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:

APPLICATION OF THE NEW MEXICO OIL CONSERVATION DIVISION THROUGH THE SUPERVISOR OF DISTRICT II FOR AN EMERGENCY ORDER SUSPENDING CERTAIN APPROVED APPLICATIONS FOR PERMITS TO DRILL, AND FOR ADOPTION OF A SPECIAL RULE FOR DRILLING IN CERTAIN AREAS FOR THE PROTECTION OF FRESH WATER, CHAVES AND EDDY COUNTIES, NEW MEXICO.

CASE NO. 15487

REPORTER'S TRANSCRIPT OF PROCEEDINGS

COMMISSIONER HEARING

December 7, 2016
Volume 3 of 3
Santa Fe, New Mexico

BEFORE: DAVID R. CATANACH, CHAIRPERSON
PATRICK PADILLA, COMMISSIONER
DR. ROBERT S. BALCH, COMMISSIONER
CHERYL BADA, ESQ.

This matter came on for hearing before the New Mexico Oil Conservation Commission on Tuesday, December 7, 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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EXHIBITS OFFERED AND ADMITTED

(8:10 a.m.)

CHAIRMAN CATANACH: Good morning. Call the hearing to order this morning, and I believe where we left off was we were on our next witness with Mr. Bruce. Is that correct.

MR. BRUCE: Yes, sir, Mr. Examiner. I have a witness from Mack Energy. We just have two exhibits, and they were attached to the Mack Energy prehearing statement.

CHAIRMAN CATANACH: Let's see if we can find those, Mr. Bruce.

JIM KROGMAN,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Please state your name and city of residence.

A. Jim Krogman, Artesia, New Mexico.

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

A. I work for Mack Energy Corporation, and I'm the drilling supervisor.

Q. Would you please tell the Commission a little bit about your background in the oil and gas business?

A. I started in oil and gas in 1978, roughnecked and drilled, and then I worked as a drilling foreman and

a completion foreman and then a drilling superintendent. And then I changed companies, and they call it a drilling supervisor, and I've been with Mack Energy for nine years.

Q. And who did you work with before that?

A. Yates Petroleum.

Q. For how long?

A. I think it was two months shy of 26 years.

Q. And in your duties at Mack and also when you worked for Yates, did you design wells?

A. Yes, sir.

Q. And did you oversee the drilling of wells?

A. Yes, sir.

Q. And so you've done that for well over 30 years at this point?

A. 35 years as supervisor and then -- but I've worked in the oil field over 38 years.

MR. BRUCE: Mr. Examiner -- I always make that mistake. Mr. Chairman, I'd tender Mr. Krogman as an expert in oil and gas drilling and operations.

CHAIRMAN CATANACH: Any objection?

MR. OLSEN: No objection.

MR. BROOKS: No objection.

CHAIRMAN CATANACH: Mr. Krogman is so qualified.

Q. (BY MR. BRUCE) Mr. Krogman, can you identify Exhibit 1 for the Examiner and talk about how Mack is drilling its wells in this area?

A. We've permitted -- I think we have six permits in this area, and I picked this one to draw my wellbore schematic in this area. Drill a 12-1/4-inch hole down to 1,200 feet, and we run 8-5/8 casing to that depth. We choose to go with a 12-1/4 hole in this area. There are some boulders, gravel and sand underneath -- in between, and it makes it difficult to run your 8-5/8 casing, so we like to go with a little bigger bit, 12-1/4 bit, and get our casing set on the bottom. And then we do our cement job.

We keep our -- we normally circulate cement probably 90 percent of the time, and then the rest, if we don't circulate cement, we run a temperature survey, tag the cement with 1-inch pipe and do a 1-inch top-out with cement.

Q. You use 12-1/4 inches. Other operators use 11 inches. And it's just a matter of preference, correct?

A. Yes, it is. You look at the area. If you have a nice continuous formation, an 11-inch bit will work perfect. I'm just saying in this particular area, my experience, we've had some issues making it difficult to get our 8-5/8 casing to TD, which is 1,200 feet. So in

this particular area, we choose to go with 12-1/4.

Q. When you say "this particular area," is that where Mack owns its acreage?

A. Yes.

Q. Now, that is a two-string design. Is this a well design that historically has been used in this area?

A. Yes, it has.

Q. And do you have any outstanding APDs under which you, Mack, have any APDs outstanding under which you plan on drilling wells?

A. Yes, we do.

Q. And they are this approved two-string design?

A. Yes.

Q. When you file an APD with the Oil Conservation Division, do you -- do you generally talk with the personnel in the district office to see if they have any issue with your well design?

A. In this particular area, no. I do my offset -- offset well research, look at it, what different operators have done. Then we come up with our drilling plan at that time.

Q. Okay. But in many areas, if it's a new area, you talk with the OCD?

A. Yes. If we have a new area, new idea, I'll

discuss it with the OCD and get their opinion before I try to permit a well.

Q. With this two-string, has Mack had any problems or seen any damage to the aquifer?

A. No, sir, not to my knowledge.

Q. Do you think a three-string design is necessary in this area?

A. No, sir, I don't.

Q. One thing there's been discussion of is cement bond logs. Do you think they're necessary?

A. No, sir, I don't.

Q. Can it lead to confusion? Can two people read them differently?

A. Yeah. This shallow -- being with a temperature at 1,200 foot, you have to get your cement tested, and you can get compressive on your comment. You pump your cement and circulate cement, and you can read a cement bond log 72 hours later, and it would probably be confusing. If it's had 50 percent bond, there's -- you don't know if you can even fix that. You can perforate your new casing and try to pump into it. And if you can't pump into it, you know, you have cement there, but it was only showing a 50 percent bond. There's no way to fix that. And then you damage the integrity of your casing because you've perforated and left -- put holes

in it.

Q. So, again, you don't think CBLs are necessary?

A. No, sir.

Q. Would you look at your Exhibit 2 and describe what's in that exhibit?

A. This exhibit is a drawing of a three-string. We've set -- I designed it for a 17-1/2-inch hole, 13-3/8 casing down to 450 feet and then a 12-1/4 hole with 8-5/8 down to 1,200 feet and then our 7-7/8 down to -- with 5-1/2-inch casing down to TD.

Q. Down at the bottom, you've put some costs. You've got one -- I don't have it in front of me right now, but the column on the left, that gives certain costs of about 70,000-plus. Could you discuss those briefly?

A. Yes. We have -- to do the extra wait-on-cement time and drill that extra section, the hole to run the 13-3/8, our day work, it would take us two days. So that cost is about 23,000. Cement -- to cement the 13-3/8 is another, roughly, 13,000. Then we have -- since we're adding two days on to the well, we have two more days of supervision, two more days of surface rental, more freshwater being hauled, more cuttings to haul off since we're drilling closed loop, and then we have a BOP test two times instead of just once.

Q. And you have some comments also in the right-hand column. And in looking at those, those sounded pretty much like what Mr. Bird from COG discussed yesterday, correct?

A. Yes, sir.

Q. And even though you didn't put a cost by those, those can add a substantial amount to the well costs?

A. That can be added costs. The numbers I put down is everything with -- according to plan, which Mother Nature is known to throw us a curve ball, so my cost I put down at 72,000 was a minimum cost.

Q. It could well be a couple hundred thousand dollars?

A. Yes, sir, it could be.

Q. The wells that you're talking about, are they Yeso wells like COG talked about?

A. Yes. They're vertical Yeso wells.

Q. Okay. And what is a typical cost for a Yeso well drilled and completed?

A. Drilled and completed, it's 1.1 to 1.2 million on a vertical well.

Q. So if you're looking at even just a couple hundred thousand dollars extra, that's quite a percentage increase to the well cost?

A. Yes, sir.

Q. And does that adversely affect well economics?
A. Yes, it does.
Q. Mr. Krogman, were Exhibits 1 and 2 prepared by you?
A. Yes, sir.
Q. And in your opinion, does this rule need -- proposed rule need to be adopted?
A. I'm sorry?
Q. Does this proposed rule need to be adopted?
A. No, sir.
MR. BRUCE: Mr. Chairman, I move the admission of Mack Exhibits 1 and 2.
MR. OLSEN: No objection.
CHAIRMAN CATANACH: Exhibits 1 and 2 will be admitted.
(Mack Energy Corp. Exhibit Numbers 1 and 2 are offered and admitted into evidence.)
MR. BRUCE: I pass the witness.
CHAIRMAN CATANACH: Mr. Brooks?

CROSS-EXAMINATION

BY MR. BROOKS:
Q. Is it Mr. Krogman?
A. Yes.
Q. Good morning.
A. Good morning.

Q. I want to address the cement bond log issue very briefly. Are you telling us that running a cement bond log 72 hours after setting the casing is not reliable? Is that the testimony that should be understood?

A. I don't know if it would be unreliable. It may be confusing. What I'm saying is what is a good bond log? 50 percent? 70 percent? In my judgment, 70 percent would not be good if it -- 50 percent is not good. If somebody says 70 percent's good or not good and we can't fix it, you know, we perforate the casing and try to pump into it, cannot pump into it, we did more damage to our -- than what was necessary after we waited 72 hours.

Q. Well, why can you not get a good reading from a cement bond log?

A. This is so shallow. It's a temperature -- your temperature at that depth is probably, I'm going to say, 87 to 89 degrees. Your cement, you're testing it at surface before you pump the job. You do your compressive strengths. You get an 8-hour, 12-hour, 24-hour up to 72 hours, and you have the compressive strength of the cement. When you pump your cement and let it set for 72 hours, time and temperature shows what the bond log will read, and when you look at the bond

log, you may not see 100 percent logged.

Q. Is there any alternative way of knowing whether you've got cement filling up the annular space fully?

A. When the cement is circulated?

Q. Yeah.

A. Yes, sir.

Q. The fact that you -- what I'm having trouble understanding is why does the fact that you circulate the cement and it comes out at the surface, how does that establish that there are not gaps or vacancies in the cement downhole?

A. When you're pumping your cement down your casing, through your shoe and back up to surface in the annular space, if you get circulate cement to surface -- you know, if you do have a thief zone that's taking some fluid or cement, it'll -- it'll fall back, and then you do a 1-inch top-out. In this area, most of the time, it doesn't fall back but 20 to 30 feet. So since you're pumping down and coming shoe up, there should not be a void.

Q. What is the difference between this type of setting the cement and the type of cement where you would expect the cement to run a cement bond log? Why would you want to do so in other instances and not in this?

A. At Mack Energy, we run cement bond logs probably on 50 percent of our wells on the production casing. We do -- make sure our cement company has proper cement tested. We get the paperwork, and then we'll do a job -- say the first job in one area, we'll do a cement bond log, make sure everything looks good for our production casing, and then the next two wells in that same area, we may not run the cement bond log because, you know, it costs money. If it worked the first time, it should work the second time, you know. Why would you want to --

Q. Right. If you're talking about the same cement job, I certainly understand that. If you test it once, unless your test procedure has established unreliability, there would be no reason to test it again --

A. Right.

Q. -- unless you had some indication of a problem.

But the temperature -- the temperature survey does not tell you anything about the integrity of the cement, correct?

A. Correct. It just gives you the top of cement.

Q. Tells you where the top is.

Now, you testified that you hadn't had any issues with fluids escaping into the freshwater; is that

correct? That's a correct summary of your testimony?
A. (No response.)
Q. That you have not had any -- any issues with well fluids escaping into freshwater formations when you use this design; is that correct?
A. Not to my knowledge.
Q. Now, how would you know that when you don't have monitor wells, unless some water well owner complained?
A. I've never had anybody complain.
Q. But, otherwise, you wouldn't -- there is nothing you do that would tell you that you've got some escape into a freshwater formation? I suppose if you lost circulation, you would know. But if it was a small amount, would you know at all whether fluid was escaping into a freshwater formation?
A. If we have lost circulation, you can assume it's going somewhere; you don't know where.
Q. Yeah. But if you didn't lose circulation, you wouldn't know, right? You wouldn't know -- you might have some small amount of -- you might have a plume escaping into the freshwater formation. You wouldn't know about it.
A. An amount too small to measure.
Q. Okay. I think that's all I have. Thank you.

CHAIRMAN CATANACH: Mr. Olsen?
MR. OLSEN: Good morning, and thank you.
CHAIRMAN CATANACH: Good morning.

CROSS-EXAMINATION

BY MR. OLSEN:

Q. Good morning, sir.
A. Good morning.
Q. How long were you with Yates?
A. 25 years and ten months.
Q. Forever and ever, right?
A. A long time (laughter).
Q. And your last position with Yates?
A. Drilling superintendent.
Q. As a drilling superintendent with Yates, were you responsible for well design, or did they have someone doing well design that you provided the information?
A. We have an engineering team that permit -- gave information. I had an assistant superintendent that would write a prognosis. Then we would have a discussion about it, see what is the depth, weight, and start the project.
Q. Is that the way you do that at Mack?
A. No, sir. I do the research. I do the well planning, do the casing design and cement testing, and I

have an operation -- operations manager who is the completion engineer, also, which we have communication with him and decide which way is the best for this company.

Q. You're the engineer in charge without an engineering degree?

A. Yes, sir.

Q. I was looking at your Exhibits 1 and 2, and something struck me as interesting with your well design on Exhibit 1. And you show going down to 1,200 for a single string, correct?

A. Yes.

Q. Now, I was looking at the location of that well, and that's in Section 14, 20 South, 25 East, correct?

A. Yes.

Q. Now, most of Mack's locations are east of the river, correct?

A. Yes.

Q. Now, east of the river, do you know if there is a shallow aquifer and an artesian aquifer, or is it -- or do you know?

A. I know there are two aquifers. I assume there are two aquifers in this area because it's all around that area.

Q. Have you studied the hydrology of the area, sir?

A. I've looked -- I've talked with the OCD, in fact, in -- probably in 1984 and discussed the freshwater zone that's on the surface and then the second artesian aquifer.

Q. Well, I guess the reason I'm asking this is in earlier testimony where -- you weren't here for the testimony yesterday by Mr. Atkins and Mr. Peery, were you?

A. No.

Q. And their testimony was that the shallow aquifer and the groundwater aquifer lied primarily on the west side of the Pecos River, right at the Pecos River. How far east of the river is this location you're talking about, Section 14, 20-25? That's quite a ways east of the river, isn't it?

A. Oh, yes, sir. I'd have to guess. On mileage, I would say eight to ten miles.

Q. And out east there, there's only -- that's only -- you just go straight down because there is not an administered shallow or artesian groundwater basin out there, is there?

A. I assume there are or two aquifers there. We've always set one string of surface casing down --

Q. But you're -- I guess my question is you don't know whether or not that -- the boundary of the shallow and artesian, as established by State Engineer, where it begins and where it ends, then. Is that a fair statement?

A. Yes.

Q. And as I say, most of Mack's locations and things are out east of the river?

A. West of the river.

Q. I meant -- you're drilling east of the river?

A. Well, we drill east of the river, but these locations are west of the river.

Q. 20-25 -- 14, 20-25 is west of the river?

A. Yes, unless I'm -- unless --

Q. I think that's east of the river, isn't it?

A. No. These wells are down -- these wells are west of the river.

Q. All right. How far west of Artesia are they?

A. They are probably -- I know it's south and west -- you know, a straight line south. It's probably 15 miles south of Artesia and a couple of miles to the west.

Q. And the next point I want to make is you don't know if they're within the shallow aquifer or not, do you?

A. No, sir.

CHAIRMAN CATANACH: Mr. Olsen, according to one of these exhibits, that would be in the shallow --

MR. OLSEN: It is in the shallow?

CHAIRMAN CATANACH: -- and both aquifers.

MR. OLSEN: I misunderstood. I thought they were east of the river.

Q. (BY MR. OLSEN) My question: Out east of the river, do you use the same well design?

A. Yes, sir.

MR. OLSEN: Pass the witness.

CHAIRMAN CATANACH: Questions from Mr. Feldewert? Mr. Larson?

MR. FELDEWERT: No, sir.

MR. LARSON: I have no questions.

MS. FOSTER: No questions.

CHAIRMAN CATANACH: I have a couple of questions.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. So these wells you're drilling from, Mr. Krogman, you're assuming both aquifers are present at those locations?

A. Yes.

Q. How do you know where to set the surface

casing? Is it 1,200 -- is that a set depth that you guys use?

A. On permitting, we -- we permit the wells six months ahead of time. So we have a database. We look at everything. We'll permit 1,200 feet. We'll turn all the information in. Once we get closer to drilling the well, we review the information again, and then, you know, if it can be -- if it needs to be set deeper or shallower, we'll send in a sundry notice.

Q. How would you determine if it needed to be set deeper or shallower? What do you use as a guideline for that?

A. I'll go out and look at different operators, what they've done in the past, if they've set different hole size, different depth casing and do some more research on why they did that. When our initial permit -- when we permitted was for a different depth.

Q. So are you confident that all these casing-setting depths cover that deep artesian aquifer?

A. To my knowledge, they have been. You know, if it's 900 feet or 1,100 feet, you know, 1,200 feet, I know we're in good shape. We're above the oil zone. You want to get -- from your last drilling break you have, you want a good 100 foot of good, hard formation before you get into a -- risk getting into something

different. So a standard rule is drill 100 foot past your last drilling break or wherever your casing works out so you can have a good connection and do your cement job.

Q. Do you guys ever use mud logs to determine any depth to set or any -- I mean, it's been suggested by the Division that we use mud logs to determine hydrocarbon shows and then we set casing above that.

A. Mack Energy, they run mud logs -- mud logs on certain wells. The Geology Department picks which wells. The last probably ten wells we've drilled, we have not had a mudlogger on them this go-around. We were doing some infill drilling and they thought they had a good handle on what the formation tops were.

Q. Do you guys use a -- just freshwater in your mud program?

A. We drill with freshwater on our surface casing, and after we set surface casing, we'll -- the type of logs we run for our production string, we have to have 30,000 chlorides for our induction [sic] log to read correctly. So we will do a cut brine system after we set our surface casing at 1,200 foot.

Q. After you set it and cement it?

A. Yes, sir.

Q. Do you know what the pressure is by chance in

the Artesian Formation?

A. I don't know what the pressure is. I've never seen it flow. So freshwater weighs 8.3 pound per gallon, at 1,000 feet -- I've never seen it flow before, so I don't know what type of pressure it has.

Q. So your testimony is that your freshwater mud is sufficient hydrostatic head to prevent any flow from the artesian aquifer?

A. Yes, sir.

Q. Do you believe that there is any communication during drilling operations between the deep and the shallow aquifers in this area?

A. The communication -- you know, it's freshwater and you're drilling with freshwater, the hydrostatic pressure is holding it right there if you have a full column of fluid. So when you run casing and cement, it's sealed off with -- heat stoned [phonetic] and sealed off with your casing and your cement. So it's isolated.

Q. Have you had issues with lost circulation in the artesian zone?

A. Yes, sir. Well, the artesian zone is the deeper water. In some areas, we have. In this particular area, the last well I drilled out there, I lost circulation. I set 40 foot of conductor, and I

lost circulation at 45 feet. So I drilled down to 80 feet with my 12-1/4 bit, and I got a cement truck out there and pumped cement back from 80 foot up to my conductor pipe and redrilled the hole and kept returns the whole way down. So on this particular well, where it has the conductor at the very top, I put down -- we learned our lesson. We need to set 80 foot of conductor in this area.

Q. Do you guys -- when you're conducting cement operations, do you monitor the cement returns, and do you look at the density or anything like that?

A. Yes, sir, we do.

Q. So you're making sure the quality of that cement is adequate on your returns?

A. Yes. We test our cement. We get our cement out there. The company we use has computerized trucks. They set the density where it needs to be. We catch a wet sample and a dry sample of surface. We mix our cement up. We catch our wet sample then. We pump our cement downhole. We store that cement where I can go back -- if I want to do a quality-control check on the additives I've used, I can grab that dry cement and take it to a different cement company and tell them -- ask them to tell me what's in it to make sure I'm getting what I'm paying for. And I can also send that wet

cement to a different lab and do compressive strengths on it to match what was done in the other company's lab for quality control.

Q. Mr. Krogman, there was some discussion yesterday of Concho's method of drilling and hole size, in particular. I wanted to ask you, using a larger size, 12-1/4 inch --

A. Yes, sir.

Q. -- do you feel like you're still getting an adequate turbulent flow with the larger hole size?

A. Yes, sir. I take two pumps out there to get my turbulent flow.

Q. So you do use two pumps?

A. Yes, sir. If you can't get casing down to the right spot, you either have to plug the well and start over with the cost of location and rig moved. In this particular area, the boulder issue, it's cheaper for me to drill a 12-1/4, make sure I can get my 8-5/8 casing down and pay for a second pump to be out there to get turbulent flow.

Q. So the other -- my last question would be what is the time frame when you stop drilling, when you determine you're going to set the casing at a certain point? How long a duration is that between then and your actual cement operations, because you've got to run

the casing, you've got to --

A. Yeah. You've got to trip out of the hole -- trip out and run our casing and do our cement job. Probably six hours to eight hours, we're finished.

Q. And during that time, your hole is still full, correct?

A. Full of fluid, yes, sir.

Q. So you shouldn't have any cross-flow in that interim period?

A. Correct.

Q. I have nothing further.

COMMISSIONER PADILLA: I just have a couple, Mr. Krogman.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Just following on what Chairman Catanach just asked, what's your -- we heard from Mr. Bird yesterday going down to 1,200, setting casing and cementing is about a 12-hour turnaround for Concho. What would you say that entire time frame is for Mack?

A. With our 12-1/4 hole, it takes a little bit longer. We should be able to drill it in 14 to 16 hours, to drill the hole. Then we add another eight hours on for prepping the hole -- sweep, with our tools and our run casing and get cement in. And then we wait

on cement eight hours, and then we start our -- test and BLT process and hopefully be ready to drill in 18 hours WOC time.

Q. So from spud to cementing is about 24 hours -- 22 to 24 hours based on --

A. You should be finished with your spud to cementing within 24 hours.

Q. Okay. Within 50 percent of cases, Mack is running CBLs on that production string. What -- what determines those 50 percent of cases that Mack does that?

A. If we change a cement slurry, try to get a -- you know, times are -- times are tough, so you may have -- you know, we test cement all the time, and if we get a cement additive -- change our additive, we'll run a bond log on this area. If it's a new area where we're drilling, we will run a cement bond log on that. If we change our cement slurry, we'll run a cement bond log.

My operations manager is quality control. He may want to run a bond log on the next well. He doesn't tell me until we get to the completion phase. So that's the way I make sure I get all -- I don't know which one he's going to do, so I do my quality control on every one to make sure I have the best product possible. If he says, Run it here, I'm ready for him.

Q. Have any of those CBLs indicated problems as you test a new cement and try and maximize your efficiencies?

A. Not to my knowledge.

Q. You haven't had to do any squeezes?

A. No, sir.

Q. My last question, I just wanted to talk a little bit about your -- it sounds to me like you're replacing mud-logging with well control, essentially, to figure out where those -- where to set that casing, if I put it crudely?

A. I use offset information. I can go -- I go to the OCD Web site and look at where -- you know, you can punch in the section, township and range and a list of wells comes up, and I can look at different operators and see what they've set casing at. If I have a question, I know a lot of operators or people who work for operators. I'll make a phone call.

You know, I can also look at bit records from the different bit companies, and I may see something. The date may be a typo error. It took them three days to run -- drill a section and run casing, but the date's different. I'll call them and ask them what -- if there were problems on the well. If they say yeah, they had a fishing job, I may then call the

operator or -- it tells you which rig was on it. You can call up a tool pusher and ask them what happened, you know.

Everybody's trying -- we're competitive, but we work together, trying to make sure we can drill an inexpensive well.

Q. So how sure are you in all these cases that surface casing is covering the artesian, based on your data sources -- your mixed data sources, I guess I should say?

A. Oh, I'm positive it's covering. I mean, I can't see one -- I haven't had any issues with -- to my knowledge, there is no -- hasn't been an issue. I look at different sources, so --

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

A. Thank you.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. Good morning, Mr. Krogman.

A. Good morning.

Q. Have you ever -- actually, let me ask this question first. Are you familiar with this exhibit? Have you seen one of these maps that shows --

A. Yes.

Q. -- the extent of the -- of the two different

aquifers?

And you have 30-plus years of experience of drilling in this area, right?

A. Right.

Q. About how many -- how many wells inside that aquifer area have you been involved in?

A. Oh, too many to count (laughter). I mean --

Q. Order of magnitude would be all right.

A. Shoot.

Q. Tens? Twenties? Hundreds? Thousands?

A. Thousand.

Q. Thousand?

A. Yes, sir.

Q. Have you ever been compelled by operational need to put in a third casing string in any of those wells?

A. I have set three strings. Really, you know, by the Pecos River, when I was with Yates Petroleum, the soil -- surface soil is really sandy, and we've set a shallow surface casing. There was a well offsetting that they set -- set conductor and the conductor cement job didn't -- I don't know what happened. But we got flow outside the conductor and cement, and the rig started tipping over.

And our next -- the next project was to

drill down and set our surface casing, and we -- it was a deeper well. It was down to the Morrow. So we set a surface casing, got nippled up on it. We set a deep intermediate and got it for well-control issue.

Q. But nothing to do with the shallow aquifer? It had to do with an incompetent alluvium?

A. Yeah, the incompetent surface -- surface location.

Q. I was a little bit concerned when you testified that there is some subjectivity when interpreting these bond logs; two people could look at it and come up with two different interpretations.

A. Yes, sir.

Q. One that it's good enough, and one that it's not good enough.

A. Yes, sir. I've seen it in our office looking at -- you know, one engineer will look at one and say, Yeah, it looks good to me, and another one will say, No, it's --

Q. So what's your personal criteria for when you would be happy with a bond log?

A. We run bond logs on production casing only, so I'm pretty -- with my quality control and everything, 90 percent above is good for me. If it's less than that, I consider it a failure. But you can't repair -- you

can't repair it. Like I said, if you poke holes in your casing and try to pump into the cement, you can't do it.

Q. So at what level, in a bad bond log result, can you actually do some remediation? How dramatic does it have to be?

A. It's done by well-to-well case and also the area. I've seen bond logs that ran 50 percent that you can't pump into it. I've seen bond logs that ran 60 percent bond, and you were able to pump into it. It's just --

Q. Highly variable?

A. Yeah. There is so much -- are you getting your bond to your formation? Are you getting a bond from your cement to your pipe, cement to formation? You know, there are so many variations. Like I said, we like 90 percent or better at Mack Energy.

Q. So adding a delay to wait for bond logs to your operations adds additional time beyond the --

A. Oh, yes.

Q. -- beyond a materials cost that you have listed here in your well diagram in Exhibit 2. How does that impact your drilling program?

A. I don't think we would drill them. They wouldn't be economical to drill.

Q. If you add another six days or so of rig time

on it?

A. Yeah. We wouldn't drill it.

Q. When -- in that -- in that aquifer area, when do you think a bond log would be appropriate?

A. On your production casing, it should be the operator's call on it. If you circulate cement, sealing off the aquifers, there is no need to run a bond log.

Q. So you might wait six days total for your results on two cement bond logs --

A. Yes.

Q. -- for the proposed rule, and then someone might tell you you need to fix the well, and you might not be able to fix it?

A. That's correct.

Q. You might go in and do a squeeze job and still end up with the same result on the next bond log?

A. Right.

Q. And then your only option is to step out and redrill it?

A. Yes.

Q. Thank you.

COMMISSIONER PADILLA: I had one follow-up question, if I might, off of what Dr. Balch was just saying.

RECROSS EXAMINATION

BY COMMISSIONER PADILLA:

Q. Have you ever seen a CBL fail in a case where cement was circulating to surface, or not pass?

A. I don't understand the question.

Q. Have you ever seen a cement bond log come in as -- you know, indicating a substandard job in a case where cement was circulated to surface?

COMMISSIONER BALCH: Circulate to surface. Run a bond log. Ever seen failure in the bond log?

THE WITNESS: You always yield -- I don't understand. The tool failure or the cement failure?

COMMISSIONER BALCH: 50 percent.

Q. (BY COMMISSIONER PADILLA) Yeah. 50 or 60, whatever Mack would consider substandard.

A. When we've run our cement bond logs on production wells, we've never seen them that low before, to my knowledge.

Q. Okay. Thank you.

CHAIRMAN CATANACH: Just one or two.

RECROSS EXAMINATION

BY CHAIRMAN CATANACH:

Q. Mr. Krogman, you've been out there awhile. Is it your belief that most operators drill these wells in the same manner, the same procedures?

A. Yes.
Q. Freshwater mud, that kind of thing, centralizers, do you think it's pretty standard out there?
A. Oh, yes, sir.
Q. I have heard an interesting thing. I heard a while back -- and I don't know when this might have been, but you've been out there for a while -- that at a certain time, the State Engineer actually would witness cement operations on these wells. Do you ever recall that?
A. Not a State Engineer. We've had the OCD representative, field hands, come out and the BLM, but I've never had a State Engineer come out.
Q. It was a while back, but that's what I've heard was the standard procedure back some time ago. But you don't recall that?
A. No, sir, I don't. No.
Q. Okay. That's all I have.
CHAIRMAN CATANACH: Anything further?
MR. BRUCE: No, sir.
MR. BROOKS: I'd like to ask one question, follow up on Commissioner Balch's examination, Your Honor.
CHAIRMAN CATANACH: Go ahead.

RECROSS EXAMINATION

BY MR. BROOKS:

Q. Is there any tool other than a cement bond log by which you can monitor the quality of a cement job at a shallow depth?

A. I don't know the answer to that. I know in production casing, there is a -- it's a casing cement evaluation tool. It's a multi-armed caliper tool that the arms comes out and it draws colors, but I'm not an expert at that. I don't know if that'll work on the surface. I know we've run some on production casing when I was with Yates. It's a multi-arm caliper tool, but I don't know what all it does.

Q. Then one other question. We talked about -- let's see. What was it? My mind's gone blank here. Oh. The time delay that would result if you had to run a cement bond log on a -- on the surface casing. This is a subject about which we've heard some testimony from Mr. Bird and some testimony from you, but I'm not sure I have the times, because there are several stages here.

First of all, when you're cementing your surface casing, you're going to have a time delay while your cement sets up, right?

A. Yes, sir.

Q. And that's not -- that doesn't have anything to

do with whether you run a cement bond log or not, right?

A. The time --

Q. The time -- well, you're going to cement in your surface casing. There's going to be some time. You're going to have to let that cement set up before you proceed with operations, right?

A. Correct.

Q. And about how long is that?

A. We start our operations with -- eight hours, we'll do our cutoff -- and get our tools ready to drill the next section of hole. And we are required to wait 18 hours on cement to set up before we can proceed.

Q. Okay. Now, what is the additional delay that would be involved in running a cement bond log? I realize -- do you have to wait a longer period of time after the cementing job to run a proper cement bond log than what you have to wait to continue drilling?

A. Yes, sir. You have to -- the cement needs to have time to cure, so you have to wait 72 hours or more before you can run the cement bond log.

Q. So 72 from -- 18 from 72 is 54. And you're talking a little over two days -- two 24-hour days that you're going to have to delay before you can even run the cement bond log?

A. You have to wait 72 hours. Run your cement

bond log, and then you can start your other process.

Q. Okay. How long does it take to run the cement bond log?

A. I've never run one at 1,200 foot, so I'm going to guess maybe two hours rig up to rig down.

Q. So that's not a big issue there. But the big issue is you've got to wait for the cement to cure, right?

A. Correct.

Q. And then the other big issue that's been raised is that you have to have the OCD approval before you proceed drilling. Apparently we don't know how long that would take, but Mr. Kautz testified a day or day or two from our side. But that's -- so it could be as much three or four days involved, right?

A. I assume so.

Q. That's what I was trying to quantify. And your -- your statement that you wouldn't drill if you had to do that. What kind of delay is that based on, a cost addition?

A. Oh, you're adding 300- to $400,000 onto your well cost. So you're almost doubling your drilling cost on it, and it wouldn't be economical to drill the well.

Q. Now, would the answer be the same if the Commission were to simply require you to run and file a

cement bond log and not to require you to delay further drilling operations until -- pending approval?

A. We would still have to wait the 72 hours to run the bond log, and it would still cost us three more days.

Q. Thank you.

COMMISSIONER BALCH: I think what he was trying to ask is if you let your cement set eight hours and then you continue drilling and then sometime, 72 hours or more later, you run the bond log when it's convenient, how much additional time would that cost you?

Is that correct?

MR. BROOKS: Yeah. I'm trying to give the Commission the tools to determine how they might be able to mold this requirement and to have some security on the cement job with a minimum interference with the drilling process.

COMMISSIONER BALCH: Right.

So set your cement, continue drilling. Sometime later on when your tools are pulled up, you drop down, do the CBL and submit it. Then you go back to drilling.

COMMISSIONER PADILLA: It's a gamble, though, because CBL -- it's a problem when you've

drilled a bunch of holes, and you have to come back and fix it.

THE WITNESS: You want -- the way I understand on the CBL, you need to have your pipe and everything static. So if you're in there drilling in your casing and stuff, you're --

COMMISSIONER BALCH: Install pipe [sic] on the well before you run?

THE WITNESS: Yeah. Your fluid, change in temperatures on the inside versus what was set, it's not static so -- like I said, I've never run a cement bond log on the surface at that shallow. Every bond log I've run has been on production. We move the rig off. Everything is static, and we set there and let the cement cure up before, and then we'll run the cement bond log.

Q. (BY MR. BROOKS) Thank you.

CHAIRMAN CATANACH: Anything further?

This witness may be excused.

Let's take a ten-minute break.

(Recess 9:03 a.m. to 9:30 a.m.)

CHAIRMAN CATANACH: Okay. I think let's go ahead call the hearing back to order. I believe we're on Mr. -- go ahead.

MR. LARSON: Mr. Chairman, my first witness

is Jeremiah Mullen of EOG Y Resources. We have three EOG exhibits attached to the prehearing statements. I have extra copies if the Commissioners or parties need copies.

JEREMIAH MULLEN,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Morning, Mr. Mullen.

A. Morning.

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

A. Jeremiah Glen Mullen.

Q. And where do you reside?

A. In Artesia, New Mexico.

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

A. EOG Y Resources, and I'm a drilling engineer.

Q. And until a couple of months ago, EOG Y Resources was known as Yates Petroleum; is that correct?

A. Yes, sir.

Q. And what has been the focus of your responsibilities as a drilling engineer previously for Yates and now for EOG?

A. New well design and also received operations in drilling a well.

Q. And do you have experience designing and drilling oil and gas wells in the Division's designated area in its proposed rule?

A. Yes, sir.

Q. And are you familiar with the casing and other requirements in the Division's proposed rule?

A. Yes, sir.

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

A. Okay. I've got a BS in electronics engineering technology from Eastern New Mexico University. I graduated in 2002, and went directly into the oil and gas industry with Yates Petroleum. I did well planning for the Permian Basin, including West Texas. And in southeastern New Mexico, I did well planning, and approximately nine years in that was casing design, mud program, everything that's required by the state or Feds to drill the well, get an APD. I spent a year on the drilling rig as a company man and just oversaw the operations in the field and became a drilling engineer and have continued designing the wells and also overseeing the drilling of the wells from the office.

Q. And were you sworn in at the beginning of the hearing?

A. Yes, sir.

MR. LARSON: Mr. Chairman, I tender Mr. Mullen as an expert in drilling engineering.

CHAIRMAN CATANACH: Any objection?

MR. OLSEN: No objection.

CHAIRMAN CATANACH: Mr. Mullen is so qualified.

Q. (BY MR. LARSON) Mr. Mullen, did you listen to Mr. Bird's testimony yesterday regarding the proposed requirement of an intermediate casing string?

A. Yes, sir.

Q. Did you hear anything from Mr. Bird that you disagreed with?

A. No, sir.

Q. And do you get your water at home in Artesia from the city water utility?

A. Yes, sir.

Q. And to the best of your knowledge, is groundwater the source of that water?

A. Yes, sir.

Q. And when you design an oil and gas well, do you take into consideration the protection of the groundwater?

A. Yes, sir.

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

EOG Y Resources Exhibit Number 1.

A. This is -- Exhibit 1 is a list of wells that -- well, formerly Yates -- EOG Y operates in the designated area.

Q. And did you prepare this document?

A. Yes, sir.

Q. And did you, along with other EOG and Yates employees, look at the well files for each and every one of the wells identified on Exhibit 1?

A. Yes, sir.

Q. And did the other employees conduct their well file research under your direction and supervision?

A. Yes, sir.

Q. What is the total number of wells that Yates operated in the designated area?

A. 771 wells.

Q. And based on the research of the well files, were any of those 771 wells designed with an intermediate casing string to protect groundwater?

A. No, sir, not the -- well, I have to clarify that. What became an intermediate casing string, the only reason it became intermediate was because of shallow-hole problems. So we set surface casing. So then what was then called the intermediate casing, we did set below the artesian aquifer. We -- we didn't --

we didn't run a surface for the sole purpose of casing off an aquifer and then run an intermediate to case off an aquifer.

Q. But the intermediate strings were to address downhole problems?

A. Well, the intermediates -- well, that's what's kind of tricky. It's called the surface string, you know, for instance, if you set it down below the aquifer. But if you have hole problems uphole, you set a surface string shallow to case off your hole problems. Well, now this one that was your surface string becomes your intermediate string. So it was -- we set -- I guess I would have to say in that case, we did set an intermediate to case off the deep aquifer.

Q. And do the Yates well files reveal any instances of any communication with either the shallow aquifer or the deeper aquifer?

A. Did not see that in the well file, no, sir.

Q. Do the well files reveal any evidence of hydrocarbon contamination of either aquifer?

A. No, sir.

Q. I'll next ask you to identify the document marked as EOG Exhibit Number 2.

A. This is a summary, if you will, of data from Exhibit 1.

Q. And did you prepare this document?
A. Yes, sir.
Q. And would it be correct to characterize it as a summation of your well file research and the data set out in Exhibit 1?
A. Yes, sir.
Q. And after you prepared this exhibit, did you make some modifications to the data that appears on this exhibit?
A. I did.
Q. And what was that modification?
A. Well, it's more of a clarification. Here we have the number of wells operated in a designated area. That included even the area that just had the deep aquifer. So it encompasses the whole thing. Well, on the next line where it says, "Wells with one casing string to protect both aquifers," well, that's -- that's not accurate. It's wells with one casing string through the artesian aquifer, because both aquifers don't exist all over the place. So I have to correct myself on that. It wasn't to protect both aquifers. It was a single casing string through the artesian aquifer.
Q. And so you ran a different set of numbers based on wells within the area that both aquifers appeared?
A. Yes, sir, I did. I ran -- and it's -- it's the

same format. Total number of operated wells within both aquifer area operated by EOG Resources is 441 wells, of which 198 of them ran one casing string to protect both aquifers, and the wells that did have two casing strings, excluding the production casing, we had 243 wells. And wells with two casing strings run solely to case off the aquifers separately was zero.

Q. So that zero number remains the same even under your subsequent analysis?

A. Yes, sir.

Q. And do your percentages in the textural part change as well?

A. It does. The wells that we ran a single casing string, 198. It calculates to about 45 percent.

Q. And in your opinion, is the single surface casing cemented to the surface protective of groundwater?

A. Yes, sir.

Q. And you found no indication in your well file review that any of the wells within the area where both aquifers appear have communicated with or have contaminated either of the aquifers?

A. No, sir.

Q. With regard to the casing requirements in the Division's proposed rule, have you computed the

additional drilling costs that EOG would incur if the Commission were to adopt the rule?

A. Yes, sir, I did. I come up with approximately $314,000.

Q. And are you referring to what's been marked as EOG Exhibit 3?

A. Yes, sir.

Q. And would you identify that for the record, please?

A. EOG Exhibit 3 shows just the added costs that we would incur if we had to run the extra casing string and also run the cement bond log after -- after the surface and intermediate.

Q. Did you prepare the document marked as Exhibit 3?

A. Yes, sir.

Q. And could you briefly describe your breakdown of the estimated costs for adding an intermediate casing string?

A. What I did -- really what you're doing is you're adding a shallow casing string. You still have your -- your one at approximately 1,200 feet. What you're doing is you're adding a shallow surface string. I've got the -- what I did is I just went through and put what I thought would be the added costs, your bit,

your casing, your cement, float equipment for your casing, wellhead, BOP test, casing inspection, et cetera, et cetera going down the list, including your bond log and your W -- or your weight on cement for a bond log.

Q. And what is your second set of numbers there?

A. Well, the second set of numbers would be just -- I didn't include any of the other costs because we would just be running that string as a surface casing, so that would already be existing. So I just added the bond log cost and the weight on the cement bond log.

Q. And those costs total $314,286 per well?

A. Yes, sir.

Q. And I notice you have a line item of amount of time to wait for the district office to review and approve a bond log, and you've got question marks there.

A. Right. And as has been discussed, that's the big question, is how quick can we get a bond log reviewed and approval and returned back to us.

Q. So that's really an unknown at this point?

A. That is an unknown.

Q. And what would the per-day costs be for the waiting period relating to a bond log?

A. Rig and rentals, approximately $40,000 a day.

Q. And do you have a document marked as Respondent's Exhibit 2 in front of you?

A. Yes, sir.

Q. And Respondent's Exhibit 2 is entitled "Historical 2-String Design Well Diagrams"; is that correct?

A. Yes.

Q. And how does this diagram compare with the Yeso horizontal wells that Yates and now COG operate in the designated area?

A. It's similar to -- we have the single string through the artesian aquifer, and then we drill out and -- and run a lateral -- run a pipe into the Yeso Formation.

Q. And on some or all of those wells, did Yates and its predecessors cement the production casing of the surface?

A. We usually have cement come to surface. If you design for 500 feet, but on the -- on the lateral, on the production casing, what we'll do is on what we call the unlogged portion of the hole, which would be the lateral section (indicating), we pump 35 percent excess over true hole volume. And then on the curve and the vertical part that's an open hole, we log that. And so we'll pump 15 percent over logged volume, and then

casing to casing, we pump 10 percent. If your hole is pre-gauge, I mean 1,200 foot of pipe, bring to 500 foot, I mean, it's going to circulate.

Q. In your opinion, does a well with surface and overlapping production casing cemented to at least 500 feet above the base of the surface casing adequately protect groundwater?

A. Yes.

Q. And on average, based upon your well review, what was the depth for the surface string for the wells in the designated area?

A. It depends on where you're at in the -- in the shelf. A little further north, we had shallower surface casing. As we got down in -- where we've been active -- well, not within the last year, but where we were active in the Yeso area, 1,000 to 1,200 feet on average.

Q. And since EOG purchased Yates, has the focus of the former Yates employees, now EOG employees, in Artesia changed?

A. Definitely. EOG -- EOG Resources has a Midland office, and so they -- they have -- historically, they've operated in what we call the Delaware Basin, and Yates Petroleum also operated in the Delaware Basin. So when the merger happened and we became EOG Y Resources, EOG Midland, the division -- the Midland division is

focusing on the Delaware Basin in New Mexico. The Artesian office, we've got the shelf. And so that's our bread and butter, if you will. We've got to make the Yeso Formation work for us. There is other stuff east of town, but our big play is the Yeso play south of Artesia, and that's what's going to -- that's what's going to make us or break us as a division.

Q. In light of the additional drilling costs that you included in your Exhibit 2, how does that impact EOG's Yates -- I'm sorry -- EOG's Yeso drilling program going forward?

A. It makes them uneconomical.

Q. And do you believe that a requirement of an intermediate casing string would provide any additional protection to groundwater?

A. No, sir.

Q. I would next address your attention to Respondent's Exhibit Number 3. Do you have that in front of you?

A. Yes.

Q. And do you agree with the third bullet point addressing the proposed 2-inch, quote, "Clearance between the hole diameter and the couplings of the casing string"?

A. Yes.

Q. And do you also agree with Mr. Bird's testimony regarding that issue?

A. Yes.

Q. And in your opinion, would the three-string design proposed by the Division present increased safety risks?

A. Yes, sir.

Q. And what would those risks be?

A. With any -- with any added procedure in the oil field, I mean, you have -- you have -- just in the drilling operations of set -- say having to set an extra string and run a bond log, and you have added trucking. You have to run your pipe, cement your pipe, just all these procedures, and these added procedures do have risk associated with them.

When we choose to set a shallow surface casing, we have to calculate the risk. Is the risk greater to set that pipe and you have to bring all these people in, or is the risk greater to get stuck and then have to bring people in anyway and then still have to run pipe just to case off, you know, in the shallow-hole problems. And in the cases where we've set shallow casing, we feel that the risk is greater not to do so.

Q. In your opinion, have the drilling practices of EOG's predecessors in the designated area been

protective of both the shallow and the artesian aquifers?

A. Yes, sir.

Q. In your opinion, would the requirement of an intermediate casing string provide an additional protection of the upper and lower aquifers?

A. No, sir.

Q. And in your opinion, is the proposed rule necessary to protect the aquifers?

A. No, sir.

MR. LARSON: Mr. Chairman, I move the admission of EOG Exhibits 1, 2 and 3.

CHAIRMAN CATANACH: Any objection?

MR. OLSEN: No objection.

CHAIRMAN CATANACH: Exhibits 1, 2 and 3 will be admitted.

(EOG Y Resources Exhibit Numbers 1, 2 and 3 are offered and admitted into evidence.)

MR. LARSON: I'll pass the witness.

CHAIRMAN CATANACH: Mr. Brooks?

CROSS-EXAMINATION

BY MR. BROOKS:

Q. I'm sorry. I've forgotten your name.

A. Jeremiah Mullen.

Q. Mullens?

A. Mullen.
Q. Good morning, Mr. Mullen.
A. Morning.
Q. Paging through this exhibit, I found quite a number of -- not a large percentage at all, but quite a number of individual cases where you have -- okay. Well, let me back up. In the first instance, there are, as your summary reflects, a lot of cases in which Yates has run an intermediate casing string in the wells in this area, correct?
A. Yes, sir.
Q. And the vast majority of those that are listed on your Exhibit 1 do not indicate on the exhibit anything about what the reason was for doing that, on the summary.
A. On the summary? No.
Q. On Exhibit 1. There are a few instances where it does.
A. Yes. And the reason for that, when we were working on this exhibit, it was in Excel. And what I did is I went through and while we were looking for how many wells were set with two strings, how many set one string, and if you can insert a comment, and when you hover over it, it pulls up why.
And so when I went through and did was --

on all mine, I had a comment inserted on the Excel spreadsheet. My boss who actually helped, he put his comments in the -- right here in the scale. But each and every one of them, if there were two strings set -- and if I can point to an example of an APD I have. Can I do that?

Q. Okay. The pages are not numbered, but if you can tell me which page to page to.

A. Well, I'm talking -- well, a large amount of these wells, when they were permitted, stated that approximately whatever depth we thought we would need to set surface, "surface casing will be set in cement circulated to shut off gravel and cavings."

Q. To shut off?

A. Gravel and cavings.

Q. Oh, okay.

A. So with all these wells we ran a shallow surface and then ran an intermediate, then we did that because we anticipated hole problems or the potential of hole problems, and we put that in the permit.

The ones that we -- that we had some permits that did not have that but were designed like that because we have offset wells, as Mr. Krogman had pointed out -- you have offset wells that you study, and if you see a potential problem, then you -- then you

would design it to take care of that.

And so on these wells, none of them were designed for the sole purpose of casing off that shallow aquifer separate from the -- it was -- all the ones that have two strings, it was either for a problem that has occurred while drilling or a problem we anticipated.

Q. Now, did you prepare these from -- you said you prepared these from well files. Now, were those the OCD's online well files, or were those Yates' internal well files?

A. Well, we have OCD online well files that we looked at. Well, you don't have the well files for all these wells just readily available --

Q. Okay.

A. -- but the OCD well files.

Q. Yeah. I was interested in that because there's been some testimony that the reasons for setting casing at particular levels were not ascertainable from the well files. But whatever information you have provided, reasoning is from the OCD well files?

A. And which in particular were not?

Q. It wasn't a particularized testimony, so I can't give you that information.

A. Okay. You can -- you can -- when you look in the well file, you have to know what you're looking for

to know where a pipe was set or when something was done, particularly the older -- the older well files. And -- and -- and like I said, if we did have a well file in-house, then we would use that -- we would use that just to check and make sure that we had the right data.

Q. Now -- so although most of these wells that have intermediate casing pursuant to your -- what is reflected on Exhibit 1, the copy I'm looking at anyway, most of them have no notations to read. Now, is it your testimony, then, that you have examined the files for each of those wells, and each of them discloses that the reason was for protection of hole integrity and not for protection of groundwater? Is that what you're telling us?

A. The surface -- if there were two strings set, then there was -- it either had it noted that it was set for casing -- cavings or -- what was stated -- gravel and cavings, or there was some loss of circulation or a hole problem, and then they set the two strings, or -- or you had an offset that you would design it -- where you had a problem on offset and you designed it that way.

Q. Did you then investigate what the problem on the offset was, where they said there was a problem with the offset?

A. No, I did not.
Q. Okay. There are many instances -- not a huge number, but there are quite a few instances on this schedule, Exhibit 1, where it says surface casing -- where there is a notation in the cell for the depth of surface casing and it says, "Surface casing set for." And I tend to assume that was probably an operator error.
A. No. Again, this was done in Excel. And that was a question that I brought up. Do I need to have -- do I need to have all the -- because it's in Excel and it doesn't print your comments unless you had it show them --
Q. Yeah.
A. -- and it decided not to show them. But this is -- if you click on the cell -- it was done in Excel -- it's "surface casing set for hole problems."
Q. Okay. Well, I'm looking specifically -- yeah. I'm looking specifically at the third-from-the-last page of Exhibit Number 1 where it's talking about Prickly Pear --
A. Yes, sir.
Q. -- Prickly Pear AIE Federal Number 1 and the Federal FC -- I found one at the Charlotte McKay Federal #3 -- are the two that I specifically looked at. And on

my copy, it says -- also way up at the top, Boddington BKF Federal Com #1. In the left-hand column, it says "surface casing set for." That's all it says.

A. Yes, sir.

Q. Now, I have enough experience with Excel to know that sometimes, for reasons I don't fully understand, it shortens -- the system shortens the column height, and when you print it out, then that simply -- it simply does not print out whatever's left in the column below --

A. Correct.

Q. -- below where they shorten it out. So I'm tending to assume that is the reason.

But is it your testimony, then, that each of those instances -- if you had the full Excel file in front of you in electronic form, you would be able to ascertain that it is noted that it was set for surface protec- -- for hole integrity protection? Is that what you're testifying to?

A. Yes.

Q. Now, then I go over to the next-to-the-last page of the exhibit, and we have quite a number of wells down here that say -- well, beginning with the Mescal SE Federal #1/Upper Penn, about two-thirds of the way down this exhibit, the left-hand column says casing was set

at "359 - water protection," case setting -- casing set at 2,300 [sic], water protection, slash, well.

A. Right. That's well integrity -- wellbore integrity.

Q. Okay. Well, "wellbore integrity" does not appear on that copy.

A. Correct.

Q. And that is true for a number of wells down in that -- on that page, which would tend to indicate to me, just looking at my copy, that the shallow casing was set for water protection. But you're telling me that's not what it says?

A. That's not -- it was not set for the sole purpose of water protection. Wellbore integrity --

Q. Was it set partly for the protection of water, since that appears with a slash after it?

A. Well, if you set it, then it would -- you know, it would act as that if it was set deep enough.

Q. Yeah. And these were wells that were drilled in the 1970s and 1980s, so it wouldn't have anything to do with the recent controversy.

A. Well, some of them were in 2007 and --

Q. I think it will tell us specifically.

A. Oh, okay. Yeah, 1976 or 2000- -- no, wait. Sorry. '81, '07, '84, '98.

Q. Okay. So you're assuring us that you've examined every one of these and that there is no instance in which water protection was anything more than one of the reasons why the surface casing was set?

A. Well, the reason it was set is if you have hole problems. It wasn't set for water protection. If there had not been hole problems, they would have drilled on down and set it below the artesian aquifer like we did on -- I'm sorry.

Q. I'm sorry. Go ahead.

A. Like we did on some of the wells there in that area.

Q. And how long have you been involved in drilling wells in this area personally?

A. Well, since 2002, in the -- in the well planning.

Q. So you would have no personal knowledge regarding wells drilled in the 1970s and 1980s --

A. Only what -- 1970s, only what I've learned from the files. From 1982 on, my boss, for about 20-some-odd years, he drilled wells in the area, and he's the one that did this -- did a lot of this -- well, I say a lot. He did a third of this research.

Q. Okay. There's been testimony from several -- from two witnesses now that they have drilled a lot of

wells through these two aquifers and they have never encountered a flow of fluid out of the aquifers into the hole -- out of either aquifer into the hole. Does your experience accord with that?

A. Yes, it does.

Q. Is that something you would know about if it occurred?

A. We would. We'd see -- as you drill the well, they do a time log, and if your pits [sic] are taking on fluid, then you know there is an inflow from somewhere.

Q. Okay.

A. And then they would indicate that on -- if there's more fluid coming in than displacing the hole.

Q. Okay. There's also been testimony that you have not encountered any leakage or that -- the operators who have testified have not encountered any leakage of fluids through the surface casing that would have presented the pollution problem from freshwater. And I asked the last witness this question. I'm going to ask you this question also. How would you know if that had occurred or whether it hadn't occurred unless you had a complaint from someone?

A. If there was -- if you have surface casing set and cemented to surface --

Q. Whether there is leakage which would presumably

be because of a defect in the cement or a leakage in the casing, would be the things that would come to my mind, anyway, that might have caused it. But how would you know if that had occurred?

A. Well, you would just know if somebody reported. I mean, there's been -- there's been -- you know, a few of your witnesses said there's been no indication of contamination, so I have to go by their testimony, because I don't know of any. That's all I can say. I don't know of any.

Q. Isn't that basically what these operators are testifying to; they haven't been alerted to any?

A. Yes, sir.

Q. And you don't really have a procedure for testing to determine if anything's actually occurred? That's not part of the operation that you do, right?

A. No, sir, other than circulating cement to surface and, like I said, making sure you set your pipe through the artesian aquifer.

Q. And except for the fact that the cement does, in fact, circulate to surface, if you don't take a cement bond log, you don't have any further way of knowing that you don't have vacancies in that cement somewhere?

A. Well, you just -- I mean, once you circulate --

as Mr. Krogman testified, when you circulate it -- I mean, what we'll do to ensure a good bond is we'll -- the State recommended -- or the State regulates that you set centralizers at one, three and five. That's first joint, third joint and fifth joint. Thereafter, well, EOG-wide, we do every third joint to surface just to ensure the centralized casing and get the bond, and we do want the turbulent flow, also.

Q. There's been a lot of questions about turbulent flow, and I'm not going to ask anything more about that.

But I'm talking about how you verify the quality that you've actually gotten from -- you rely on the fact that you tested the cement before it was put in the well --

A. Yes, sir.

Q. -- and that it has successfully circulated to the surface?

A. Yes, sir.

Q. And that's really all you have to let you know that the cement -- that you've got a good cement job, is you don't do a cement bond log, correct?

A. That, and the fact you have no instances of contamination reported.

Q. Okay. Now, let me look again at Exhibit Number 3 where you compute costs. Now, the 183,618 that you've

reported for the cost of the added casing string, we can speculate that that may be a couple of dollars off since it comes out to 180?

A. It could be higher.

Q. But that cost is the cost for the added casing string?

A. Well -- yes, sir, and the bond log -- waiting on bond log.

Q. Okay. Yeah. The added casing string, including the added bond log --

A. Yes, sir.

Q. -- because under the proposed rule, you've got to run two bond logs for each of the casing strings?

A. Yes, sir.

Q. And the second computation is the cost of the second bond log, right?

A. Yes, sir.

Q. So if the Commission were to decide to require a bond log and were to decide not to require two casing strings, at least not in all cases, then the cost figure that you've given us would be the 130,000, plus approval time, rather than 314,000, right?

A. You're saying if there is no -- if no surface -- or --

Q. If the Commission were to decide not to require

two -- two water protection strings.

A. Right. Okay. So one water protection string with a bond log.

Q. With a bond log.

A. So you're -- well, that's -- well, $130,000 minimum.

Q. Okay. And if the Commission were also to not adopt the rule requiring you to wait to continue operations until the bond log had been approved, then you could delete the question marks there, and you would have the 130,000. I realize it's not a precisely accurate assessment --

A. Right.

Q. -- because estimates never are. But your testimony would be that you're looking at 130,000 in additional costs based on that scenario. But if the Commission were not to adopt the two casing strings, not adopt the waiting requirement for OCD approval, but to continue the cement bond log.

A. If you did not have to wait the 72 hours, you would --

Q. Well, you'd have to wait the 72 hours before you could do the bond log.

A. Oh, right. Yeah. You're correct.

Q. But you wouldn't have to wait any longer for

Division approval.

A. Oh, correct. Correct.

Q. You could go on with operations while the Division was doing its thing, if the Commission decided not to adopt the waiting period.

A. For the review and the approval?

Q. Yes.

A. That is correct.

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

CHAIRMAN CATANACH: Mr. Olsen.

MR. OLSEN: Thank you, sir.

CROSS-EXAMINATION

BY MR. OLSEN:

Q. Mr. Mullen, are you -- you're not a hydrologist, are you?

A. No, sir.

Q. Or a geohydrologist?

A. No, sir.

Q. Have you studied the hydrology or geohydrology of the area of the 700-plus wells that you've identified in your Exhibit 1?

A. No, sir.

Q. I'd like to go to Exhibit 1, if I may. And I just want clarification purposes. It appears that your exhibit is put together by township and range beginning

at 8 South and then going -- and ending on the last page at 23 South, 23 east, correct?

A. Yes, sir.

Q. So you've put this together from north to south?

A. Yes, sir.

Q. I also went through and tried to identify some dates, and it looks like -- I found on the third page from the first -- on the third page from the beginning, and it looks like 1964, the Marathon well, Marathon AGI State, which was set in 17 South, was drilled at 109 -- casing set at 109 and 600 feet. Did you personally look at that well log?

A. I can't say I personally did. I can say that myself or one of the other two people that looked -- this one in particular, I can't say.

Q. Let's go down a couple or three lines to the State DF #1 Wolfcamp. That's a 1963 well.

A. Yes, sir.

Q. That appears to have two strings set, one at 124 feet and then one at 1794.

A. Yes, sir.

Q. And that's in 17 South, correct?

A. Yes, sir.

Q. Do you know how many wells are identified in

your Exhibit 1?

A. 771.

Q. Your Exhibit 2 identifies 771 wells --

A. Yes, sir.

Q. -- and that is a total of the wells identified in Exhibit 1; is that correct?

A. Yes, sir.

Q. Then I want to go to your Exhibit 2 for just a moment. Your Exhibit 2 identifies 410 wells with two casing strings, excluding production casing. Do you see that?

A. Yes, sir.

Q. That 410 number, is that derived from the wells identified in Exhibit 1 where there are two strings?

A. Yes, sir.

Q. And so the number that you have in Exhibit 2, 48 -- I'm sorry -- of the 771 wells, 48.9 percent of them utilized one string of casing to case off both aquifers. Is that an accurate number?

A. Yes, sir.

Q. So then -- is it fair to say, then, using your numbers, about half of the 771 wells identified in Exhibit 1, nearly 50/50 have had two strings, half have had one string?

A. Yes, sir.

Q. Now -- and that ranges -- that's a -- I found a 1963 well. I didn't find any older than that.
A. There is a 1957, I believe.
Q. A what?
A. 1957.
Q. Can you tell us what page that's on?
A. Let me see.
Q. I'm sorry. There's 1961. I'm sorry.
A. Okay. That would be the very first well on the -- one, two, three, four, five, six, seven, eight -- on the 11th page.
Q. That's the Hawkings GY?
A. The Wright JA #1. It's 18 South, 26 --
Q. Uh-huh. Okay.
And then it appears that the latest well identified in your exhibit is what year? Can you tell us?
A. It should be 2014.
Q. And can you tell me where that well is located?
A. It would be in the Yeso. Well, let me find the exact location. Be 18-26. It's either the -- I apologize. In Section 19 -- I'm sorry. 19 South, 25 East, 2014, we have a well called the Roy Number 9.
Q. I see in 19-25 a Savannah State that's a 2014 well.

A. I believe the last well was a number nine in 2014.

Q. Let's go to Section -- the page that has Section -- Township 19 South, 25 East. And that has a 2014 well, the Savannah State Com well. Do you see that --

A. What section?

Q. -- drilled in 2014?

In Section 32, 19 South, 25 East.

A. Okay.

Q. Why is that well -- it shows -- it shows the surface casing set to 843. Why is there an "NA"?

A. Well, there's no intermediate string run for water protection. As far as I know, there was no intermediate string.

Q. Okay. Let's go right to the well right below it. It was drilled in 1972, same township, same range, only Section 4. That has surface string of 400 pound, 406 feet, and then down to the bottom of 1129, correct?

A. Yes, sir.

Q. Do you know whether or not that information was used when the Savannah well was designed?

A. No. When we did these Yeso wells, we had a geologist that would let us know where she -- where she picked -- would pick the -- where we would be out of the

artesian aquifer and into that San Andres before you hit a water show, and that's the only thing I can see that we would pick that.

Q. I see.

Go to the page -- Mr. Brooks was asking you some questions and the second-to-the-last page of Exhibit 1 for just a moment. And I would direct your attention to the 2001 well, the Luke Bav Federal well. Do you see that? It's Section 3, 21 South, 22 East.

A. Yes, sir.

Q. Now, it says "357 feet - surface set for water." Then at "1402 - water protection well." Can you explain for us the difference in these two notations, "surface set for water" and then "water protection well"? What is that?

A. I would have to see -- this one -- the water protection well, I'd say would be well integrity. Maybe they had some losses going through there, and so they said water protection, well integrity.

"Surface casing set for" -- I'd have to pull my -- and I apologize. I would have to pull the Excel file to see what the end of it was. I can't say. I can't say that.

All I can say is I know for sure that my boss had done that part of it, and he said -- as he

searched the well files and what he saw, he didn't see they were set -- any pipe was set solely just for water protection.

Q. Okay.

MR. OLSEN: May I have just a moment?

CHAIRMAN CATANACH: (Indicating.)

Q. (BY MR. OLSEN) Mr. Mullen, thank you.

MR. OLSEN: We pass the witness.

CHAIRMAN CATANACH: Thank you, Mr. Olsen. Do you have any questions?

MR. FELDEWERT: (Indicating.)

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. I just have one for you, Mr. Mullen.

Can you talk a little bit more about the excess cement and why Yates, slash -- or now EOG does that?

A. Well, Yates did it. I can't say that they're going to implement that with EOG Y.

Q. Have you drilled wells with EOG?

A. No, we haven't. We haven't drilled a well since we drilled -- well, in this area, since we drilled these Yeso wells in '14. Economics weren't there, so we stopped the program.

For Yates, what we want to do is ensure

that we get at least the tieback that's required, and so we -- we do the excess just in case we have out-of-gauge hole. As we drill more and more, the 35 percent excess -- I guess I should redo that. That's what we did in the beginning. As we saw that we had better gauge hole, we reduced it to 30 and, you know, see what we've got. If we're still circulating, you know, we might reduce -- the lowest I saw was like 25 percent excess in the unlogged portion.

In the logged portion, we always kept it 15 percent excess, and in the casing on casing, we always kept it 10 percent excess. But that's just to ensure that if you do have some out-of-gauge hole, you're not going to end up with cement below your casing shoe because then -- well, then, you have to remediate.

Q. So did you ever have any wells that went way above that as far as having to increase that excess?

A. Having to increase the excess?

Q. Any problem wells where they -- you know, your percent ratio went through the roof?

A. No, sir. We were able to reduce our percentage ratio just as we drilled the wells and saw that we were -- I mean, if you drill it and you get -- and you get, you know, 200 -- 200 barrel -- or sacks of cement back, well, then you want to reduce your excess so you

get a little less. You know, you try and balance it out, but you don't want to be under.

Q. Across the board, that's the standard. But you didn't have -- maybe it's a better question to ask in relation to lost circulation. You guys didn't have any big flows go out and have to compensate?

A. Oh, you're talking about the surface casing.

Q. Anything.

A. Okay. On the surface casing, we pump excess, because you're going to have -- you're going to have some washout, you know, just drilling that -- drilling that hole. You know, it's bigger than your smaller hole. But you'll have a little washout. So we do pump excess. And if you have lost circulation, you still -- you want to pump -- I believe we pump 40 percent excess and we circulate it out. If you have losses, you might still pump that 40, but you don't increase it because you have losses because, you know, your hydrostatic head's too high. So if you increase your excess, you're just going to increase what you're pumping in the formation. So we'll keep our same excess, but we'll -- we'll top it out, you know. If it doesn't happen to circulate, we'll top it out with 1 inch.

Q. So that hydrostatic was enough to compensate for cross-flow, you think?

A. Oh, yes, sir.
Q. Okay. Thank you.

CROSS-EXAMINATION

BY COMMISSIONER BALCH:

Q. What was -- what were AFEs coming -- I'm sorry. Good morning, Mr. Mullen.
A. Morning.
Q. What were the AFEs coming in for the most recent Yeso wells?
A. For our most recent -- and now that we're EOG Y, we've started looking at -- as I said, this is going to be our bread and butter. And our drilling AFE, we're looking at, for a Yeso well, like 1 million, 1.1 million.
Q. That's pretty similar to other operators?
A. I believe so. COG may be -- may be a little less than us because they've got that -- they've been operating, and if you're operating quite a bit, you can get some deals.
Q. You indicated in a lot of your -- your two-string completions that the intermediate -- the intermediate casing cement came to surface. You've had a number of those. Kind of --
A. On the well -- well, I was talking about on the production casing --

Q. Yeah.
A. -- where it -- you know, it came to surface.
Q. So in that case, you would have your intermediate string, cement at the surface, and your production casing, cement at the surface?
A. Yes. Yes. If we had -- if we had a -- a shallow surface and then -- and then a water protection, yeah, you would have your intermediate -- well, you'd have your surface, your intermediate and your production to surface. If you just -- if we -- in those Yesos, most were -- most were one string. We didn't have a whole lot of losses on those. So it was our surface casing that was set down deep, so it would then be called our surface.
Q. Okay.
A. And we would have cement behind surface and cement behind our production.
Q. Which would give you two layers of steel and two layers of cement between the water and the wellbore?
A. Yes, sir.
Q. Now, if that were to be an operational constraint, without a cement bond log, the only additional expense would be bags of cement, and make sure you always went to surface on that -- on that production string?

A. Yes, sir.
Q. What would be the approximate incremental cost of something like that? I know it's going to vary by bags of cement and depth and all that.
A. Yeah. It will -- it'll vary. I'm really not sure.
Q. But a few thousand dollars, not hundreds of thousands?
A. Oh, yes, sir. Yes, sir.
Q. Thank you.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. Mr. Mullen, what kind of hole problems are you talking about?
A. You have cave-ins. You know, it's -- when you're drilling through -- and we're similar to -- to Mack Energy in that we drill a little larger hole size. But, see, we set 9-5/8 casing rather than 8-5/8, so our hole size is 14-3/4. The reason we do that, as Mr. Bird said, you plan your well from the bottom up. Our production engineers, when we're going to pump these wells, they want to be able to put big pumps down there. So our design is to -- is to drill an 8-3/4-inch hole to about 70 degrees in our curve, and then we reduce hole size to 7-1/2 -- I mean -- sorry -- 8-1/2. We run

7-inch and then we switch it down to 5-1/2, and that way they can put -- they can put whatever size pumps they want in the 7-inch casing so -- instead of being limited to 5-1/2.

So what that does is that makes us drill an 8-3/4-inch hole, which requires a 9-5/8 casing, which then we have -- we use 14-3/4-inch diagonal for the same reason that Mack does, is because -- from what you're asking, you have formation that can -- that can come in on you. You can get stuck, you know. So that would be the main reason that we would set it, or if you did have lost returns and you thought it could present problems from cave-ins and stuff like that.

Q. Do your hole problems -- are they -- are they -- do they occur in any certain area?

A. It's usually the shallow. It varies, 200 -- we had one; it was at 200 feet. We've had some that are 300. I mean, it varies.

Q. So it varies vertically and horizontally? I mean, they can be anywhere in this area? I mean, it's not concentrated to a certain area within the horizontal?

A. Not that I'm aware of.

Q. So it's kind of a random thing?

A. Yes, sir. And we do have -- we do have areas

where you don't see it and then some areas, you do. But I wouldn't be able to say this is exactly where.

Q. And the wells that you guys are drilling today or recently, you're still running -- when you do encounter hole problems, you're still running two protection strings?

A. No, sir. We're running one water-protection string, but if we do encounter problems and we feel that the risk is greater than -- so we'll run -- we'll run a surface string to case off hole problems.

Q. You're still practicing that?

A. Yes, if -- if the hole problems -- we think that it's greater than -- than going ahead and drilling down, if we feel the risk is greater doing that, then we'll set the surface.

Q. So I just have -- I was looking through the wells, and I just had a question on a particular one, on page 2, and I was just curious. But it's about a little more than halfway down. It's the Phillips KH Fed Com #2. That particular well has the upper string set at 420 feet, which I assume would cover the hole issues and probably the upper aquifer. Did you find it?

A. I did. I did. I would assume so.

Q. The next casing string is set at 2965, and I'm a little concerned that that appears to -- if that

artesian aquifer is present in that area, that casing would have been drilled through that and into possibly some other zones.

A. Yes, sir. And I'm not -- I'm not aware of the depth of the -- of the first oil show below the -- the artesian aquifer. I'm not -- I'm not aware of -- I don't know where the map is. Where is 1427? It's north of Artesia.

Q. 1427 appears to be right -- let's see. It looks to be on the eastern edge of the designated area.

A. Okay. Within the --

COMMISSIONER PADILLA: It's outside.

COMMISSIONER BALCH: Looks like it's outside.

THE WITNESS: Oh, you know what it may be? Because when we -- when we pulled this list, we pulled it off of the OC- -- I forget who supplied that. It encompassed all these townships, and some of those townships are outside of the actual -- so --

Q. (BY CHAIRMAN CATANACH) So that may not be an issue?

A. Yes, sir.

Q. Okay. I don't have any other questions.

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

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Mr. Brooks and Mr. Olsen asked you about some notations in the first two columns on Exhibit 1.

A. Yes, sir.

Q. And those -- you describe them as comments that would show on Excel but have been truncated --

A. Yes, sir.

Q. -- in order to create an exhibit that was usable?

A. Yes, sir.

Q. Is that correct?

A. Yes, sir.

Q. And the well file review that was conducted by EOG employees, there were people involved there that had institutional memory about these wells, weren't there?

A. Oh, definitely. My immediate boss, like I said, has been drilling since '82, and he drilled quite a few. Now, the older wells, he didn't, of course. And he did it for 20-some-odd years, and he remembers everything. I mean, he does -- I'll ask about something and he says, Oh, yeah, that was the well that the geologist came out that day and we went over -- you know, he just remembers everything, well names, what happened, everything, much better than I can.

Q. And one last question. If you look at Exhibit 2, do you see the paragraph of text there and the second sentence says, "Of these 771 wells, there are 337 [sic] of them that utilize one string of casing to case off both aquifers."

A. 377?

Q. Yes.

A. Yes.

Q. And you realized after you created this exhibit that some of these wells were in the area where there is only one aquifer?

A. Correct. And that's where the clarification came in on the -- on the numbers, to just include where there are two aquifers.

Q. Okay.

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

CHAIRMAN CATANACH: Anything further of this witness?

MR. OLSEN: Nothing further.

CHAIRMAN CATANACH: You may be excused.

THE WITNESS: Thank you.

CHAIRMAN CATANACH: Another witness?

MR. LARSON: Yes. Would this be a good time to take a break?

(Recess 10:45 a.m. to 11:00 a.m.)

CHAIRMAN CATANACH: Turn it back over to you.

MR. LARSON: Mr. Chairman, I'll start with Mr. Maxey. I've passed out to the Commission and all counsel a full set of Lime Rock exhibits. They're the same exhibits that were attached to our prehearing statement. We've just enlarged three of them to make them more readable. They contain the same information.

CHAIRMAN CATANACH: Thank you.

JOHN C. MAXEY,

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

DIRECT EXAMINATION

BY MR. LARSON:

Q. Please state your full name for the record.

A. John Maxey.

Q. And where do you reside?

A. Roswell, New Mexico.

Q. And do you have your own consulting business?

A. I do.

Q. And what type of business is it?

A. I'm a consulting petroleum engineer.

Q. Do you have a working relationship with Lime Rock Resources II-A, L.P.?

A. Yes, I do.
Q. And did Lime Rock retain you to testify on its behalf?
A. Yes, they have.
Q. And was that with regard to some Division requirements regarding some Lime Rock APDs?
A. Yes. I've come into this project a little late. Lime Rock, as this situation developed with the hearing in April or May, Lime Rock had several two-string design APDs that were denied, and they worked with the OCD to -- on three different wells for a three-string design in the acreage that they're operating in, and they've recently just finished a vertical well in September. And they called me and said they had had -- that there's been an issue with groundwater. They felt like there was going to be a contamination issue brought up at the hearing, so I prepared a lot of work. I knew I needed to understand the aquifer and how it worked, plus their operations.
Getting here Monday morning, it sounds like there is not necessarily a contamination issue, but dealing with the new rule, I'm going to go through -- I will be as brief as I can because you've heard a lot of testimony about the aquifer. My work is based on Welder and others, and we'll talk about that. But I just -- I

will skip -- I agree with 80 percent with what's been testified on how this aquifer works. There are some points I disagree with, and I'll bring those up.

Q. And we will try to hold you to being brief.

When you say contamination, was it communicated to you by Lime Rock that the stated purpose for the new rule was to prevent contamination?

A. That's the impression I got in my initial discussions with Lime Rock.

Q. And do you have experience designing, drilling and completing oil and gas wells in the designated area?

A. Yes, I do.

Q. And have you previously been qualified as an expert petroleum engineer by the Commission?

A. Yes.

Q. And would you summarize for the Commissioners your educational background and professional experience in the oil and gas business?

A. Yes. I have a bachelor of science degree from Oklahoma State University in petroleum engineering technology. My first -- I accepted employment with Chevron. When I got out of school, I went to Midland. I've worked for Chevron and Mesa Petroleum, Bran Oil Company, Read & Stevens. Now, subsequently, I've been in business since March of 2011 as a consulting

engineer.

Initially, my work with Chevron -- what attracted me to that offer was the training program they had for the new drilling and producing -- or production engineers. I asked if I could be put into the drilling department because they put you out for six weeks with a mentor, and then they cut you loose as a well site supervisor, and essentially gave us a lot of autonomy to design cement, hydraulics, mud programs on location. I did that for a couple of years, West Texas, southeast New Mexico.

I had an opportunity -- well, I also worked in SACROC. I've had a lot of experience with drilling, completions and workover type work in the field with Chevron. In the SACROC Unit, I sometimes had -- we rotated our shift times. I sometimes had two drilling rigs and up to three pulling units running at a time that I was running around and doing different things on in that unit. That unit's just west of Snyder, so it was very convenient to work there.

I then had an opportunity to do air drilling with Mesa Petroleum in Roswell, so I accepted a position doing that. I wanted that experience. And I've drilled quite a few wells on the Pecos slope. The majority of them have been with air.

And while in Roswell, I met Kay Havenor, Dr. Havenor who's got his Ph.D. in geoscience. I mean, this is back in the '80s. We had some discussions with the aquifer and some of the drilling we were doing on the Pecos slope and how both the aquifers work.

I was then transferred to the corporate office. I worked as a division production engineer for Mesa. I was responsible for Oklahoma, Texas, north to the Canadian border. I've done AFEs, well design. I was responsible for production optimization, project -- presenting projects to management, economic justification, outside-operated drilling deals I had to evaluate, reserve assignment, division cash-flow projections.

From there, I had an opportunity to advance to operations manager for Bran Oil Company. I was in charge of all drilling and producing operations in southeast New Mexico and West Texas. Bran is the predecessor to what's now Matador Resources. And while I was employed with Bran, a position opened up at Read & Stevens, an operating -- operations manager/petroleum engineering position, and I accepted that and went back to Roswell. And I've been there ever since. I had about 22 years with Read & Stevens, culminating as president of the company, and then in

March of 2011, I started my own practice.

Q. And are you a registered professional engineer?

A. Yes, I am.

MR. LARSON: Mr. Chairman, I tender Mr. Maxey as an expert in petroleum engineering.

CHAIRMAN CATANACH: Any objection?

MR. OLSEN: No objection.

CHAIRMAN CATANACH: Mr. Maxey is so qualified.

MR. LARSON: Thank you.

Q. (BY MR. LARSON) Mr. Maxey, did you listen to the testimony given by Mr. Bird yesterday afternoon?

A. Yes, I did.

Q. Is there anything you heard that you disagree with?

A. No.

Q. How many wells is Lime Rock currently operating in the designated area?

A. Almost 200. 197 wells. Their acreage is 18 South, 26 East 18 South, 27 East.

Q. Is that within the area where both aquifers appear?

A. The far eastern portion of their acreage would be outside the boundary of the -- it's outside the boundary of the shallow, and it's just outside the

boundary of the deep, as drawn by the Welder map.

Q. And does Lime Rock have a long-range drilling program for its acreage within the designated area?

A. Yes, they do.

Q. What is the nature of that long-range program?

A. They have about 8,000 acres that they're operating there. My acreage on that map is -- the boundary of their acreage, there's minor changes of ownership inside that boundary. They have approximately 8,000 acres. They have 381 locations that they want to drill. They'd like to drill about 25 locations per year. That's about a 15-year life. Currently, with what's happened -- transpired in that area with the last three wells and having to run the three strings, they've shut their program down.

Q. And does their program involve vertical Yeso wells?

A. Vertical Yeso wells. They're in an area of the Yeso -- Glorieta-Yeso that they prefer to complete vertical.

Q. And would you identify the document marked as Lime Rock Exhibit Number 1?

A. Exhibit Number 1 is basically a township and range grid. I needed to get an idea of the scope and magnitude of what we were dealing with. When I

initially talked to them, they were very concerned about the potential contamination issue that may be brought up here. I have to say they're very committed to protecting the resource out here, and that's why they brought me in to study this.

This is the map that's basically from Welder's Report 42 that he did in 1983. I've taken a township and range grid and overlain his boundaries on the shallow and the deep. And I think this was testified to by the other witnesses.

Q. And that's the same Welder report that the OCD witnesses --

A. Yes.

Q. And did you prepare this map that's marked as Exhibit 1?

A. Yes.

Q. What is the total number of oil and gas wells in the designated area identified on your map?

A. I use a commercial database called Laser to pull my well spots, and using that commercial database inside the boundaries of OCD -- the OCD new rule, there are over 9,000 oil and gas penetrations. And doing a little work on oil wells -- or excuse me -- water wells, there's thousands of water wells. So there's going to be the order of magnitude of tens of thousands of wells

in this outline.

Q. And does your Exhibit 1 identify Lime Rock's acreage?

A. Yes, it does.

Q. Is that the yellow area?

A. It's the yellow area, 18 South, 26 East, the far northwest part of 18-27.

Q. And that identified acreage is the acreage that Lime Rock has plans to develop over the next 20 years?

A. Yes.

Q. And after you were retained by Lime Rock, did you have occasion to review any hydrogeologic studies that focus on the Roswell Basin?

A. Yes. I primarily reviewed the Welder report. I wanted to get -- the Welder report is '83. A lot of the work that he did -- you know, you look at the plates in his report, they're '75 vintage, mid-'70s vintage. So I also went to Land and Newton. That's a paper that was published in 2007, which they basically updated the Welder report. Land and Newton are two researchers at the New Mexico Bureau of Geology. That paper and that work was partially funded by the Artesian Conservancy District. So it was an update that they had requested.

I also looked at the Daniel B. Stephens associate report done in '95. They performed a

numerical simulation on the two aquifer system.

And then, of course, Kay Havenor's work. I know Dr. Havenor and have had conversations with him, but I referenced his 1968 circular that is available at the Bureau of Mines. The Bureau of Geology used to be the Bureau of Mines when he did that.

Q. And that's connected to the New Mexico Tech?

A. Yes. I consider it connected to New Mexico Tech in Socorro. Yeah.

MR. LARSON: Maybe Dr. Balch can clarify that, if I'm wrong.

COMMISSIONER BALCH: New Mexico State Survey, research committee in New Mexico like a petroleum research.

Q. (BY MR. LARSON) And what do those hydrological studies tell you about the hydrology in the portion of the designated area in which there is both a shallower and a deeper artesian aquifer?

A. Well, there's been testimony already. I guess I could suffice it to say that if you just want to -- all the testimony's been very general in nature. And, unfortunately, it's very difficult to generalize when you're talking with all the various witnesses and they're operating in various areas of this aquifer. I'm going to get specific to Lime Rock's acreage.

But, in general, the one thing I notice, when you move north to south -- you could pick a range and move north to south -- everything's pretty consistent, fluid quality, the thicknesses of the aquifers. I mean, there is some variance. But you're moving updip from east to west, and that's the direction that you see the big change.

When you come from the west side to the east side, you're moving from the recharge zone into the artesian where it becomes confined. You're moving into the shallow and the artesian, and then you move to the east side where you lose a lot of water quality and have oil and gas in the artesian.

Q. And the information you reviewed, does it indicate that in some areas there are oil shows in the confining unit?

A. Yes, oil shows in confining unit -- actual production in the confining unit.

Q. And given that, do you think it's advisable to adopt a one-size-fits-all rule with a uniform casing requirement?

A. No, sir.

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

A. Okay. I need to point one thing out on

Exhibit 1 --

Q. Sure.

A. -- because it ties into Exhibit 2. So I need to go through this just very briefly.

If you want to reference the Havenor report, both Welder and Land and Newton reference the Havenor report in their reports. His report was done back in the '60s, Circular 93. He noted -- and I'm going to locate you on the map. Can you find Roswell on my map, please? And if you'll look just above Roswell, you'll see Township 10 South, 24 East. Okay? Move one township to the east, 10 South 25. Directly above the 1, you see a cluster of wells, quite a few of them in there. In particular, there are six wells in the Bitter Lakes West, and they produce from the San Andres, the artesian portion of the aquifer. This is just a few miles to the northeast of Roswell.

Dr. Havenor also did an RGS paper, Roswell Geological Symposium paper. I have those symposium books in my office. He talked about -- this is producing from the Slaughter zone. And there was some testimony earlier from the OCD about the Slaughter zone that it's a pretty continuous zone. And Dr. Havenor, in his paper, he spoke about the Slaughter zone, this particular field. It's made 24,000 barrels of oil from

six wells. And I'm going to quote two sentences from his report. He's talking about the Slaughter interval in this field, Section 17, 10 South, 25 East. And he said, "It should be re-emphasized" -- he's talking about the Slaughter zone. "It should be re-emphasized here where fresh, potable water is produced in the Slaughter zone beneath Roswell, that only a few miles to the northeast hydrocarbons are produced from the Slaughter with oil field waters containing" approximately -- "about 39,000 parts per million chloride. Also less the significance be lost, the Slaughter zone is a continuous porosity horizon throughout the northwest shelf into West Texas."

So here's where I'm going to disagree with the previous witnesses. The artesian aquifer produces oil and gas in the areas mapped and within the OCD's boundary. You'll see later that it produces from the confining unit. There is a problem with that in trying to put it together and made [sic] it to the law as now written, the proposed rule from the OCD. The Slaughter interval is continuous all the way out into -- very far east of the Pecos River. And you can read the paper. But it's hydrologically connected nearly to the -- to the Texas border, to this interval right here (indicating). So I don't agree that -- that this

reservoir stops at the river or it stops at these boundaries, these aquifers. Now, the shallow I would agree more so that it stops at the river but not the deep. That's the point I need to make.

And we have artesian head -- artesian aquifer charge that comes from the west. We have oil and gas and brine encroachment that comes to the east. In the far eastern part of this, it creates a problem trying to handle this with a one-size-fits-all. Okay?

Q. Just for the record, what is the full citation that --

A. What's the what?

Q. The full citation.

A. Oh, what it came from?

Q. Yes.

A. Well, he authored an RGS paper. That was November of '66. I'm not sure which one I pulled that out of. Those are done by years. Those are in binders. And then his report was out of -- where did I put that? It's the Circular 93, I believe is what it was that I stated earlier. Yeah, the 1968 Circular 93 for the Bureau of Mines. Is that what you're talking about?

Q. Yes, the one you were quoting from.

A. Yes. That's the one I was quoting from.

Q. And then sticking with Exhibit 1 for a moment,

is the significance of your testimony about the wells in the aquifer in the Bitter Lakes area that it's directly due north of Lime Rock's acreage?

A. The significance is that it's on the far eastern side of the aquifers. If you'll note on that map, it's two miles inside the shallow and deep aquifer boundaries as mapped by Welder, so it's two miles to the west. So it's in an area where supposedly we're supposed to run three strings of pipe under the new rule, but it creates a problem when the artesian aquifer's what's producing. And so Lime Rock's acreage is located on the far eastern side. However, it's pretty far south. That's where we get into it. That's why I was trying to explain. North-south, there is not a lot of difference. East-west is where the big difference is in water quality and fluid content of these aquifers.

Q. Does that close the loop on what you wanted to talk about on Exhibit 1?

A. Yeah. We'll go to Exhibit 2.

Q. Okay. And would you identify Exhibit 2?

A. Exhibit 2 is a figure out of the Open File Report 503, dated 2007. This was Land and Newton, the one I referred to that you can find at the Bureau of Geology.

Q. And is this a true and correct copy of the map derived from Open File Report 503?

A. This is a true and correct copy, with the exception at the top where it says "approximately 40 miles." There was no scale on this map. So it said "Pecos slope," I believe, up there. I just overwrote that and gave you some scale from that Border Buckle out to the east of Comanche Hill. This slide covers approximately 40 miles from west to east.

Q. Just for the record, Mr. Maxey, the exhibit that we had with our prehearing statement shows the 40-mile access that you added to it. The one that I passed out this morning does say "Pecos slope."

A. Okay.

Q. Unfortunately, when we copied these, we went back to the earlier version.

A. Okay. So from the left-hand side to the right-hand side of that slice is approximately 40 miles.

Q. And what does the exhibit tell us about the portion of the designated area where both aquifers are present?

A. Well, this -- this -- again, this is -- you've already heard this testimony. But this illustrates, I think, a little better. There is recharge to the west into the San Andres. It becomes artesian under the

Seven Rivers aquitard that's depicted in orange here. You'll notice the alluvial aquifer is yellow. It's actually in communication and lies directly on the San Andres out to the west. I happen to live in that area of town. I have a well in that part of this area.

The thing to note, number one, is there was -- there was testimony that there's leakage as a confining -- a leaky confining unit, which I agree with. And as the -- you know, change in pressure is what drives fluid migration in these aquifers. And there was testimony about fluid moving from the shallow to the deep aquifer, from the deep to the shallow. In this paper, they discuss it. They built on Welders. That's what these blue arrows depict, is how fluid flows in the aquifers and the confining unit. And there was a reference in the Welder paper and in the Land paper to some work done by Handtusch [phonetic], back in '56, and he estimated when the confining unit -- when water moves from the lower aquifer up into the shallow aquifer, as has been discussed, the confining unit boundary now becomes a discharge boundary, okay, because you have water moving across it. He estimated that in January of '54, '55 and '56, that the discharge across that boundary was 12,400 acre-feet for that month.

So we have some testimony about could we

have water mixing when we're drilling. And I wanted to set this up and show you gentlemen that there is a tremendous amount of potential for natural occurrence of water movement. And my whole point with this is it's difficult to understand how you cannot -- how you couldn't look at this and consider the possibility that this can all be protected with one string. It functions -- there are two aquifers. One is artesian. One is a groundwater-type aquifer, that because of a lot of pumping in the deep aquifer, the gradients have come much closer together than they used to be prior to the development in the late 1800s, the initial development. So that's what this slide is to illustrate, to give a broad view of the geology. It's a little better detail than what's been presented. And it gives you an idea, with the blue arrows, as to how fluid moves in the aquifer, and that these authors actually depict fluid moving from the brine areas to the east. They moved west -- are moving -- they can migrate west, and they also move upwards through some fractured and dissolutioned intervals on the far side.

Q. And one take-away from your exhibits would be what's identified as the Seven Rivers aquitard is not an impermeable layer?

A. It's not an impermeable layer. It's a leaky

confining unit. As a matter of fact, in the paper --

MR. OLSEN: Mr. Director -- excuse me -- to the extent the witness is going to be tendering testimony regarding hydrology, geohydrology, we tender an objection that he's not been qualified as a hydrologist or a geohydrologist. I believe he's been qualified as an expert in the field of petroleum engineering only, so any -- we'd -- we would object to any opinions tendered by him as it relates to those two fields, hydrology and geohydrology.

CHAIRMAN CATANACH: Do you want to respond?

MR. LARSON: I don't know that he's offered an opinion. I think he's giving his interpretation of the publicly available document.

MR. OLSEN: That's the basis of it. He's tendering testimony as to his opinion or interpretation of a field that he's not qualified to, and so our objection will stand.

MR. BROOKS: Mr. Chairman, I won't want to express any opinion on the witness' qualifications, but I do agree. In interpreting publicly -- publicly available data, when you're dealing with material of a highly technical nature, it does involve expressing an opinion which only a person qualified in the relevant discipline would be able to do.

CHAIRMAN CATANACH: So what are you recommending, that you want to strike his testimony, or what is your --

MR. OLSEN: Well, if the witness is prepared to testify that he has an opinion as a petroleum engineer if one string, two string will work, as in previous testimony, fine. But if it's going to be dealing in the realm of hydrology or geohydrology and rendering an opinion from that, we don't believe he's qualified.

CHAIRMAN CATANACH: Some of these conclusions that you're testifying to, are they indicated in the report?

THE WITNESS: Yes.

CHAIRMAN CATANACH: So you can testify as to the conclusions in the report, offering an opinion?

THE WITNESS: Yes. If I have -- if I'm coming across as offering my own opinion, that's my mistake. I'm testifying as to what I'm reading in this report.

You see, we have been -- Lime Rock has been required to set two strings of casing, neither of which protected the aquifer. They were set above the aquifer. And it's because the aquifer is productive of oil and gas, and it's because the confining unit is productive

of oil and gas. You have to get a foundation of what's going on here and an understanding of why. All I've been hearing is we have to protect the aquifer. And where Lime Rock is -- has drilled their wells, I've got exhibits and I'll show you that the Grayburg Formation down there, the confining unit, has produced almost 500,000 barrels of oil in one small field.

MR. OLSEN: But, Mr. Director, with all due respect to the witness, the reports have not been made a part of the record. It's not an exhibit. The author -- the reports are certainly available for purview, but the contents thereof and the interpretation or the presentation of the contents thereof are made by those folks that are from that particular field or of that science. Our position is that the witness cannot go there because he is not qualified. He is a petroleum engineer, so if he wants to talk about the development of oil and gas from a particular zone, how that's done, that's fine. I don't have an objection to that. But when it goes to the interpretation of water flows and migration, that -- that particular science, we tender the objection.

THE WITNESS: Mr. Commissioner --

MR. LARSON: Hold on.

Mr. Chairman, as an expert petroleum

engineer who designs wells, obviously part of the information he analyzes is the formations that the well is going to go through. So I think at least at that level, a petroleum engineer, he is able to interpret data.

MR. OLSEN: I don't disagree with Mr. Larson, counsel. Only as to -- if it deals with the hydrology and geohydrology of the area, I don't believe the witness is qualified. Certainly if it deals with the geology and the development of an oil and gas well in those bearing zones and things, I'd be the last one to argue with that, but not when it comes to the hydrology and geohydrology of the Roswell Artesian Basin.

CHAIRMAN CATANACH: Mr. Larson, would you be willing to enter copies of these reports into the record?

MR. LARSON: Certainly.

CHAIRMAN CATANACH: Well, I guess if we can enter the report into the record as evidence, he can testify as to the report.

COMMISSIONER BALCH: In that case, you would be referring to the passages in the reports in lieu of giving what might be a personal opinion?

THE WITNESS: Say that again.

COMMISSIONER BALCH: You could read interpretations by the qualified hydrologists' reports, and that would be the --

THE WITNESS: Okay. Rather than quote the report?

COMMISSIONER BALCH: You can quote them. Say what page number, what line number, and then read it out, and then it's not your opinion. It's their opinion.

THE WITNESS: Well, that's what I did. I read the quote. And I think I had the page number, if I need to enter that.

Q. (BY MR. LARSON) Do you have the page number, for the record?

A. I believe I do. Let me look.

CHAIRMAN CATANACH: Yeah. And that's another thing I'd like to bring up. Being a petroleum engineer, we have studied, you know, fluid-flow reports. We're not hydrologists, but that's part of the engineering curriculum, that type of fluid flow.

MR. OLSEN: No, I don't disagree with that. My objection goes to interpretation of the hydrology, geohydrology in the Basin, and the witness is tendering an opinion. That's the same as the objection that came yesterday that the hydrologist or geohydrologist were

not engineers -- petroleum engineers. The inverse of that objection here is that this witness is not a hydrologist or a geohydrologist and cannot render opinions on that particular science, on that issue. That's the basis of our -- of our --

COMMISSIONER BALCH: I think we generally allowed that testimony to continue.

MR. OLSEN: Sir?

COMMISSIONER BALCH: I think we generally allowed that testimony to continue under those circumstances.

COMMISSIONER PADILLA: Yesterday?

CHAIRMAN CATANACH: Let's just say we try to stick to the report and try to stick to the opinions -- I mean the conclusions that came from that report.

THE WITNESS: These are the conclusions from the report. When I -- when I spoke about the discharge across the boundary, 12,400 acre-feet, in January, that came from the report. That's -- that's what came out of the report. And that was referenced in both Welder and Land and Newton. And I might add that counsel cross-examined the last witness and said, Have you looked at the Welder report to know where the depths of these aquifer are? That's exactly what I've done.

CHAIRMAN CATANACH: Okay. Let's continue then and try and stay on track.

COMMISSIONER BALCH: Would you please cite where you read your conclusions, if you can?

THE WITNESS: I don't have the page, but that's Havenor 1968 -- excuse me. I'm on the wrong -- it's Havenor 1969. It was the Circular -- Circular 93, 1968.

Q. (BY MR. LARSON) You're referring to Dr. Havenor's report in 2007?

A. Yes.

COMMISSIONER BALCH: When you're reading a conclusion by a hydrologist from one of these reports, it would be nice to know the report name, citation, page number.

THE WITNESS: Okay. I see what you're saying now. Yeah. Havenor's quote --

COMMISSIONER BALCH: Yes.

THE WITNESS: -- was the quote I read from the Circular.

COMMISSIONER BALCH: And it's clear that it's not your opinion; it's Havenor's opinion?

THE WITNESS: Yes, that's correct.

Q. (BY MR. LARSON) Okay. Moving on to Lime Rock's acreage identified in Exhibit 1, are there hydrocarbons

that appear in the confining unit under that acreage?

A. Yes. And I've identified the confining unit from the Welder report.

Q. And given the presence of producible hydrocarbons in the confining unit, does it make sense to have an intermediate casing string from a well that produces those hydrocarbons?

A. In the context of what's been proposed as the OCD rule, no.

Q. And why not?

A. The OCD rule states that we need to drill into the San Andres on the intermediate to the first oil show. The first oil show occurs well above the San Andres, and it occurs at the base of the confining unit. So we basically have set the initial surface string approximately 425 to 450 foot. That's in the confining unit. It cased off the shallow aquifer. And per the Welder report, an average depth on this acreage, that I can show you where we are on the cross section, is 150 foot the base of the shallow.

And the second string, when the oil show was hit at the base of the confining unit, when we set the second string, it had to be set within 50 foot of that show, which put it in the confining unit also. We could have had one string that would have handled that

situation.

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

A. This is a map that I pulled at the State Engineer's Web site. I just wanted to get an idea of water well spots. I've overlain the section, township and range grid on the topo map that has the well spots that came from the State Engineer's Office.

Q. Have you prepared this exhibit using information from the OSE Web site?

A. Yes. Yes.

Q. And Lime Rock's acreage is also shown on this exhibit?

A. Yes. It's shown in yellow, 18 South, 26 East and 18-27.

Q. And what points did you want to make in preparing Exhibit 3?

A. The first one is a moot point. I thought there was going to be some contamination issue discussed, but that's already been determined that there is none.

Secondly, I wanted to get just a qualitative look at the wells in the area. And if you'll notice, the wells are towards the west side of Lime Rock's acreage, and the number of wells diminishes as you move east. So I went out to the State Engineer's

Office. I went through the logbooks in 18-26 on Lime Rock's acreage. I did not do an exhaustive search, but what I found was freshwater flows out of the artesian down to approximately 670 feet, roughly. And below that, I found oil shows. And in one in particular well in the west half-northwest quarter of 15, I found brine water flow at 830 feet.

Q. And what was the oil show you saw in one of the water wells? What was the depth of that oil show?

A. It was below those freshwater flows that were probably artesian, because they flowed to surface, according to the well logs. And the approximate depths of the oil shows have been 750 and deeper.

And these are -- these are old logs. I don't know where the State Engineer quit keeping more current logs on oil wells, but these are all primarily cable tool wells. Some of the dates were 1925, 1926, 1927. And as you know with cable tool, you're going to -- it's a good method of sampling, and it's a good method of seeing flowing zones.

Q. And that was the Roswell Office of the State Engineer?

A. Yes. I was in the State Engineer's Office out on West 2nd in Roswell.

Q. Would you next identify the document marked as

Lime Rock Exhibit 4?

A. This is a map from -- again, I pulled three RGS Symposium papers that were done over or in the vicinity of the Lime Rock acreage. This is -- the map is actually from one of the papers that handled two of the pools, and I've actually put the boundaries on a third -- on this map because it was in the same area.

Q. And are there some RGS Symposium documents attached to it?

A. Yes. Yeah. My mistake. The attachments to that map are the actual symposium papers, one done -- let's see. We've got the Dayton San Andres field, the Dayton Grayburg field and the Atoka San Andres field. There is one field that there is not an RGS paper on, but I wanted to make a note of the production. And it's in a small box. In the upper, right-hand side, you see the Atoka Grayburg field. I pulled that data on those producing wells. Those wells in that small field in the east half of Section 14 produce 395,000 barrels of oil and 1.9 million barrels of water from a depth from 550 to 990 feet. That actually -- 14H -- the well in 14H actually flowed 134 barrels of oil a day from that depth.

Q. Did you prepare Exhibit 4?

A. I prepared Exhibit 4.

Q. And is there anything more than you'd like to -- anything more you'd like to inform the Commissioners about regarding your data on Exhibit 4?

A. Yeah. Let me just run through it real quick.

You'll see the blue box in the upper, left-hand side. That's the outline of the Atoka San Andres field. And briefly, in that paper that was done at RGS Symposium, I wanted to note in there that the depth of the producing formation was 500 to 650 feet below the top of the San Andres. However, if you'll note midway down the page, other shows encountered were -- shows were found in the lower Queen Grayburg section. The chloride content of the water produced out of the San Andres at the depth of 500 to 650 feet below the top is 130,000 parts per million chlorides.

Moving to the bottom of the page, you'll see the outline of the RGS Dayton San Andres study and the cumulative production. The Dayton San Andres produces in the upper 600 feet of the San Andres. However, you'll find that there were also shows encountered in the Lower Queen Grayburg section. That's midpage.

And then if you move over to the outline of the RGS Dayton Grayburg study, a quarter million barrels of oil. The Dayton Grayburg, first oil occurrence is

found 150 foot -- in the 150-foot interval above the San Andres, with most production coming from the Grayburg sands. I also underline that oil apparently comes from fractured porosity. So we've got a fracture formation, which my point there is we could have some vertical permeability related to oil movement.

Other shows in this formation -- or other shows encountered in this field were found in the San Andres unit.

So these are just RGS symposiums that show that back in the late '50s, early '60s, when these were developed, there were actually fields producing. And I'll identify where they are on the cross section I have later, but they're in the confining unit -- base of the confining unit and into the top of the artesian.

Q. Would you next identify the document marked as Exhibit 5?

A. Exhibit 5 is a cross section I prepared. This cross section's primarily -- I prepared this cross section along with consultation with the Lime Rock geologist that's taking care of this area. Actually, he's the manager for Lime Rock's geologist.

Q. And are the wells identified in Exhibit 5 Lime Rock wells?

A. These are Lime Rock wells. Two of them will

say -- you can't read it. But two of them are Devon headers, but they acquired those in an acquisition at some point. So they're all Lime Rock operator wells.

Q. And do the mud logs support a conclusion that there are hydrocarbons in the confining unit and the deeper artesian aquifer, as shown on your Exhibit 2?

A. Yes.

Q. And are the three identified wells still producing?

A. Yes.

Q. And what is the shallowest mud log shown on your Exhibit 5?

A. The shallowest mud log show -- and this was not an exhaustive show of mud logs, but the offset -- excuse me. The Fanning 13J #1 is not in this cross section, but it is the shallowest occurrence immediately adjacent to this cross section at -- and I've drawn it on there in a box in the upper, right-hand side, approximately -- and I know the depths are hard to read, but every 500 feet, I blew up the depth interval -- the center scale on the depth so you can read it. That shows approximately 800 feet. It occurred at 760 feet in the offset well, in the Fanning J. Because of about 50 foot of structural movement, I put it at a stratigraphic equivalent of about 820 feet on this log.

Also to note on this is a map in the lower, right-hand corner of this exhibit. It shows you where on the Lime Rock acreage this cross section is run. Also, I added additional mud log data at the green dots. Each one of those has a shallow -- well, all these wells have shallow mud log shows. But I've taken the depth of the shallowest show in those green wells, and I've just basically found the top and bottom of those shows and averaged them. The shallowest was at 740 foot. I think I stated 760. It's 740 foot in the 13J. The deepest show is at 1,320 feet in 11G. The average of those shows is 1,176. I actually have the shows marked. The first oil show on each of the logs that are on the cross section, I've actually marked it so you can see it.

Q. And for the future Lime Rock wells drilled in the vicinity of the acreage on Exhibit 5, would there be any viable reason for the Division to require both a surface casing and an intermediate casing with both strings cemented to the surface?

A. For water protection?

Q. Uh-huh.

A. No.

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

A. This is a mud log on the Fanning 13J #1, the

well we just spoke about that had a show at 700 -- first mud log came in at 740 feet.

Q. That's the well identified on Exhibit 5?

A. It's the -- yeah. It's boxed in on the upper, right-hand side, where it says "offset Fanning 13J #1, first mud log show."

Q. And is Exhibit 6 a true and correct copy of the mud logs of the Fanning 13J #1?

A. Yes.

Q. And what does the mud log tell you about the Lime Rock Fanning 13J #1?

A. Lime Rock set surface at approximately 450 feet, set the first -- the freshwater protection string. And they drilled out through an anhydrite section, as logged on the mud log, through -- 700 down to 730 feet was pretty much anhydrite. There was a little bit of sandstone and carbonate logged in there, but not much. Pretty much an anhydrite interval.

The first permeable interval was a sand that was topped at 735 feet. It was a Queen sand. It's in the Queen section. And there is a show of oil in that sand, 20 percent yellow fluorescence, presence of streaming yellow cut, presence of residual ring and a trace of dark brown oil stain. You go deeper into that. As you develop the sand, approximately 750 -- excuse me

765 to 780 feet, the fluorescence increased to 30 percent, continued with a slight steaming yellow cut, residual ring, trace of dark brown oil stain.

As you move down the hole -- they've noted the top of the Grayburg at 850 feet, and you start to run into a carbonate interval. And you've got carbonate developing approximately 850 feet. And at 870 feet, you have an oil show in the carbonate, 20 percent yellow fluorescence, presence of fast-streaming cut, fast-streaming yellow cut, presence of residual ring, trace of bleeding gas, bubbles and a trace of dark brown oil stain. This show continues down to 950 feet.

You continue to see the logged lithology. The next show occurs at 1,040 feet, and the top of the San Andres is approximately 1,100 feet. So these are all above the San Andres.

Q. So the Division's proposed rule would require Lime Rock to run an intermediate string through producible hydrocarbons; is that correct?

A. Yes. It would require Lime Rock to run an intermediate -- an intermediate aquifer protection string through oil and gas shows and through intervals that have produced hundreds of thousands of barrels of oil.

Q. Did you hear Mr. Kautz' testimony yesterday

about the depth of the intermediate string?

A. Yes.

Q. And where did he say that that depth would be to find the producible hydrocarbons?

A. Can you rephrase that?

Q. Sure. What was his testimony with regard to the depth to set intermediate string when you have a show of producible hydrocarbons?

A. It would be to the first show.

Q. And would that show be above the deeper artesian aquifer?

A. Yes.

Q. So you'd have an intermediate string if you didn't go through the deeper artesian aquifer?

A. That's correct.

Lime Rock set their freshwater -- their first freshwater production string in the confining unit. You can see on the mud log that they logged anhydrite immediately out from under the shoe, and they logged anhydrite basically down to the show. So then they were required to case that off, and they basically set two strings of casing in an anhydrite section.

Q. And are you talking about the Terry 14C #2 well, or are you talking about the Fanning well?

A. I'm talking about the Fanning well. Well, I'm

talking about the Terry, also. That's where the drilling report comes from.

Q. I just wanted to make sure the record was clear on that.

A. Yeah.

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

A. Exhibit Number 7 is two days of drilling report for the Terry 14C #2. This well is located in Section 14, Unit C. You can locate that unit on the map on the previous exhibit if you'd like.

Q. And did you prepare Exhibit 7?

A. Yes, I did, from Lime Rock's drilling reports.

Q. When was the Terry 14C #2 drilled?

A. These drilling reports are from August 28th and 29th of this year.

Q. And is this one of the wells that -- for which Lime Rock had submitted an APD that was denied?

A. Yes. They submitted a two-string -- let me clarify that. They submitted a one-string aquifer protection string and a producing string APD that was denied. And then they resubmitted -- in discussions with the OCD and presenting -- I think Mr. Kautz testified to having seen evidence of oil shows in the confining unit. Well, that was probably the -- well,

Lime Rock had submitted evidence of oil shows in the confining unit to the OCD.

Based on that testi- -- based on those conversations, Lime Rock agreed and the OCD agreed that surface protection string would be set at 425 to 450 feet. The second aquifer protection string would be set at 900 feet, which I don't understand why because that was above the top of the San Andres -- this cursory geologic look would have told that you -- or to the first oil show. And on this particular well, the Terry 14C, the first oil show is noted on the drilling report, had shows in the sample at 681 feet, stopped drilling.

Q. And it would just be speculation on your part to say Mr. Kautz' testimony is based on this well?

A. Yes.

Q. And what other information have you gleaned from the drilling report information on Exhibit 7?

A. Okay. When they drilled their surface hole to 400 -- in approximately 450 foot, they used about 28 hours -- and think of it this way. They TD'd the well. And from that point, I started the clock until they were back at that point after they drilled out the shoe of the casing. So I considered how much time they had from the time they were on bottom, TD'd the surface hole to where they were back to drilling the intermediate. That

was about 28.25 -- it wasn't about. It was 28.25 hours. Okay? So it takes nearly 30 hours for that to happen.

They drilled 256 foot. They had eight hours of drilling. That's from the time you come to work at 8:00 in the morning until you leave at 5:00. That's how long they got to drill. They saw their first show. They had to once again go through 30 hours of -- pay for 30 hours of time for all the drilling rig, the rentals and everything else, pay for all the crews, call everybody back out, buy the casing, set another string of casing. And we were above the artesian aquifer, so I really don't understand why that was done. Anyway, they set casing, cemented to surface, drilled out and continued on.

Q. Would you identify Lime Rock's final exhibit, which is marked as Number 8?

A. As I testified from my review of the geology, the oil shows, one string of casing is sufficient down to the first oil to take care of the shallow water.

Looking at the OCD's rule -- proposed rule, I knew there would be some effects to economics -- impact to economics for Lime Rock considering how that rule is worded. And that rule requiring cement bond logs, downtime, quite frankly was very difficult to estimate. Some of the estimates I heard from testimony

on Monday and Tuesday were really kind of scary.

Anyway, I prepared -- I work with Lime Rock. Their AFEs on these vertical wells -- now, these are directional wells, too, because there is a lot of congestion in the area. So they have to build a location in one spot and shift the bottom hole a little bit to get to their intended target. But we're talking vertical wells roughly 4,600 feet, under a two-string scenario, $925,000 to just over a million dollars, depending how it goes with the directional.

I worked with them on their existing costs. I tried to determine -- the waiting time, that's a real tough deal. You've got -- well, it's already been brought up in testimony as far as cement cure time, trying to get somebody to look at a bond log. But I've come up with an additional cost of $150,100, on average, for those AFEs if, in fact, they need to run two strings. That's about 16 percent of the cost of the -- increase in cost.

Q. Okay. And would you -- just for the record, did you prepare Exhibit Number 8?

A. I did prepare Exhibit Number 8.

Q. And in addition to the estimated increase of cost per well, did you also run the numbers on the impact the proposed new rule would have on Lime Rock's

15-year development?

A. Yes. I prepared a type curve on their existing production. I went back to them -- and I wanted to just have an independent shot at it. I went back with them, and I was very close to what they had for the reserves they're booking for a well. So I used the type curve, used their lease operating expenses that they provided, these investment costs -- these additional investment costs, and tried to determine what kind of economic impact we're going to have here under the new rule as written.

Q. And what would the impact be on the number of wells that Lime Rock might drill under its current CapEx for the current 15-year program?

A. Well, they would like to -- they have a program that they would like to drill 25 wells a year on, let's say, 1,000 acres. The increased cost due to the proposed OCD rule is almost $3.8 million to their yearly program. They have 381 locations they've identified for development. And so when you start looking at the total cost on those locations, we're talking about $57.2 million over the life of this.

When you start thinking about -- you know, we've talked about CapEx. When you budget, you have to budget a certain amount of money to a project. If your

costs now go up, you have the same amount of money so you do less. What this does to their project, they lose four wells a year because of the increase in cost. That's a decrease of 61 wells over the life of their project. Their project had a 15.2 year life. Based on what they would like to drill every year, that's been decreased by 2.4 years.

Q. And what impact would it have on Lime Rock's cash flow?

A. I used -- I need to qualify one thing on the exhibit. These numbers are 100 percent. Lime Rock operates this acreage and has virtually 90 -- over 90 percent of the interest -- working interest in this. Rather than try to go from -- work with their land department and figure exactly where that ownership interest fits, I just ran 100 percent numbers. So I want to clarify that. So these are 100 percent numbers, very close to what they own.

The decrease in undiscounted cash flow due to the annual well reduction is nearly $15 million. That's what they'd lose on the four wells. The decrease in cash flow over the lifetime is $227 million.

Q. And it would also have an impact on State of New Mexico revenues?

A. Yes, it would. The State of New Mexico

loses -- and I just used an estimate of 8 percent in production taxes, and half of -- the majority of this land is federal acreage. They would lose half the royalties on the federal acreage. I confirmed that with the State Land Office, a phone call. And so my estimate of the decrease in New Mexico tax and royalty revenue based on the annual reduction is $4.6 million. And estimated decrease over the life of this project for the State of New Mexico is approximately $71 million.

Q. And you mentioned earlier that you live on the northwest side of Roswell?

A. Yes, I do. I live -- I've lived in Roswell -- I've lived there twice, but basically you can almost count since 1981. I live now -- we've lived, for 17 years, out on the northwest part. We're in an area where there's probably just a little bit of shallow aquifer, no confining unit, and the artesian is below us, and my water comes out of the artesian. And I irrigate. I have domestic, and I have irrigation water and water rights that are stacked.

Q. And would it be fair to say you have a personal interest in the aquifer you draw water from not being contaminated?

A. I'm very vested in freshwater in New Mexico. As a matter of fact, in my own personal well, I have a

meter to check my levels. I watch the level fluctuate. I know there is testimony that the level fluctuates 150 foot. Well, it depends on where you are. I've been checking the level in my well now for almost two years, and it fluctuates. It has fluctuated over that time period maybe about 7 feet. And I check hardness in my well. The testimony of 1,000 parts per million in the western part of the aquifer by Conservancy District, mine's 1,117 on my last check. So yes, I'm very vested in this.

Q. And do you believe the Division's proposed requirements are necessary to protect your personal groundwater source?

A. No.

Q. And do you believe that an intermediate casing string proposed by the Division is necessary to protect usable groundwater throughout the Roswell Artesian Basin?

A. No.

Q. So in your opinion, would the proposed intermediate casing requirement result in the impairment of Lime Rock's correlative rights and cause waste?

A. Yes.

MR. LARSON: Mr. Chairman, I move the admission of Lime Rock Exhibits 1 through 8.

MR. OLSEN: No objection.
CHAIRMAN CATANACH: Exhibits 1 through 8 will be admitted.
(Lime Rock Resources Exhibit Numbers 1 through 8 are offered and admitted into evidence.)
MR. LARSON: I'll pass the witness.
CHAIRMAN CATANACH: Mr. Brooks, questions?
MR. BROOKS: I would anticipate it will take me a while to question this witness. He said a lot of things. But I wait for the Commission's pleasure. If you want me to proceed, I certainly will do so.
COMMISSIONER BALCH: I think Mr. Brooks can question him for a while.
COMMISSIONER PADILLA: Half hour, 45?
MR. BROOKS: It wouldn't be more than an hour certainly, though probably be less.
Okay. You wish me to proceed? I will do so.

CROSS-EXAMINATION

BY MR. BROOKS:

Q. Mr. Maxey --

MR. FELDEWERT: Hold on, David.
MR. LARSON: Whoa.
CHAIRMAN CATANACH: All right. Let's go

ahead and break for lunch at this point.

MR. BROOKS: Very good.

CHAIRMAN CATANACH: Depending how long it goes this afternoon, we may not be able to deliberate this afternoon. Just a warning.

MR. BROOKS: Yes, sir.

CHAIRMAN CATANACH: Because Mr. Balch has to leave at a certain time.

MR. BROOKS: I was aware of that.

In fact, there was a request that Mr. Maxey furnish the full copies of these reports, and that would have to be -- probably would not be --

Mr. Maxey, it would have to be done after the hearing, or do you have them here where they can be made available?

THE WITNESS: Of what? The -- what did you say?

MR. BROOKS: Of the reports.

THE WITNESS: I've got those on PDF, but I don't have a printer.

MR. BROOKS: Okay. That was my guess, that they might have to be furnished and have to be facilitated, if the Commissioners deliberate for the day. So I make that point to the Commissioners. Do you wish me to go ahead, or are we going to take a lunch?

CHAIRMAN CATANACH: We're going to take a lunch break and proceed at 1:15.

MR. BROOKS: Thank you.

(Recess 12:00 p.m. to 1:20 p.m.)

CHAIRMAN CATANACH: Call the hearing back to order at this time, and I believe we were turning it over to Mr. Brooks.

MR. BROOKS: Thank you, Mr. Chairman, Honorable Commissioners.

CROSS-EXAMINATION

BY MR. BROOKS:

Q. Mr. Maxey, good afternoon.

A. Good afternoon.

Q. I'm going to have to somewhat apologize to you because I'm going to be going over again a lot of stuff you talked about. But you talk fast and I think slow, so I wasn't able to pick up on your points always to know what you were actually saying.

A. Okay.

Q. I have no agenda to waste time. We've been admonished by the New Testament: "Use not vain repetitions, as the heathens do." And far be it for me to do anything the heathens do, so I shall proceed.

There is one point that I am very clear on and I want to -- or I think I'm very clear on and I

want to clarify.

If I understood your testimony correctly, you, I believe, are under the impression that if a show of oil -- or a hydrocarbon show were encountered in the aquitard, which lies between the valley-fill aquifer and the artesian aquifer, that you would be required to set an intermediate string at that level. Was that the premise of your testimony?

A. It wasn't that I thought what they required. That's what the OCD required on the wells they drilled, on the three that they drilled.

Q. And that was -- those were drilled in the interim, between the time of the emergency order and the date of this hearing?

A. Yes. Well, not all three. Yes, that's correct. Yeah. That's correct. Yeah. Those were -- that was the agreement they had after those APDs were denied.

Q. Okay. Very good.

I have a tendency to hide things from myself here, but if I can find my application -- it's got to be here somewhere.

Do you have available to you a copy of Exhibit A to the Fifth Amended Application for Rulemaking, Mr. Maxey?

A. No, not up here.

MR. BROOKS: Can you provide him with a copy?

Oh. Well, we're going to have to take an interruption because I agreed with Mr. Larson that he could present these reports. So I would pause for him to do that.

MR. LARSON: Thank you, Mr. Brooks.

Mr. Chairman, during the lunch break, we made copies of the two reports that Mr. Maxey referred to in direct testimony. I'd like to get them presented and entered into the record.

REDIRECT EXAMINATION

BY MR. LARSON:

Q. Mr. Maxey, would you identify the document that's been marked as Lime Rock Exhibit 9?

A. It's Circular 93, a paper by Kay Havenor titled "Structure, Stratigraphic and Hydrogeology of the Northern Roswell Artesian Basin, Chaves County, New Mexico."

Q. And is Exhibit 9 a true and correct copy of Dr. Havenor's report?

A. Yes.

Q. Would you identify the exhibit marked as Exhibit 10?

A. Yes. This is Final Technical Report, Open-File Report 503, done August 2007, "Seasonal and Long-term Variations in Hydraulic Head in a Karstic Aquifer: Roswell Artesian Basin, New Mexico," by Lewis Land and Brad T. Newton.

Q. And is Exhibit 10 a true and correct copy of Open-File Report 503?

A. Yes.

MR. LARSON: Mr. Chairman, I move the admission of Lime Rock Exhibits 9 and 10.

CHAIRMAN CATANACH: Any objection?

MR. OLSEN: No objection.

CHAIRMAN CATANACH: Lime Rock Exhibits 9 and 10 will be admitted.

(Lime Rock Resources Exhibit Numbers 9 and 10 are offered and admitted into evidence.)

MR. LARSON: Thank you.

That takes care of it, Mr. Brooks.

MR. BROOKS: Okay. Since I only have one copy, may I approach and let him look at my copy?

MR. FELDEWERT: David, I've got an extra copy.

MR. BROOKS: Oh. Can you provide it to the witness?

MR. FELDEWERT: I can.

MR. BROOKS: Thank you, Mr. Feldewert.

CONTINUED CROSS-EXAMINATION

BY MR. BROOKS:

Q. Okay. I would call your attention, then, Mr. Maxey, to paragraph C, subparagraph 2 of the -- well, first of all, this is Case Number 15487, Exhibit A, Fifth Amended Application for Rulemaking. And it starts out that this is an amendment to 19.15.39 NMAC, adding new Section 11, effective whatever date. So this is the -- I represent to you this is the rule that we, the Division, are proposing for the Commission to adopt.

Now, I call your attention to paragraph C(2), and I would ask you to read that paragraph.

A. "The operator shall set surface casing string at least 50 feet below the base of the shallow aquifer, such that the surface casing is landed in the first competent formation, and circulate cement to surface."

Q. Okay. Thank you.

Now, there is nothing in that provision that would require you to set an immediate string above the artesian aquifer, right? That's only about what where you have to set it in reference to the valley-fill aquifer?

A. Yes.

Q. Okay. Then please read section -- paragraph

three.

A. "The operator shall set" -- "the operator shall set an intermediate casing string in the San Andres Formation at a depth of approximately 1,200 feet below the surface and not more than 50 feet above the first show of hydrocarbons encountered in the San Andres Formation on the mud log."

Q. Okay. So it says in the San Andres -- they shall set the string in the San Andres Formation above the first show of hydrocarbons in the San Andres Formation.

A. Correct.

Q. So that provision also does not require any setting of the intermediate casing above the San Andres Formation, right?

A. That's right, the way this is written.

Q. Okay. Now, I will -- and paragraph C is entitled "Wells that penetrate the shallow aquifer."

Now we go to paragraph E, and that's entitled "Wells that penetrate only the artesian aquifer." And this time I'll read it, and I'll let you follow me, and tell me if I'm reading it correctly.

"For wells that will not penetrate the shallow aquifer, but will penetrate the artesian aquifer of the Roswell ground water basin, or will penetrate the

San Andres Formation within the area of the artesian aquifer, as mapped by the office of the state engineer, or within one mile thereof, the operator shall include in the casing program all of the provisions required by Subsection C...except that the surface casing string... shall not be required, the intermediate casing string required by Paragraph (3)...may serve as the surface casing string, and...shall be circulated to surface." Did I read that correctly with some omissions?

A. Well, I'm not sure if you're wanting me just to see if you read it correctly, or do you want my opinion on it, or what --

Q. Just if I read it correctly. I omitted some --

A. I mean, it was pretty close to verbatim. I don't think it was exactly verbatim.

Q. Okay. Well, I have to claim credit for that language, and I do so with some embarrassment because I should have said -- it doesn't really make sense to say the surface string shall not be required but the intermediate string shall be, because what's an intermediate between? It actually becomes the surface string. And I'll concede that.

But my point is is there anything in there that would require you in any event to set an intermediate casing string above the San Andres

Formation?

A. Can I read it again?

Q. Please do.

A. (Reading.)

Are you talking about a Lime Rock -- I'm here to testify on behalf of Lime Rock and their acreage. What I have testified to is not an area where we've penetrated only the artesian aquifer.

Q. Okay. Then it's irrelevant, so I will pass it.

A. All right.

Q. My point -- the point I am making is that I believe that to the extent your testimony was premised on there being a requirement to set a second string of casing above an oil show in the aquitard, that that does not represent the rule that the Division is now asking the Commission to adopt?

A. I'll clarify.

Q. Okay. Please do.

A. Lime Rock's two-string APD -- and let me just say when I speak of the number of strings, let's talk about the entire well so we don't get confused on whether I'm talking about surface, intermediate or --

Q. In the context of this proceeding, that's helpful.

A. Okay. So we're talking about total well casing

program.

Q. Right.

A. So they submitted a two-string program in the area I've been talking about. It was denied.

Q. Okay.

A. They went back to the OCD. The OCD approved -- I don't know. I was not present. Remember, I'm not involved yet.

Q. Right.

A. They had discussions with the OCD. The OCD approved a three-string design for surface to -- it's either 425 or 450 -- intermediate to 900, and then production casing to TD. In the APD, it says 900 feet before the first oil show. Okay? So what I showed you in the cross section, even the way the APD was approved, it was not -- it was not according to the proposed rule.

Q. Okay. So what you were asked to do in that case, under the approved APD, was to set an immediate string that actually duplicated the surface string, from a hydrologic standpoint, and they're both in the aquitard; is that correct?

A. Yeah. Let me -- let me -- just to get this point straight, if I use this Exhibit 5 --

Q. Exhibit 5. Let me get Exhibit 5.

CHAIRMAN CATANACH: Whose Exhibit 5 is

that?

THE WITNESS: Lime Rock's Exhibit 5.

Q. (BY MR. BROOKS) Okay. I've got it.

A. Now, the well that I used for the drilling report, Lime Rock Exhibit 7, that was the Terry 14C #2, which is in Unit C of Section 14. So that's Section 14, Unit C on the map that's on the exhibit.

Q. Yeah.

A. Okay. That was where -- I've got two different wells here, but it happened on this Terry 14C. That's what I testified to. We had a mud log show at -- oil show and samples at 681 feet. So 14C -- I'm on strike with the well in Section 11. I'm very close to the well in 15, so I'll use the well on 15. 600 -- what did I say? 681 feet -- 681 feet on well A on the cross section is -- that is actually above the confining unit per the tops in the Welder report.

Q. So that's above the -- that would be up in the -- would that be in the valley-fill?

A. No. It's below the valley-fill. It's at the base of the Queen section, which is the base of the confining unit.

Q. Okay.

A. Welder identifies the top of the artesian. He also states that is -- implies that that is also the

base of the confining unit, and he states the same thing; the base of the shallow aquifer is the top of the confining unit. So he distinctly separates the shallow, the confining unit and the deep.

Q. Okay.

A. And the APD, as approved by the Division after discussions with Lime Rock, said, Set your intermediate 900 of the first oil show. Well, 900 feet -- you can see that the top of the San Andres is about 950.

Q. Right.

A. So as approved by the OCD, the intermediate was approximately 50 feet above the top of the San Andres, but since we hit the first oil show at 681 feet, I believe it was, that actually backs you up to the base of the confining --

Q. But you would admit that second string would not be required by the provisions of this proposed rule?

A. No, because we're drilling an area -- we're drilling in an area where we are penetrating the shallow and the deep aquifer per your boundary and per the Welder report map that you're utilizing for your rule.

Q. But where in the rule -- proposed rule would it ever require setting an intermediate casing string above the San Andres -- above the San Andres?

A. Well, it wouldn't, not in your proposed rule.

Q. That's what I was asking. I asked if you agreed with me and you answered no. And I understand that's a bit of a double negative.

A. Well, now, hang on. Hang on. We've been on two different portions of the rule. So which one are you talking about? The last one we were in, you stated -- we were on paragraph E, and that is "Wells that penetrate only the artesian aquifer." That is not the situation with Lime Rock. So let's not get confused.

Q. So let's deal with paragraph C. Okay. In my opinion, the provisions are (2) and (3), but if I've overlooked anything, bring it to my attention.

A. No. I think that's fair.

Q. And (2) requires you to provide the surface casing below the valley-fill?

A. Yes.

Q. Which would probably be -- you said in the report, you had the valley-fill and the confining layer and then the --

A. Artesian.

Q. -- artesian. So that would be within the confining layer -- confining layer.

A. According to Welder's numbers.

Q. And his maps that he's got in the report.

And so that's where your surface casing would be, under paragraph C(2)?

A. Well, it would be under -- it would be, as it states, I think, at least 50 feet below the base of the shallow. You've got to know where the base of the shallow is.

Q. Right.

A. You can use the Welder map and -- it's a map of the -- he's got a map of the shallow -- of the base of the shallow --

Q. Right.

A. -- and he's got a map of the top of the artesian.

Q. Yeah.

A. Okay? So from those two maps, you can find your confinable.

So you have to drill at least -- it says -- excuse me. I'm on the wrong paragraph. "Casing string at least 50 foot below the base of the shallow into the first competent formation." So you've got to hit -- you've got to know where your base is. You get through the base at least 50 feet, and then you start looking for a competent formation. But according to your rules, you don't want to get into the artesian --

Q. Right.

A. -- before you stop.
Q. Right.
A. So according to your rules, you can pretty -- now, let's get out of the Lime Rock area, if you want me to go there with you.
Let's say there are no oil shows anywhere.
Q. Right.
A. We're talking -- let's get into the center of the aquifer. And that's the point I'm trying to make in my first exhibits where I was referencing both these reports.
Q. Yeah.
A. Everything's full of freshwater. So per your rules, I could drill anywhere to 50 feet below the shallow aquifer, all the way down to the top of the artesian and set my surface. That's the -- that's what you can do under your rules.
Q. Well, that's not my understanding of it. You said -- I thought C requires you to drill -- I thought you said C requires you to drill -- set casing in the first competent formation below the base of the --
A. If you have a competent formation, you have to stop, but if you don't have one --
Q. That's true. If you don't have a competent formation between the two, you do not have to set that

casing.

A. It depends on the operator, but anhydrite may not be -- depends on the operator. But in their view, may not be a competent formation.

Q. Well, there might be some instances, then, in which you might not be required to set that upper casing under that rule.

A. No, not under this part of the rule. You have to set a shallow string of casing, under C(2). You have to under your rule -- under your proposed rule.

Q. Yes, do you have to.

A. Yeah.

Q. And it has to be above the artesian aquifer.

A. Correct.

Q. But you do not have to set a second string of casing --

A. Yes, you do.

Q. -- above the artesian aquifer. You only have to set the second string of casing in the San Andres, correct?

A. You're correct in your interpretation of your rule.

Q. Yes, sir.

A. But you're not correct as to how the agreement was arrived at between Lime Rock and the OCD after the

emergency meeting for their three-string program and what the OCD told them to do.

Q. Okay. What I wanted to clarify was the rule because it's my understanding that's what we're here to talk about today. And to the extent that the rule --

A. It is -- and let me -- may I make a counterpoint?

Q. Go ahead.

A. I'm sorry to interrupt you.

I guess one of the things I want to articulate and why I'm showing this is because you have a proposed rule right here.

Q. Right.

A. Yet the OCD, that's not how they design -- or approved that APD, and that's not how it subsequently worked out with that APD for actually two of them at least that I've got exhibits.

Q. Okay.

A. So here's the problem that Lime Rock has. And you've put them in a quandary because you forced them of this law [sic]. By your action -- by the OCD's action, you said, Yes. You've got oil shows all through here. You need to set this shallow intermediate. It does not protect the artesian aquifer because the artesian aquifer is productive or has shows of oil and gas. So

you're telling a competent, prudent operator, You know what? Despite the fact that you've produced over a half million barrels out of the Grayburg section at the base of the confining unit and in the artesian aquifer, you've got to drill all that up, and we've got to protect freshwater -- that freshwater aquifer.

My assumption -- see, I don't know what you're protecting. I'm still lost at what you're protecting. But you're stating that they have to drill through oil and gas and most probably block brine water that's high TDS, and then set a protective string, which we've been talking about, an artesian aquifer. That's the problem. And as a pursuant, competent operator, they cannot do that, and they will go somewhere else until this is resolved.

Q. I'm not sure I understand you. Are you talking about what the rule requires, or are you talking about what the OCD has required in certain particular instances?

A. Both. I'm talking about the reason there was an agreement arrived at for Lime Rock to do what they did -- unfortunately, if they had done what your rule said, they would have been branded environment criminals.

Q. Well, assuming that is true, the rule is clear

that you have to set one -- the proposed rule is clear, is it not, that you have to set one string of casing between the base of the valley-fill and the artesian?

A. Yes, sir. Your proposed rule states that for the surface string in the two-aquifer area. That's correct. I agree.

Q. And that would only be for the protection of the valley-fill?

A. Per the OCD's definition, yes. That's not my opinion.

Q. Well --

A. I believe you can protect both with one string. So I don't want to -- I don't want to agree with you that we need two strings to do this. That's why I'm hedging that answer. But I agree with you --

Q. Let me ask you this hypothetically, since you're appearing as an expert. If you set a protective string below the lower aquifer --

A. Okay. Wait a minute.

Q. -- set a protective string --

A. I agree with you --

Q. If you do what the industry advocates --

A. One string?

Q. You do a two-string plan, where you set one protective string, and that is cemented in place below

the artesian aquifer --

A. Okay.

Q. -- and you have a competent cement job and a nondefective casing --

A. Yes.

Q. -- you're going protect both aquifers -- I think we will agree on that; will we not?

A. Okay.

Q. -- from pollution, although any that may occur during the drilling process, correct? Because once you go through that top aquifer, there is at least a theoretical possibility of the communication between the two aquifers through the wellbore --

A. Not in the --

Q. -- while you're drilling from the upper aquifer down to the point where you set the casing?

A. Okay. So you kind of -- you kind of went two places. First we had a competent cement job and a competent casing string to protect both aquifers.

Q. Yeah.

A. Then you started talking about drilling between two aquifers, which would imply we don't have a casing string set now. So --

Q. You wouldn't at that time. What I'm saying --

A. Let's back up.

Q. Okay. You drill into the shallow aquifer.
A. Yes, sir.
Q. You drill through it.
A. Yes.
Q. And during your drilling operations, you're going to be circulating mud. You keep on drilling. You're drilling under the two-string plan. You keep on drilling until you get to the artesian aquifer.
A. Base of the aquifer.
Q. And then you've got to get to the base of the artesian aquifer or the highest oil show. And I'm going to get to that in a minute because I think you have a problem with what's going on in the San Andres; do you not?
A. Above the San Andres.
Q. Well, that's -- we're talking about above the San Andres now. I'm going to ask you about the San Andres later. We'll get into that.

Into the San Andres, you have to the point where you're going to set your surface casing in your two-string plan. Now, during the time when you -- when you penetrate the valley-fill till you get to your point where you set your surface casing, get your surface casing set and get it cemented, there is at least a theoretical possibility of communication in the hole,

into and out of the valley-fill, and once you get into the artesian aquifer, into and out of the artesian as well, right?

And I say theoretical because I know both -- both of the industry witnesses have testified that that won't happen. And I'm not asking you to second-guess their credibility on this, but tell me, theoretically, that could happen in some instances while you're in the drilling process?

A. Okay. So you're talking about with the artesian open during drilling operations?

Q. Yes.

A. And it's a shallow open during that drilling operation, right?

Q. Right.

A. Okay. So now I think I understand your question. You're asking me if I drill the artesian and I continue down and I drill -- excuse me -- I've drilled the shallow. I continue down and drill the artesian. I have both aquifers open in one hole, and I'm drilling.

Q. There is a theoretical possibility of communication; is there not?

A. What kind of communication? Are you talking about one flowing to the other?

Q. Yes.

A. Okay. Here's the problem I have with what you'd like to hear me say, I think. You have a hydrostatic -- you have a hole full of fluid, and you're circulating. Okay? You're starting off with 8.4 pound-per-gallon fluid. You've got cuttings coming up the back side, so you've probably increased that mud weight by two-tenths or three-tenths. If you've developed viscosity, you've picked up more solids than what you're going to carry with freshwater, if you felt the native mud. So you're going to actually have a little more mud weight. So that kind of hydrostatic pressure, I'm going to have to say -- with circulation, I'm going to have to say no.

Q. And that is basically what your -- what the other witnesses have said. It's very similar to what they've said. And our witness, Mr. Kautz, testified that there was a possibility of that communication, and the Commission will have to make that decision.

A. Well, can I further clarify?

Q. You may.

A. Okay. If you've got a hole full of fluid -- and let's just, for argument sake, say it's 8.8 pound per gallon. You do the numbers. And that's probably a .45 psi per foot. You have to ask yourself, Does a water table aquifer or does the artesian right now under

Lime Rock's acreage, after being pumped for multiple -- tens of years, does it have a gradient of higher than .45 psi per foot? No, sir, it doesn't.

So just keep this in mind. Fluid flows from an area of high pressure to low pressure.

Q. I'm aware of that, sir.

A. Very simple. We've got less pressure in the aquifer many times than we do hydrostatic in the borehole. We don't lose returns because we do a -- and don't break down the formation. Fluid does not go.

Q. You're saying that in practice, it's not going to happen, that there is not going to be, during drilling and operations, any leakage between the aquifers. Well, that point has been made by other witnesses, and I would like to not spend any more time on it.

But my point is -- my question is: Both aquifers are open to the -- to the borehole?

A. To the wellbore.

Q. There is a possibility under certain circumstances that such movement could occur?

A. Now, under certain circumstances, if there is lost returns, you have to ask yourself where is the -- when you lose returns, it doesn't mean fluid goes all the way into the zone; you completely lose your

hydrostatic. That's false.

You have fluid level fall to a certain point where it's balanced wherever your lost circulation zone is. You still have hydrostatic, but the question is how much. So depending how much hydrostatic you have, there could be some leakage from one zone to another. Now, yesterday that was characterized as contamination. And I take great exception to someone characterizing -- the mixing of waters is how that should be presented. The mixing of 1,000 TDS with maybe 2,000 TDS water. In my book, that's not contamination. I'll drink water -- I'll drink a gallon of both of those sources, and we'll see if it's contaminated. And I'm just making that point because I had to listen to that testimony -- to that yesterday, and to your point, there is a possibility of leakage.

Q. Okay. Thank you. That's what I was asking.

Now, let me go ahead then. After you have drilled through the artesian and set your pipe, then the -- then there is probably little or no possibility of leakage if you have a good cement job and if you have nondefective casing, correct?

A. That's correct.

Q. But if you have a defective cement job or if you have a leak in the casing, there could be

communication?

A. Well, you're really stretching it with me with defective casing because you're talking about the shoe of a cement job being defective. All that cement goes around the shoe, and every sack that you've mixed goes around the shoe. I'm not sure how you have defective casing. If you want to say that's probable, I'm going to say no. Is it possible? Everything in this world is possible.

Q. Yeah.

A. And secondly, defective casing, I'm struggling with that one, too.

Q. Well, that's probably less of an issue because -- for certain reasons. But suppose you had a micro-annulus in your cement. That could create --

A. I'm glad you brought that up. Micro-annuluses don't transmit fluid.

Q. They do not?

A. I've never found in my entire career, I've never met anybody in my career, no peer I've ever worked with has said they had a problem with communication with micro-annulus. This whole bond log thing has really been under my skin.

Micro-annulus is something that keeps us from having an acoustic coupling from the cement to the

case- -- excuse me -- from the casing. On the back side, you'll have a micro-annulus. And that's just -- it's micro. It's very, very small. If you were to be able to put fluid through there, it would be at extremely high pressures. All the micro-annulus does is it messes up your acoustic coupling between your casing to your cement. Your cement bond log is an acoustic device. If you lay one on the ground and turn it on, you'll hear tick, tick, tick, tick, tick. And it's at a higher frequency than that, but it ticks. And that acoustic signal is transmitted through the casing. If there is a micro-annulus there -- it goes into the micro-annulus -- you don't have a good coupling to your cement, so at that point, you don't have a good return on that signal.

So what you do, you pressure up 1,000, 1,500 pounds on casing. It removes the micro-annulus, and you get a good cement bond log. That's what micro-annulus is. So no, there is not communication through micro-annulus.

Q. Is there not a possibility of communication if the cement is defective?

A. If there is a channel --

Q. A channel?

A. -- there is a possibility.

Q. Well, I may have misused the term "micro-annulus."

A. It's been misused. And I'm not blaming you. I'm just saying it's been misused.

Q. If there is a channel -- there could be a channel in the cement that would allow communication?

A. It's possible to have a channel in cement and that -- may I -- just so I can finish.

Q. Yes.

A. Usually a channel in the cement is because there hasn't been adequate drilling of the -- you haven't had good hydraulics while you're drilling the hole, and maybe you've had some poor mud properties, and maybe you haven't conditioned the hole properly at the bottom prior to running your casing.

Q. How would you know that that existed?

A. When you get to bottom, you're going to pump the sweep. You're going to watch those sweeps. As they come over the shaker [sic], you've got a lot of cuttings. You need to pump another sweep. Okay? You can pump these freshwater sweeps. Get some bentonite gel. It's the same thing that's in the ground as far as formation. It's not harmful to your -- core to your aquifers. You mix higher viscosity, bentonite gel sweeps. Sweep the hole. When the hole is clean, you

can -- and you're rotating and reciprocating pipe while you're doing this at intervals. You can watch your torque and your drag. If your torque is cleaning up, if your drag is cleaning up, you know you're cleaning the hole. And you get to a point where everything is consistent, you're done. You've got a clean hole.

Q. Okay. But how about if I go to another subject?

Other than your point about the instance in which Lime Rock -- well, first of all, I need to set the stage, because everything you said was pertinent to the area in which Lime Rock was drilling.

A. Yes.

Q. And I never got clear on the map. So if you will let me get my area map --

A. Exhibit 1.

Q. -- in front of me, and that is -- the area map I'm working from -- well, actually I think there is a better exhibit in here, if I can find it. Yeah. It's your own Exhibit 1. It has the -- has the townships and ranges.

A. Yup.

Q. It's better labeled than any of the other exhibits by any party I have seen. So can you tell me which townships you're concerned with?

A. It's marked in yellow towards the lower, right-hand side. 18 South, 26 East would be the northeast quadrant.

Q. Okay.

A. And the far -- basically I'd call it the west half of the northwest of 18-27.

Q. Okay. So that is the yellow dot in 18-26, 18-27, and maybe a little bit up into 18 -- into 17-26?

A. No, sir. It's -- specifically, it's the northeast quadrant of 18-26, and it's the west half-west half of 18-27. The acreage does not go up into 17.

Q. Okay.

A. And I'm being specific with this because all of the testimony from the OCD and the Conservancy District was in a broad, general sense over the entire aquifer, and this was totally missed to what I brought up today.

Q. Okay. So part of your area of interest is within the area that is under both aquifers. Part of it is an area where the valley-fill exists, but the artesian does not, right?

A. You're correct on the boundaries, but, unfortunately, the entire area would be under your rules per your one-mile upper.

Q. Okay. Okay.

A. So we would be required for two strings outside

the boundaries of the aquifer.

Q. Very good.

Now, other than the point you made that we discussed at length about the requirement that was imposed on Lime Rock at one point to put in a second string above the artesian aquifer, other than that, what other points did you make in your testimony that I may have missed?

A. Well -- okay. I don't know. That's hard to -- you're asking me to backtrack on my entire testimony, so that's pretty difficult from memory.

Q. Well, I got the point about the intermediate casing string, and I got the point about the costs of delay, which every witness from the industry side has presented.

A. Right.

Q. I think you said some other things that I wasn't sure what you were saying, and I sure wish I knew.

A. Well, I wished I knew, too, what to tell you (laughter).

Q. Well, I do not want to plow ground has already been plowed, so I will stop at this point. And thank you very much, sir.

CHAIRMAN CATANACH: Mr. Olsen?

CROSS-EXAMINATION

BY MR. OLSEN:

Q. Good afternoon, sir.

A. Good afternoon.

Q. Your Exhibit 1 --

A. Yes, sir.

Q. -- the legend says "well" and then "(oil, gas, DH)." DH is a dry hole, correct?

A. Right.

Q. Of the 9,000 wells that you identified, how many of them were dry holes?

A. I don't know.

Q. The identification of a dry hole would not be of value for you to know that in your --

A. No, sir. I was curious at the number of penetrations in this area within the boundary of the OCD. So, basically, we have over 9,000 wells. I think in my earlier testimony, you saw the water wells. There are probably of thousands of water wells out here up the valley. So basically what I was trying to -- and if you recall my testimony about why I'm involved here, I had to get an idea and scope of what I was dealing with.

Q. I appreciate that, but I want to break this -- deal with your Exhibit 1 for just a moment.

A. All right.

Q. The destination of dry hole, did that denote the depth of the hole when you were looking at this?

A. No. Well, it was in my database, but I did not. I didn't look it up and put it on the map.

Q. I want to address your comment about thousands of penetrations from water wells. Do you know how many wells there are in the boundaries of the PVACD that are metered?

A. No, sir.

Q. Well, I want to -- because that's of importance. Do you know if there are 2,000 or 4,000, more than 2,000?

A. No, sir, I don't. But what I do know is there are probably more domestic wells that aren't metered than there are metered irrigation.

Q. Well, that leads to the next question. Of the domestic wells in the RAB, do you know what the average depth is?

A. Of the domestic wells?

Q. Yes.

A. No, sir.

Q. So your statement of tens of thousands of penetrations, what value is that to your testimony if you don't know the depth of the domestic wells or how many irrigation wells? What's the value of that?

A. Well, as I testified originally, I thought we were coming here because there was an issue, and I really wanted to be part of the solution. I thought there was a problem with contamination. I've come here, and I found out there isn't. So one of my points -- I'm just telling you why. One of the points that I looked at in particular is that there are 9,000 wells within this area that have penetrated one or both aquifers, with the exception of those that are just outside on the east side. I used the OCD boundary. And that's over 100 years of history or approximately 100 years of drilling history. And now I've come here, and there was no testimony -- Lime Rock's concern -- because they're in an area -- I can't remember the exhibit.

Q. No, no, I understand. I appreciate that. And we could carry on this discussion --

A. We could. I could go all day.

Q. -- over a couple of scotches, and that would be more fun, I'm sure. I certainly would enjoy the scotch.

COMMISSIONER BALCH: We can't do that until at least until 3:45.

CHAIRMAN CATANACH: Let's do that.

(Laughter.)

Q. (BY MR. OLSEN) You came here prepared to testify about the issues in the two townships, correct?

A. Pardon?
Q. In two townships.
A. Yes.
MR. OLSEN: Pass the witness.
CROSS-EXAMINATION
BY COMMISSIONER BALCH:
Q. So I think -- Mr. Maxey, good afternoon, by the way.
A. Good afternoon.
Q. One of your main points is that one size doesn't fit all and maybe the rule has been too narrowly described?
A. Yes. The rule will not work in the Lime Rock area. I mean, it just will not work.
Q. Maybe you'll agree with me that allowing best practices is usually the most sound way to do business?
A. The rule that was provided that the industry has discussed was based on consensus and best practices.
Q. So for your acreage, what would an ideal completion look like?
A. An ideal completion would be a deeper surface string closer to the first oil show, and then everything above --
Q. And then a production string?
A. And then a production string. And the

production string -- they're so close -- with the surface string at 600 feet or so, just for argument sake, by the time you are going to have a tieback 500 feet into that string, you're going to circulate surface. So you're going to have -- once you set your deeper surface string and then you cement up the production string through the surface, you've got two strings. You could actually centralize the production string inside the surface string. And you've got one cement string with one consistent cement sheet around it inside the surface casing.

Q. And you circulate both of those to surface --

A. And if you circulate both those to surface, you've got a tremendous amount of protection.

Q. A few extra bags of cement. How would that impact economics?

A. I'm sorry?

Q. How would that impact economics if you had to add another 500 feet of cement?

A. It would be peanuts.

Q. Compared to?

A. Well, that's what I'm telling you, is what impacts economics is when you don't get cement to where it's supposed to be. So cement is consistently circulated on surface. I just looked back at the

drilling report on the two wells we've talked about. The surface string is at 450. I think they cemented over 100 -- circulated over 100 sacks of cement. Now, that's a lot of cement. You'd like to cut that down, but what's the alternative if you don't get to surface? You're shut down. Your temperature survey, your WOC -- you're waiting on a temperature survey to get out. Then you bring the crew back out. You rinse some 1 inch. You bring it out. You've got a 1 inch. So really additional cement -- that's why I say it's peanuts.

Q. You've got a good reason to do it right the first time?

A. You've got a good -- the industry is well motivated to do this right the first time.

Q. I think I would agree with you if you have two layers of steel and two layers of cement, then you would have a good amount of protection.

A. You'd have -- the outside string, you have a cement sheet. That's a good amount of protection. If there are any holidays [sic] in that cement sheet, you potentially could have -- not in the freshwater intervals. In the freshwater intervals, if you have any corrosion, it's probably going to be galvanic, like a -- just like a battery cell. And then once it penetrates that string, it's not going to penetrate a consistent

cement sheet that's around your production casing.

Q. Let me test your knowledge of kind of the overall area. I know you're focused on Lime Rock for your testimony today.

A. Right.

Q. But, in general, most of these wells are going to have a single surface string through the base of the aquifer -- the artesian aquifer, existing wells?

A. Well, that kind of asks me to generalize, and I'm showing you an area where you wouldn't set it to the base of the aquifer. You've got oil and gas shows. You've got a field that produced a half million from the Grayburg in the confining unit. So it's hard to answer that question.

What needs to be done -- the Conservancy District cross-examined one of our witnesses, may have been COG, and asked him if he used the Welder maps to determine the depths of the aquifer. That's where I went. That's the first place I went. And that's what the industry normally does. I normally go to the State Engineer site, and I look for where the wells are and where the water's coming from. That's how I determine how to protect freshwater.

Q. So you look for the depth of the water wells?

A. I look for the water wells. If there are

inconsistencies in the depth, then I have to look further. In truth, I didn't know the Welder maps existed. I knew of the Welder report. I didn't know those maps that identified tops and bottoms had been mapped the way they are. That's an excellent resource. In this particular area, where you have the dual aquifer, the Welder maps are the perfect resource to determine where these tops and bottoms are in the aquifers in the confining unit.

Q. Thank you.

CROSS-EXAMINATION

BY COMMISSIONER PADILLA:

Q. Good afternoon, Mr. Maxey.

A. Good afternoon.

Q. Just a couple of questions for you.

Your economic calculations -- I don't know which exhibit that was.

A. It was the last one, 8.

Q. Number 8?

A. Yeah.

Q. So you took into account state acreage at 100 percent royalty. And the Fed acreage at 48 percent, that comes back to the state?

A. I did, yeah. I just had learned of the 48 percent. That's kind of a newer development, isn't it?

It used to be 50 percent.

Q. Right.

A. Yeah.

I can't remember if I did the 48 or the added the 2 percent with the 50, to tell you the truth. But I knew that was just --

Q. Ballpark?

A. It was the -- minimum, it was 48 percent.

Q. What's the -- I guess I could find it if I calculated it. What is the state royalty rate you used?

A. Well, these were federal, and I don't know -- well, what I assume --

Q. There are no state leases in here?

A. I don't know if there are no state leases, but as Lime Rock has represented to me, the vast majority of this is federal. They're dealing with -- primarily dealing with BLM. But when this particular issue came up, they're dealing with OCD.

Q. It's federal and I don't care.

(Laughter.)

COMMISSIONER BALCH: But you're still a taxpayer.

COMMISSIONER PADILLA: Yeah, I guess.

Q. (BY COMMISSIONER PADILLA) I'm intrigued by -- you said that Lime Rock would be labeled as

environmental criminals if they had followed through what the OCD was suggesting. Is that because they essentially would be throwing money at an ineffective solution? Can you expand what you mean by that?

A. No. I'm pretty sensitive to the criticism the industry gets on -- on multistage fracking. And here in this particular instance, the OCD is promulgating a rule. And based on the way this rule is written right now, it would force Lime Rock Resources to protect the shallow aquifer and then drill out through oil and gas shows, potential brine waterflows, because I've seen that on the logs. As I stated, I've been out to the State Engineer's Office and reviewed logbooks. They're about this thick (indicating) for each township -- or two townships. And you drill through those oil and gas shows, and some of those intervals actually produced. They were the oil and gas fields under the OCD rules. I mean, that's the field names that I gave you in the RGS. So you would have drilled all of these and then drilled into the San Andres -- and keep in mind, the artesian starts approximately in the Lime Rock area about 150 feet above the top of the San Andres. So the whole goal with setting into the San Andres was to protect the artesian aquifer.

Now, the base of the artesian that

Mr. Brooks and I were talking about, I don't know where that is for sure. I know that the base is usually defined in those reports as very impermeable rock. There could be some -- a geologist might interpret the lithology of it. But I don't know exactly where it is.

Once you set that intermediate through -- into the top of the San Andres, basically you're -- you're supposedly protecting the top of the San Andres and those carbonate aquifer rocks approximately 150 feet above with that string. Well, there are oil shows and oil production out of those rocks. So what you've done is you've cased off oil and gas shows, and if there was any potential water -- freshwater you drilled through between the base of the surface casing, then what we've done is completely contrary to what OCD's has always done. It's drill and case the freshwater, and then you go worry about your oil and gas.

And what that one string does in this particular area, it potentially cases off -- you drill through potential freshwater and then your oil and gas shows and case it all off. And if there is ever a concern for bad cement, that would be your concern. Now instead of a little bit of mixing of waters that are different TDS, you've got contamination potential of oil and gas, hydrocarbon potential of freshwater.

So really you need to be looking at the first show. Everybody needs to understand what this aquifer, you know, both the system -- I like to call it the system. But when you get out of the first oil show, you've got to be real careful, because if you're in the eastern part, you've had oil and brine water migrating from the east side, as reported by these papers. And so a prudent operator is not going to drill freshwater and then continue to drill into oil and gas --

Q. Okay. Okay. Last question was --

A. -- knowingly.

Q. There was some discussion about the competent formation and -- let's see. C(2), landing in the first competent formation.

A. Right.

Q. And there was some talk about whether or not -- what you do in the case of a non -- the unconsolidated formation or something like that. Have you seen instances where you can't -- the competent formation in a spot, as outlined by the rule, which would be 52 below the base of the shallow aquifer, at least 50 feet. So you'd have 50 feet under the shallow and keep going --

A. Right, to your first competent.

Q. -- to the first competent?

A. Yeah.

Q. What are the odds of not finding a competent formation, in your experience?

A. Well, if you look at Lime Rock Exhibit 6, surface casing is set at 450, approximately. I've marked it on the first page. There is a box there.

Q. Is that the log? Yeah.

A. Exhibit 6 is the mud log. First page, surface casing landing depth is marked with an arrow.

Q. Okay.

A. Okay. We drill out -- look at the center column. That's how the mudlogger logs lithology. And those checkmark-looking things, that's how they log anhydrite. It's a softer evaporite.

Q. Which you said might or might not classify.

A. You know, it depends on who is drilling the well. I don't like it because I've -- I've fished for shoes that I've backed off a casing that I've drilled from. And that's the problem. When you get into an incompetent formation, you can wash out at the shoe.

Matter of fact, your rule -- you know, when you drill a well and back up 50 foot to run casing, you know, it could be problematic, but I'm willing to concede the point to get this thing done. That can be problematic because you now drill out of a shoe that doesn't have a firm formation below it. I don't know

what the cement will be like right there at that shoe. And once I drill them out, I go immediately into a big hole. I've got a smaller bit. And then I hit bottom again, and I start drilling. As I get deeper, I'm transporting cuttings out of a hole at a certain velocity. Enter that big hole. It slows down stuff that falls out, and casing. It can create a problem with cuttings. There is a potential problem with cuttings, but it's a short interval. I think a maximum of 50 feet. So I'm willing to say that's okay. It could be problematic, but I'm willing to say it's okay for the industry anyway.

But this anhydrite is an issue. If you look at this log and you have some kind of a carbonate there that is not -- the thickness of that log to carbonate will not be accurate. You will continue to get cuttings kind of falling out of there. So there is something there that could have been considered competent, but as you go down the hole, I'm struggling to find something competent until you get to the oil show at 750 feet.

And that's why I think you're much better off, particularly in this -- where we are, to drill until you see the first oil show. That satisfies -- that should be helpful to the OCD, and then back up a

little bit and case that off and cement --

Q. Thank you.

A. -- because we have oil and gas shows, you know, consistently below that.

CROSS-EXAMINATION

BY CHAIRMAN CATANACH:

Q. So let me ask you just to follow up on that. If you drill to the top of the first oil show, you're drilling through that anhydrite section?

A. Yes.

Q. So is there any possibility of contamination of the shallow aquifer through that drilling mud? I mean, you're picking up salt in the anhydrite section, aren't you?

A. Well, you know, it's a good point. Lime Rock has not noticed an increase in chlorides through this section, but you're very close to where salts start coming in. And that's why this eastern battery is really important. It's not -- you know, when you look at the boundaries, you tend to see that straight north-south line. You go, Okay; well, the salt doesn't end there if it doesn't want to. It could come -- it could finger in there. There's a possibility that there could be salt in there.

Q. So at the location of the Lime Rock acreage,

where do you see the artesian aquifer? Is it in the San Andres?

A. Well, the San Andres is part of it. Would you want me to give you the tops out of the Welder?

Q. I guess what I'm trying to find out is you want to set the casing -- the surface casing at the first oil show, which would be in the confining layer, right? It would be in the Queen interval?

A. Wait a minute. Let me look at the log again, make sure of my depth.

Let's use the exhibit that has the example. The first oil show is 730 feet. This is -- we need to use the well on right-hand side, A-1, because the mud log is from the northwest offset to that log on the right-hand side of the cross section, the mud log. Do you see what I'm saying? Look at the map, A prime, that well. Okay. The green dot to the northwest -- to the immediate northwest of the A prime well, there is a green dot under the black line. You got it?

Q. Uh-huh.

A. That's this mud log. Okay? So that's why I'm looking at this electric log on the right. So that first show -- and I've got it marked in a box, "offset Fanning 13J #1, first mud log show." It was at 760 feet -- or excuse me -- 740 feet. I marked it at about

812 because on the east side, you get some pretty steep San Andres dip, and it starts to flatten as you get over to the western part of the acreage and keep moving to the west. So I had to move it down a little bit to the stratographic equivalent. So that's really just -- the top of the artesian, on that third log, based on Welder's top, is 719 feet. And I've got this oil show at 8 -- excuse me. It's 812 feet at the top of the aquifer, and I've got the oil show right about 812. So this oil show came in right at the top of the aquifer.

So yes, the surface casing, if we set it deeper, because we have no oil shows, would be to the basal part of the confining. Now, you could set it shallower because they have not seen an increase in chlorides, but some of these have drilled with brine in the deeper section.

Q. It's not your testimony that the artesian aquifer in this area is already contaminated by oil and gas?

A. Well, the Welder tops of the artesian aquifer on the well on the right is 812 feet. The well on the center is 719 feet, and the well on the left is 705 feet. So I've got oil shows in the base of the confining unit and in the aquifer, and in some places, I don't.

Q. So you believe in that area that you've got oil in the aquifer -- in the artesian aquifer?

A. Yes.

RECROSS EXAMINATION

BY COMMISSIONER BALCH:

Q. 500 million barrels of production so far?

A. That would be great. No. It was 500,000. I'm sorry.

Q. 500,000.

A. Yeah. It's 500,000.

Q. So that's more than what you would expect from a leak?

A. Yes. Well, I use that as an approximation. It's not that much. It's -- where is that exhibit? It is the Atoka Grayburg, 950 to 990, 395,000 barrels of oil, and 1.9 million barrels of water. Those wells flow. You don't generally have oil and gas with -- now, I don't know the GOR, but I'm going to guess it's pretty low. It's not solution gas drive. I believe these oil wells were flowing under artesian pressure in the brine water leg of the aquifer. Sorry to make this complicated, but it's a complex system.

Q. Is the Lime Rock area unique to this --

A. In my opinion, from what I've read of these papers and studied this whole thing, the entire eastern

portion is unique. You know, I heard a lot of testimony yesterday that didn't talk about the -- the chlorides were really no problem. The lower aquifer was always presented as high quality -- higher quality than the shallow. And nobody said anything about shutting the Basin down in a portion of it in the 1950s because of chlorides encroachment in the aquifer -- in the artesian aquifer.

The State Engineer shut a portion of the shallow -- of the deep aquifer down because of chlorides encroachment east of Roswell. And that has remediated itself somewhat, and that area is open. But you have to watch on the eastern side. If you irrigate too hard, you'll pull in higher and higher chlorides out of the deep aquifer, and then the shallow aquifer, which is higher quality on the eastern side, becomes higher chloride because a water recharge comes from the surface as you irrigate. And that's not my opinion. That's in those reports. I mean, it's all through the reports.

RECROSS EXAMINATION

BY CHAIRMAN CATANACH:

Q. And that occurs along the eastern boundary of the designated area that we've defined from north to south?

A. Yes, sir.

Q. That whole area?

A. Yes, sir. Some of the worst part is in the northern part of the Basin, but you see it -- I mean, I'm showing you the evidence for it.

Q. And that is coming from the San Andres -- the oil- and gas-bearing producing portion of the San Andres is where that encroachment is coming from?

A. Well, it's -- now, I didn't look -- I didn't study it in terms of this, of what I presented today. In general terms, along the east side, that's what I've seen in the reports, and what I'm seeing supports my own research on oil and gas bases. Here in the Lime Rock acreage, it corroborates what those reports say happens in the eastern side. Now, there is not much discussion about oil and gas in those reports, but it is mentioned. It's talked about, that there is -- I mean, I talk to water wells -- drillers who have told me that they see a sheen of oil on some of the wells they drill in the center part of the Basin in the deeper aquifer.

So I'm not a hydrologist. I can't give you an opinion on water movement, but I believe there is oil -- oil's going to migrate updip, and there is evidence of oil in the artesian aquifer in the eastern part. And I reference the Kay Havenor report. It's producing out of the Slaughter zone. And he's done his

hydrological study. It's been referenced in the Welder report, and the Land report. And, I mean, he was pretty blunt. The Slaughter zone is where Roswell gets its drinking water, and it's produced -- I can't remember whether it's 820-some-thousand out of six wells to the northeast, with 39,000 parts per million.

Q. Those are the wells you refer to as Township 10 South, 25 East, I believe?

A. Yes, sir. They're actually in 17. All of them are in 17. So I think it's six wells.

Q. And those are producing from the Slaughter portion of the San Andres?

A. Yes, according to Havenor.

And the exhibits by Mr. Goetze that were presented, the Slaughter's on that cross section.

Q. So with regard to the rules we're proposing, are you saying that the Lime Rock area should be treated separately from the rest of the designated area?

A. Well, the way the --

THE WITNESS: Counselor, what's the rule called that's been submitted from the industry? What do you call that?

MR. LARSON: Modification.

MR. FELDEWERT: Modification.

THE WITNESS: The modifications that were

submitted -- if you're going to do a one-size-fits-all, you're going to have to have some flexibility in the modifications that were submitted. Protect freshwater down to the first oil show, whether it's the first -- and not drilling deeper than the artesian aquifer, of course. But when you have these instances of oil shows either in the artesian or above, you stop, and that's your surface protection string.

So that, and there were several conference calls I was a part of. And there were probably numerous other calls or discussions, but that is a consensus. That's how you -- that would be a way to handle this, is to protect -- drill your surface protection string. The papers I referenced, there is plenty of evidence that this system circulates from shallow to deep and deep to shallow. As a matter of fact, you'll find in the Welder Report, the confining unit produces 10 percent of the annual irrigation pumped in the Roswell Basin. It produces 10 percent of the amount that's pumped for irrigation.

So the actual confining unit produces water so that it's important to protect shallow, the confining unit, and when we get into the first oil show, you're kind of looking like you may be done with the first water.

Q. Okay.

CHAIRMAN CATANACH: I have no further questions.

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

REDIRECT EXAMINATION

BY MR. LARSON:

Q. When you used the term "environmental criminal" --

A. Maybe I shouldn't have used that.

Q. -- is that a hyperbole?

A. Yes.

Q. Directing your attention to Subsection C of the proposed rule, Mr. Brooks was questioning you about that.

A. C?

Q. Yes.

A. Okay.

Q. If you look at Subsection 2 and 3, would it not be mandatory, even in the instance where you have an oil show at 812 feet, that you would be required to drill an intermediate string to a depth of 1,200 feet below surface into the San Andres?

A. Well, not necessarily 1,200 feet. That's a suggestion. But into the San Andres, yes.

Q. In your situation, the first oil show would be

above the deeper aquifer. You wouldn't even get to the San Andres?

A. Correct. Well, yeah, that's correct.

MR. LARSON: That's all I have.

MR. BROOKS: Mr. Chairman, I'd like to make one more try at clarifying this. I don't know if I'll succeed, but I'll try to be very brief.

CHAIRMAN CATANACH: Go ahead.

RECROSS EXAMINATION

BY MR. BROOKS:

Q. What I understood you to be saying in response to the Commissioners', S apostrophe, questions was a little bit different than what I understood you to be saying before. Because I now understand you to be saying that if you have a show of hydrocarbons in the confining layer, that you need to have a surface protection string above that show -- location of that show, is that correct, for the protection of the upper aquifer?

A. No. I'm not saying you have to have one set prior to that. No, sir.

Q. Well, at that point?

A. At that point you could set your surface protection string.

Q. Okay. But that would not have any -- that

would not provide any protection to the valley-fill -- I mean to the artesian aquifer from communication with the hole until you got all the way to the base of your hole, 6,000, 8,000, 9,000 feet where you were going, and set your production casing if you used the two-string plan. Am I correct?

A. Well, first off, if you're going to 9,000 feet, you're not going to set 450 feet or 500 feet of surface and drill at 9,000 necessarily. That wouldn't be a prudent operation.

But the reason -- let me take another stab at it, too. What we are suggesting in the Lime Rock acreage is that you drill the first show, and you set a single surface protection string. You would drill out into what you are stating is the artesian aquifer, but you have to ask yourself, if all the confining -- if the base of the confining unit and the artesian aquifer has oil shows and can produce in the area and has produced oil in the area, then we can protect that part of the aquifer even though it's not potable water, even though it's not usable water. It's oil and gas now. We can protect that part of the aquifer with a protection string cemented up to surface or at least with a 500-foot tieback.

Q. But you said even if it's not potable water.

With artesian conditions, can't you have a potable water formation below the oil and gas formation?

A. I'm not a hydrologist. I can't answer that question.

Q. Well, I think I'll stop at that point. Thank you.

MR. OLSEN: Mr. Director, if I may just for a matter of clarification on a statement from the witness?

I believe the witness testified, sir --

And I'm looking at your exhibit. Gary, this was your Exhibit 10.

THE WITNESS: Tell me what page you're on.

RECROSS EXAMINATION

BY MR. OLSEN:

Q. Yes. Page 9 of Exhibit 10, and you had made the -- made the statement about 10 percent of the water produced. Remember that comment that you just made?

A. Yes.

Q. And I direct your attention to that part of the report, the second full paragraph, left column, talking about the Welder report.

A. Yes.

Q. And would you -- is this the part of the Welder report that you make reference to?

A. Well, this is not the Welder report. So I'm assuming it is because the guy's quoting Welder.

Q. My question is, sir, did your comment regarding the 10 percent of the production come straight out of the Welder report, or did it come as a result of your reading Exhibit 10, page 9, where it defines the production from the zone? Because isn't it true, sir, that paragraph -- I mean page 9 makes it clear where the production is coming from for the groundwater, that 10 percent?

A. It's from the moderately permeable zone in the confining beds on the Grayburg, Queen, Seven Rivers Formations.

Q. Those three formations, correct? The Grayburg, the Queen and the Seven Rivers are all producing zones?

A. And he also clarifies that by saying the confining unit.

Q. Okay.

A. Okay.

Q. That's -- they can read the report then and evaluate it. Thank you very much.

A. Uh-huh.

RECROSS EXAMINATION

BY CHAIRMAN CATANACH:

Q. So I just want to follow up on Mr. Brooks'

question. You set the surface casing in the first oil show, which might be in the confining layer?

A. Okay. Can I -- if we've set casing to the top of the first oil show? Is that what your premise is?

Q. Right. You're setting casing at the first oil show, which might be in the confining layer, which might be Grayburg, Queen possibly?

A. Yes.

Q. So then you drill out -- you drill through the artesian aquifer to the productive zone, which I presume to be Yeso?

A. Yeso-Glorieta, yeah.

Q. So is there any chance during that operation where you'll potentially have the possibility of contaminating or further contaminating the artesian zone?

A. Well, I think what -- that's a difficult question to answer because I'm not sure what contamination you're talking about. But what I've shown here is we have oil shows within the artesian aquifer. So I don't know what I'm -- when we talk about contaminating it, I don't -- I don't know how you contaminate something that's got oil and gas in it already.

Q. So you're saying it's already got oil and gas

in it, and you're not going to contaminate it any further by drilling through it?

A. We have shows that are in the aquifer. I mean, that's where I struggle with your question. When you say contaminating it, I have -- there are a lot of wells in this area. As a matter of fact, in this nine-township area, there are over 4,000 wells. That's half of the 9,000 in the whole area. So this is a microcosm of a lot of things. And we have oil shows in the -- in the confining unit, the base of the confining unit and in the artesian aquifer. So that's where I struggle when you say would we further contaminate it. I don't know where to go with that. I apologize.

Q. Okay. That's all I have.

CHAIRMAN CATANACH: Anything further of this witness?

MR. LARSON: Nothing further.

CHAIRMAN CATANACH: Okay. This witness can be excused.

So since this is on rulemaking, I'd ask at the present time if there are any members of the public or any other interested party that would like to make a statement at this time.

I don't see any volunteers.

So we'll consider that to be a no public

comment.

AUDIENCE MEMBER: Excuse me. I'd like to say something.

I have a few questions that I'm concerned with because I have been working with this for a little while. And when they say --

CHAIRMAN CATANACH: I'm sorry. Identify yourself.

AUDIENCE MEMBER: My name is Karen Collins. I work for the OCD. I have a degree in natural resources, a BS.

I have a little bit of concerns when they say they see browning. Okay? Define that to me. Is it oil? Is it rust? What is it? Is there investigations done to find out if it's oil that's coming through? If it is oil, do they stop, then seal up and get out of the area? And with what he's saying now, with the oil already in the reservoir -- the artesian reservoir, it doesn't make sense to not add extra protection. Okay?

I can understand their point as far as the time it takes to get a log back and everything like that. Maybe we need to work on figuring a quicker return. My concern is there is damage to it already. If that be the case -- every one of you probably have children. They will have children. Where is their

water going to come from if this water is ruined any further?

Thank you.

CHAIRMAN CATANACH: Thank you, Ms. Collins.

So I guess at the present time I would ask if counsel want to make closing statements.

CLOSING ARGUMENT

MR. BROOKS: Well, Mr. Chairman, I don't think I can add very much. I do believe that if the Commission considers that the cost of the adoption of the rule is greater than the potential benefit -- And I do understand that there has been a lot of evidence that this time frame during drilling is very short and that they haven't experienced flows and so forth. And the Commission may not be disposed to adopt a very expensive additional string requirement for that reason. If that is the Commission's view, I think the Commission should consider whether or not there are regulatory alternatives in the rule or otherwise that could be adopted to give us some assurance that if they set a casing string below the lower aquifer, that it will be done in such a way that it will prevent any ongoing communication between aquifers of different quality.

Thank you.

CHAIRMAN CATANACH: Thank you, Mr. Brooks.

Mr. Olsen, anything?

CLOSING ARGUMENT

MR. OLSEN: Just briefly, sir. And let me first start by saying -- telling the Commission that we appreciate the opportunity to be here, on behalf of the District. I think our goal as a government agency is first to protect -- the waters of the state of New Mexico belong to the state. They're not individually owned. So we, as protectors of the water, have an obligation, whether it be PVACD or the State Engineer's Office or the OCD, Environment Department, State Land Office. We all have one purpose of our being, if you may, and that is to protect the assets of the state of New Mexico, and the water is the life blood of the assets of the state of New Mexico.

For the PVACD, this matter really started with what we perceived to be the failure of the operators to comply with the existing regulations under 19.15.16.9 and 10. That historically, per the one exhibit from -- from Yates, over 700 wells, and nearly half of them had what we called two-string, that has now evolved to what we're now calling three-string, wells being set.

We view the proposed rule not being so much about oil and gas, but about protecting the waters

within the RAB and protecting the waters of the state of New Mexico and, as I believe Mr. Atkins said, an infinite source -- resource forever of the RAB. That's what we view this rule about. Granted, it's dealing with the drilling of oil wells, but we're talking about protecting the water of the state. And nor is it about profit margins of operators.

I recognize that there are costs of everything, but there is also a cost -- and we didn't talk about it, of course, but there is a cost. If this water becomes contaminated, if it becomes degraded, if it becomes nonpotable, if it becomes nonuseable, what are the costs? And I found the statement from the one witness rather unique when he was talking about being concerned about feeding his family and the 25 people he has working for him. What about the 100,000-plus people that live and reside and work within the Roswell Artesian Basin? What is the cost there of contamination?

And I would liken the way it's going on, the present operators, it's like the fox guarding the chicken coop when it comes to drilling wells. Lost circulation. Okay, it's in a report. So what? Who is making sure that it's -- that circulation is being brought to the top? OCD? Is anybody out there standing

on that? No. How do we even know that it's being done and is being done short of a report being filed? And somebody then -- we have to rely on somebody to go look at the report, make sure it's being done.

This rule, at least in our opinion, levels the playing field a little bit between the folks that are drinking the water and irrigating with the water and building trailers with it and using water on their lawns, that this helps even the playing ground, if you may, level it a little bit with the operators out there.

The protection of this water is not just the obligation of -- and therein, I'm distressed, quite candidly, with you -- with the absence of the State Engineer here in this hearing. Very candidly, I'm distressed about that, because I believe that as a sister agency here, as an agency that we work with on a daily basis, we believe they should have been here. But that is neither said here nor there. The issue is before us now.

We submit to you that, one, either the rules as they exist today, that we take measure to make sure that they're being fully complied with, take place, or that we adopt the rule as it's written to protect the waters within a critical part, a one and only in the state of New Mexico area, and to protect these waters.

Again, I thank you so much for the opportunity to be here and be a participant in this.

CHAIRMAN CATANACH: Thank you, sir.

Mr. Feldewert?

CLOSING ARGUMENT

MR. FELDEWERT: Mr. Chairman, let me start at the beginning. Mr. Olsen just touched on it. Do we need special rules? Okay? I don't see how. There is no evidence here. We've had decades of drilling. There's been thousands of wells. No evidence of any groundwater degradation. Mr. Kautz offered his opinion. When these rules are properly applied, they are adequate to protect this area.

The issue is education within the Division. They had a period of time where there were people looking at APDs that didn't understand the area and didn't understand the rules. They didn't know how deep those casings needed to go, that protective string. The current rules -- and I don't want this to get lost. The current rules are protecting the aquifers. There has been no evidence. Dr. Balch asked their geologist, Is there any evidence of any systematic problem? None. Okay? These aquifers are being protected by the current Division rules which require a protective string cemented to surface through the aquifers. It has

worked, and it will continue to work.

And all that has been presented is an unsubstantiated fear. Mr. Brooks, I think, put out a theoretical possibility that somewhere along the line, there is some kind of communication. And Mr. Peery said, Well, there are 9,000 wells out there. There must be some of them that are leaking someplace. Okay? So put aside that we've got well tests that make sure we don't have that issue. We have pressure tests that make sure we don't have that issue. Put aside that there are thousands of water wells that will get you to make that same conclusion, that some of those must be leaky. In fact, Mr. Peery talked about some of them being leaky. Okay?

But the existing Division rules are working, and they have worked. And you don't create special rules without supporting evidence for a demonstrative need.

So I ask: What supports the special rules? I see no evidence of systematic failure. And if you're going to have special rules, what area? Okay? All they talked about is this theoretical possibility that while you're drilling, one aquifer may somehow come into communication with the other. That is their theoretical possibility. That's what Mr. Goetze said. That's what

Mr. Peery said. That's what Mr. Krogman said. That requires two aquifers. So why do we have a designated area that is three times the size of where we have two aquifers? That makes no sense to me.

And this shallow aquifer, the overlying aquifer area is identified on a number of these exhibits. You can look at Lime Rock Exhibit Number 1. You can look at any other exhibits you want to and identify where we have this overlapping area. But the remainder of this designated area, there is not even a theoretical possibility there of concern that they have expressed, so nothing to support the rules, and no concern -- no theoretical possibility or theoretical concern with anything other than where we have two the aquifers, which then brings us to the last point.

If rules are needed for this overlap area, what should they be, knowing that your duty is to prevent waste. Okay? And like it or not, that means you balance the concerns. You balance this theoretical possibility with the impact on development that is going to occur to try to address their theoretical possibility.

And I think the evidence has been clear today that we don't need two strings. The existing rules do the protection, have done the protection and

will continue to do protection. We don't need cement bond logs because the rules require the cement to be circulated to surface. Everybody agrees you don't need them if you circulate to surface. Mr. Kautz said that. Mr. Peery said that. Mr. Goetze said that. And all of our witnesses agree because it's true. Okay? So there is nothing to support requiring cement bond logs. Under the existing rules, we've got cement circulated to surface.

Annular space, the other aspect we talked about today. Mr. Kautz said, Keep that 2 inches. But he's not engineer. He said he left it to the engineer to determine what that 2 inches should be measured out. And if you're going to have a special rule that identifies that 2 inches, which is what everybody says you need and what everybody does, which is 2 inches off that casing so you get the proper turbulence you need and that you can accommodate the tools off the shelf. There is no evidence, zero, to suggest that you should measure that off the couplings, as they have proposed.

So, again, I get back to this point. You cannot make special rules based on politics or speculation or some theoretical possibility or unsubstantiated concerns. If they come before you and they say, We need special rules, they've got to bring

forth evidence showing why. We've had decades of drilling. They've been monitoring the aquifer out there. They've seen absolutely no degradation. So what supports the special rules? What even suggests that your current rules aren't working? They are protecting the aquifers, and that's what's been shown the last two days.

CHAIRMAN CATANACH: Thank you, sir.

Mr. Larson?

CLOSING ARGUMENT

MR. LARSON: In the sake of brevity, I will say that I agree 100 percent on the points Mr. Feldewert has made. I said in my opening statement, to a significant degree, we'd be making an uncomfortable juxtaposition between groundwater protection and increased drilling and other associated costs. I think everybody who is a resident of the state of New Mexico is sensitive to the fact we all rely on groundwater.

But from my perspective, we've been presented with no evidence demonstrating an actual threat or even a credible potential threat of contamination caused by the industry's long-standing drilling practices and the Division's regulatory authority.

And I specifically agree with Mr. Feldewert

on the issue of waste. I think we've heard unrebutted testimony that special rules proposed by the Division would impact operations and, in turn, communities and revenue to the State of New Mexico.

And so on behalf of EOG and Lime Rock, I request that the Commission deny the application in its entirety.

CHAIRMAN CATANACH: Thank you, Mr. Larson.

Mr. Bruce?

CLOSING ARGUMENT

MR. BRUCE: Mr. Chairman, I'm going to start off with something that has bothered me for a long time, and that is anytime there is any rule proposed before the Commission about protecting the environment, it's always assumed that the oil and gas companies want to pollute the environment.

All the people on my side of the aisle and not only people in this room, but hundreds and hundreds of other people, we all live in this world. We want a clean environment. We want freshwater. We want fresh air, clean air. Us, our children, our grandchildren live in this world. We want to protect it. I've known that ever since I started this 35 years ago. And the only other person who has been here longer is Mr. Carr, and I know he believes the same thing, and he's a lot

older than me.

(Laughter.)

MR. BRUCE: That said, the proposed rule is a remedy in search of a problem. There is no evidence, like Mr. Feldewert said, of any oil and gas drilling causing contamination of freshwater in this area. Historical well design and drilling programs are sufficient to protect the freshwater.

In addition, the district offices already have the authority to require additional measures in the drilling of a well to protect freshwater. I would also point that the protector and regulator of freshwater, the State Engineer, knows of this proceeding, has known of it for months and months and months and is not here. If there was a problem, I think they would be here.

Therefore, the proposed rule is completely unnecessary, and it should not be adopted. If anything, adopt the rule proposed by the operators. It really does what's already being done. Maybe it summarizes it in a more succinct matter, because that's all that needs to be done.

CHAIRMAN CATANACH: Thank you, Mr. Bruce.

Ms. Foster?

CLOSING ARGUMENT

MS. FOSTER: Yes. Thank you, Mr. Chairman,

Members of the Commission.

On behalf of the 300-member companies of the Independent Petroleum Association, thank you for allowing us to participate in this hearing. It's been interesting and educational.

As you heard from all the lawyers in this case, no evidence has been presented by the OCD or the Pecos Valley concerning contamination. And back to Mr. Kautz. He was pretty clear that there was no contamination. He did review what he thought was two cases or at least the OCD thought they reviewed two cases of contamination, and he came back and said no contamination.

Now, the definition of contamination may be up for question. I think that the other side believes that mixing of the two waters -- of the two aquifers might be considered in their minds contamination, but in the context of what the OCD has to regulate and to protect correlative rights and prevention of waste, I don't believe that the mixing of the two aquifers is contamination in the context of what you have to look at.

So what evidence was presented? I think it was very clear, from the operators who presented, that this rule, even the proposed rule, and the way that the

Oil Conservation Division has behaved towards operators since the passage of the emergency record back last May has presented regulatory uncertainty to the industry and has caused several companies to pull back on their drilling programs, costing the state millions of dollars.

I think also -- again, this has been said by several of the attorneys already -- that the absence of the Office of the State Engineer in this proceeding is extremely telling, and I don't think I need to say anything more about that.

So all I would ask is that -- the Oil Conservation Division just needs to enforce the current rule that's on the books. That's provided regulatory certainty. Operators have operated under that rule for many, many years. We know how to operate under that rule. There has been no case of contamination. There is no justification for changing what the rules are currently.

Thank you.

CHAIRMAN CATANACH: Thank you, Ms. Foster.

So I guess what I'd like to do is ask the parties to present statement of reasons for or against adopting the proposed rule.

Also, with regards to Mr. Brooks' closing

statement, I'd like to ask you, in the absence of the Commission adopting a requirement for two protection strings, is there -- is there a best management practice the Division could come up with for drilling and cementing with a one-string protection string that might be adopted in this area?

MR. BROOKS: I would have to consult with the Division's experts. We have not -- we did not prepare for this case under that assumption. So --

CHAIRMAN CATANACH: It might be helpful to the Commission, when we deliberate on this, to have something maybe to fall back on if we do decide --

MR. BROOKS: Well, I think there are -- I would hope that there are some such alternatives available. The only place that I brought it out and you probably noticed this in my proceeding -- in my questioning was about the cement -- but given the testimony, there may be some difficulties with that, and there might be a better solution. But I would have to consult and get additional input from the people in the Division who know more about it than I do to get there.

MS. FOSTER: Mr. Chairman, in that regard, I think the testimony -- there was discussion about different mudding programs, as well as monitoring that was brought out by Pecos Valley. If, in fact, the OCD

would be making those recommendations, I think the industry should have the opportunity to present witnesses and look at what would be proposed, because we did not -- as the rule was proposed, we did not consider mudding -- different mudding obligations, and we did not consider monitoring. That was not something we considered. We just looked at the rule as proposed.

Thank you.

MS. BADA: And it's not a recent outgrowth. So if it's proposed, you're going to have to re-notice.

CHAIRMAN CATANACH: Then forget it. Don't worry about it.

With regards to deliberations, I would propose that we delay deliberations.

COMMISSIONER BALCH: I'd certainly like time to go through all the materials we have.

CHAIRMAN CATANACH: We are currently scheduled to deliberate on January 5th on a previous case that was heard by the Commission. We can probably schedule that for the same day.

COMMISSIONER BALCH: Tuesday, the 5th of January?

CHAIRMAN CATANACH: Tuesday, January 5th.

MS. MITCHELL: That's a Thursday, January 5th.

COMMISSIONER BALCH: I'm dyslexic with my twos and fives.

MS. MITCHELL: That's okay. I'm just the peanut galley. There may be a problem with that.

CHAIRMAN CATANACH: I believe there is an Examiner Hearing that day.

COMMISSIONER BALCH: We can deliberate in another room.

CHAIRMAN CATANACH: But we may not have two court reporters. It's going to have to be on the record.

MR. FELDEWERT: You do have OCD. It is OCD hearings then.

COMMISSIONER BALCH: We could borrow a couple of hours of their time. We need to publicly deliberate on rulemaking.

CHAIRMAN CATANACH: Let me ask the court reporter.

(Discussion off the record regarding two court reporters.)

COMMISSIONER BALCH: The next opportunity would be the regular hearing on the 11th, which may not be in Santa Fe.

How about Wednesday, the 4th?

CHAIRMAN CATANACH: I think that works for

me.

COMMISSIONER BALCH: Is it too late to re-notice Caza for the 4th?

CHAIRMAN CATANACH: I don't think we've noticed that yet.

MS. BADA: I was told that it hasn't been 20 days.

COMMISSIONER BALCH: So we could notice it. Are you available?

COMMISSIONER PADILLA: Uh-huh.

MR. BROOKS: I'm not involved in the Caza case. And you will take your advice from the Commission counsel, no doubt. Without having studied the rules specifically in that connection, I have some -- some question whether when you continue the case to a particular date, you can then come in and have -- and set a portion of that proceeding at an earlier date. You can move it to a later date. But whether you can set it for an earlier date -- I don't want to be construed as expressing an opinion. I really don't. I'm not counsel for anyone in that case, so I just mention it.

MS. BADA: My understanding was that they hadn't continued it, so that's why we're having to notice that.

MR. BROOKS: Yeah. Well, you have the 20 days.

MS. BADA: Right.

MR. BROOKS: To the extent that that is the standard, the 20 days before January 4th would be December 15th, I believe, which is more than a week off now.

COMMISSIONER BALCH: So we could re-notice both of them to the 4th.

MS. BADA: I don't believe we need to re-notice.

COMMISSIONER BALCH: We could notice both of them to the 4th.

MS. BADA: You'll need to continue it.

COMMISSIONER BALCH: Continue it. That's why we have lawyers, parse our words.

CHAIRMAN CATANACH: So we actually continue this case to -- it would be a special docket on the 4th. Is that what you're saying?

MS. BADA: Yes.

CHAIRMAN CATANACH: Okay. So we'll continue this case to a special Commission docket on January 4th.

MS. BADA: Yes. You need to give them a date for when you want your --

CHAIRMAN CATANACH: Statements of reason?
COMMISSIONER BALCH: A week before or two weeks would be better.
CHAIRMAN CATANACH: Two weeks prior to January 4th?
MR. BROOKS: Two weeks prior to January 4th? That would be Christmas week. That's okay with me. I don't know what other counsel may have. It would be prior to Christmas, as I understand it. So it's something I can do.
MS. FOSTER: The 21st?
MR. BROOKS: December 21st I believe is correct.
CHAIRMAN CATANACH: Okay. So statements.
MR. BROOKS: Statements of reason due on the 21st. The continuance to be to January 4th.
CHAIRMAN CATANACH: So do I have a motion to continue this case until January 4th, which will be a special Commission docket?
COMMISSIONER BALCH: So moved.
COMMISSIONER PADILLA: And seconded.
CHAIRMAN CATANACH: All in favor?
(Ayes are unanimous.)
CHAIRMAN CATANACH: I think that takes care of the business for today.

MR. OLSEN: Start time will be?

COMMISSIONER PADILLA: 8:00.

CHAIRMAN CATANACH: Start at 8:00. We have two cases to deliberate on that date. One is on the record. One is off the record.

COMMISSIONER BALCH: Start with Caza or start -- let's start with this one.

CHAIRMAN CATANACH: We can start with this one. We'll start at 8:00.

Now, we may need to change the venue. But we can be here because there won't be a hearing, so it'll be in this room.

Okay. Anything further? If not, this Commission meeting is adjourned.

(Recess 12:09 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.

MARY C. HANKINS, CCR, RPR
Certified Court Reporter
New Mexico CCR No. 20
Date of CCR Expiration: 12/31/2016
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