that. I haven't studied that.

Q. Not in this particular area.

A. Further south?

Q. Further south.

A. I haven't -- I haven't studied that. I can't speak to that.

You know, to speak to that, really developing -- our current development plan we feel is the optimal way to develop out there. And we haven't considered two-mile laterals yet because, like I said, of the technical difficulty we've seen or heard about and the inability to initiate a frac at a mile and a half. There's been a couple that we haven't been able to initiate the first two or three stages, and that was in zone.

Q. Thank you very much.

RECROSS EXAMINATION

BY CHAIRMAN CATANACH:

Q. I guess the problem is when you drill mile-and-a-half laterals, you're always going to have stranded acreage somehow, I think, unless you -- unless you develop it from the section to the south and do another mile-and-a-half from the south.

A. Exactly. I mean, if you're -- in our unit, yes. But if you had a mile-and-a-half with unit, then you would -- it would just be the setbacks that you lost, and that's just -- that's the rules. So --

Q. Okay.

CHAIRMAN CATANACH: Any other questions of

this witness?

MR. LARSON: I have a couple of follow-up questions, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Referring to your Exhibit 11 --

A. Let me get there.

Okay.

Q. -- how many unit acres would be stranded in order to pick up Caza's 80 acres in the southwest quarter of Section 19, assuming that their one-mile well would be approved?

A. At full development? It's 20 acres --

Q. No. Under your first scenario.

A. It would be 60 acres -- 60 acres. Three times 20 would be 60.

Q. And looking at 13, which is full development, how many unit acres would be stranded if the application is granted?

A. Twice that, 120.

Q. 120 unit acres?

A. And it's much better rock than what we're seeing in the south.

Q. And looking at Exhibit 2 --

A. Yes, sir.

Q. -- I think there was a question of whether you could put your -- potentially put a surface location at the north section line of 18. Isn't that the location that Legacy initially proposed to the BLM and was rejected?

A. Exactly. We initially proposed that. I was not the engineer over the area at that time. I was overseeing Craig on it. But we did attempt to get location there, and they were -- that's when we had to move them to the south. The BLM would not allow them there.

MR. LARSON: That's all I have, Mr. Chairman.

RECROSS EXAMINATION

BY MR. BRUCE:

Q. One point of clarification. I'm not asking you to put surface locations to the north of Section 18. I was saying to the south of Section 18.

A. Uh-huh.

Q. And do you know if that is -- what type of land that is, surface land?

A. I'm unaware. They might know.

Q. Okay.

MR. BRUCE: That's all I have, Mr. Chairman.

CHAIRMAN CATANACH: This witness may be excused.

MR. BRUCE: May I put up Mr. Sam for three or four questions?

CHAIRMAN CATANACH: Why not?

ANTHONY B. SAM,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Mr. Sam, just a few brief questions. And we're talking about the two-mile laterals --

A. Yes.

Q. -- and the COG wells to the south.

A. (Indicating.)

Q. Since those wells were drilled and completed, have both drilling techniques and completion techniques improved?

A. Since March of '15?

Q. Yes.

A. Yes, sir. There has been good headway made in drilling techniques, with directional drilling equipment that has come online in the last six to eight months, not to mention the completion techniques that are being used now, particularly in the Wolfcamp, over two-mile

laterals, dissolvable plugs put in place for the toe sections, sliding sleeves for coil-tubing assisted frac systems that you can reduce your stage length to 50, 75 feet, initiate fracs much better than you would under a normal perf and plug situation.

Q. And because of that, could the older completion techniques account for some of the poor -- or not-as-good performance in a two-mile well as you might expect?

A. Absolutely.

Q. Could it also indicate that the rock quality down there is poor?

A. Yes, it could be.

Q. Now, the wells that Caza has drilled in the east half of Section 19, if they pan out the way you think they will --

A. Uh-huh.

Q. -- what type of EURs do you think they'll have?

A. Well, we anticipate the EURs for the actual recovery for the 3rd Bone -- new 3rd Bone well that we drilled, the 3H, to be greater than the 2H, which was the initial well, because of the volume of ceramic proppant that we placed in each stage and also the number of stages -- the number of stages that we put in place.

So yes. I think we're looking at around 650,000 BOEs recoverable in the -- in the 3H. It's a reasonable number. We're in the 550 -- 550,000 for the 2H, which was the initial well, so 100,000 barrels more with new technology that's just been put in place in the last year.

Q. And you've looked at Legacy's geologic exhibits?

A. Yes, sir.

Q. In essence, they place -- whether it's the 2nd or 3rd Bone Spring, they say basically the north half-northeast is the only productive area in the east half of Section 19.

A. Yes, sir.

Q. Do you think 550,000 or 600,000 barrels of reserves are coming out of a single quarter-quarter section for each of these wells?

A. No, sir. Volumetrically, I do not believe that's feasible.

I'd also add, just from a direct drilling standpoint, we had significant shows of cut and -- oil cut and gas sampling in our mud log while we were drilling the lateral in the 3H and the 4H from the south to the north continually.

Q. Thank you.

CHAIRMAN CATANACH: Did you have any questions?

COMMISSIONER PADILLA: I just have one, actually.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Has Caza drilled any two-mile laterals?

A. Caza has not drilled any two-mile laterals to date.

Q. Thank you.

CHAIRMAN CATANACH: Okay. Did you have anything else, Mr. Bruce?

MR. BRUCE: Nothing further in this case.

CHAIRMAN CATANACH: Mr. Larson?

MR. LARSON: Nothing further.

COMMISSIONER BALCH: Shall we go into closed session?

MR. BRUCE: Unless you want closing arguments, but --

COMMISSIONER PADILLA: Unless you want closing argument.

(Laughter.)

CLOSING ARGUMENT

MR. BRUCE: If I can say something just very briefly.

Caza's drilling in Section 19 because that's the easiest thing to do, proposing to drill, Caza and Legacy. Some of the scenarios -- definitely the 3rd Bone Spring has to be stand-up. Absolutely. I don't think anybody denies that.

But if you look at the 1st and 2nd Bone Spring, or if this application is denied, even in the 3rd Bone Spring, all of a sudden you're looking at dealing with Cimarex operating to the south. I don't know what plans they have. And then you're also looking at 1st Bone Spring at least in the northeast quarter, so we don't strand that going to the east. I don't know who that operator is, but that's going to take time to get done. And if you're looking at 2nd Bone Spring, you're looking at drilling to the west. And so you'll have separate well units for different Bone Spring intervals, and I don't think that's the way to go.

How long does it take? How long does it take to do all that? You're looking at numerous wells being proposed to different operators, the proposals, trying to get them to join in the well. And what if wells are drilled in the interim? You don't know that. Then, once again, you're looking at stranded acreage specifically in the southwest quarter.

But either way you're looking at problems.

And the simplest, most effective thing to do is to approve Caza's application and just drill north-south in Section 19. It's the simplest, best way to go.

Thanks.

CHAIRMAN CATANACH: Thank you, Mr. Bruce.

Do you want to make a closing?

CLOSING ARGUMENT

MR. LARSON: I understand Mr. Bruce's simplicity argument. Unfortunately, it has significant detrimental economic impact on Legacy.

Legacy, as you've seen, has a comprehensive development plan for this Lea Unit that includes the wells in northwest 19 and the west half of 18, including getting permitting from BLM -- that's $200,000 -- and the well pads, which will be lost. That investment will be lost if we take Mr. Bruce's approach. And ironically, there'll be unit acreage stranded if the Commission grants the application. And finally, I think Mr. McKamey and our engineer both established that there will be a very disparate allocation of reserves in the proposed project area.

And for all these reasons, Legacy's position is that the application should be denied.

CHAIRMAN CATANACH: Thank you, Mr. Larson.

REBUTTAL CLOSING ARGUMENT

MR. BRUCE: Mr. Chairman, I do have one last thing, which is simply issues are raised about combining the unit and -- and I am submitting to you Division Order R-8680, which involved unit and nonunit acreage, simply for the fact that it's permissible in this concern. Big Eddy Unit and Santa Fe and Bass had forced-pooling applications to include nonunit acreage in the well unit, and the Division -- the Division granted Bass Enterprises' application. But there is no bar to committing nonunit acreage with unit acreage, and we think that's necessary to prevent waste.

CHAIRMAN CATANACH: I don't know if I can consider this, Mr. Bruce. I heard this case in 1988.

MR. BRUCE: Oh, you've forgotten it by now, Mr. Chairman.

CHAIRMAN CATANACH: Okay. Thank you, Mr. Bruce.

I was still in high school. No. I was still in college.

Thanks.

Were you in that case?

MR. BRUCE: Oh, of course, I was. That's the only reason I know about it.

CHAIRMAN CATANACH: Do I have a motion to

go into executive session?

COMMISSIONER PADILLA: I think there is already one out there.

COMMISSIONER BALCH: So moved, yes.

CHAIRMAN CATANACH: Okay. All in favor?

(Ayes are unanimous.)

(Executive Session, 3:48 p.m. to 4:49 p.m.)

CHAIRMAN CATANACH: Do I have a motion to go back into regular session?

COMMISSIONER PADILLA: So moved.

COMMISSIONER BALCH: And seconded.

CHAIRMAN CATANACH: All in favor?

(Ayes are unanimous.)

CHAIRMAN CATANACH: Motion is past to go back into regular session.

I would just like to state that during executive deliberations, we only looked at the evidence and testimony presented in this case, and that's all we basically talked about.

So what the Commission decided to do at this point is we want to leave the record open. We want to obtain a statement from the State Land Office regarding their position on this case. We're going to have them submit a statement to us by November 15th, which would be next Tuesday. After we receive that

statement, the Commission plans to deliberate the week of November 21st, and hopefully we will come to a decision at that time. We would, again, probably announce that decision at the December 5th hearing and get that taken care of at the first part of that hearing. So it won't be a big delay. We hope to reach a decision by that time. So that's --

MR. BRUCE: So just like an Examiner Hearing?

CHAIRMAN CATANACH: Exactly. Just two more egos, and that's all.

(Laughter.)

CHAIRMAN CATANACH: So anything further at this time?

Okay. Then we'll leave the record open, and we'll get back to you.

(Recess, 4:51 p.m.)

STATE OF NEW MEXICO
COUNTY OF BERNALILLO

CERTIFICATE OF COURT REPORTER

I, MARY C. HANKINS, Certified Court Reporter, New Mexico Certified Court Reporter No. 20, and Registered Professional Reporter, do hereby certify that I reported the foregoing proceedings in stenographic shorthand and that the foregoing pages are a true and correct transcript of those proceedings that were reduced to printed form by me to the best of my ability.

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

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

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