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PUBLIC HEARING  
STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

Pecos Hall, 1st Floor, Wendell Chino Building  
1220 S. Saint Francis Drive  
Santa Fe, New Mexico

TRANSCRIPT OF PROCEEDINGS  
April 23, 2025  
VOLUME XIV

HEARD BEFORE:

HEARING OFFICER RIPLEY HARWOOD

COMMISSION MEMBERS:

GERASIMOS ROZATOS, Chair  
BAYLEN LAMKIN, Member  
DR. WILLIAM AMPOMAH, Member

COUNSEL TO THE COMMISSION:

MR. ZACHARY SHANDLER, ESQ.

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I N D E X

PAGE

TRANSCRIPT OF PROCEEDINGS.....5

THE WITNESSES

    WILLIAM J. KNIGHTS

        Redirect Examination by Mr. Rankin.....6

        Recross-Examination by Mr. Wehmeyer.....65

        Recross-Examination by Mr. Beck.....108

    EXAMINATION BY THE COMMISSION

        By Commissioner Ampomah.....112

        By Commissioner Lamkin.....120

    JOHN MCBEATH

        Cross-Examination by Mr. Wehmeyer (Cont'd)..124

        Cross-Examination by Mr. Moander.....190

        Cross-Examination by Mr. Beck.....190

        Redirect Examination by Mr. Rankin.....228

    EXAMINATION BY THE COMMISSION

        By Commissioner Lamkin.....202

        By Commissioner Ampomah.....204

TRANSCRIPT CERTIFICATE.....247

1 (On the record at 9:00 a.m.)

2 TRANSCRIPT OF PROCEEDINGS

3 CHAIR ROZATOS: Good morning to everybody.  
4 My name is Gerasimos Rozatos. I am the acting  
5 director of the Oil Conservation Division. I'm also  
6 the acting chair for the Oil Conservation Commission.  
7 We are continuing our evidentiary hearing today, on  
8 April the 23rd, 2025, for the consolidated cases by  
9 Goodnight Midstream and Empire New Mexico.

10 Again, as always, I start with the case  
11 numbers. The case numbers for this particular  
12 hearing are Case Numbers 24123, 23614 through 17,  
13 23775, 24018 through 24020, and 24025.

14 One thing I wanted to mention before we  
15 started with our actual evidentiary hearing,  
16 Commissioner Ampomah has a scheduling conflict  
17 tomorrow with his classes that he is teaching, so we  
18 do need to start tomorrow at 10:30 to accommodate the  
19 commissioner's schedule. So please just arrange  
20 tomorrow, Thursday the 24th, that we start at 10:30.

21 Other than that, Mr. Hearing Officer, I  
22 transfer this hearing back over to you.

23 HEARING OFFICER HARWOOD: All right. Good  
24 morning, everybody. Before we start, are there any  
25 preliminary matters?

1 MR. WEHMEYER: Not from Empire.

2 MR. RANKIN: None from Goodnight this  
3 morning. Thank you.

4 MR. MOANDER: Nothing from OCD, Mr. Hearing  
5 Officer.

6 MR. BECK: Nothing from Rice. Thank you.

7 MR. SUAZO: Nothing from Pilot.

8 HEARING OFFICER HARWOOD: Okay. Great. If  
9 memory serves me correctly, it's redirect of  
10 Mr. Knights.

11 Mr. Knights, I just remind you you're  
12 under oath from yesterday.

13 MR. RANKIN: Thank you, Mr. Hearing Officer.

14 Good morning, Commission Chair,  
15 Commissioners.

16 WILLIAM J. KNIGHTS,  
17 having first been previously duly sworn,  
18 testified as follows:

19 REDIRECT EXAMINATION

20 BY MR. RANKIN:

21 Q. Good morning, Mr. Knights. How are you this  
22 morning?

23 A. Tired.

24 Q. It's good to be honest, especially when  
25 you're on the stand.

Page 6

1                   Mr. Knights I'm going to ask you a  
2 couple questions that were raised during your  
3 cross-examination yesterday.

4                   Do you recall yesterday during  
5 cross-examination by Mr. Wehmeyer, Empire's counsel,  
6 where you were asked questions about your revisions to  
7 direct testimony that was submitted with the  
8 Commission?

9                   A. Correct. Yes.

10                  Q. And you made two corrections to your  
11 original direct testimony, correct?

12                  A. Correct.

13                  Q. And the first was to correct the  
14 oil-in-place calculation, because, as I understand,  
15 you understood it calculated based on 1-foot  
16 increments when they were really half-foot increments;  
17 is that correct?

18                  A. Correct.

19                  Q. And that resulted in you cutting the  
20 oil-in-place calculations in half, correct?

21                  A. Correcting them to that value.

22                  Q. Based on those half-foot intervals, right?

23                  A. Yes.

24                  Q. Now, you were deposed in December of 2024  
25 before you identified the mistake, correct?

1 A. Correct.

2 Q. And Empire's experts could have reviewed  
3 your written testimony, exhibits, interpretive logs  
4 and your analysis in advance of your deposition,  
5 correct?

6 A. Correct.

7 Q. And they could have pointed out that error  
8 that resulted in 100 percent overestimate of the oil  
9 in place, correct?

10 A. Correct.

11 Q. But that didn't happen; that wasn't brought  
12 up during your deposition, correct?

13 A. No. Yes, correct.

14 Q. So no one else had identified to you that  
15 you had made that 100 percent overestimation of the  
16 oil in place, correct?

17 A. Correct.

18 Q. But you, yourself, identified that error  
19 after your deposition and made the correction yourself  
20 to your testimony after you brought that to my  
21 attention, correct?

22 A. Correct.

23 Q. We filed your revised testimony in January  
24 2025, correct?

25 A. Correct.



1 Q. Then you also made another change, changing  
2 the oil-saturation cutoff in your interpretation or in  
3 your analysis from 30 percent to 20 percent, correct?

4 A. Correct.

5 Q. And, as I understand, you did so because it  
6 was easier -- your rationale was, it was easier to  
7 compare based on Empire's experts' own definition of  
8 what a commercial ROZ is, correct?

9 A. Correct.

10 Q. And you're not the only one who used the 20  
11 percent oil-saturation cutoff in your oil-in-place  
12 analysis, correct?

13 A. That is correct.

14 Q. In fact, Empire's witness -- experts, Ops  
15 Geologic, did the same, correct?

16 A. Correct.

17 Q. And, in fact, when they used the 20 percent  
18 oil-saturation cutoff in their oil-in-place  
19 calculations, they effectively wiped off all the oil  
20 saturations that are below the 20 percent oil  
21 saturation in their oil-in-place calculations,  
22 correct?

23 A. Correct.

24 Q. So they did the same thing that Mr. Wehmeyer  
25 was accusing you of doing by wiping off 20 percent of

1 all oil saturation up to 20 percent from their  
2 oil-in-place calculations, correct?

3 A. Correct.

4 Q. Now, you were also -- Mr. Knights, you were  
5 also questioned about Dr. Lindsay's fracture study  
6 yesterday by Mr. Wehmeyer; do you recall that?

7 A. Yes, I do.

8 Q. And, in fact, you did review Dr. Lindsay's  
9 fracture study, which was presented as part of his  
10 evidence and testimony on the EMSU 679 core, correct?

11 MR. WEHMEYER: We have an objection. Every  
12 single question has been leading, and I've let 30 of  
13 them go. But at some point, we need to hear from the  
14 witness. Objection. Leading.

15 HEARING OFFICER HARWOOD: Well, it's a fine  
16 line. I tend to allow it if it will move things  
17 along. But bear it in mind, Mr. Rankin --

18 MR. RANKIN: I'll adjust.

19 BY MR. RANKIN:

20 Q. Mr. Knights, did you review Dr. Lindsay's  
21 fracture study on EMSU 679?

22 A. Yes, I did.

23 Q. What did you conclude about the fractures  
24 that he identified in that oriented core fracture  
25 study?

1           A. That they were -- basically same conclusions  
2 he had, is they were 1 to 2 to 3 inches, and a few of  
3 them were up to a foot or 2.

4           And I disagree with his interpretation  
5 that somehow that indicated that there were fractures  
6 and faults that go all the way down to the San Andres,  
7 300 feet below it. Especially since those fractures  
8 in the cores need to be restricted to individual  
9 stratigraphic units.

10          Q. Now, you just used the words "San Andres,"  
11 and I know having worked with you for as long as I  
12 have, that you're almost allergic to formation tops,  
13 so let's talk about it in different way.

14          So you mentioned the words "San Andres,"  
15 how did do you relate that to Goodnight's permeability  
16 barriers?

17          A. As we've discussed the San Andres, I look at  
18 there's three different intervals in the San Andres.  
19 There's an Upper San Andres, a permeability barrier,  
20 and the Lower San Andres that Goodnight injects is in  
21 the Lower San Andres that is separated from the Upper  
22 San Andres and the Grayburg. And it is very confusing  
23 when somebody mentions San Andres of which three  
24 intervals are you talking about.

25          Q. So just to be clear, those fractures in

1 Dr. Lindsay's analysis of 1 to 3 inches, just explain  
2 whether it's your opinion those fractures could extend  
3 down to the depths where Goodnight disposal is  
4 occurring.

5 A. Yeah, I didn't see any indications that they  
6 would be extensive and, you know, more than the couple  
7 of feet that he actually identified in the wells.

8 Q. Okay. Now, kind of continuing down this  
9 path on fractures and communication, yesterday,  
10 Mr. Wehmeyer and Dr. Ampomah both asked you questions  
11 about what evidence of the permeability barriers you  
12 testified exist from approximately minus 500 subsea to  
13 about minus 700 subsea. Do you recall those lines of  
14 questions?

15 A. Yes.

16 Q. In preparation for your written testimony,  
17 did you actually review the core report for the EMSU  
18 679 as part of our overall analysis?

19 A. Yes, I did.

20 Q. I'm going to go ahead and share my screen.

21 Mr. Knights, is this a document that you  
22 prepared that identifies excerpts from the core report  
23 that was provided to Goodnight by Empire?

24 A. Yes. This is Lindsay's fracture study data.

25 Q. And it's approximately six pages that you've

1 excerpted portions from that fracture study; is that  
2 right?

3 A. Correct.

4 Q. And if you would just review what this core  
5 report and the information from Dr. Lindsay's fracture  
6 study shows with respect to your opinions about  
7 permeability barriers that you were asked about  
8 yesterday.

9 A. So most of the permeability that's in the  
10 testimony so far has been horizontal permeability, and  
11 this core report actually has vertical permeability.  
12 So what I've highlight in blue is those permeabilities  
13 that have less than 1 millidarcy, in blue. So each  
14 one of those blue boxes that vary are variations in  
15 feet, I would consider a permeability barrier.

16 And as you go through, I've also put on  
17 the measured depth and TVD subsea. And so as we go  
18 through these pages, you can see that there are  
19 multiple perm barriers. As we go through the 179  
20 feet, I think there will be 29 sections of individual  
21 perm barriers that individually could be perm  
22 barriers, but in aggregate, are significant perm  
23 barriers to vertical flow.

24 I think you'll see some other things I  
25 can describe.

1 Q. Before we move on, I'm going to ask you to  
2 just sort of orient us for the purposes of the record.

3 So this is a table of the core  
4 information, and I'm going from left to right here.  
5 You've got column headings, and I think it's the  
6 fourth column heading has the vertical permeability;  
7 is that right?

8 A. Correct.

9 Q. Just so the record is clear, you're talking  
10 about these blue boxes. The number to the immediate  
11 right of that blue box is the vertical permeability  
12 that was measured in the core that you're referring  
13 to, correct?

14 A. Correct.

15 Q. And then on the left-hand side, you've got  
16 the measured depths, which is from the core report  
17 itself, correct?

18 A. Correct.

19 Q. And then you've corrected that to a subsea  
20 depth based off the Kv for the well, right?

21 A. Correct.

22 Q. So let's start with the blue boxes. I'll  
23 scroll through. Just point out any points that you  
24 want to make.

25 A. Yeah, we can start at the very first one,

1 just to get oriented.

2 So the first, 4170, these are 1-foot  
3 increments. The permeability is 13 millidarcies. The  
4 next point down is .52 millidarcies, so a  
5 significantly lower perm. And even if they're not  
6 mathematically, the ratio of those is actually a perm  
7 barrier to fluid. So when you have distinct drastic  
8 changes in permeability, that's a restriction to  
9 vertical flow.

10 Then as you go down, there's a  
11 1 millidarcy. Then you get back into 2 feet that are  
12 below a millidarcy. So I went through that entire  
13 core. And this is basically from 590, so down closer  
14 to the interval that I think is that main perm barrier  
15 across the field.

16 Q. Now, in addition, on the far right there's a  
17 description that whoever was analyzing the core -- is  
18 that who -- explain to me what this shows on the far  
19 right in the columns, the description.

20 A. That is the lithology description that a  
21 geologist that was interpreting the cores did. So  
22 I've marked two things on there. I've marked  
23 anhydrite where that is present in the core. And then  
24 I've also, in a few places, marked SHR, the solid  
25 hydrocarbon residue, as just important features that I

1 thought were important in the core.

2 Q. So just so the records is clear, what is the  
3 significance of the presence of anhydrite here? How  
4 does it relate to the testimony that Dr. Davidson  
5 gave?

6 A. Well, anhydrite is relatively difficult to  
7 identify, especially in these intervals. But when you  
8 do have anhydrite, and the interval, it does indicate  
9 that there is anhydrite there -- I think Dr. Davidson,  
10 from his log analysis, identified areas that from the  
11 log characteristic could represent anhydrite.

12 Q. So I'll scroll through the next page here.  
13 As I do, just let us know what's significant on each  
14 of these pages?

15 A. Again, in this 25-foot interval, there's  
16 four separate intervals that I would consider perm  
17 barriers. So I think those are individual layers,  
18 beds that, you know -- again, geology is deposited  
19 laterally and horizontally, so they could extend over  
20 significant areas.

21 Q. Okay. Next page.

22 A. Next 25 feet, there's five perm barriers.  
23 The other thing I'd like to present, these boxes in  
24 the red, those are extraordinarily high perm barriers.  
25 And one of the things that that does is it allows for,



1 say, loss circulation. But those are also barriers to  
2 vertical perm.

3 If you have fluid going up through the  
4 system and you're going through very, very low perm  
5 and you hit a 4 darcy perm interval, that fluid is not  
6 going to go up, it's going to go laterally. So it's  
7 like, bad analogy, but a reverse bucket with holes in  
8 it. You're trying to get the water to go up and you  
9 hit this hole, the pressure is dropping, the water  
10 fluid is going laterally instead of vertically.

11 So it's not just the low perm intervals  
12 that are barriers to vertical flow, it's also these  
13 high perm intervals. So as you go through, you'll see  
14 a number of those.

15 The other thing, on the right-hand side,  
16 you see an increasing number of indications of  
17 anhydrite.

18 Q. And on that point that you just made about  
19 the vertical perm and the red boxes, it appears to  
20 tend to -- explain if that correlates also with the  
21 horizontal perm in this case.

22 A. Correct. And sometimes you'll see a  
23 difference where the horizontal perm is much lower  
24 than the vertical perm, and that's an indication of  
25 fractures. But if you look at the perms here, those

1 high perm streaks, when you do have that fracture,  
2 it's very localized in 1 or 2 feet of the section and  
3 not completely in the entire interval.

4 Q. And just to be clear, the column to the left  
5 of your vertical perm column is the horizontal perm  
6 measurements; is that correct?

7 A. Yes. When they do the cores, they measure a  
8 maximum perm direction, and then 90 degrees to that to  
9 try to get a heterogeneity in the permeability,  
10 because there's some directional permeability.

11 Q. And then you mentioned something when you  
12 were talking about this vertical perm value. You  
13 mentioned the term "loss circulation." It was  
14 discussed yesterday. If you would, just spend a  
15 moment explaining what that means and why you refer to  
16 that term here when you were talking about that value.

17 A. As you're drilling a well and you have a  
18 fluid column and a pressure, if you hit a high  
19 permeability zone or a lower pressure zone, you start  
20 losing that fluid from the drilling mud and it goes  
21 out into the formation. And it's an indication of a  
22 significant change in pressure gradient, or pressure.

23 And that is basically in some areas  
24 where the logs might say there's porosity, but a loss  
25 circulation zone is a direct physical evidence of

1 change in pressure and permeability.

2 Q. And in this particular instance, this is  
3 just the 1-foot increment, so you wouldn't expect to  
4 see significant results in your drilling, correct?

5 A. Yeah, depending on -- but 1 foot would  
6 probably -- you would definitely -- probably see  
7 something. But it may not be significant.

8 Q. Next page here, just, again, touch on what  
9 we're seeing here and how it relates to your --

10 A. So we're down to 4250 in a measured depth  
11 and negative 665 TVD subsea. And we see now a little  
12 more concentrated permeability barriers. So there's  
13 12 feet out of 13 feet that I would consider  
14 permeability barriers. And then as you can see, an  
15 aggregate on this 25 foot that goes with the  
16 significant barriers.

17 Again, I did mention yesterday about  
18 having a single perm barrier across the entire EMSU  
19 would be difficult to map. But in aggregate, these  
20 things are incredibly strong permeability barriers to  
21 vertical flow.

22 Q. And you put on here -- you indicated here  
23 the top of the San Andres, and you put in parentheses  
24 "GNM." What does that mean?

25 A. Well, that was my initials for Goodnight.

1 Since most people are discussing San Andres and the  
2 Grayburg, again I live in the TVD subsea world so I  
3 don't have to deal with that. But some people need --  
4 so that is the Goodnight top, and it's right along  
5 some of this high permeability barriers.

6 Q. And you didn't pick that depth, correct?

7 A. No. I did not. I took that from Preston  
8 McGuire, Goodnight's geologist.

9 Q. And you're not opining on that depth, you're  
10 just putting that there for reference so we understand  
11 where Goodnight has picked its San Andres top and  
12 permeability barrier, correct?

13 A. Correct. You know, you can -- there's an  
14 infinite way of picking a top. And I think if you  
15 were just presented this data, you know, if you were  
16 thinking perm, you might go up to the top of that perm  
17 barrier and pick a top there. But the log data may  
18 pick it differently. It's just opinion. Nomenclature  
19 is a quagmire.

20 Q. Next page here, what does it show?

21 A. This shows two more perm barriers. Probably  
22 about 20 -- 90 percent of that interval is a perm  
23 barrier to vertical flow. You can will see some  
24 anhydrite on the right side.

25 Another thing that you see on the right

1 side is SHR. That's the one below, if you're  
2 following these curves. There it is. So SHR is solid  
3 hydrocarbon residual. And as I mentioned before, that  
4 is an indication that you're below the ROZ or very  
5 close to the base of the ROZ.

6 Q. And then I think this is your last page of  
7 this exhibit. What does that show here?

8 A. This shows more permeability barriers.  
9 Again, probably 90 percent of those are permeability  
10 barriers. But you're also seeing a little more of the  
11 high perm. So you have a couple feet here. And maybe  
12 that's 4 or 5 feet within that 10-foot zone. That  
13 would probably start losing mud weight and having a  
14 little more loss circulation.

15 Q. And you've also indicated here some  
16 additional SHR?

17 A. Yes, solid hydrocarbon residual.

18 And so in aggregate, I know I mentioned  
19 yesterday that between 500 and 700 feet, I see in my  
20 interpretation a significant number of permeability  
21 barriers, but I really hadn't presented a map or a  
22 cross-section or anything else. So I thought it would  
23 be important to again go back to the direct physical  
24 evidence, the actual core data, and kind of  
25 demonstrate what my interpretation is.

1 Q. Now, on that point, you didn't yourself map  
2 anything, but you reviewed Mr. McGuire's exhibits?

3 A. Correct.

4 Q. This is Mr. McGuire's Exhibit B-9, which is  
5 a cross-section that starts on the left from Empire  
6 New Mexico's EMSU 460, and it includes Goodnight's  
7 disposal wells that are existing in the EMSU and goes  
8 over to the EMS 462, which is another water supply  
9 well.

10 If you would, Mr. Knights, I'm going to  
11 ask you -- I'm going to direct your attention to the  
12 EMSU 460 and if you would, let us know what the  
13 approximate distance is of the EMSU 460 from the EMSU  
14 679 well, which is the cored well that we were just  
15 discussing?

16 A. And its approximately 300 feet from the  
17 cored well. And so I think using the measured depth  
18 and the calculations from the core data and placing  
19 those on this cross-section would be in that 4200 to  
20 4300.

21 Q. I'm going to zoom in to that depth so we can  
22 have a better look at it. I'd like for you to just  
23 tell us a little bit about what you're seeing at that  
24 depth and how that relates to the core data that we  
25 just reviewed.

1           A. If you could go back so I get the depths  
2 right on the measured depth, to the core, top and  
3 base. So the base was 43 and the top measured depth  
4 was 4175. So basically 42 to 4350.

5           So if we look at 42 to 4350 on this  
6 interval, it would be that interval there. So in that  
7 interval, I have a significant perm barrier between --  
8 within that interval, that 29 separate perm barriers  
9 in 175 feet of rock.

10           And, again, I didn't do any correlations  
11 or mapping across the field. But if I did, and let's  
12 just assume these are correct, without my QC, but I  
13 would have extended that perm barrier across the  
14 stratigraphic interval across the EMSU and interpret  
15 that had as a perm barrier.

16           Q. Just to be clear, what is the 460 well here?

17           A. The 460 well is a water supply well. And so  
18 you can see where the plug-back and perms are. So  
19 that was one of the wells -- I'm not quite sure, was  
20 it 65 million barrels of water that were withdrawn  
21 from that interval?

22           Q. And that was a well that previous EMSU  
23 operator Chevron drilled, correct?

24           A. Correct.

25           Q. And you reviewed the well file for that

1 well?

2 A. Yes, I did.

3 Q. Is that the top that Chevron picked; do you  
4 know?

5 A. I believe that's the top that Chevron  
6 picked. It's my understanding that Goodnight started  
7 with the Chevron San Andres pick as this pick that  
8 goes across there. And I think they've adjusted it.  
9 But that was the starting point for...

10 Q. Now, yesterday, Mr. Knights, you discussed  
11 generally, as part of your response to your  
12 cross-examination, your interpretation or  
13 understanding of what this influence or how the water  
14 supply wells and the volumes that were produced from  
15 the water supply wells and the volumes that were  
16 injected in the water injection wells that Goodnight  
17 operates that were depicted here influenced  
18 underscored or informed your interpretation of the  
19 perm barriers.

20 If you would, just explain, referencing  
21 this exhibit, how that is and how that supports your  
22 interpretation of these extensive permeability  
23 barriers across the EMSU.

24 A. So I always like to start out with the hard  
25 physical evidence, which is core data. And looking at



1 and reviewing that, I think that's a strong perm  
2 barrier to vertical flow.

3 And then the next data that I think is  
4 most important, again, is the material balance, both  
5 volumes and pressures.

6 And this, the water supply wells, making  
7 69, so 130 million barrels out of this area indicated  
8 a long, extensive reservoir.

9 The four wells in the middle are the  
10 water injection wells. And those are injecting  
11 into -- the simple answer is, they're at the same  
12 depth as the water supply wells, I'd interpret that as  
13 an entire separate reservoir, a single reservoir  
14 across the entire EMSU.

15 And because the flows and the pressures  
16 have very little indications from the withdrawal or  
17 the injections, very limited pressure changes in the  
18 interval, that that is a tremendously large aquifer  
19 that has a huge capacity for both permeability and  
20 fluid volumes to be delivered in it. It also  
21 indicates that it is pressure separated there the  
22 intervals above.

23 MR. WEHMEYER: And I have an objection. I  
24 would move to strike. This is not in any of filed  
25 written testimony.

1           Additionally, yesterday I asked what is  
2 the method for determining your barriers so that we  
3 can have an intelligent and sworn conversation about  
4 it. And it was 7 percent porosity, was the answer.

5           All of the work that he's done overnight  
6 with counsel has not been disclosed as a matter of  
7 basic due process. This was due in writing months  
8 ago. And the explanation of I had overnight to come  
9 up with a new analysis is not sufficient.

10           We object to move that it be stricken on  
11 the basis that it was not disclosed.

12           MR. RANKIN: Mr. Hearing Officer, may I  
13 respond?

14           Mr. Hearing Officer, actually,  
15 Mr. Knights did discuss this analysis yesterday, and  
16 he explained that his interpretation is that because  
17 of the volumes withdrawn and the volumes injected and  
18 the fact that there is no response in the pressures,  
19 that informed his interpretation of the permeability  
20 barriers to being extensive and lateral in length.

21           I simply wanted to be able to clarify  
22 the basis for that, because he was challenged on that  
23 point. And I wanted to be able to show to the  
24 Commission what his basis for that testimony was.

25           MR. WEHMEYER: May I reply briefly?

1 THE HEARING OFFICER: Well, my understanding  
2 is that he was going to defer pressure issues to  
3 somebody else.

4 MR. RANKIN: That's true. And this is not  
5 addressing the pressure. This is addressing his  
6 interpretation of the geology and how that informed  
7 his opinion.

8 MR. WEHMEYER: May I reply briefly.

9 THE HEARING OFFICER: Okay.

10 MR. WEHMEYER: Again, none of this was  
11 disclosed. In fact, the geologist said he didn't do  
12 any geology. And when I gave him all the wells and  
13 said where are the mud losses, no idea; how does this  
14 pressure play into anything, no idea; how do mud  
15 losses have to do with anything, no idea.

16 The explanation of I took overnight to  
17 work with the lawyer is not sufficient. This is  
18 absolutely ambush. We've not had a due process  
19 opportunity to prepare or examine among this. This  
20 was do months ago if he wanted to do the work.

21 Additionally, with respect to the  
22 mapping, there's been no foundation for the --  
23 somebody put colored markers across a poster board  
24 and called it a perm barrier. This is not science.

25 MR. RANKIN: Mr. Hearing Examiner, what

1 Mr. Wehmeyer is saying is just not true.  
2 Mr. Knights, and I'm showing my screen here, is his  
3 direct testimony addressed mud loses in his direct  
4 testimony. Okay? He did address this issue, and  
5 it's important for him to be able to explain the  
6 basis of his opinion.

7 He was challenged on it. Mr. Wehmeyer  
8 was focusing on the porosity and other items.  
9 Mr. Knights did testify about his interpretation of  
10 the importance of understanding the effect of the  
11 large volumes of water withdrawn and the large  
12 volumes of water injected as a basis of his  
13 understanding and interpretation that there are  
14 extensive laterally permeability barriers.

15 So, Mr. Wehmeyer, it is not the case  
16 that this is ambush. He testified about it  
17 yesterday. And I'm simply trying to redirect to  
18 clarify the basis for his opinion. And that's  
19 exactly what he's giving us today.

20 HEARING OFFICER HARWOOD: It looks like your  
21 microphones are not working. Only mine is working.  
22 That's pretty insignificant. I can pass this around,  
23 I guess.

24 All right. Well, you can come up here  
25 and speak into this microphone. You can use this one

1 so we can continue so you can answer the question.

2 MR. RANKIN: Mr. Hearing Officer, previously  
3 counsel for Empire argued strenuously that in their  
4 opinion, because of the obligations of the commission  
5 to confirm that there is no waste and to protect  
6 correlative rights, it's important for the Commission  
7 the hear all relevant evidence.

8 This is not an ambush. This is all  
9 evidence that was discussed in Mr. Knights'  
10 testimony. He stated that he relied on the -- he  
11 reviewed the testimony of Mr. McGuire and relied on  
12 the exhibits by Mr. McGuire. He testified in his  
13 direct testimony that he was pointing out loss  
14 circulation.

15 And yesterday during cross-examination  
16 he testified that the extensive volumes, massive  
17 volumes of water that were withdrawn from the  
18 disposal zones and injected into the disposal zone  
19 informed his opinion about the lateral extent of  
20 these permeability barriers.

21 I understand that Mr. Wehmeyer doesn't  
22 want the Commission to hear what Mr. Knights has to  
23 say, but I think it is absolutely within the scope of  
24 the cross and the redirect. And I can ask that the  
25 Commission allow me to proceed.

1 HEARING OFFICER HARWOOD: Okay. I guess  
2 what I'm inclined to -- so what I'm inclined to do is  
3 give Mr. Davidson, like, 15 minutes of recross,  
4 limited to these exhibits, okay, these two exhibits  
5 that we've seen so far. And if there are any other  
6 new ones, you'd be able to do that.

7 I hate to open that door, and I don't  
8 mean that would be limited to Empire and not OCD,  
9 Rice or Pilot. You'd have to carry the ball for  
10 everybody. Would that be satisfactory?

11 With that said, you know, there's only  
12 limited merit to your objection. I think we've heard  
13 a lot of this before.

14 And I just would caution you, we don't  
15 need to hear this stuff again. I have in my notes  
16 from yesterday, as well as just now, the Lower  
17 San Andres. I know that wasn't Mr. Knights words,  
18 but that area, he said is an entire separate  
19 EMSU-side vast water reservoir. That is not the  
20 first time we've heard that.

21 Go ahead, Mr. Rankin.

22 I guess let's take a 10-minute break and  
23 figure out the what the technical issue is. Let's  
24 come back at 9:45.

25 (Recess held from 9:36 to 9:46 a.m.)

1 HEARING OFFICER HARWOOD: And your mic is  
2 working, Mr. Rankin?

3 MR. RANKIN: It is, Mr. Hearing Officer.

4 THE HEARING OFFICER: It looks like we're  
5 down to one dysfunctional monitor. Everything else  
6 seems to be working. So while it is, let's proceed.

7 Over the break, I did confer with  
8 Commission members, so I'm inclined to sustain  
9 Mr. Wehmeyer's objection there. There is new  
10 material beyond my technical ability to understand,  
11 but not the Commission's.

12 So to the extent that there's new  
13 material presented this morning -- and that's not to  
14 disadvantage you, Mr. Rankin. You know, if there's  
15 new material, I'm going to give Mr. Wehmeyer, an  
16 opportunity for recross on that new material and the  
17 Commission may have additional questions. Okay?

18 So to the extent that you opened the  
19 door to this new stuff, and in fairness to you, some  
20 of the questions from the Commission have opened the  
21 door to some of this new stuff, but it's going to be  
22 fully explored. Okay?

23 MR. RANKIN: Mr. Hearing Officer, I have no  
24 objection to additional recross of Mr. Knights.

25 HEARING OFFICER HARWOOD: It's already clear

1 at this point that we're going to probably be going  
2 into May. That's almost a foregone conclusion. So  
3 that being the case, you know, time this week is not  
4 necessarily a finite constraint.

5 MR. RANKIN: Mr. Hearing Officer, just so  
6 I'm clear on the ruling, your ruling is that you're  
7 sustaining Mr. Wehmeyer's objections to this  
8 additional redirect testimony; is that correct?

9 HEARING OFFICER HARWOOD: What I'm saying is  
10 there's merit to it, and we're going to solve it by  
11 not prohibiting you from continuing. But the stuff  
12 that you opened the door to will be fodder for  
13 cross-examination and further examination by the  
14 Commission, as well as OCD, Pilot and Rice.  
15 Although, you know, hopefully everybody else's cross  
16 and questions will cover your interests.

17 MR. RANKIN: And just to be clear, you're  
18 not striking Mr. Knights' testimony?

19 HEARING OFFICER HARWOOD: No, not striking  
20 it.

21 Your microphone is off again. It looks  
22 like everybody's microphone except mine is also off  
23 again. Nothing we can do about technical gremlins.  
24 Let's go off the record for five minutes and see what  
25 we can do.



1 (Pause in the proceedings.)

2 HEARING OFFICER HARWOOD: It looks like our  
3 microphones are working again. I can't remember the  
4 name of the witness, Empire's witness that spoke so  
5 fast, but I encourage the rest of you to emulate him  
6 while the microphones are working.

7 Go ahead, Mr. Rankin.

8 MR. RANKIN: Thank you, Mr. Hearing Officer.  
9 I appreciate it.

10 Before I move off this topic, I would  
11 like to move the admission of what I'll mark as  
12 Goodnight Exhibit 1, which is Mr. -- I'm going to  
13 mark this as Exhibit E-2, which is would be attached  
14 to Mr. Knights' direct testimony. And based on his  
15 testimony, in support of it, Mr. Hearing Officer.

16 HEARING OFFICER HARWOOD: Subject to my  
17 ruling, Empire, any objection?

18 MR. WEHMEYER: Is what he's saying is E-2 --  
19 what is it, I guess, if I could inquire?

20 MR. RANKIN: If I may respond, Mr. Hearing  
21 Officer. It would be this six-page document that is  
22 excerpts from Dr. Lindsay's core report. It's got  
23 Bates labels from discovery provided to us by Empire.

24 HEARING OFFICER HARWOOD: Is this what we're  
25 seeing on the screen, EMSU 679 vertical perm barrier?

1 MR. RANKIN: Correct. Thank you,  
2 Mr. Hearing Officer. Yes.

3 MR. WEHMEYER: There's been no modifications  
4 to what was provided previously.

5 THE HEARING OFFICER: My understanding is  
6 the witness added the blue columns.

7 MR. WEHMEYER: Was that last night?

8 HEARING OFFICER HARWOOD: I'm guessing it  
9 was.

10 MR. RANKIN: It was last night.

11 MR. WEHMEYER: Then I absolutely have and --  
12 we do not have brand-new -- with this whole case  
13 about perm barriers, we don't have new perm barriers  
14 that come in at 11:30 at night working with counsel.  
15 This is brand-new science work. We haven't had an  
16 opportunity to rebut it. We object strenuously.

17 HEARING OFFICER HARWOOD: I'm not going to  
18 admit it at this time. We'll see what happens after  
19 cross-examination. You can renew your request at  
20 that time.

21 MR. WEHMEYER: Very well.

22 BY MR. RANKIN:

23 Q. Now, Mr. Knights, I'm going to move on to  
24 another demonstrative that was helpfully presented to  
25 the Commission yesterday by Empire. I'm going to put

1 it on my screen so you can see it better that you  
2 could see it yesterday on the chart that they put up  
3 by your seat. And you just tell me if you need me to  
4 zoom out of zoom in.

5 But this is a demonstrative that was  
6 presented by Empire yesterday as part of your  
7 cross-examination. Do you recall?

8 A. Yes, I do.

9 Q. You hadn't seen this demonstrative exhibit  
10 before yesterday, correct?

11 A. Correct.

12 Q. And were you able to read it from where you  
13 were sitting yesterday?

14 A. No, I couldn't.

15 Q. Could you identify what the wells were?

16 A. Not really, no.

17 Q. Were you able to identify what the different  
18 lines were on the exhibit when you were being asked  
19 about them?

20 A. Well, they were described, but not labeled  
21 well enough that I felt confident about them.

22 Q. Since yesterday, did you have a chance to  
23 review the exhibit that was presented by Empire  
24 yesterday in your cross-examination?

25 A. Yes, I was.

1 Q. So at the time you didn't know -- you still  
2 don't know who created this, do you?

3 A. No.

4 Q. Or exactly what data they used to create it?

5 A. No, I do not.

6 Q. And you didn't have an opportunity at the  
7 time to determine whether it was accurate or not,  
8 correct?

9 A. Correct.

10 Q. I'm just going to ask you what your  
11 understanding is, as you sit here today, of what these  
12 different lines are.

13 So first of all, Mr. Knights, as you  
14 understand it, at the top here is map. What does that  
15 map show?

16 A. It shows the cross-section that goes across  
17 the EMSU from the northwest to the east and south,  
18 Southeast.

19 Q. Okay. And then how does that -- what's your  
20 understanding of what that cross-section map -- how  
21 does that relate to what's below on this exhibit?

22 A. I would say that that's the cross-section  
23 line, so it shows that those wells are a cross-section  
24 going across the entire EMSU.

25 Q. It's hard to see them. But if you'll zoom

1 in on this digital version, you can make out the well  
2 names and the API numbers, correct?

3 A. Correct.

4 Q. So a number of these are EMSU wells and then  
5 some of them are saltwater disposal wells, correct?

6 A. Correct.

7 Q. And many of these are actually Goodnight's  
8 wells, as I go across the cross-section, correct?

9 A. Correct.

10 Q. Mr. Knights, based on cross-examination from  
11 Mr. Wehmeyer, if you could, just tell us what you  
12 understand this blue line to be that goes across the  
13 cross-section here from left to right.

14 A. My understanding is that that's Goodnight's  
15 top of their San Andres.

16 Q. And since yesterday you haven't gone through  
17 to confirm yourself whether those are accurate or not,  
18 correct?

19 A. No, I have not.

20 Q. But your assumption is that those accurately  
21 reflect the picks that Goodnight has presented to  
22 Empire in the course of discovery in this case,  
23 correct?

24 A. I would assume so.

25 Q. Now, what's your understanding of what this

1 fuchsia or purple line is that I'm indicating with my  
2 cursor here?

3 A. I believe that indicates a loss circulation  
4 zone.

5 Q. And what's your understanding of where the  
6 information would have -- may have come from that  
7 Empire -- or whoever created this chart used to  
8 indicate those depths?

9 A. I'm not sure of the source, but when I  
10 reviewed it, I used the daily drilling reports.

11 Q. And you had reviewed the daily drilling  
12 reports that were provided by Goodnight in discovery;  
13 is that correct?

14 A. Correct.

15 Q. Now, I want to ask you, how do you relate  
16 this cross-section that Empire, as I mentioned,  
17 helpfully created showing a map across the entire EMSU  
18 showing a loss circulation interval, while operators  
19 drilled down into the San Andres that they encountered  
20 across the entire EMSU field, how do you relate that  
21 to the core data that we just reviewed?

22 A. Well, again, I think the core data shows  
23 that there's some very high permeability intervals  
24 that would be indicative of loss circulation. Some of  
25 those zones were very thin, so there might be minor

1 losses in fluids. But if they were thicker, they  
2 could have significant lose of fluid.

3 Q. Just looking at this, one thing, what's your  
4 main takeaway, just looking at this cross-section and  
5 looking at each of these wells across the entire  
6 field? What's your main take away about the loss  
7 circulation that we're seeing here?

8 A. The main takeaway is that the loss  
9 circulation is below the Goodnight structure top. And  
10 I believe the red is -- is that Empire's top of  
11 San Andres?

12 Q. Is that your understanding, that the red is  
13 Empire's pick for the top of the San Andres?

14 A. I think, but I really can't read it.

15 Q. Now, you have reviewed the drilling reports  
16 for many of these wells, correct?

17 A. Yes. Well, all the Goodnight ones. There's  
18 some on there I haven't reviewed.

19 Q. And yesterday during our testimony, you  
20 specifically called out the Andre Dawson, that you had  
21 recollected the drilling report from the Andre Dawson;  
22 do you recall that testimony?

23 A. Correct.

24 Q. Now, you just stated that the loss  
25 circulation was below the pick for Goodnight's pick

1 for the top of the San Andres, right?

2 A. Can you repeat that question.

3 Q. You stated that the loss circulation  
4 identified on this cross-section was below Goodnight's  
5 pick for the top of the San Andres, correct?

6 A. In most of the wells, but not in the Dawson  
7 on this.

8 Q. Now, you mentioned yesterday that you  
9 familiar with the Dawson drilling report; do you  
10 recall that?

11 A. Yes.

12 Q. And you stated, as I recall, and you can  
13 clarify, that there was some minor loss circulation  
14 high, and then deeper in the zone, there was more  
15 substantial loss circulation deeper down; do you  
16 recall that?

17 A. Yes.

18 Q. In particular location where Empire, whoever  
19 created this, we don't know, puts a loss circulation  
20 at approximately what depth would you say that is?

21 A. About 4050, maybe 4010.

22 Q. So now, Mr. McGuire did include in his  
23 testimony, this Exhibit B-20, the drilling report --  
24 part of the drilling report for the Andre Dawson. Is  
25 this the Andre Dawson or part of the Andre Dawson



1 drilling report that you reviewed previously?

2 A. Correct.

3 Q. This is Exhibit B-20, Goodnight's  
4 Exhibit B-20?

5 Now, if you look at the first page on  
6 this exhibit, Mr. Knights, just explain to us what  
7 we're seeing here as we go down -- what is the  
8 drilling report saying beginning with this portion  
9 here that I'm highlighting in yellow?

10 A. That's a drilling report that says there's  
11 minor seepage noticed at 4,000 in the beginning, added  
12 magma fiber to control.

13 Q. If you would, relate that statement on the  
14 drilling report to what you testified about when you  
15 were reviewing the core report.

16 A. Well, the minor seepage would be maybe be  
17 one of those high perm streaks that's very thin, maybe  
18 1 foot or so.

19 Q. That 4,000 feet, if I go back to the  
20 demonstrative from Empire, 4,000 feet is about the  
21 depth that I'm highlighting -- I'm marking here with  
22 my cursor, right?

23 A. Correct.

24 Q. And that's well above what the loss  
25 circulation zone is indicated on this cross-section,

1 right?

2 A. Yes. Significantly above it.

3 Q. So now let's go back to the drilling report  
4 on B-20. What is the next entry here that addresses  
5 any loss circulation?

6 A. That is 4295, and that is 22 barrels per  
7 hour. A decent -- decent or bad loss, but not  
8 tremendously significant. I don't think that would  
9 impede drilling.

10 Q. Let me go back to the demonstrative here and  
11 I'm going to look again at the Andre Dawson well. I'm  
12 going to go back down. Where would you place 4295 on  
13 this interval?

14 A. It would be right on top of the red and the  
15 blue. So I think that would be Empire's top of the  
16 San Andres and Goodnight's top of the San Andres.

17 Q. Do you see any indication or have you  
18 identified any indication in the drilling reports of  
19 any loss circulation that would correspond to what's  
20 marked on Empire's demonstrative here?

21 A. No, I do not.

22 Q. Just so I'm clear and the Commission is  
23 clear and not mislead, is there anything that you --  
24 did you go back and look at the mud logs to determine  
25 whether there's any loss circulation reflected in the

1 mud log that corresponds with the depths identified by  
2 Empire in this cross --

3 A. Yes, I did. And I didn't see anything at  
4 that depth.

5 Q. Now, you talked about the fact that there  
6 are additional zones where there are more substantial  
7 loss circulation yesterday in your testimony.

8 If I go to the next page of this, how  
9 does that jibe with what you testified yesterday? And  
10 how does that relate to your understanding?

11 A. This statement at 4562, they were drilling  
12 dry, so they lost total returns. And my  
13 interpretation of that is, it's a large perm barrier  
14 or loss circulation zone with high permeability that's  
15 much thicker than those 1- or 2-foot zones.

16 And that is -- since that is relatively  
17 consistent deeper in this Lower San Andres, that I  
18 think that's another big data point for the potential  
19 of karsting, large karsting, in the Lower San Andres.

20 Q. Now, last page here, Mr. McGuire's  
21 Exhibit B-20, again, what do we see here and how does  
22 that relate to your interpretation?

23 A. Let's see. Drilled 12 -- vertical hole, 740  
24 to 5760 and weight on bit and drilling dry.

25 So as they were drilling to 5760, they

1 couldn't keep fluid in the hole. The entire mud  
2 column just went out into the reservoir.

3 Q. Are there any other wells that you recall  
4 that also exhibited substantial loss circulations that  
5 you'd like to comment on?

6 A. I guess back on the Dawson, could you put  
7 your cursor at that 445, where that first loss  
8 circulation is.

9 Q. 4295; is that right?

10 A. That was the first one, but the second one  
11 was I believe at 45 -- right about there. Because the  
12 other thing I noticed on the cross-section is that  
13 most of these major loss circulation zones were  
14 similar depth below the perm barrier. And that's  
15 another indication that across the EMSU, you have a  
16 similar reservoir quality at that -- below the top of  
17 Goodnight's San Andres pick.

18 I think the other well that was familiar  
19 with was the Ryno.

20 Q. Okay.

21 A. And I remembered that I had multiple loss  
22 circulation zones. The first one I think being  
23 approximately where they have it marked. And then I  
24 think at 4560, I believe, they lost total returns.  
25 And I think it's right about where their black line

1 is, which I -- if I can believe correctly, that was  
2 Ops' top of Lower San Andres. But there were a number  
3 of multiple -- again, identifying that kind of quality  
4 of reservoir below the Goodnight top and actually Ops'  
5 top of the San Andres, as well. .

6 I think that's unique situation, where  
7 we have with two people picking the same top for  
8 San Andres.

9 Q. Now, I want to come back to another concept  
10 that you were crossed on yesterday by Mr. Wehmeyer.  
11 And if you recall in your cross-examination by  
12 Mr. Wehmeyer, do you recall him asking you or he  
13 referred to baffles and sometimes to barriers when he  
14 was examining? Do you recall that?

15 A. Yes, I do.

16 Q. What's your understanding, according to  
17 Mr. Wehmeyer's definitions, of the difference between  
18 those two terms?

19 A. Well, it's my understanding that  
20 Mr. Wehmeyer defines baffles as limited aerial extent  
21 perm barriers.

22 And my perm barriers are, I think, an  
23 aggregate of perm barriers or baffles I would consider  
24 perm barriers to vertical flow. So any one of those  
25 little low permeability intervals on a core thing

1 would be maybe considered a baffle or a perm barrier,  
2 depending on your definition. But in aggregate, I  
3 think those are a strong vertical permeability  
4 barrier, especially when you have an interval of 100  
5 feet and 50 percent of the rock is low perm.

6 Q. So if you would, Mr. Knights, just explain,  
7 just for clarity for the record, is it still your  
8 opinion that there are effective barriers, lateral  
9 extensive barriers, in the aggregate, across the  
10 interval in the EMSU from minus 500 subsea to minus  
11 700 subsea?

12 A. Yes. That's my testimony.

13 Q. And now just going back again to Empire's  
14 demonstrative exhibit, just please explain how loss  
15 circulation that is depicted here and on this  
16 demonstrative exhibit supports your conclusion.

17 A. Well, the loss circulation, especially when  
18 you consider the multiple loss circulations and the  
19 full column loss circulations at approximately a  
20 similar depth below Ops San Andres top and the  
21 Goodnight San Andres top would indicate that is  
22 another indication of a somewhat uniform reservoir and  
23 continuity across the entire EMSU.

24 Q. Now, I'm going to pull up your direct  
25 testimony, and is this exhibit -- it's Figure 13 from

1 your revised direct testimony. Does this exhibit here  
2 support, corroborate what we just reviewed as to the  
3 loss circulation and Empire's demonstrative exhibit?

4 A. The perm barrier there is approximately the  
5 same depth as the perm barriers that were in the cored  
6 interval, and if you extrapolate Preston's tops across  
7 the EMSU.

8 Q. And you undertook some of this mapping  
9 previously in your direct testimony and represented in  
10 Figure 14, correct?

11 A. Well, mapping -- they're basically points on  
12 a map and a cross-section. I didn't create contoured  
13 maps, but depending on how you define a map.

14 Q. Does this network of barriers that you're  
15 discussing also match up with the -- one moment.

16 Looking at Dr. Davidson's slides from  
17 his summary testimony, Slide Number 17, titled "Cross  
18 Section Showing Interval of Bedded Anhydrites," does  
19 this network of barriers that we were just discussing  
20 also match up with the bedded anhydrites that  
21 Dr. Davidson identified in his log interpretation  
22 analysis in his Slide 17 that go from the northwest to  
23 the southeast across the EMSU?

24 A. Yes. Those are approximately the same depth  
25 intervals across the EMSU.

1 MR. RANKIN: Mr. Hearing Officer, at this  
2 time, I would move the admission of Goodnight E-2,  
3 this Slide 17 from Dr. Davidson's summary testimony.

4 HEARING OFFICER HARWOOD: That's not -- I  
5 thought all these slides were already in the record.

6 MR. RANKIN: They were demonstratives. We  
7 didn't move them into admission. I just want to make  
8 sure that this slide, in particular, is moved into  
9 admission. I'll be happy to have the whole thing  
10 moved into admission or have it be part of the  
11 record.

12 HEARING OFFICER HARWOOD: Any objection from  
13 Empire.

14 MR. WEHMEYER: If this was not appended to  
15 the sworn testimony when we received the direct  
16 testimony with exhibits and evidence, absolutely I  
17 object. There's been no fountain laid for its  
18 accuracy. This witness didn't create it. We oppose  
19 admission.

20 HEARING OFFICER HARWOOD: Was it?

21 MR. RANKIN: It was not part of  
22 Mr. Davidson's written testimony. It was presented  
23 as part of his summary testimony. Mr. Davidson did  
24 testify to it. He presented it as part of his  
25 summary testimony. And I would ask that the Hearing



1 Officer accept it into the record. Mr. Knights also  
2 testified object it and I believe it should be part  
3 of the record.

4 HEARING OFFICER HARWOOD: Well, if it's a  
5 different witness that testified about this, at least  
6 until now -- why don't you start making a list of  
7 these additional exhibits that you'd like moved into  
8 evidence and I'll reserve ruling until after there's  
9 been further cross-examination and questions from the  
10 witness.

11 MR. RANKIN: Thank you, Mr. Hearing Officer.

12 BY MR. RANKIN:

13 Q. Does your testimony and your analysis,  
14 Mr. Knights, also match up with the testimony of  
15 Mr. McBeath, where he identified in the lower portion  
16 of the Grayburg, substantial vertical permeability  
17 barriers in the EMSU 211 RFT data set provided by  
18 Empire?

19 A. Yes, it does.

20 Q. Can you explain how that's the case?

21 A. The variation in pressures that don't  
22 conform to a single pressure gradient indicate that  
23 these individual layers are isolated, pressure  
24 isolated. And some of these zones are only 10 feet  
25 apart, so that means a perm barrier that's going to

1 support pressure can be relatively thin.

2 Q. If you would, Mr. Knights, just explain how  
3 these pressure differentials in the Lower Grayburg  
4 help sustain some of these loss circulation events in  
5 the Lower San Andres?

6 A. I'm not sure. Can you --

7 Q. Well, I mean, these are in the Lower  
8 Grayburg.

9 A. Yes.

10 Q. If could you just put them into context.  
11 How is it that these substantial pressure  
12 differentials in the Lower Grayburg would help explain  
13 some of these loss circulation -- this loss  
14 circulation zone in the San Andres?

15 A. I think the individual perm barriers in the  
16 Grayburg, in the Lower Grayburg, and then the  
17 significant ones in the core analysis in the 679 well  
18 indicate that even in between, there's significant  
19 other perm barriers or baffles that are throughout the  
20 entire section that would inhibit vertical flow.

21 I think the other thing that would  
22 relate is that these high perm streaks, where you lose  
23 circulation, could have dramatically different  
24 pressures gradients from those above.

25 Q. Now, I'm going to move off of these to a

1 different topic, Mr. Knights, that you addressed on  
2 your cross-examination.

3 Do you recall Mr. Wehmeyer asking you,  
4 cross-examining you on this Slide Number 14 in your  
5 cross-examination?

6 A. Yes, I do.

7 Q. Do you recall him asking you about whether  
8 the 1939 report that you relied on for your analysis  
9 had an reference to edge water encroaching from the  
10 east?

11 A. Yes, I do.

12 Q. And do you recall what your testimony was at  
13 the time?

14 A. I believe at the time that those arrows,  
15 they were my interpretation from the map, which is  
16 accurate. But I think after reviewing, I also went  
17 back and looked at the paper. And I may have got that  
18 implication from the actual write-up.

19 Q. So I'm presenting here what was previously  
20 marked at Goodnight Midstream Cross Exhibit Number 18.  
21 Is this the report that we were discussing, the 1939  
22 report?

23 A. Yes, it is.

24 Q. Okay. And I think it's starting on Page 12  
25 of that report. Is that where the study addresses

1 edge water encroachment?

2 A. It is.

3 Q. And when I scroll through, at the bottom of  
4 Page 12, I'll go ahead and read this into the record.

5 "Water was produced first in the southwest part of  
6 Eunice field, probably because that part was drilled  
7 first." Did I read that sentence correctly?

8 A. Correct.

9 Q. Then it goes on to say, "Water is  
10 encroaching on the," and then I'll need to scroll down  
11 a couple pages to get to the next part of that  
12 sentence, "west, southwest, and southeast edges of the  
13 field, but the water drive appears to be most active  
14 on the southwest." Did I read that correctly?

15 A. Correct.

16 Q. So that sentence is addressing that there is  
17 edge water encroachment on the southeast, correct?

18 A. Correct.

19 Q. Now the next sentence in the paragraph goes  
20 on to say, "It will be noted in figure 10 that water  
21 is being produced from a large part of the  
22 structurally low portion of zone A." Now, that  
23 doesn't address edge water coming in from the east,  
24 correct?

25 A. Correct.

1 Q. The next sentence goes on to say, "Water is  
2 encroaching from the southeast and only recently has  
3 made its appearance in the northeastern of the zone."  
4 Did I read that correctly?

5 A. Right.

6 Q. So here now, it's talking about water  
7 encroachment from the edge water on the northeast,  
8 correct?

9 A. Correct.

10 Q. Now, the next paragraph goes on to say, "On  
11 the west water encroachment is active in zone B but is  
12 irregular in zone C." Now, that, obviously, doesn't  
13 relate to encroachment on the east, correct?

14 A. Correct.

15 Q. It goes on to say -- and I'll skip over this  
16 middle sentence here, but in the last sentence of that  
17 paragraph it says, "On the east side of the field,  
18 water has encroached irregularly in zones B and C."  
19 Did I read that correctly?

20 A. Correct.

21 Q. So I'll go back to your summary slide, which  
22 is from Figure 6 in your rebuttal testimony, correct?

23 A. Correct.

24 Q. Just explain again, if you would, how that  
25 report and the description of the edge water that was

1 identified in 1939 explains, in your opinion, the  
2 water production that has been observed through the  
3 course of history and the EMSU and the Grayburg.

4 A. So the Grayburg -- again, this paper in  
5 1939, these lines and hatched lines are actual  
6 encroachment that happened between 1934, '35, '36 and  
7 '37. And as you can see on the map, it encroaches  
8 from basically all sides, some of them very close to  
9 that EMSU 239 well that is the one well that had  
10 really high water after it was drilled into the  
11 San Andres and completed in 1973.

12 So it could have -- the high water could  
13 be, number one, from the edge water from the north,  
14 but also from the deepening into the San Andres. It  
15 actually penetrated through the negative 3050  
16 producing oil-water contact of the original oil-water  
17 contact and into the top of the San Andres.

18 So it seems to me, the logical source of  
19 water in that well is, number one, edge water, would  
20 be my first geologic assumption. And then second  
21 would be the deepening of the well into the San Andres  
22 on the top of the structure in 1973.

23 Prior to I think it was 1970, that well  
24 had made only 35,000 barrels of water. Once it was  
25 deepened between '73 and I believe it was '81, when

1 the map was made, that is where all the water was  
2 produced in that well. So it's, in my opinion, caused  
3 by the deepening of the well into the top of the  
4 San Andres that brought that high water volume into  
5 that well.

6 Q. Now, Mr. Knights, again, you've been not  
7 wanting to talk about tops, you're referring here to  
8 the San Andres. I'm just going to kind of scroll down  
9 to another one of your exhibits and I want you to  
10 explain, when you say San Andres, what it is you're --

11 A. It's not my San Andres.

12 Q. So here is a good one, I think. So if you  
13 would, just maybe referring to this exhibit, when you  
14 talk about the San Andres here, whose San Andres are  
15 you talking about?

16 A. In this one, it's the NuTech top that has  
17 the top of the San Andres 1 foot below the producing  
18 oil-water contact. So any well penetrating the  
19 producing oil-water contact, at least in this area,  
20 would be penetrating into the San Andres aquifer.

21 And I would say the San Andres, this is  
22 Upper San Andres. So I still believe there's three  
23 distinct units in the San Andres: the Upper  
24 San Andres; the perm barrier; and then the Lower  
25 San Andres.

1 Q. And just for purposes of record  
2 clarification, this figure from your summary slide is  
3 Figure 4 in your rebuttal testimony, correct?

4 A. Correct.

5 Q. Very good. Do you recall your testimony  
6 when cross-examined yesterday where Mr. Wehmeyer asked  
7 you questions about Ops Geologic's determination that  
8 some of their highest oil saturations are in the  
9 lowest porosity rock?

10 A. Correct.

11 Q. Do you recall him asking you how you would  
12 get the oil into that type porosity if the San Andres  
13 were just migratory pathways?

14 A. Yes.

15 Q. Mr. Knights, are you convinced that much of  
16 that oil in Ops Geologic's analysis is actually oil?

17 A. I'm not convinced. I think because the  
18 saturations were so high in the intervals where we had  
19 core data, that if they're overall optimistic on their  
20 oil saturation in where we had core data, in areas  
21 that don't have core data and they have high oil  
22 saturation, I'm -- I could be skeptical.

23 Q. Would you mind clarifying your position for  
24 the Commission?

25 A. Well, the very low porosities, if you reduce



1 the porosity by a small portion, you could eliminate  
2 the oil saturation at interval.

3 Q. Do you recall yesterday, Mr. Knights,  
4 cross-examination from Mr. Wehmeyer asking you about  
5 whether you relied on Dr. Davidson for picking any of  
6 your formation tops?

7 A. I did not pick any formation tops, and  
8 Mr. Davidson did not give me any formation tops.

9 Q. Did you, in fact, rely on Dr. Davidson for  
10 any tops of any kind in your analysis?

11 A. No.

12 Q. Is it your understanding that Dr. Davidson  
13 even used any tops in his petrophysical analysis at  
14 all?

15 A. No. I know he did not.

16 Q. Now, his logs, his interpretive logs, did  
17 include an indication of where Goodnight's top of  
18 San Andres is located, correct?

19 A. Yes.

20 Q. But just to be clear, it's your  
21 understanding he did not use or rely on those in his  
22 interpretation or analysis, correct?

23 A. Correct.

24 Q. I want to talk a little bit about  
25 sensitivity analyses. Do you recall yesterday

1 Mr. Wehmeyer cross-examining you extensively over what  
2 sensitivities NSAI undertook to test its analysis?

3 A. Yes.

4 Q. And do you recall during your testimony that  
5 you did identify that Dr. Davidson's analysis included  
6 a distribution between plus or minus 10 percent? Do  
7 you recall that?

8 A. Yes.

9 Q. In fact, that plus or minus 10 percent was  
10 based -- you tell me. What is your understanding of  
11 what that plus or minus 10 percent was based on from  
12 Dr. Davidson's testimony?

13 A. It was based on reasonable estimates of the  
14 pressure differentials that could be used in his  
15 B sub o.

16 Q. And that related to his core corrections,  
17 correct?

18 A. Yes.

19 Q. So if the Commission were looking for a high  
20 estimate of NSAI's petrophysical analysis, they would  
21 add 10 percent to Dr. Davidson's analysis, correct?

22 MR. WEHMEYER: Objection. One, this is not  
23 his analysis, so it's not relevant. Secondly, we  
24 visited extensively yesterday about any sensitivity  
25 analysis he could share with the Commission. The

1 fact that he's either slept and dreamt it overnight,  
2 which is one of his methods he has testified to, to  
3 Mr. Rankin supplied it to him, does not allow him to  
4 come today with a new sensitivity analysis after I  
5 spent 30 minutes trying to get him to tell me about  
6 if had done one.

7 So this is absolutely new. He's not the  
8 witness to do it with. That's the objection.

9 MR. RANKIN: Mr. Hearing Officer, if I may  
10 respond.

11 HEARING OFFICER HARWOOD: Please.

12 MR. RANKIN: Mr. Knights testified that  
13 there were sensitivities included in NSAI's analysis  
14 from Dr. Davidson's 10 percent. And I'm just  
15 clarifying what that's based on, because the record  
16 wasn't clear during cross-examination yesterday. I  
17 want to make sure it's clear for the record.

18 HEARING OFFICER HARWOOD: I'll allow the  
19 question and you can make note of it Mr. Wehmeyer and  
20 go there again if you would like to.

21 BY MR. RANKIN:

22 Q. So, Mr. Knights, so basically, if the  
23 Commission wanted to understand the high side of  
24 NSAI's petrophysical analysis, they would add  
25 10 percent to Dr. Davidson's petrophysical analysis,

1 correct?

2 A. Correct.

3 Q. And if they want to understand NSAI's low  
4 side, based on Dr. Davidson's analysis, they would  
5 subtract 10 percent from his analysis, correct?

6 A. Correct.

7 Q. Yesterday do you recall being asking by  
8 Mr. Wehmeyer if you're aware of any other units that  
9 allow commercial SWDs, or saltwater disposals wells,  
10 to inject within a unitized interval?

11 A. I do.

12 Q. Now, as part of your analysis, Mr. Knights,  
13 you study the history of water production, injection,  
14 oil production in and around the EMSU as part of your  
15 analysis, correct?

16 A. Correct.

17 Q. Did you identify any commercial saltwater  
18 disposal wells that were disposing of produced water  
19 in the San Andres in the acreage that would later  
20 become the EMSU as part of your analysis?

21 A. Prior to the formation of the unit, yes.

22 Q. And Goodnight's Exhibit B-47, I'm going to  
23 just pull that up. This is Mr. McGuire's exhibit. Is  
24 the well that I've highlighted here where drilling had  
25 commenced injection in 1966; is that the one you're

1 talking about?

2 A. Correct.

3 Q. Okay. What year was the EMSU created, do  
4 you recall?

5 A. 1986, '83, '86.

6 Q. And the unitization of the EMSU included the  
7 San Andres interval, which would have included the  
8 zone in which this well had been injecting for nearly  
9 20 years, correct?

10 A. Correct.

11 Q. And are you aware of any statutory  
12 waterflood unit or any unit that was formed around and  
13 included disposal operations from an existing  
14 commercial disposal well?

15 A. No, I'm not.

16 Q. Are you aware of why anyone would possibly  
17 do that?

18 A. Well, yes. I know why.

19 Q. Why would a unit operator seek to include an  
20 existing commercial saltwater disposal well within  
21 their unitized interval?

22 A. Well, in the process of unitizing, companies  
23 try to include all the water source and water  
24 injection ability so they can have a complete economic  
25 system. So from a water disposal and water source,

1 they would want to include that in their interval.  
2 But not as a producing interval.

3 Q. Now, you heard testimony from Mr. West. You  
4 were present for the testimony of Empire's witnesses,  
5 correct?

6 A. Correct.

7 Q. Did you hear testimony from Mr. West and  
8 Mr. Wheeler that there was no hydrocarbon production  
9 from the San Andres at the time the EMSU was created  
10 in 1986?

11 A. Yes.

12 Q. And you're familiar with the unitization  
13 documents stating that the San Andres was being  
14 included as a source of water supply?

15 A. Yes.

16 Q. Mr. Knights, Goodnight Exhibit B-7, is this  
17 part of the unitization documents that you reviewed as  
18 part of your work on this case?

19 A. Correct.

20 Q. And if I scroll down on that exhibit, is  
21 this what you're referring to as you understand the  
22 reason that the operator who sought to create the EMSU  
23 included the San Andres as part of the unit?

24 MR. WEHMEYER: Objection. Speculation.

25 MR. RANKIN: I'm asking what his

1 understanding is.

2 MR. WEHMEYER: Speculation. This is a  
3 matter of public record. In terms of what the  
4 Commission acted on, why, on what basis, it's rank  
5 speculation from a witness with no knowledge. And  
6 this is certainly not expert.

7 HEARING OFFICER HARWOOD: Overruled.

8 BY MR. RANKIN:

9 Q. Mr. Knights, if you would just read for me  
10 the sentence that I've highlighted here, and explain  
11 to me how this informs your understanding of why the  
12 San Andres was included in the unitization of the  
13 EMSU?

14 A. It was included, you know, basically as a  
15 water source and a water disposal interval to make it  
16 an economic unit, not necessarily for the hydrocarbon  
17 production.

18 Q. What this sentence says, "The bottom of the  
19 interval must be the base of the San Andres formations  
20 to include the area's most prolific water production  
21 zone." Did I read that correctly?

22 A. Correct.

23 Q. And that substantiates your understanding  
24 for why the San Andres was included in the EMSU,  
25 correct?

1 A. Correct.

2 MR. RANKIN: Mr. Hearing Officer, at this  
3 time I have no further questions for the witness.  
4 Before I make Mr. Knights available for any recross,  
5 I guess just for the record, can we make sure we  
6 understand what the scope of recross would be?

7 MR. WEHMEYER: My I respond?

8 HEARING OFFICER HARWOOD: Yes.

9 MR. WEHMEYER: It's all been new, so I think  
10 pretty much everything you heard today, being all  
11 brand new, I'm probably going to have some questions  
12 about it.

13 HEARING OFFICER HARWOOD: I'm going to give  
14 Mr. Wehmeyer wide leeway on it.

15 MR. RANKIN: I appreciate that, Mr. Hearing  
16 Officer.

17 THE HEARING OFFICER: The goal yesterday was  
18 when we broke and decided that you would redirect  
19 this morning, was hopefully to narrow the scope of  
20 redirect, and instead it was expanded.

21 So in all fairness to everybody,  
22 including the Commission, Mr. Wehmeyer and other  
23 parties are going to have wide leeway.

24 MR. WEHMEYER: Thank you. May I proceed,  
25 Mr. Hearing Officer?





1 A. Yes, I would.

2 Q. That would also be inconsistent with  
3 Dr. Lindsay's testimony and many other testimony and  
4 literature that we've seen about the Grayburg pinching  
5 off to the east, and I'm going to misuse our  
6 terminology, trapping or at least pinching off to be a  
7 barrier?

8 A. Correct.

9 Q. Did the paper say the water was encroaching  
10 from northeast or southeast?

11 A. I believe it said it was southeast and the  
12 east.

13 Q. But all of your arrows are not from the  
14 southeast. The arrows you added are actually from the  
15 northeast. Why?

16 A. That was basically the major water  
17 production.

18 Q. What type of logs did they have in the year  
19 1939?

20 A. Some very rudimentary logging tools.

21 Q. Spontaneous potential log, would that be the  
22 only log that existed in 1939?

23 A. No. There were more logs than that.

24 Q. Can we agree that over the last  
25 approximately 90 years, technology has improved

1 drastically since your 1939 paper?

2 A. I would very much agree with that.

3 Q. And you haven't been able to find anybody  
4 else that would have agreed that there was any water  
5 entering from the northeast or southeast, and your  
6 only basis for it is your 1939 paper?

7 A. Yes.

8 Q. With respect to the cores, you wanted to  
9 talk today about core, and we covered yesterday that  
10 you didn't look at the core and you didn't describe  
11 the core, correct?

12 A. Correct.

13 Q. Today when you put up your slide with the  
14 blue highlighting on it against the core, did you see  
15 any descriptions where bedded anhydrite -- was bedded  
16 anhydrite discussed anywhere to the core descriptions?

17 A. No.

18 Q. And, in fact, where any identification of  
19 anhydrite happened, that actually doesn't line up at  
20 all with where you placed your blue blocks, does it?

21 A. I don't specifically remember, but I don't  
22 think so.

23 Q. In addition, just so we can put a -- today  
24 we talked a lot about pressures. I thought yesterday  
25 you hadn't done any pressures work, you didn't have

1 any pressures testimony.

2 A. I think I mentioned pressures yesterday.

3 Q. What was your methodology and work with  
4 respect to pressures as part of your engagement here?

5 A. I reviewed pressure data as reflected on the  
6 geology. Again, the -- the biggest indication is  
7 pressure and volume. So material balance is part of a  
8 geologic evaluation for myself.

9 Since I've worked with an engineering  
10 firm for 32 years, I've found that to be a critical  
11 component in geologic evaluations of reservoirs.

12 Q. Okay. I'm going to go in now and talk about  
13 the barriers. I thought we had visited about that at  
14 length yesterday, but apparently, there's new  
15 testimony.

16 First, before even getting into the  
17 barrier, have you performed any kind of geomechanical  
18 studies --

19 A. No.

20 Q. -- anywhere in the EMSU or around it?

21 A. No.

22 Q. Not work that you did?

23 A. No.

24 Q. And you haven't seen any other work?

25 A. No.

1 Q. And we talked about a frac gradient analysis  
2 in terms of at what pressures, as this builds, will  
3 rock crack?

4 A. Correct.

5 Q. And a lot of this rock is dolomite. Yes?

6 A. Correct.

7 Q. That's a very easily cracked rock, isn't it?

8 A. Sometimes.

9 Q. To the extent that Dr. Davidson wants to  
10 talk about anhydrite barriers, which doesn't line up  
11 with the core and is not reflected in the core, can  
12 anhydrite be broken down by saltwater?

13 A. Usually fresh water.

14 Q. Okay. But water can break down anhydrites  
15 over time, can't it?

16 A. Yes.

17 Q. And you haven't done any studies in terms  
18 of -- if you wanted to write into the core description  
19 that there is anhydrite bedding and then move your  
20 blue blocks to barriers at the anhydrite, we know we  
21 don't have frac gradient studies, we know we don't  
22 have geomechanical studies, we know water will break  
23 down anhydrite over time, you haven't done any kinds  
24 of study in terms of the effect of his water injection  
25 and those pressures on anhydrites?

1 A. No, I have not.

2 Q. Let's talk mapping. The map that I had, I'm  
3 going to try to publish this, if you could call this a  
4 map. You put the brown permeability barrier. Are you  
5 calling this a map? What do you want to call this?

6 A. Cross-section. There's a map on one side  
7 that shows where the cross-section goes. It's the two  
8 wells that have spectral gamma rays that are near the  
9 EMSU, but outside the boundary.

10 Q. If we wanted to indulge this as mapping, did  
11 you do this kind of mapping anywhere else?

12 A. I have a number of cross-sections and maps  
13 that show wells.

14 Q. That show a perm barrier like this  
15 highlighted in brown?

16 A. No. I think the one in my summary testimony  
17 has them in black and Grayburg and purple, I believe.

18 Q. That was your work before today, right?

19 A. Before today, yes.

20 Q. Before today and yesterday?

21 A. Yes.

22 Q. Okay. With respect to the perm barrier that  
23 Mr. Rankin chose to show the Commission here, you can  
24 tell the Commission that these wells are way off to  
25 the east in relation to our EMSU, aren't they?

1 A. Yes. They are three to four miles east.

2 Q. Three to four miles east, right?

3 A. Yes.

4 Q. And as we talked about the concept of  
5 mapping, I asked yesterday, I said, "You're a  
6 geologist, geologists love maps," you haven't created  
7 one single map here.

8 With respect to the idea that there is  
9 an aerially consistent blanket of a barrier across all  
10 of the EMSU, you have never mapped that, have you?

11 A. Correct.

12 Q. You've never tried to map that, have you?

13 A. Correct.

14 Q. And, in fact, you have seen from logs that  
15 there is a lot of heterogeneity in terms of carbonate  
16 systems, such as we have here, in the San Andres,  
17 isn't there?

18 A. Yes. Very complex carbonate system.

19 Q. In terms of being able to say that there is  
20 a blanket barrier that goes all the way across the  
21 EMSU, that would require extensive mapping in this  
22 heterogeneous environment, wouldn't it?

23 A. No.

24 Q. Why did you not -- if you want to testify  
25 today that there is -- and, again, I asked you

1 yesterday. Do you remember yesterday I said, "Is it  
2 the testimony of Netherland, Sewell, with you here in  
3 the seat, that there is, in fact, a barrier that goes  
4 all the way across?" and you said you couldn't testify  
5 to that one way or the other? Do you remember that?

6 A. Yes. A barrier.

7 Q. Are you standing by that sworn testimony or  
8 do you have new sworn testimony today?

9 A. Could you don't repeat that again.

10 Q. Are you standing by the sworn testimony  
11 yesterday, or do you want to have new sworn testimony  
12 and change it?

13 A. Could you repeat what I actually said  
14 yesterday, so I could understand.

15 Q. That you were not sitting here testifying to  
16 the New Mexico Oil Conservation Commission --

17 A. I didn't --

18 Q. -- that it was the determination of  
19 Netherland, Sewell that there is, in fact, an  
20 impermeable barrier that separates what you want to  
21 call the injection zone from the Grayburg?

22 MR. RANKIN: Mr. Hearing Officer, object.  
23 Mischaracterization of Mr. Knights' testimony, I  
24 believe.

25 HEARING OFFICER HARWOOD: Hold on a second.



1 Let me try to find my notes.

2 The collective recollection here is that  
3 he said he would not commit to that 100 percent.

4 MR. RANKIN: I just want to make clear that  
5 Mr. Wehmeyer is trying to get Mr. Knights to testify  
6 about a single barrier.

7 And what Mr. Knights is testifying about  
8 is that there's multiple barriers in aggregate that  
9 substantiate his opinion. And that's my concern, for  
10 the record.

11 HEARING OFFICER HARWOOD: Mr. Wehmeyer,  
12 having heard the objection, why don't you just see if  
13 you can rephrase the question.

14 BY MR. WEHMEYER:

15 Q. We spent a lot of time yesterday talking  
16 about an barrier and if there is one and where it is,  
17 if there's something that isolates the Grayburg from  
18 the San Andres. Do you remember all that testimony?

19 A. I remember most of it.

20 Q. And at the end of that, I asked you, "Are  
21 you sitting in that chair, for Netherland, Sewell,  
22 going to go on the record" -- you know, these  
23 transcripts are -- we're reading about 1984  
24 proceedings, right?

25 A. Yes.

1 Q. Are you going on the record for Netherland,  
2 Sewell that there is an impermeable barrier that  
3 isolate all communication between the San Andres and  
4 the Grayburg? Yes or no?

5 A. It's not a yes or no question. Is that  
6 nonresponsive?

7 Q. Yesterday you wanted to say it's gray. Is  
8 it gray?

9 A. Is there other color choices?

10 Q. There's been a lot of money and time spent  
11 at this thing, including written statements that we've  
12 had done through rebuttal reports. You've even done a  
13 surrebuttal report, haven't you?

14 A. Correct.

15 Q. And I don't think it's funny that we're here  
16 examining on brand-new opinions while we haven't had  
17 experts to help guide the examination or to prepare  
18 written responses to it.

19 So my question is, at this foundational  
20 piece -- Number 2 of your very first charge here -- do  
21 you remember we looked at your report yesterday?

22 A. Yes.

23 Q. Number 2 of your charge was confirm barriers  
24 from Goodnight. Do you remember that?

25 A. Yes.

1 Q. Did they tell you where the barriers were?

2 A. No.

3 Q. Today do you know where Goodnight's claimed  
4 barriers are?

5 A. Not necessarily. I know where my barriers  
6 would be.

7 Q. Well, presumably, they would have had  
8 barrier -- they're injecting into the San Andres and  
9 they know there's Grayburg oil production immediately  
10 above it. Would you hope that they had barriers in  
11 their mind somewhere?

12 A. Yes.

13 Q. But they didn't tell you where they are?

14 A. Not specifically, no.

15 Q. And you have no clue with what you came up  
16 with in these two wells here aligns with what they  
17 have, do you?

18 A. I would assume that it would.

19 Q. You don't know that? You're guessing?

20 A. Since I haven't seen -- they haven't  
21 provided me a perm barrier map or anything of the  
22 such, I guess I would not know what their perm barrier  
23 looks like.

24 Q. Additionally, this perm barrier that you  
25 want to speak of today, is it not contiguous. You're

1 saying there's different layers, that if you put them  
2 all together, maybe they get there, right?

3 A. Yes.

4 Q. And so the idea that somehow, as you talk  
5 about different layers of perm barriers alleged, that  
6 this they could somehow align with what Goodnight  
7 would have come up with, you've certainly not done any  
8 of that comparison or work either, have you?

9 A. I'm very confident of the work that I've  
10 looked at. And all data supports a perm barrier  
11 between the Goodnight injection zone and all the  
12 reservoirs above it.

13 Q. But that's not true and you know that's not  
14 true because I showed you'd the studies from the  
15 actual operators in this field, Chevron, in the  
16 Technical Committee Report, Dr. Lindsay's Ph.D. work.

17 How can you say there's no evidence of  
18 communication after seeing the bubble maps, after  
19 seeing Dr. Buchwalter's material balance simulation?  
20 How can you honestly sit here and tell the Commission  
21 that there is no evidence, some of this coming from  
22 the actual operator in the field, Chevron, of  
23 communication?

24 A. I've seen some interpretations, but me,  
25 looking at the data, I don't see any data that

1 supports that. And I have a different expert opinion  
2 on whether there's a barrier or not.

3 Q. So you agree that's different than saying  
4 that there's no evidence, right? You would agree that  
5 there's certainly evidence that has been received by  
6 this Commission that there is, in fact, communication?

7 A. No.

8 Q. Now, as we come back to your work here, I  
9 think we talked about this yesterday, you viewed your  
10 work as just picking and critiquing what other people  
11 did. You did not perform a ground-up analysis here,  
12 did you?

13 A. Well, on my analysis and due diligence is a  
14 ground-up from the actual hard physical data and  
15 evidence. And I use that to do due diligence on any  
16 analysis that I've seen. And in that process,  
17 incorporating all that true physical data, I can come  
18 up with some conclusions that I feel are valid.

19 Q. Had you ever, before today, mapped perm  
20 barriers within the 679 core?

21 A. No.

22 Q. Okay. So if on my fuss that this is all  
23 brand new and we haven't had a chance to look at --  
24 core is king. You were in here when Ryan Bailey is  
25 like, "It's all about the core," like, we have to come

1 back to the core. Dr. Lindsay starts this thing with  
2 geology from the very jump. You start with literature  
3 studies, you have to understand the geology. After  
4 you understand the geology, you want to look at the  
5 core and study the core and make sure everything  
6 correlates to the core. You've heard all that  
7 testimony right?

8 A. Yes.

9 Q. But you didn't do the geology work out here?

10 A. I'm a geologist, so I think all my work is  
11 geologically rated, and engineering.

12 Q. In terms of stratigraphic analyses or  
13 lithological analyses -- I'm probably mispronounce  
14 lithology analyses, facies analyses, you didn't do any  
15 of that, did you?

16 A. No.

17 Q. Okay. And so coming back to core is king,  
18 before last night, you didn't even look in the core to  
19 try to see whether there were any barriers, according  
20 to you?

21 A. No. That is wrong.

22 Q. So why was it that last night you chose to  
23 put the blue blocks on there?

24 A. It was just a visualization of my analysis.  
25 I thought it would be representative and it would be

1 important for the Commission to see where those  
2 barriers are and how I came to my decision.

3 Q. Dr. Davidson talked about barriers, and he  
4 used a different methodology than you, didn't he?

5 A. Yes.

6 Q. And you have not done -- because you didn't  
7 map across the unit, you couldn't say whether your  
8 alleged barrier matches up in all respects with  
9 Dr. Davidson's alleged barrier, can you?

10 A. They probably absolutely don't exactly.

11 Q. As we're looking for a barrier, you don't  
12 know what Goodnight would have interpreted as a  
13 barrier. What you went off with the Commission on as  
14 a barrier -- and you talked about dolomite and the way  
15 your would barrier work, it's not like we can just go  
16 out there and say at the bottom of the Grayburg, at  
17 the top of the San Andres, here it is, we see it in  
18 core, this is the barrier, you can correlate it all  
19 the way across. That's not the kind of barrier you're  
20 talking about, right?

21 A. That may be present, but I haven't seen  
22 that.

23 Q. You're talking about this stringer-type  
24 system?

25 A. A plethora of baffles in a concentrated

1 stratigraphic interval that creates a vertical perm  
2 barrier.

3 Q. So as we talk about Dr. Davidson's  
4 methodology against yours, you would agree, probably  
5 your perm barriers wouldn't align with what he came up  
6 with, would they?

7 A. Not exactly, no.

8 Q. Additionally, Mr. Rankin showed you this  
9 cartoon. I'm going to try to get to it.

10 MR. RANKIN: Mr. Hearing Officer, object to  
11 the characterization of the exhibit as a cartoon.

12 HEARING OFFICER HARWOOD: Is there a  
13 question pending?

14 MR. WEHMEYER: I think Mr. Rankin just  
15 wanted to say this is not a cartoon. I don't think  
16 it was an objection in any serious sense, but maybe  
17 he wants to explain it.

18 HEARING OFFICER HARWOOD: Well, yeah, it's  
19 overruled. We've used that term before.

20 BY MR. WEHMEYER:

21 Q. Who created the cartoon?

22 A. I believe it was Preston McGuire.

23 Q. Preston McGuire. Okay. Now, Preston  
24 McGuire, do you know other than, like, as an  
25 internship, has he ever worked at an oil company, like



1 someone that would produce and extract oil and gas out  
2 of the ground?

3 A. I don't know.

4 Q. And as we talk about how one might create a  
5 cartoon, was this created before your work or after  
6 your work?

7 A. I actually don't know when it was created.

8 Q. So you didn't provide input into the  
9 creation of the cartoon, did you?

10 A. No, I did not.

11 Q. And, again, Mr. Rankin showed it to you. Do  
12 you know, did Dr. Davidson provide input to  
13 Mr. McGuire for him to create the cartoon?

14 A. No.

15 Q. And so I'm just trying to understand the  
16 thing. Because Mr. Rankin asked you questions about  
17 it. Can you see my cursor down here?

18 A. Yes.

19 Q. If the shaded areas is a barrier and water  
20 is being injected here -- do you see the little  
21 interval where they say there's injection?

22 A. Yes.

23 Q. And the water would move over here in baffle  
24 fashion, move over here, move over here. Here,  
25 there's no connection. You could move through there.

1 I mean, that is not an impermeable  
2 barrier, is it, with the way they've created this?

3 A. I don't see how fluid would move, as you've  
4 designated, through there.

5 Q. How not?

6 A. Vertical perm barriers.

7 Q. Where are the vertical perm barriers shown  
8 on here?

9 A. Well, there's gray lines that Mr. McGuire  
10 has put on there.

11 Q. Are you talking about the color shaded in?

12 A. Yes.

13 Q. What was his standard for deciding to shade  
14 something in?

15 A. I have no idea.

16 Q. What is the aerial distance between these  
17 well logs?

18 A. Probably a mile to half a mile.

19 Q. So you're talking about an entire mile in  
20 between this. And on what basis would you shade in in  
21 between? Because you said you've never even tried to  
22 map. And, in fact, you're confident you couldn't map  
23 barriers in between the various logs, could you?

24 A. I could. I didn't.

25 Q. Okay. What would be to basis? For example,

1 like right here, when you're talking about a distance  
2 of mile between logs, what would be the basis for  
3 putting a barrier indication right there in that  
4 triangle fashion?

5 A. Extrapolating data outside the wellbore.

6 Q. But he's got a log immediately to the left  
7 of it and it shows no barrier at all there. How would  
8 that be extrapolating to a log?

9 A. I don't know how he created these gray  
10 lines, or if these are indications or perm barriers.  
11 Is there a legend on here?

12 Q. I have no idea. You were asking about it  
13 and you testified off of this thing. So you're the  
14 guy I've got since you're the one under oath and  
15 decided to have sworn testimony about this Exhibit B-9  
16 thing.

17 I'm trying to figure out what is it and  
18 how on earth could this thing have been created.

19 A. Is that a question?

20 Q. Is the answer you have no idea?

21 A. No.

22 Q. You don't know, or you do know?

23 A. Repeat your question.

24 Q. As I asked, since he asked you questions  
25 about this thing, in terms of what this is --

1           A. Wait. To the first part. Say the first  
2 part again.

3           Q. Mr. Rankin asked you questions about  
4 being -- the only reason --

5           A. Yes, I --

6           Q. My next question is, how on earth was this  
7 created?

8           A. As a geologist, this is a common practice.  
9 And you try to interpolate between wells, based on the  
10 log data. And it's both either stratigraphic,  
11 lithostratigraphic, chronostratigraphic, or a physical  
12 reservoir, or various techniques in extrapolating  
13 across these. It's a common mapping technique.

14                   I'm very used to seeing cross-section  
15 and evaluating and looking at them. And right now,  
16 for this, as far as I see, this looks very reasonable.  
17 I'm not sure of the specific interpretation. You'll  
18 have to talk to Mr. McGuire about exactly what he used  
19 to extrapolate in between the wells.

20                   But looking at the core data in the 460  
21 well that's right next to the 679 well, I have 175  
22 feet where predominant in that interval is low perm  
23 vertical barriers, it seems like his correlation  
24 across there, much like on your map over here that has  
25 San Andres going across the EMSU and the lost drilling

1 circulation at a similar depth across the EMSU, all  
2 indicates that these things are continuous across the  
3 EMSU.

4 Q. Here's my question. Before today, you have  
5 never been engaged here as an expert geologist to  
6 assess whatever these colored cartoons on and draw a  
7 scientific analysis on them, have you?

8 A. I don't think I was specifically asked to  
9 look at the color on this map.

10 Q. I would hope that before you would just tell  
11 the Commission this thing is accurate, you would do a  
12 whole lot of looking at logs, you would go back, look  
13 at core, you would go back and perform correlations,  
14 you wouldn't sit here and off the cuff look at  
15 cartoon, you don't know how it was created, and say  
16 this thing is accurate. Do you have that right?

17 A. I wouldn't say it's inaccurate. I have  
18 looked all the core data. I have not looked at these  
19 logs. I have not correlated them. I've looked at the  
20 perforated intervals on the injection intervals. I've  
21 looked at the perforated intervals on the water supply  
22 wells. And all of that informed my opinions.

23 Q. My question is on these cartoons. If I see  
24 these cartoons again, Netherland, Sewell has not  
25 performed an analysis on the accuracy of these

1 cartoons, has it?

2 A. Correct.

3 Q. And as far as you know, Dr. Davidson had no  
4 input on creating the cartoons; is that correct?

5 A. That's correct.

6 Q. And in terms of the methodology that  
7 Goodnight would use for establishing a, quote,  
8 unquote, perm barrier, you don't know that  
9 methodology, do you?

10 A. Not specifically, no.

11 Q. With respect to the idea that it would be  
12 pressure based, based on loss circulation fluid, I  
13 want to ask about picking tops off of engineering  
14 data, do you ever pick tops of formations? That's  
15 part of what you do. Yes?

16 A. Yes.

17 Q. Have you ever done it based off of  
18 engineering data and mud loses?

19 MR. RANKIN: Mr. Hearing Officer, I  
20 understand wide scope, but I didn't redirect  
21 Mr. Knights at all on any of this.

22 MR. WEHMEYER: If I can respond briefly.

23 THE HEARING OFFICER: Sure.

24 MR. WEHMEYER: Today we now have tops. We  
25 know what tops are. Yesterday, we didn't know where

1 the San Andres was, where the Lovington Sand was or  
2 where the Grayburg was. But today we do have top  
3 information, so I'm exploring how he picks tops.

4 THE HEARING OFFICER: Okay. Overruled.

5 BY MR. WEHMEYER:

6 Q. Have you ever, as a geologist, given a  
7 client an analysis in which you picked tops of  
8 formations based on mud losses?

9 A. Tops of reservoirs, not necessarily  
10 formations. Tops of reservoirs can cross formations.

11 Q. So the idea that you would pick formation  
12 tops, just using engineering data off of mud losses,  
13 that's not anything you've ever done. True?

14 A. Picking tops of formations, no.

15 Q. I'm sorry. It's the way I phrased the  
16 question. Let me just ask it so we know what the no  
17 is. That's my fault.

18 In the history of your career, you have  
19 never picked formation tops using engineering data and  
20 mud losses to define a top, have you?

21 A. To define a formation top, no.

22 Q. Additionally, you have never mapped  
23 formations based on mud loses, have you?

24 A. Mapped formations, no.

25 Q. Now, there was discussion about -- do you

1 remember Mr. Rankin's questions to you about  
2 Dr. Davidson's oil in place and the low case and the  
3 high case? And we visited about that earlier; do you  
4 recall?

5 A. Yes.

6 Q. And with respect to the 20 percent, do you  
7 remember also visiting about the 20 percent oil  
8 saturation?

9 A. Yes.

10 Q. You would agree that based on your testimony  
11 yesterday, that the feasibility of an ROZ starts -- if  
12 there's 20 percent oil saturation, you can start a ROZ  
13 under the Melzer and Dr. Trentham analysis?

14 A. Yeah. That's their definition of the  
15 minimum amount of oil you would need to --

16 Q. To start a ROZ?

17 A. -- start a ROZ.

18 Q. And we've covered that Netherland, Sewell's  
19 analysis omits all the oil, all the oil in place under  
20 20 percent oil saturation is gone, right?

21 A. No. It's still there. It's just not in the  
22 oil-in-place calculation.

23 Q. You would agree here --

24 A. Well --

25 Q. Go ahead. I'm sorry. I didn't mean to



1 interrupt you.

2 A. Well, if you have a net pay and you have  
3 10 feet of 30 percent oil saturation, all that oil  
4 from zero to 30 is counted in the oil in place. So  
5 your characterization of all the oil from less than  
6 20 percent is excluded is inaccurate.

7 Q. If it's below a 20 percent saturation over  
8 whatever interval, it's out, correct?

9 A. Well, if you have an oil saturation at  
10 30 percent, all 30 percent. It's not that  
11 differential of 10 percent.

12 Q. Right. But if it's anything under  
13 20 percent, you've taken those volumes out, if that's  
14 the average saturation?

15 A. If that's the average saturation in the  
16 interval, then it is excluded as net pay, yes.

17 Q. But the way that the CO2 injection would  
18 work, that CO2 is going to migrate upwards, reducing  
19 viscosity as it goes through all the formation, isn't  
20 it?

21 A. Through all the formation is correct.

22 Q. And so you would agree that that would make  
23 the oil-in-place numbers conservative because within  
24 that zero to 20 percent, some of that oil is going to  
25 be recovered through EOR, isn't it?

1           A. Yes. That would increase the oil in place  
2 and reduce the recovery factor.

3           Q. You speak in terms of conservative or not  
4 all the time, I imagine, as part of your work. Yes?

5           A. Say that again.

6           Q. I speaking in terms of is this analysis  
7 conservative as a sensitivity analysis, that's  
8 something that's part of your day-to-day work?

9           A. Adjectives are always used, yes.

10          Q. So to put a point on it here, we know how  
11 EOR and CO2 works, that it's going to reduce that  
12 viscosity, that it's going to flood bottom to top.  
13 And that even if it's below that 20 percent threshold  
14 for an interval, CO2 will enter the interval and you  
15 will get some of that oil, right?

16          A. I would not say that that's a certainty.

17          Q. Is it a likelihood?

18          A. Probably not.

19          Q. But you would disagree that that would  
20 render the oil-in-place numbers conservative here  
21 where we know that everything below 20 percent  
22 intervals is excluded from oil in place?

23          A. In my opinion, they're realistic. But some  
24 people call me short for tall, I'm 5'6".

25          Q. This is this the last I have, just because

1 we've cracked open this deal with -- on Dr. Davidson.

2 I just want to be clear, and I think  
3 this will be helpful to Dr. Ampomah's questions  
4 yesterday, which we want to make sure it gets  
5 answered.

6 In terms of average oil saturations,  
7 based on core, did you go back last night and  
8 calculate average oil saturations at all?

9 A. No.

10 Q. Do you know that was something that  
11 Dr. Ampomah was asking about would be helpful?

12 A. Yes.

13 Q. Okay. Let's just take it in pieces.  
14 Yesterday we were talking about n values, and, in  
15 fact, the n values that would come out of  
16 Dr. Davidson's work, he didn't exclude any of those  
17 oil saturations in the core, right, all of them were  
18 used?

19 MR. RANKIN: Mr. Hearing Officer, I  
20 understand the wide leeway on recross, but I don't  
21 know how this relates to anything that I engaged with  
22 Mr. Knights on on redirect.

23 MR. WEHMEYER: He's brought back open the  
24 issue of volumes. This is a question Dr. Ampomah had  
25 yesterday. I think we can get it answered. If

1 Mr. Rankin can bring in brand-new testimony today, I  
2 think indulging three slides that will be less than  
3 10 minutes will be incredibly helpful to the  
4 Commission.

5 MR. RANKIN: I'm trying to understand where  
6 I addressed the volumes. I may have misremembered  
7 how it brought it to the redirect.

8 HEARING OFFICER HARWOOD: All right. I'm  
9 going to give Mr. Wehmeyer the leeway on this.  
10 Overruled.

11 MR. WEHMEYER: Thank you.

12 BY MR. WEHMEYER:

13 Q. I'm not sure I'm going to be able to get  
14 this any larger. Can you at least read that there?

15 A. I think I got it.

16 Q. In terms of the spectrum of facies, we  
17 covered the spectrum of facies yesterday. In that  
18 bottom left, this was actually Dr. Davidson, he was  
19 speaking about oil saturations from that UT BEG paper.  
20 Was that the one on Seminole; do you remember that?

21 A. Yes.

22 Q. What he was saying was that in wackestone  
23 and mud dominated packstone, based on the UT BEG, oil  
24 saturations that were reported there were up to 40  
25 percent. That was actually an average. The average

1 oil saturations in the worst rock, wackestone and mud  
2 dominated packstone, on average was 40 percent at  
3 Seminole. Do you remember seeing that and hearing him  
4 testify about it?

5 A. I don't remember exactly what that is.  
6 There was residual oil zone or total oil?

7 Q. That was oil saturation -- what's the  
8 difference between residual oil zone versus total oil?  
9 Help me with that.

10 A. Well, residual oil zone is basically a  
11 residual oil. You can have oil saturations that are  
12 significantly higher than that. So I don't know what  
13 the average -- I just see residual oil zone  
14 saturations down here on the bottom.

15 Q. Yeah. And again, it's his chart. That's my  
16 understanding of what this is. You don't know?

17 A. You can call Dr. Davidson back. But if you  
18 ask questions that I can answer, I know some of what  
19 he does.

20 Q. But we saw yesterday, like, the magenta on  
21 the far right, if it's wackestone, based on his model,  
22 it immediately puts 92 percent water saturation into  
23 it, doesn't it?

24 MR. RANKIN: Mr. Hearing Officer,  
25 Dr. Davidson testified several times yesterday that

1 they did not use wackestones in the model. If  
2 Mr. Wehmeyer wanted to cross Dr. Davidson on this, he  
3 could have done so. He crossed Mr. Knights  
4 extensively yesterday on Dr. Davidson.

5 I don't see how this relates to my  
6 redirect or how it's appropriate to continue crossing  
7 Mr. Knights on something that is Dr. Davidson's work.

8 HEARING OFFICER HARWOOD: I'll allow it. It  
9 goes to weight, not admissibility.

10 BY MR. WEHMEYER:

11 Q. Again, all of these volumes, every bit of  
12 testimony you have here in terms of volumes, it all  
13 comes from Dr. Davidson's work, right?

14 A. Correct.

15 Q. And he used the facies model, and you're the  
16 geologist, correct?

17 A. Correct.

18 Q. And I would hope that you quality checked  
19 his data before you just plugged it in and offered  
20 sworn testimony. Right?

21 A. I reviewed it.

22 Q. Okay. So with respect to wackestone or  
23 worse rock, right, wackestone or worse, it immediately  
24 starts with 92 percent water saturation, doesn't it?

25 A. Based on the core data, yes.

1 Q. And we're going to talk about core data.  
2 But just based on these plots, does it appear that  
3 this would be consistent with Seminole in the BEG  
4 paper, where the worst rock facies has the highest oil  
5 saturations and the best rock facies has the worst oil  
6 saturations?

7 A. Can you repeat that question?

8 Q. Yes. So what the BEG paper documented was  
9 that it was the worst rock that would have the highest  
10 oil saturations, right?

11 A. Okay. I think I saw that yesterday. Yes.

12 Q. But, in fact, the plots that Dr. Davidson  
13 uses would never allow the worst rock, that's  
14 wackestone or worse, to ever get higher than -- get  
15 lower than 92 percent water saturation. Fair?

16 A. Fair.

17 Q. The majority of his rock was wackestone or  
18 worse, right?

19 A. No. I don't believe wackestone was even in  
20 his model.

21 Q. Even worse than -- I don't know what to call  
22 worse than wackestone. How about that?

23 A. Nothing to the left on this chart was  
24 included in Dr. Davidson's.

25 Q. It was all the stuff on the right?

1 A. Yes. Wackestone was not included.

2 MR. RANKIN: Mr. Hearing Officer, I believe  
3 that's a mischaracterization of Dr. Davidson's  
4 testimony.

5 We're getting on a path here where we're  
6 trying to retread Dr. Davidson testimony with a  
7 witness who did not do the work. If he wants to ask  
8 him about how the rock relates to the core, you know,  
9 that's fine. But we're totally getting off track  
10 here with Dr. Davidson's testimony.

11 HEARING OFFICER HARWOOD: It's this witness'  
12 understanding of Dr. Davidson's testimony. This  
13 witness has already testified that his testimony  
14 relies upon and was based upon Dr. Davidson's  
15 testimony. And he's already answered the question  
16 yes. Overruled.

17 BY MR. WEHMEYER:

18 Q. What we have here is core data. It has  
19 been -- just trying to get it to fit on one slide.  
20 Actual core data out of the 679, it's been sorted by  
21 rock types, so you can see the different core  
22 measurement points and different colors.

23 Do you see that the X axis is corrected  
24 core water saturation?

25 A. And how was that corrected?



1 Q. This is off of the Ops Geologic model, where  
2 they've corrected oil --

3 A. Which one?

4 Q. Ops Geologic's chief case. I'm not sure --  
5 what do you mean, which one?

6 A. There were two.

7 Q. Off of the core.

8 A. Yes. Both of their models had different  
9 adjustments to the core.

10 Q. I'm going to get to the unadjusted next.

11 A. So is the --

12 Q. This is the adjusted.

13 A. -- high side case?

14 Q. With them correcting, the average oil  
15 saturation was 23.94 percent, and the San Andres was  
16 21.44 percent. Do you see that?

17 A. Yes.

18 Q. But with respect to the n values, you would  
19 agree, if there's an n from the core, and as we bring  
20 this back to Lucia, if there's an n that goes over 10  
21 or 11, that's highly suspicious, isn't it?

22 A. You know, a lot of this stuff is math, and  
23 when you start dividing things, you can get some  
24 erroneous numbers. But the data behind it is really  
25 the problem. So yes, there can be some erroneous

1 numbers in other calculations.

2 Q. But, I mean, again, just n -- if you're  
3 seeing n values over 11, isn't that going to give you  
4 some concern that something is off in this data?

5 A. I would go back and look at the data.

6 Q. Do you know that some of the core plots that  
7 Dr. Davidson used actually went over 100, went to 113,  
8 and he left those data points in?

9 A. That wouldn't surprise me.

10 Q. Working off of an analysis in which the n  
11 value was over 100, it wouldn't surprise you that he  
12 would leave that in?

13 A. When you look at petrophysical analysis, you  
14 have a lot of calculations, and these numbers can get  
15 out of whack. And I always go back and look at the  
16 actual data. And irrespective if whether the n vector  
17 was 200, I would relate that back to the actual core  
18 data and correlate it back and see what is validated  
19 to the core data.

20 And then I would go and look at  
21 different fields, as Dr. Davidson did, and he did five  
22 independent studies of his model. And he accurately  
23 predicted the saturations that occurred in five  
24 different fields.

25 So I think no matter how this person got

1 to the number, I look at the end results and compare  
2 and validate it to actual data, production data and  
3 other field data. And especially a blind test tells  
4 me a lot about the accuracy of the model. And if it  
5 had an n of 350 but it predicted all the actual data  
6 that I had, I would rely on that model.

7 Q. So, again, you're the geologist, we know you  
8 didn't study the core, but with respect to the core  
9 here, we know that you cannot add oil to that core.  
10 Whatever you have measured in the core, it's at least  
11 that amount or something greater, right?

12 A. Correct.

13 Q. And we know that it's going to be variable  
14 up and down the core as well, don't we?

15 A. The correction or just the --

16 Q. The variability of oil loss based on all  
17 sorts of different factors. It's not going to be  
18 uniformly lost from the top of the core to the bottom  
19 of the core. You're going to have different losses in  
20 intervals of the core?

21 A. You could -- does this analysis incorporate  
22 different B sub Os at every foot?

23 Q. My question is just, as matter of the  
24 physics, we know that as you move from top of the core  
25 to the bottom of the core, there's going to be

1 different amounts of oil losses in didn't places.  
2 Right?

3 A. Okay. Yes.

4 Q. And we also here don't know how the core was  
5 handled, do we?

6 A. I do not.

7 Q. And so as we talk about unreasonable n  
8 values, would you agree that an n value over 11 is  
9 unreasonable?

10 A. No.

11 Q. So an n value of 113, Dr. Davidson uses,  
12 it's not your testimony that that would be an  
13 unreasonable n value?

14 A. No. I would look at the results of the  
15 model and validate it.

16 Q. And, again, as we talk about the core here  
17 was handled, you don't know how long the core laid  
18 around? Which that can affect the oil measurements,  
19 as well, can't it?

20 A. Yes.

21 Q. And so you would take issue with Scott  
22 Birkhead -- and you issued a surrebuttal to Scott  
23 Birkhead, didn't you?

24 A. Yes.

25 Q. So Scott Birkhead says, "These ends are

1 unreasonable, if it's over 11, I'm taking that out.  
2 This is suspect data. We can't draw conclusions from  
3 this data that is outside" -- you would disagree with  
4 that methodology?

5 A. So he's eliminating that core data from his  
6 data set?

7 Q. If it's coming up with an n value over 11.

8 A. I think that's his interpretation. I think  
9 that's a valid way, his methodology.

10 Q. So Scott Birkhead is not crazy to eliminate  
11 what he's identified, if it's n over 11, this is  
12 suspect data, there's some problem here, this is not  
13 reasonable, I'm taking it out for purposes of core  
14 analysis? You agree that's valid methodology.

15 A. I think he used that as an interpretation.

16 Q. Do you agree that's a valid methodology?

17 A. After reviewing and corroborating it with  
18 the actual well data and the areas that we do have,  
19 production and core data, I think it didn't validate  
20 the analysis as much as Jim Davidson's did.

21 Q. Do you agree that what Scott Birkhead used  
22 in excluding data that was over an 11 n was a valid  
23 method? Yes or no?

24 A. I would say that is a reasonable  
25 petrophysical analysis.

1 Q. Would you agree using n values of 113 would  
2 be an unreasonable petrophysical analysis?

3 A. No.

4 Q. Now we have uncorrected averages in the  
5 Grayburg of 16.2 percent and 14.34 percent in the  
6 San Andres. Do you see that?

7 A. No.

8 MR. WEHMEYER: We just lost our monitors. I  
9 have two minutes and I'm done here.

10 HEARING OFFICER HARWOOD: Let's come back at  
11 11:30. We'll be off the record.

12 (Recess held from 11:21 to 11:30 a.m.)

13 HEARING OFFICER HARWOOD: So before you  
14 begin, and hopefully -- I think you said two minutes.  
15 We'll try and hold you more or less to that.

16 Before we got to that, Chairman Rozatos,  
17 I'm looking at Goodnight's witness list. We still  
18 have Nate Holloman, Preston McGuire, Dr. Larry Lake,  
19 Tom Tomastik, and at least half of Mr. McBeath,  
20 whatever is left of his testimony, to get through for  
21 Goodnight. And we also have OCD with one, possibly  
22 two witnesses.

23 So what we're thinking we should do is,  
24 you all at some point, off the record, get together  
25 and figure out how you're going to allocate the

1 remaining time available in this proceeding to get  
2 this thing done by -- let me look at my calendar.

3 We recommence May the 19th, we have that  
4 week set. So I'm suggesting that you all compute the  
5 time and witnesses between now and, say, May the  
6 21st, which would be the Wednesday of that week. And  
7 allocate the time amongst yourselves so that we get  
8 this case done by -- I mean, the goal will be by  
9 midweek, May the 21st. So if you all would get  
10 together and see if you can do the math and maybe  
11 come back to us tomorrow and let know if you've been  
12 able to reach any kind of agreement on that.

13 All right. Mr. Wehmeyer, go ahead with  
14 your what remains of your cross-examine.

15 MR. WEHMEYER: Thank you very much.

16 BY MR. WEHMEYER:

17 Q. Again, yesterday there was a question from  
18 Dr. Ampomah about looking just at core average oil  
19 saturations. And if those are average in the Grayburg  
20 before any correction whatsoever at 16.2 percent, does  
21 that align in general parameters with what you -- or  
22 you just never calculated it.

23 A. No, I had an average of I think it was 14.34  
24 for all of it -- or 37 on one of my exhibits that  
25 didn't distinguish between Grayburg and San Andres.

1 Q. And if Ops Geologic calculated the  
2 uncorrected oil saturation in the San Andres as  
3 14.34 percent, you would agree with that, disagree  
4 with that?

5 A. I would have for look. But it seems to me  
6 that that's high.

7 Q. And then if we take out what Scott Birkhead  
8 identified as the suspicious saturations in the core  
9 that is places that would have required an n over 11,  
10 or as high as 113 in Dr. Davidson's work, that would  
11 adjust to 17.2 percent uncorrected, but excluding the  
12 suspicious data in Grayburg, just eyeballing it, do  
13 you disagree with that?

14 A. The only thing it seems to be eliminating  
15 the very low saturations in the core.

16 Q. Where the n value would go over a 11 on a  
17 Lucia curve, right?

18 A. Yeah, so it's the low oil saturation in the  
19 core.

20 Q. And then, if uncorrected, if you take out  
21 those suspicious data points that would have n's over  
22 11 would come to uncorrected oil saturations of 19.5  
23 under Scott Birkhead's work -- and I understand your  
24 comment, you're saying, "I wouldn't take them out,"  
25 but does that look, rough order of magnitude, like



1 that would be accurate?

2 A. I do not know.

3 Q. And then looking at the rock quality index,  
4 do you see, as we talk about the different quality of  
5 rock that's color coded, at the bottom against the  
6 plotted dots out of the core, do you see that?

7 A. I see the colors. And what are the numbers?

8 Q. Rock quality index. In terms of just  
9 looking at the lower quality rock, is going to be your  
10 blues and your teals, and the lower quality rock  
11 actually fits nicely with the UT Bureau of Economic  
12 Geology paper in terms of the expected 40-ish percent  
13 saturations in the lower quality rock and finding the  
14 lower saturations in the better quality of rock, or  
15 have you not done an analysis like that here?

16 A. I'm just trying to understand the plots. So  
17 the blue dots are poor quality rock?

18 Q. Yes. That's lower on the rock quality  
19 index.

20 A. The extremely suspicious saturations are all  
21 in the low quality rock?

22 Q. Well, the blue flags show up that way,  
23 that's right.

24 A. And those are the data that excluded from  
25 the analysis?

1 Q. Yes, for the column on the right. But if  
2 you look to the left, you can see that lower quality  
3 rock, there's plenty of those data points that fit  
4 nicely into the curves, don't they?

5 A. I don't see that really.

6 Q. I'm just indicating at these dark blue ones.  
7 Can you see them?

8 A. I see some blue ones over there. I see a  
9 lot more blue on the other side.

10 Q. And, again, you don't know how the core was  
11 handled. You do know that using those core data  
12 points would require extremely high n values, right?

13 A. Yes.

14 Q. And we know that based off of those core  
15 measurements, it could be significantly additional oil  
16 in there, depending on how it was handled, or  
17 expulsion, but it certainly can't be at least less,  
18 right?

19 A. Correct.

20 Q. And then this is literally the last  
21 question, I just want to make sure the commissioners  
22 are clear.

23 When you showed the one we were looking  
24 at, where you said you had spectral gamma, with the  
25 flag barrier on there -- are you with me on what we're

1 talking about?

2 A. Yes.

3 Q. Now, that is significantly farther south and  
4 east from the EMSU, correct?

5 A. That's I think four miles from the north end  
6 and three or four miles from the south end.

7 Q. And you had actually testified that,  
8 according to you, that was a completely different  
9 depositional environment down there, wasn't it?

10 A. I don't remember testifying to that.

11 Q. You've also talked about how nicely  
12 Dr. Davidson's model matches other EOR projects.  
13 Those are also, according to you, in different  
14 depositional environments, aren't they?

15 A. Yes.

16 Q. Wouldn't that give you concern, if he's  
17 matching that so closely, given that they're in a  
18 different depositional environment?

19 A. No. It seems like it would validate even  
20 more his model.

21 MR. WEHMEYER: Pass the witness.

22 HEARING OFFICER HARWOOD: Does OCC have any  
23 questions?

24 MR. MOANDER: No, Mr. Hearing Officer.

25 HEARING OFFICER HARWOOD: Rice?

1 MR. BECK: I do have some questions.

2 CROSS-EXAMINATION

3 BY MR. BECK:

4 Q. Mr. Knights, seems like again today there  
5 was confusion about your position yesterday, which I  
6 thought we cleared up, about the barrier across the  
7 EMSU that prevents communication from the disposal  
8 zone above the disposal zone, right?

9 A. Correct.

10 Q. And I thought yesterday you said that you  
11 can't say for certain that there is, quote, an  
12 impermissible barrier?

13 A. Correct.

14 Q. And today I think you said something that  
15 may have clarified that for me at least, and I just  
16 want to make sure that I'm clear on it, which is that  
17 you have found through the work that you've done that  
18 there's, today you used the phrase, "concentrated  
19 strata" that prevent communication, right?

20 A. Correct.

21 Q. What does that mean?

22 A. That means if you have a significant  
23 interval that a high percentage of your things are  
24 permeability barriers, that that interval would be a  
25 significant perm barrier for fluid migration, vertical

Page 108

1 fluid migration. It would basically inhibit any fluid  
2 migration.

3 Q. So you're saying that it's possible there is  
4 an impermissible barrier that Mr. Wehmeyer has talked  
5 to you about, but you just haven't confirmed that?

6 A. Correct.

7 Q. But you have confirmed that there's  
8 concentrated strata that acts in that strata to  
9 prevent communication from the injection zone up above  
10 it, right?

11 A. Correct.

12 Q. Now, when we look at this map, I think today  
13 you talked about -- is this the Andre Dawson here?

14 A. Yes.

15 Q. And this purple color, I think you said was  
16 the first area that there was a little loss of mud,  
17 right, from the drilling?

18 A. Correct.

19 Q. And then if you look, the greater loss was  
20 at I think 4562; is that right?

21 A. There were three loss circulation zones in  
22 the Dawson. One significantly above at 4,000 feet,  
23 where they don't have anything. There's not one at  
24 4,000 -- or 4315, where they had it. The first one  
25 that I had was right at the tops, the San Andres tops

1 by both Goodnight and Empire. And then below that,  
2 there was another total loss of circulation. I forget  
3 the exact depth, but it was somewhat approximately --  
4 the colors are different on here. So it was right  
5 about in this interval that's just above the Ops Lower  
6 San Andres pick.

7 Q. So the third one where there was a total  
8 loss is just below that 4500 maybe at 4550 line,  
9 somewhere in there?

10 A. Defer back to the mud log that we showed  
11 just a little earlier.

12 Q. And then the second one we looked at was the  
13 Ryno SWD; is that right?

14 A. Correct.

15 Q. And so that total loss, according to you,  
16 according to the records you reviewed, was about at  
17 4560, you said?

18 A. It was right about this -- again, the Lower  
19 San Andres pick by -- I think it's Ops, so I think  
20 it's right in this interval right there.

21 Q. So if we move that line down, then, this  
22 purple line, I think it's fuchsia on the slide, if we  
23 move that down to the Lower San Andres pick, it would  
24 be right about there where my pen is?

25 A. Correct.

1 Q. So that's continuing sort of the lateral or  
2 maybe a little bit lower line from those wells to the  
3 left. Agree?

4 A. Correct. And after reviewing the core data,  
5 what I see is that when you get close to Goodnight's  
6 San Andres pick, there gets to be significantly more  
7 perm barriers, but there are also some of those high  
8 perm streaks that get progressively, looks like,  
9 thicker as you get deeper.

10 And although we don't have core data, if  
11 we did, I think these purple lines would match up with  
12 significantly thick high perm intervals that are  
13 basically, you know, between 50 and 200, 300 feet  
14 below the top of the Goodnight San Andres structure.

15 Q. And so what I'm suggesting here is that when  
16 we look at the significant loss, that purple line, if  
17 we use just the significant loss, would be basically  
18 lateral and maybe moving down a little bit as we go  
19 cross this as opposed to these big up-jumps. Do you  
20 agree with that?

21 A. I agree.

22 Q. And the strata, I think you said yesterday,  
23 was -- I guess you called it the DMZ, the  
24 demilitarized zone was about 200 feet; is that right?

25 A. Correct.

1 Q. And then if we look at the Goodnight picks,  
2 and where that purple line would be, that's all right  
3 about 200 feet, right?

4 A. It's about 200 feet from below that pick.

5 MR. BECK: That's all I have, Mr. Hearing  
6 Officer. Thank you.

7 HEARING OFFICER HARWOOD: Thank you,  
8 Mr. Beck.

9 Pilot, any questions for Mr. Knights?

10 MR. SUAZO: No questions, Mr. Hearing  
11 Officer.

12 HEARING OFFICER HARWOOD: Back to  
13 Dr. Ampomah.

14 EXAMINATION

15 BY COMMISSIONER AMPOMAH:

16 Q. Thank you, Mr. Knights. So I do have a few  
17 questions. You know, a lot of different, you know,  
18 between yesterday, you know, what we went through and  
19 then today. So I just want to clarify that.

20 Can we have the core data that you  
21 showed with the blue boxes on for a moment? I just  
22 want to take one of them.

23 So I just want to clarify that. So  
24 you've highlighted the anhydrites. So just point out  
25 to the Commission how the anhydrite that we are seeing

Page 112



1 here supports your perm barrier that you are using as  
2 a permeability to establish.

3 A. Using this core data, basically relied on  
4 the vertical perm and not a lithology.

5 Q. Do you review Dr. Lindsay's testimony about  
6 how he described the anhydrites that were shown on the  
7 core?

8 A. I'm not sure. Which?

9 Q. Okay. Do you know the type of anhydrite  
10 that we have here?

11 A. I do not know.

12 Q. Now, you are saying that these anhydrites --  
13 so you are corroborating Dr. Davidson's testimony that  
14 these anhydrites are all classified as barriers and  
15 all of that.

16 I mean, you see anhydrite just beneath  
17 your minus 600 TVDSS, just the one that is highlights,  
18 and then you have bugs. You have a bug there.

19 A. Yes.

20 Q. So explain to the Commission how anhydrite  
21 being there and then a bug becomes something that you  
22 are certain that is a barrier?

23 A. Well, I think in the core photo I showed  
24 before, you had dolomite and bugs filling with  
25 anhydrite. So I don't think it's, you know, in

1 opposition to have anhydrite and a bug in a low perm  
2 interval.

3 Q. And you know that it's not all anhydrites  
4 that are classified as a perm barrier?

5 A. Correct. I think one thing I'd like to  
6 state is that there is a number of ways you can  
7 calculate a perm barrier. We had Ops Geologic use a  
8 method. Dr. Davidson used a method using log analysis  
9 and determining what he called from high density  
10 anhydrite layers, he interpreted those as anhydrite  
11 layers.

12 But, again, I think I go back to the  
13 actual physical data of the actual core. So this may  
14 not corroborate, and I think if I did another perm  
15 measurement using log data, I could come up with  
16 another interpretation of perm barriers.

17 But in aggregate, when you have multiple  
18 different analysis techniques, they come up with a  
19 significant number of perm barriers over a small  
20 stratigraphic interval, that those are just  
21 demonstrative of a vertical perm barrier.

22 Q. So the blue boxes that you've picked, is it  
23 your testimony to the Commission that these blue  
24 boxes, you know, where you do have Kv, let's say, and  
25 the 1 millidarcy, is truly a perm barrier?

1 A. Yes, I believe so.

2 Q. So would you invest -- assuming, let's say,  
3 you are going to delineate your area for your project,  
4 would you all use a perm barrier of, like, let's say,  
5 1 foot, 2 feet, isolated to establish a perm barrier?

6 A. Maybe not a single 1-foot interval, but a  
7 number of 1-foot intervals over a relatively thin  
8 stratigraphic interval, I would. And there are some  
9 places where very thin layers are incredibly strong  
10 perm barriers.

11 Q. So you are using this to establish that  
12 there is perm barrier. Is this across the entire  
13 EMSU?

14 A. Using the data and the depth and the 460 log  
15 that is very close to this, and then after reviewing  
16 Preston McGuire's cross-section, it does seem like  
17 there's a lateral continuity in that zone across the  
18 EMSU.

19 Q. So if we dig deeper into Mr. McGuire's  
20 cartoon that was shown, I don't want to go much  
21 details with you on that, but if we review that, do  
22 you believe that it will corroborate this?

23 A. I believe so, yes.

24 Q. So, sir, is it your testimony that in our  
25 industry, we use loss circulation to identify

1 barriers?

2 A. Yes.

3 Q. Do we have reference?

4 A. Not that I know of, no.

5 Q. So then how do you convince the Commission  
6 without any well-established reference for us to more  
7 or less agree to that?

8 A. It's difficult for me to come up with a  
9 scenario where there's not a perm barrier, because the  
10 physical process are so dramatically different from  
11 the feet above it and the -- to me, it's impractical  
12 not to think of those as perm barriers.

13 Q. Yeah, I didn't want to go into the pressure  
14 discussion with you, but you brought it up again  
15 today. So you are able to use the pressure  
16 differences to more or less come up with different  
17 gradients within even the Grayburg. And then are you  
18 saying that this is attributed to the potential perm  
19 barriers?

20 A. Correct.

21 Q. Did you research into that to corroborate  
22 that with the production history?

23 A. No. I used the difference in pressure  
24 gradient, assuming that the entire Grayburg was at  
25 some state in 1926 before any well was drilled, that

1 it was in pressure communication and a constant. And  
2 so any differential in pressures would be obviously  
3 from the production that was done.

4 Q. And then did you also analyze the waterflood  
5 performance and attribute that to your assessment?

6 A. Repeat that one.

7 Q. Did you also utilize the waterflood, the  
8 four-month period, to support your claim within, let's  
9 say, these perm barriers?

10 A. Yes. I mean, the waterflood within the  
11 Grayburg showed very isolation and different depletion  
12 in multiple intervals, indicating that there were perm  
13 barriers even within the Grayburg, and then extending  
14 down in the core, seeing that it's in the Grayburg.

15 And as you go towards the San Andres,  
16 the top of the San Andres, as Goodnight picked it, and  
17 as the Empire group picked it on this cross-section  
18 behind me, that as you approach that, these perm  
19 barriers become increasingly frequent.

20 And I think it's pretty much credibly  
21 strong evidence that around the top of the San Andres  
22 that that is a perm barrier in aggregate and in  
23 individual across the EMSU.

24 Q. So you talked about the unitization  
25 documentation, and I think I have that. You said the

1 San Andres -- or you read that the San Andres was  
2 included in the unit because of the water supply?

3 A. Correct.

4 Q. I want to ask you, was it to the benefit of  
5 the unit holder, or to everybody?

6 A. To include it as the operator of the unit,  
7 would benefit if they had both the water supply, water  
8 disposal and the oil and gas unit.

9 Q. So it was specifically to the unit holder?

10 A. Specifically to the unit holder?

11 Q. Yeah, to the unit operator?

12 A. Yes.

13 Q. Now, if we are using that as a criteria,  
14 explain to the Commission why the Commission should  
15 allow external water with exceedingly high TDS  
16 comparable to even that salinity within that area.  
17 You know, would that not defeat the purpose of the --  
18 in the long term, the water supply wells?

19 A. If there was a large continuing waterflood,  
20 I would say it would be. But I think there are  
21 probably other sources of water.

22 Q. So compatibility will not be an issue here,  
23 or shouldn't the Commission even consider  
24 compatibility of water that is coming in and the water  
25 that is there that could be utilized as a waterflood

1 in the Grayburg?

2 A. Yeah, I think the Commission should consider  
3 the availability of water compatibility in the  
4 waterflood and where that alternative water may come  
5 from.

6 Q. So when Empire talks about there's a high  
7 possibility that there could be some high level of  
8 scales, that even is not easy to treat, should the  
9 Commission not consider that?

10 A. I think the Commission should consider  
11 everything possible.

12 Q. My last question to you, when Mr. Beck  
13 talked about concentrated strata that represents  
14 communication barrier, I mean, can you show the  
15 Commission a cross-section to really establish this?

16 A. Across -- could you repeat that question?

17 Q. So he said -- you've testified that you  
18 support the assessment that there's a concentrated  
19 strata that represents the communication barrier; is  
20 that correct?

21 A. Yes. Correctly.

22 Q. And I'm asking you can you show a  
23 cross-section, a well established cross-section that  
24 is supported by a core, that is supported to mud logs,  
25 that is supported by logs to establish this statement?

1           A. Yes. I think the 679 core establishes the  
2 vertical perm barriers towards the top of the  
3 San Andres in this well. I think the 300-foot well on  
4 the EMSU 460 that's 300 feet away says this interval  
5 is correlatable if you -- if I could corroborate  
6 Preston's cross-section or if you believe that  
7 cross-section that this interval that has established  
8 perm barriers from this core data is correlative  
9 across the EMSU.

10                   And I think the cross-section provided  
11 by Empire here shows that all of the geologists  
12 previous that have picked the San Andres, I didn't,  
13 but that is kind of continuous across the EMSU.

14           Q. Thank you.

15                   HEARING OFFICER HARWOOD: Thank you,  
16 Dr. Ampomah.

17                   Mr. Lamkin, any additional questions for  
18 Mr. Knights.

19                   COMMISSIONER LAMKIN: I just have one  
20 question.

21                                   EXAMINATION

22 BY COMMISSIONER LAMKIN:

23           Q. Would the heterogeneity of this interval  
24 that we've been discussing and the inconsistency of  
25 these low permeability zones affect formation parting



1 pressure?

2 A. I would assume it would, but I do not know.  
3 That's not my expertise.

4 COMMISSIONER LAMKIN: Thank you.

5 HEARING OFFICER HARWOOD: Mr. Rozatos, any  
6 questions for Mr. Knights.

7 CHAIR ROZATOS: I do not, but thank you  
8 Mr. Knights for your time. We appreciate it.

9 HEARING OFFICER HARWOOD: Mr. Shandler,  
10 don't want to leave you out.

11 May this witness be excused?

12 MR. WEHMEYER: Yes, on behalf of Empire.

13 MR. RANKIN: Mr. Hearing Officer, I'm sure  
14 Mr. Knights has far better things to do at this in  
15 his life, so yes, I ask that he be excused.

16 HEARING OFFICER HARWOOD: Before we break  
17 for lunch, you can you tell us who your next witness  
18 will be.

19 MR. RANKIN: In consultation with Empire's  
20 counsel, Mr. Hearing Officer, we were going to resume  
21 the cross of Mr. McBeath. I'm going to make sure  
22 during the lunch break that he's available. And  
23 depending on how long that goes, then we would move  
24 into the direct testimony of Mr. Nate Allman. And  
25 then we were hoping to have Mr. Lake available if

1 necessary this afternoon, because he's scheduled to  
2 fly in this afternoon and arrive in Santa Fe at 1:30.  
3 However, his flight had issues so he had to take  
4 another route and he's arriving in Albuquerque this  
5 evening at 8:00.

6 So if we happen to finish Mr. Allman  
7 early, I would ask that we be able to resume with  
8 Dr. Lake in the morning. I know that we can't start  
9 till 10:30. But that's my request of the Commission.

10 HEARING OFFICER HARWOOD: So after lunch,  
11 you'll be back up with Mr. McBeath. All right.

12 MR. RANKIN: And just to be clear,  
13 Mr. Hearing Officer, and counsel understands this as  
14 well, Mr. McBeath will be testifying via the Teams  
15 platform.

16 HEARING OFFICER HARWOOD: Well, we hope he  
17 will, given this morning's technical activities.

18 Mr. Chairman, what's your pleasure in  
19 terms of when we should be back here.

20 CHAIR ROZATOS: Let's come back at 1:15.

21 HEARING OFFICER HARWOOD: And if you all  
22 have time or the opportunity to discuss scheduling of  
23 the remaining witnesses over lunch, that would be  
24 appreciated. All right. Thank you we'll be  
25 adjourned till 1:15.

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(Lunch recess was held from  
12:00 to 1:15 p.m.)

HEARING OFFICER HARWOOD: I believe I see a familiar face there on the platform. Is that John McBeath I see?

MR. RANKIN: Yes, it is, Mr. Hearing Officer. Mr. McBeath is on the platform.

HEARING OFFICER HARWOOD: Mr. McBeath, you're on mute.

MR. RANKIN: Mr. MacBeath, can you hear us.

CHAIR ROZATOS: Mr. Rankin, you may want to double alcoholic that he's connected to the sound.

MR. RANKIN: Mr. MacBeath, can you hear us now.

HEARING OFFICER HARWOOD: Mr. MacBeath, it's been a few days, so just to err on the side of caution I'm going to put you under oath again, if you would raise your right hand.

Mr. Wehmeyer, take it away with your cross-examination.

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JOHN MCBEATH,

having first been duly sworn, testified as follows:

CROSS EXAMINATION (Cont'd)

BY MR. WEHMEYER:

Q. Mr. MacBeath, can you hear me okay?

A. I can hear you fine.

Q. I'll apologize in advance with the cumbersome procedure with doing this remotely.

And so much time has passed. I think when we left off last time, we had moved in your analysis over to talking about commodity price as part of the economic case. Does that square with roughly where you think maybe we left off, we were talking on price?

A. I think that's right.

Q. And just in terms of your economic model, we did cover this, but I just want to hit a couple high points so that the commissioners understand what you did.

You obviously had the economic case that was prepared by Empire in the first instance which had, as part of the economic case, assumptions in like pricing and had assumptions in it like operating costs, had CapEx in it, had curves for recovery factor, and then obviously has volumes, oil-in-place

1 volumes to start with.

2 Does that generally square with what you  
3 remember in terms of the economic case you had from  
4 Empire?

5 A. With a couple of little comments or  
6 corrections. So there's not really a recovery curve.  
7 There's a dimensionless curve. And if you stop the CO2  
8 injection at a particular time, that will define  
9 recovery. That's how it works in the model. And so  
10 with that clarification, I think I agree with what you  
11 said.

12 Q. Okay. And so just coming back, obviously  
13 you had critiques of the model. But you did not build  
14 your own ground-up economic case here as part of your  
15 work, did you?

16 A. I did not build an independent model. I  
17 used Empire's as a starting point and then made  
18 corrections to it.

19 Q. So we talked last time, and again, I'm not  
20 going to rehash everything we covered last round, but  
21 at a real high level, you critiqued the dimensionless  
22 curve, but didn't build your own curve?

23 A. No, I did not.

24 Q. Then with respect to operating expenses, you  
25 didn't do a ground-up operating expense analysis.

1 Basically, your chief criticism of Empire here was  
2 their use of a dollar MCF on CO2?

3 A. Okay. So you're calling the CO2 expense an  
4 operating expense. That's right, because the  
5 assumption was, and this comes from Mr. West's  
6 deposition, that because of 45Q tax credits, that he  
7 thinks he can get the CO2 for 50 cents and MCF cheaper.

8 And so I was concerned about the  
9 certainty of that assumption. So to show the show  
10 sensitivity of economics to this factor, I ran it with  
11 and without that 50 cents.

12 Q. So basically, the difference between \$1 and  
13 \$1.50?

14 A. That's one of the variables I changed,  
15 that's right.

16 Q. And I'm just trying to bracket this for the  
17 commissioners to simplify the remainder of the  
18 testimony so we know the points we're fussing over and  
19 not.

20 Other than moving CO2 from \$1 to \$1.50,  
21 and I put it in an OpEx or an expense category, is  
22 there a better way I can speak to this to be more  
23 accurate?

24 A. I think it's broken out as a separate CO2  
25 expense in the model. But I just wanted to make sure

1 we were on the same page, because I didn't change any  
2 of the other OpEx numbers in their model.

3 Q. So as we talk about the expense case, you  
4 didn't change anything on CapEx, did you?

5 A. I did not.

6 Q. And you didn't change anything in any of  
7 OpEx case except for under your model, you ran it as  
8 \$1.50 CO2 instead of \$1 CO2?

9 A. Correct.

10 Q. Was there any fuss on the volumes of CO2?  
11 Did you quantify that in your analysis?

12 A. I did not. I did not touch the volumes  
13 versus recovered oil. Well, let me just make a  
14 clarification.

15 In my corrections, because you changed  
16 the hydrocarbon pore volume of each pattern when you  
17 changed the porosity and the saturation, you reach  
18 the -- the amount of CO2 that's required for those  
19 lower hydrocarbon pore volume runs is going to be less  
20 just because you've reduced it. And the model is set  
21 up to shut off after three pore volumes, hydrocarbon  
22 pore volumes of CO2.

23 Q. Whose model?

24 A. Empire's model.

25 Q. And in your model, did you adjust that?

1           A. It automatically adjusts so that it stops at  
2 three hydrocarbon pore volumes of CO2.

3           Q. So your model is the same or different? And  
4 if it's different, in what way?

5           A. Well, I think we're talking past each other.  
6 I was trying to be helpful with this clarification,  
7 but maybe it wasn't all that helpful.

8                   All I'm saying is, if you compare the  
9 unadjusted West run, the one that we were given from  
10 Empire, if you compare that to my runs, there's less  
11 CO2 because the hydrocarbon pore volume is reduced when  
12 I adjust the porosity and the oil saturation. Because  
13 I stopped it at the same hydrocarbon pore volumes,  
14 three pore volumes, which equates to the same recovery  
15 factor.

16           Q. Okay. So you actually use less CO2 in your  
17 model?

18           A. Yes, that's correct. In certain runs,  
19 that's right.

20           Q. Just as we talked about variables, for the  
21 commissioners, to simply this down in terms of what  
22 the fuss is, really on all that expense case, the  
23 volumes of CO2 are pretty close, don't, you know, move  
24 the end point that much. It really here is that  
25 change over \$1 CO2 versus \$1.50. Is that generally



1 fair?

2 A. I don't think I made the runs with only the  
3 CO2 price change, which I'd have to do to answer that  
4 question, because I kind of accumulate the changes. I  
5 either use a flat price, a futures price, and then  
6 with and without the CO2 change.

7 Q. And now I'm confident we talked past each  
8 other. I'm not getting to revenue yet. I'm just  
9 focused on the expense side. So we're just talking  
10 about everything on the expense side, and we've  
11 covered you didn't build your own model, what you've  
12 done is started with the Empire model and critiqued it  
13 and adjusted dials as you saw appropriate.

14 On the expense side, is the only dial  
15 you adjusted the cost of CO2?

16 A. That's true on the expense side.

17 Q. Again, we'll just cover this at a high level  
18 so we've got it framed up.

19 On the revenue side, the only thing you  
20 changed was running it at a couple different price  
21 tags. One would be a flat deck and one would be a  
22 Nymex that actually would move oil prices to less than  
23 a flat deck on yours?

24 A. Those are the changes I made to the price  
25 deck. But, again, you mentioned revenue in the first

1 part of that question, and price definitely affects  
2 revenue, but so does produced volume. And when I  
3 adjust the hydrocarbon pore volume for each pattern,  
4 that means we're producing less oil, so that has an  
5 effect of revenue, too.

6 Q. And then by way of volumes, the volumes of  
7 recoverable hydrocarbon, all of your volumes, you  
8 didn't do a ground-up reserve analysis there. You  
9 used the volumes that came from the work of  
10 Dr. Davidson and Mr. Knights; is that right?

11 A. I think it's going to be exclusively  
12 Dr. Davidson.

13 Q. Okay. So now I kind of just want to dig  
14 into each of these, but are there any other variables  
15 between the work that Empire did versus the work that  
16 you did that you think is important to point out  
17 before we start talking about these categories of  
18 differences?

19 A. On economics?

20 Q. Yes. I'm not talking about barriers or  
21 anything at this point. Just economics of the CO2 EOR  
22 project that Empire has presented to the Commission  
23 that it intends to carry out.

24 A. You've covered all the changes I've made to  
25 their economics.

1 Q. So let's just take the volumes very briefly.  
2 You heard that came from -- you said you got those  
3 straight from Dr. Davidson?

4 A. Well, I got the log files from him. And  
5 then I did the averaging myself.

6 Q. Okay. But, again, that was all of his work,  
7 that was what we heard here in terms of the  
8 petrophysical analysis and facies changes and sort of  
9 thing, right?

10 A. That's right.

11 Q. And so I know how much you've hear, and I  
12 know you've been remote here, have you been monitoring  
13 all these proceedings, since you haven't been here in  
14 the examination room?

15 A. For the most part. Not every single minute.  
16 But for the most part, I either had my phone with me  
17 or here at my computer.

18 Q. Very good. Now, by way of facies selection,  
19 you, by training and education and certification, are  
20 an engineer, right?

21 A. That's true.

22 Q. And I think it was covered at the deposition  
23 that you could look at a log, but you being an  
24 engineer, you're never going to be the guy that  
25 actually goes in and is picking tops, right?

1           A. I don't recall if that came up at the depo,  
2 but I mean, I do pick tops in my work sometimes.  
3 Sometimes they're easy, sometimes they're not easy.

4           Q. In a situation like this, in terms of  
5 picking the top of the San Andres or the Lovington  
6 Sand, the Lower San Andres, that's nothing you've done  
7 here, correct?

8           A. Except for three wells that are mentioned in  
9 my original statement that surround the 211.

10          Q. Those three wells being what?

11          A. They're three water supply wells.

12          Q. And what --

13          A. 457, 458 and 159, from memory. But they  
14 sort of form a triangle around the 211.

15          Q. What was your methodology used for picking  
16 those tops?

17          A. Well, on those, I went and looked at what  
18 the original operators had picked and used those tops.  
19 If that's not picking the top, then I'm not going to  
20 argue with you.

21          Q. And I think we talked a little bit about,  
22 you know, looking at and analyzing. But in those  
23 instances, you just went to the Commission file, took  
24 what the operators used and adopted that?

25          A. That's true, yes.

1 Q. You weren't looking at core, you weren't  
2 correlating logs; there was none of that kind of work  
3 as part of that?

4 A. Yes. Absolutely true.

5 Q. Given that Dr. Davidson chose a facies  
6 model -- and you heard that he didn't do any of the  
7 geology work here. Did you actually hear his  
8 testimony that he is not a geologist and not purport  
9 to opine as a geologist?

10 A. I think I remember him saying he wasn't a  
11 geologist.

12 Q. Doesn't that give you concern, that he built  
13 an entire facies model with respect to his  
14 petrophysical evaluation and is not a geologist and  
15 didn't do any of the literature searches and outcrops  
16 studies, lay eyes on the actual cores? In terms of  
17 your model being -- your economic case being wholly  
18 dependent on his work, doesn't that give you concern?

19 A. No. My discussions with him about the way  
20 he analyzed the different intervals suggests that it  
21 was rigorous, that it was based on standards that have  
22 been around for a long time. Yeah, it doesn't give me  
23 any concern at all.

24 Q. With respect to n values, in an Archie's  
25 equation those are things you use as part of your

1 work?

2 A. Yes.

3 Q. If you're seeing n values that are between  
4 10 and 113, would that give you concern about the  
5 reliability of that data and how it should be used?

6 A. Well, tell me what formation we're in and  
7 I'll answer that.

8 Q. San Andres.

9 A. Well, I think there's a really good  
10 discussion in Dr. Davidson's original statement.  
11 There's an appendix about the different types of  
12 saturation models that have been developed. He  
13 discusses why Archie's doesn't work well in oil wet  
14 intervals.

15 So you know, we're talking about  
16 Archie's and maybe back calculating n zones that are  
17 either not reservoir or very poor reservoir or perhaps  
18 leaning towards an unconventional zone. So I don't  
19 know the utility of back calculating an n and then  
20 using that as a basis to throw away some core  
21 information.

22 Q. With respect to Dr. Davidson's work, you  
23 certainly can back calculate and n out of that, can't  
24 you?

25 A. I suppose -- it looks like somebody did it.

1 I haven't done that. I haven't looked at it.

2 Q. With respect to plotting the measurements  
3 from core, and I don't want to beat this dead horse,  
4 but, you know, with respect to the core here that we  
5 have out of the 679, you don't know how the core was  
6 handled, right, how long it sat around before they got  
7 around to measuring?

8 A. Personally, I don't, no.

9 Q. So you know that the lost oil will vary by a  
10 number of factors, including things like gas  
11 expulsion?

12 A. I generally know that, but that's not to  
13 huge portion of my practice, looking at cores and  
14 thinking about cores.

15 Q. Additionally, just in terms of how long the  
16 core sat around, that could also, through evaporation  
17 or otherwise, lead to loss?

18 A. I suppose it could if there were extremes to  
19 that. In my experience with cores, you're taking --  
20 they're expensive so they're handled carefully and  
21 sent off to labs pretty quickly.

22 Q. In this particular instance, so on the plot  
23 where you have ends up to 113, that would be part of  
24 the data plot that Dr. Davidson used. Again, just the  
25 first question I had that kind of started this, based

1 on your work, I mean, if you're seeing an n that high,  
2 isn't that kind of a red flag that you think something  
3 is wrong here with the data point?

4 A. Honestly, I didn't see a chart that had n  
5 equals 113. And maybe I missed it when you were  
6 showing that to Mr. Knights.

7 But I think back calculating n's using  
8 Archie's in an oil wet carbonate, I don't really  
9 understand the utility of that.

10 Q. As we continue to talk about volumes, you  
11 heard the testimony that if something had -- if it had  
12 less than a 20 percent oil saturation for the  
13 interval, all of that oil would be excluded from the  
14 oil-in-place case of what Dr. Davidson gave you. Yes?

15 A. I heard a lot of questions about that. I'm  
16 not sure I'm familiar with how that map or those  
17 summations were done. I just don't know.

18 Q. Stated differently, in terms of your  
19 opinions here in the economic case, you don't know  
20 whether oil saturations below 20 percent would have  
21 been excluded from the oil-in-place volumes that you  
22 used for your economics. True?

23 A. Oil in place. So I took my averages  
24 directly from the LAS files that I got from  
25 Dr. Davidson. I don't know if those LAS files in that



1 process is where this reduction that you're suggesting  
2 occurred or if it occurred once a subsequent  
3 calculation was made for oil in place. I don't know.

4 Q. And, again, that's I think exactly the  
5 question here, is with respect to the files that  
6 you've got and the oil-in-place volumes that you used  
7 for your economics, you don't know one way or the  
8 other whether all of the oil under 20 percent  
9 saturation interval would have been excluded from  
10 that, you don't know that one way or the other as you  
11 sit here, do you?

12 A. I don't, no.

13 Q. If it was excluded, you would agree that  
14 some of that oil in an EOR is actually going to be  
15 recovered here, wouldn't it?

16 A. Which oil are we talking about?

17 Q. Oil that would be between zero and  
18 20 percent in saturation intervals of zero to  
19 20 percent. And I'm not saying you're recovering all  
20 of it. But some of those volumes would be recovered?

21 A. Depends on if you could efficiently and  
22 effectively contact it with CO2.

23 Q. With respect to miscibility studies or the  
24 effective contact, is that anything that you've done  
25 here?

1           A. I have not. I have noted the absence of  
2 miscibility studies in the work that Empire presented  
3 and the data they gave to us and --

4           Q. And, again --

5           A. -- the importance of miscibility.

6           Q. I apologize, I'm stepping on your answer  
7 just with this remote procedure. I apologize for  
8 that.

9           A. I paused. It's my fault.

10          Q. Now, so, again, if the Commission wants to  
11 see a recovery factor here, in your models, that's not  
12 work you've done, that's a variable between the Empire  
13 work and your work that we have to fuss over, is it?

14          A. In the economics?

15          Q. Yes.

16          A. That's true in the economics. I did some  
17 recovery calculations on the Tall Cotton.

18          Q. But, again, in terms of the economics  
19 presented to the commissioners here for the actual EOR  
20 development of the EMSU, you haven't done that. True?

21          A. That's true. I didn't mess with their  
22 recovery factor. I didn't. I left it alone.

23          Q. And we talked about Tall Cotton, and that  
24 has come up in both Dr. Davidson and Mr. Knights'  
25 testimony. I'm not going to beat that dead horse

1 again. But when we showed the graph that came out of  
2 the Goodnight presentation, do you remember it tracks  
3 that Tall Cotton production and then it falls off?

4 A. Which Goodnight presentation are you talking  
5 about?

6 Q. I actually think the same graph that's been  
7 shown multiple times, but I think maybe even you  
8 showed it. It's the green plotted graph of Tall  
9 Cotton oil production.

10 A. My graph is different than Mr. Knights'. He  
11 did it on a log scale. Mine is Artesian rate versus  
12 cum. But they are both green, I'll give you that.

13 Q. Let's talk about yours because you're  
14 familiar with that one for sure. And I just want a  
15 reality check, because there's been testimony from  
16 Mr. Melzer about fracking in the injection wells.

17 But as an engineer, just knowing what  
18 you know about EOR projects, if you're looking at that  
19 curve off of actual data points, wouldn't some flag go  
20 off in your head that's there's an engineering  
21 technical explanation for this, as opposed to, you  
22 know, a typical decline that you would expect through  
23 the production of hydrocarbon?

24 A. I mean, there are some jumps in that curve.  
25 It's a relatively small project. Normally when we're

1 looking at data relating to a CO2 project, there's  
2 going to be many more wells, injectors and producers.  
3 So the effect of one or two wells would probably be  
4 muted on most of the curves we look at. Tall Cotton  
5 is a little smaller, so one or two wells coming on or  
6 off or having a problem could impact that curve like  
7 we see those changes.

8 Q. And just in terms of reality checks here, as  
9 an engineer, if you just look at that graph, you're  
10 going to go looking for some kind of a technical  
11 engineering operational explanation as opposed to  
12 there just being no more hydrocarbon to be recovered?  
13 Wouldn't that flag to you that this is something that  
14 needs to be investigated from an operations technical  
15 perspective?

16 A. Well, the reason we looked at Tall Cotton is  
17 its unique because you don't have very many  
18 opportunities to look at production data and know that  
19 it only came from an ROZ. If you're in a field like  
20 Wasson or Seminole San Andres, where there has been  
21 ROZs, they're almost always lumped with the main pay.  
22 And they're also -- you have the problem in Texas  
23 where you don't have individual well production,  
24 you've got one production number for the entire unit  
25 for the month. That's why I looked at it.

1           Now, I heard one of Empire's witnesses  
2 talk about the allegations of problems with wells.  
3 But, typically, when stuff like that happens, there's  
4 not going to be a filing at the Railroad Commission  
5 for me to go look at. Operators don't memorialize  
6 failures like that, typically. So I don't know where  
7 I'd go to look to investigate that.

8           Q. And I don't think I got an answer to my  
9 question. This is a simple yes or no.

10           As an engineer if somebody brings it to  
11 you and says, "Look at this curve," just looking at  
12 that curve and how drastically the parts -- you can't  
13 draw a nice clean line through it, as a good engineer,  
14 isn't there going to be a flat that you say, "I want  
15 to dig farther into this"?

16           Now, I'm not asking about what's  
17 publicly available, but wouldn't you have a flag that  
18 makes you suspect that there's something, technical  
19 ops, engineering, that would explain that decline?

20           A. I don't have it in front of me, but if you  
21 look at that part of that curve where I did put the  
22 line, I am comfortable extrapolating those operations  
23 out into the future. And I took it to a zero rate,  
24 which is conservative. Nobody is going to produce  
25 down to zero because they can't afford the OpEx to do

1 that.

2 So if there's some stuff going on prior  
3 to that, but that's also in times where we're adding  
4 ten-acre changes and we're adding additional wells, so  
5 I really don't see anything in that plot that tells me  
6 I shouldn't extrapolate that into the future.

7 Q. And my question is if you looking at this for  
8 a client, you're telling this Commission that that  
9 graph is not anything that would trigger something in  
10 your head that says I need to investigate this from an  
11 ops technical? Is that the answer to that no, you're  
12 satisfied with it? You would take --

13 A. If you look at where I extrapolated that,  
14 there's nice smooth data, so the answer is no.

15 Q. Now, moving over to the CO2 case and that  
16 variable, you say not a buck, a buck-50, and the 45Q  
17 credits is your basis for that difference?

18 A. For that difference, yes.

19 Q. Now in terms of actually assisting client in  
20 securing 45Q credits, that anything you've ever done?

21 A. So we've had a number of discussions about  
22 that with clients, and I don't think we've ever been  
23 involved in the actual, I don't know what they call  
24 it, accounting or tax filings for that. But we've  
25 helped people look at what could be required for proof

1 that the CO2 is going to stay where you're injecting  
2 it.

3 Q. But the actual process of seeing it all the  
4 way through to secure the credits, have you done that  
5 all the way through a project for a client?

6 A. I don't think very many people have done  
7 that yet.

8 Q. And so here, in terms of telling the  
9 Commission about your practical experience about being  
10 unsuccessful in securing 45Q credits or successful,  
11 you can't share with the Commission any personal  
12 experience with that, can you?

13 A. The reason I did that change to the variable  
14 was because if you look at the economics from the  
15 standpoint of an investor, sort of kicking the tires,  
16 that's a pretty unsupported assumption to just remove  
17 50 cents or MCF for the CO2 price. And so I wanted to  
18 see the effect of that on the economics, so you put  
19 the 50 cents back in.

20 Q. And, again, Mr. McBeath, if you'll just help  
21 me by answering the question I'm asking, and then we  
22 can move on to the next one, and this will all go  
23 quicker.

24 My question was, in terms of actually  
25 seeing a 45Q project through for a client and being

1 successful or unsuccessful securing those, that's  
2 nothing that you have experience with that you could  
3 tell the Commission about?

4 A. Not with the actual tax credit, that's  
5 right.

6 Q. And then you said it would just be something  
7 an investor would want to consider, that it would not  
8 be a certain of getting that 45Q tax credit to bring  
9 CO2 down to a buck. That's basically what you were  
10 conveying there?

11 A. Sure. I think any investor would want to  
12 know how certain that was.

13 Q. Wouldn't they want to also know if a  
14 commercial saltwater disposal operator is injecting  
15 hundreds of thousands of barrels of saltwater into the  
16 recovery unit?

17 A. If the injection is taking place in a zone  
18 that you're going to try to do a CO2 flood in, that's  
19 right.

20 Q. So that the commissioners, as they make  
21 their decisions in this case, in talking about what an  
22 investor would want to know about before starting a  
23 tertiary project here in the San Andres -- are you be  
24 me so far on what we're talking about?

25 A. Yes.



1 Q. -- you can tell them that an investor would  
2 absolutely be aware of and concerned about saltwater  
3 injection into the EOR tertiary flood area. Yes?

4 A. Yes. As long as we're on the same page. As  
5 long as that hypothetical CO2 flood is in the zone  
6 where the saltwater is being disposed of.

7 Q. And you've heard Empire's testimony that  
8 their intention is to flood the entire San Andres,  
9 lower and upper, right?

10 A. I've heard two version of that testimony.  
11 One at a deposition in December, where Mr. West said  
12 the model was the top 400 feet of the San Andres,  
13 "which we relied upon to do our work." And then I  
14 heard that changed to include the whole San Andres.

15 Q. And, again, in terms of investors, you  
16 understand that Empire here is publicly traded. And  
17 there has been discussion about whether they would  
18 need to raise money or not to pursue the project,  
19 correct?

20 A. I know they're publicly traded.

21 Q. Just bringing this back to reality checks.  
22 They wouldn't have to bite off on \$1.2 billion of  
23 CapEx to carry the project out. You would probably  
24 start it at a far smaller capital expenditure on 10-  
25 or 40-acre spacing across a section, you know, high

1 grading based on your what you think the best areas  
2 are, wouldn't you?

3 A. That's possible, as long as you can contain  
4 the CO2 on the lateral edges of that.

5 Q. Okay. And so, again, as we bring it back  
6 here to just giving Empire a chance, I do remember we  
7 covered this. The minerals here are owned  
8 approximately 60 percent by the State of New Mexico,  
9 about 20 percent by the BLM, and about 20 percent by  
10 fee, right?

11 A. I think you reminded me that those numbers  
12 came from the unitization proceeding. So I don't  
13 recall them exactly, but I'll take your word for it.

14 Q. Okay. And the concept, we all agree here  
15 that what would be the most likely case is you would  
16 go in on 10- or 40-acre spacing across the section or  
17 more or less in terms of proving up the concept. And  
18 I guess just in terms of that, obviously, there's  
19 going to be a lot of engineering, a lot of geology, a  
20 lot of petrophysical analyses, where they're going to  
21 try to pick their best spot, right?

22 A. I expected to see a lot of that prior to  
23 this hearing. But if you tell me -- if I assume that  
24 there's a project going forward, I can also assume  
25 there's a lot of work to be done.

1 Q. This EMSU, this field -- not the EMSU. But  
2 this area has been producing since the '30s, yeah?

3 A. Maybe even before the '30s, yes.

4 Q. Was it late '20s, early '30?

5 A. I think early '20s some of the discovery  
6 wells.

7 Q. Isn't that one the prerogatives of an oil  
8 and gas operator, when they own that oil and gas  
9 lease, is to develop and plan their developments, you  
10 know, at the pleasure of their own timing as long as  
11 the lease is being held?

12 A. There might be some royalty owners that  
13 would disagree with you on that.

14 Q. You're not aware of any failure-to-develop  
15 lawsuits out here, are you?

16 A. No, I'm not.

17 Q. Again, coming back here, in terms of the  
18 tertiary recovery, it's not a fair criticism of Empire  
19 that they don't have all the models built to your  
20 satisfaction from an economic case because this has  
21 all been rushed as a result of this injection of this  
22 saltwater disposal. Empire has not been allowed --

23 MR. RANKIN: Objection to testifying by  
24 Mr. Wehmeyer.

25 HEARING OFFICER HARWOOD: It is a bit of a

1 narrative, Mr. Wehmeyer. Maybe you can break it up.

2 BY MR. WEHMEYER:

3 Q. So part of your fuss, and you've talked  
4 about this in your filed papers with the Commission,  
5 is that you expect more data, right, from Empire?

6 A. More analysis, I would say.

7 Q. With respect to more analysis, again, you  
8 understand that there is an urgency here to Empire  
9 bringing this to the Commission as a result of these  
10 vast volumes of saltwater disposal being injected into  
11 the San Andres, correct?

12 A. I mean, I can -- you're telling me that  
13 Empire has urgency? I don't know. That's not an  
14 engineering term. I'm not sure how I'd incorporate  
15 that into my work.

16 Q. But in terms of the relative volumes, which  
17 I don't want to show the graph again, but you've seen  
18 that stacked graph with the orange on top and the blue  
19 on bottom. I mean, these volumes that Goodnight is  
20 bringing into the EMSU are in scales vastly more than  
21 what has ever happened historically here, right?

22 A. Well, I mean, there's been a longer time  
23 historically. So you'd have to add up all the  
24 disposal in the past and compare it with what has  
25 happened in a relatively short time. I haven't done

1 that.

2 Q. Now, coming back to the \$1.50, just as we  
3 talk about the expense side, the \$1.50 versus a buck,  
4 you said, well, an investor might not be willing to  
5 take the uncertainty of this being dollar CO2 with the  
6 45Q credits, and they might want to model in a  
7 buck-50, right?

8 A. Or more. I even think the \$1.50 base number  
9 is kind of low.

10 Q. Have you brought any studies or anything in  
11 your written filed statements that explain how the  
12 buck-50 is low?

13 A. Now, I haven't. There's very little public  
14 data on CO2 prices. So you can hear stuff on the  
15 street, but that's about it.

16 Q. So as we talk about CO2 prices at a buck-50,  
17 you just said there's very little data on it, what you  
18 hear on the street. As we talk about uncertainties in  
19 your assumptions in your model, you can give me that a  
20 buck-50 is also an uncertainty in your model. Yes?

21 A. Well, in mine and in Empire's, that's right.

22 Q. And Empire could look at this from the  
23 economic perspective of: We're confident, we're going  
24 to get the 45Q credit and \$1 good for us to proceed.  
25 Right?

1           A. Yeah, they can do whatever they want, I  
2 guess.

3           Q. And, again, this comes back to shouldn't  
4 they at least be given the chance, given that they own  
5 these leases and this unit has been established for  
6 decades?

7           A. So I think that's a question that the  
8 Commission will struggle with. But my analysis was to  
9 look at the information available to try to see -- the  
10 reason I only messed with, you know, three components,  
11 with three variables in the economics, is I looked at  
12 those three obvious ones and it drove the economics  
13 south.

14                   If I had sharpened my pencil and did  
15 more work on the recovery which I think is too strong  
16 at 18 and a half percent, I would have gotten even  
17 further sort of negative. So my understanding is, and  
18 I'm not a lawyer, but we're talking about whether  
19 there's really waste here or not, and my understanding  
20 is that for something to really be waste it has to be  
21 economically viable. And that was the purpose of my  
22 looking at those economic calculations.

23           Q. As we talk about economic viability in this  
24 variable of the cost of CO2, you've already given me  
25 that, according to you, that's uncertain, not a lot of

1 public data, what you're working off of is, quote,  
2 word on the street, right?

3 A. No. What I said was I think that the \$1.50  
4 is low and I think if we were to investigate that, you  
5 know, either get information from suppliers, it would  
6 be higher than that, which would drive the economics  
7 down.

8 Q. If Empire is successful getting the 45Q  
9 credits to bring CO2 down to a buck -- you with me so  
10 far on the assumption?

11 A. Yes.

12 Q. -- you have not offered the Commission any  
13 opinions under the hypothetical that they're  
14 successful with the 45Q credit that the dollar is  
15 wrong, have you?

16 A. I have not.

17 Q. So, again, if Empire is willing to accept  
18 the case that it will get those 45Q credits and bring  
19 it down to \$1, I mean, I guess really what we're  
20 fussing over at this point then, is whether they can  
21 get the 45Q credits, because if they get them -- are  
22 you with me so far on the hypothetical?

23 A. If they get the credits?

24 Q. Yes.

25 A. Yes, I'm with you.

1 Q. -- you would not have a different CO2 price  
2 to share with the Commission besides the buck that is  
3 in the Empire model that they've already testified to;  
4 isn't that right?

5 A. Well, assuming I wasn't allowed to revise my  
6 calculations, I guess you're right.

7 Q. Now I want to move on -- and I'm sorry, I  
8 jumped over the buck-50 where I wanted to tie the loop  
9 around this.

10 As you talk about initial development of  
11 a section or more than a section or maybe a little  
12 less than a section, if we're focused on that,  
13 obviously there's going to be a lot of science and a  
14 lot of engineering that would go into picking what  
15 section that happens on, right?

16 A. Okay. You said I talked about development  
17 of a section?

18 Q. No, sir, I'm sorry. I missed on the  
19 question.

20 Earlier, we were talking about just the  
21 development, that you wouldn't do this across 14,000  
22 acres or 10,000 acres on the first day. You don't go  
23 out with \$1.2 billion on day one. You're going to  
24 start on smaller scale, right?

25 A. It's possible you would implement areas of



1 the field sequentially, that's true.

2 Q. And as you work sequentially, I'm just  
3 trying to get the Commission a rough sense on  
4 geography, are we talking here 640 acres? Would that  
5 be reasonable to you? Bigger? Smaller?

6 A. I can't really answer that, as I sit here.  
7 I'm not sure.

8 Q. Is that just because you don't have  
9 experience with actual EOR and tertiary projects in  
10 terms of, you know, the startup of the project?

11 A. No. It really turns on -- so if you're in a  
12 field where you have many acres, like we have here, to  
13 do that, there is some downside to doing pilot  
14 projects because you have boundary effects where  
15 you're going to lose recovery. You know, as long as  
16 you have injectors surrounding producers, you're  
17 probably going to be able to capture CO2 on the  
18 interior. Obviously this a hypothetical about some  
19 generic CO2 flood.

20 But on boundaries, you kind of lose out.  
21 So there would have to be some kind of analysis of  
22 where to do that, where to start if you could do that.  
23 And I'll note that even the economic spreadsheet that  
24 was provided, it goes pattern by pattern and moves  
25 each pattern out in time by some amount. So it is

1 kind of staged already in the economics.

2 Q. Yes, sir. And so what I'm coming back to,  
3 though, is in selecting that location where you start,  
4 aren't you going to want to pick the location that,  
5 based on your science and engineering, you think is  
6 your best spot for all the reasons you just spoke to?

7 A. Could be, yes. It's likely. Let me say  
8 likely.

9 Q. And just the way the San Andres works out  
10 here, there are going to be sections of land that have  
11 higher oil in place in them than other sections of  
12 land, aren't there?

13 A. Which San Andres are we talking about?

14 Q. All of it.

15 A. I suspect there will be variations, even  
16 under Dr. Davidson's analysis.

17 Q. So I would call that high grading. I don't  
18 know -- if we talk about the best spots based on the  
19 petrophysical work of Empire, can we be on the same  
20 thing that I'm talking about high graded spots?

21 A. Yeah. I don't have a problem with that  
22 term.

23 Q. So as we talk about high grading, now, with  
24 respect to your economic case, your economic case did  
25 a blanket assessment across the entire EMSU, correct?

1 MR. RANKIN: Objection. Mischaracterizing  
2 Mr. McBeath's testimony. Mr. McBeath's testimony was  
3 that he applied Empire's economic model that they  
4 planned to implement.

5 HEARING OFFICER HARWOOD: Well, he can say  
6 that.

7 THE WITNESS: Do you want me to answer it?

8 HEARING OFFICER HARWOOD: Yes, sir.  
9 Overruled.

10 A. So actually, the 72-pattern model does not  
11 cover all of the EMSU. And it's not my model. It's  
12 Empire's with adjustments.

13 Q. That's because yaw didn't build your own  
14 model here as part of Goodnight's application for the  
15 saltwater disposal wells, right?

16 A. That's true.

17 Q. Okay. And you understand part of this  
18 proceeding are these new application from Goodnight  
19 for even more saltwater disposal wells inside the  
20 EMSU? You understand that?

21 A. I do.

22 Q. If the commissioners wanted to know as part  
23 of that application, where they would go to find a  
24 ground-up economic analysis built by a petroleum  
25 engineer, you're not aware of any such analysis?

1 True?

2 A. And what kind of economic analysis are you  
3 asking about?

4 Q. To assess whether there's waste. An actual  
5 model built from the ground up by an engineer that  
6 going to come in for Goodnight as part of its  
7 application for SWDs and say, "This is our model.  
8 This is what we think is reasonable." Have you done  
9 that or have you seen one?

10 A. I think my adjustments to Empire's model  
11 fulfill what you've just asked. They show that their  
12 assumptions are not economic.

13 Q. We're going to dig more into that. But,  
14 again, really the variable there is chiefly price,  
15 volume and the cost of CO2, commodity price and volume  
16 of hydrocarbon, right?

17 A. Did you say oil price?

18 Q. Yes. Commodity price.

19 A. Oh, commodity price. Those are the  
20 variables I changed, yes.

21 Q. And we've already talked at length about the  
22 buck-50, and I'm done talking on that.

23 But now I'm just getting to this high  
24 grading. And so if the Commission wants to know, take  
25 your 72 pattern, are there places in the 72 pattern

1 that has more oil in place than others, or is it  
2 uniform across?

3 A. In that model, every pattern is identical in  
4 recovery.

5 Q. But you can tell the commissioners that  
6 that's not how the oil under the EMSU actually works.  
7 There are going to be high graded areas where are  
8 sections that have more oil in place than others,  
9 isn't there?

10 A. Well, because I averaged all of the logs I  
11 was given by Dr. Davidson, every calculation he made  
12 in the upper 400 feet of the San Andres, that does  
13 aerially capture the average saturation for all the  
14 penetrations we have at this point. So I would say  
15 that it does cover the average.

16 Q. I think we're missing. If the commissioners  
17 want to go to one particular place, for example, right  
18 where there's SWD well -- you with me right there?

19 A. The commissioners want to go to the SWD  
20 well?

21 Q. If they want to put their finger on the SWD  
22 well and say, "How much oil in place is under this  
23 particular section as opposed to a section on the  
24 other side of the EMSU?" the way your volumes are  
25 built, you can't do that, can you?

1           A. The way it's built is based on an average.  
2 I think one of the wells that Dr. Davidson analyzed  
3 was a SWD well. So you could look at that well.

4           Q. My point is, because this average that  
5 you've used is section by section across the EMSU or a  
6 little bit smaller than EMSU on your 72 pattern,  
7 right?

8           A. S I didn't follow that. I'm sorry.

9           Q. The point is, the oil in place is not going  
10 to be the same as you move section to section, is it,  
11 on what's actually under the ground right now?

12          A. It will probably not be exactly the same.  
13 That's right?

14          Q. And, again, with respect to the model that  
15 you all built by way of volumes, if there's a high  
16 graded area, based on Empire's science or engineering  
17 other both, obviously there's going to be sections  
18 that have higher oil in place in them than the  
19 average, aren't there?

20          A. Yeah, I agree with that. That's how  
21 averages work.

22          Q. Which, as we talk about the volumes that are  
23 in your analysis, you would agree that there's  
24 certainly going to be sections where Empire could go  
25 carry out its tertiary project, and even under you

1 analysis, the oil in place under that particular  
2 section would be higher than the average used in your  
3 economics? True?

4 A. If you say patterns, I will agree with you,  
5 instead of sections.

6 Q. Perfect, I'll take that. And how many acres  
7 does a 72 pattern cover?

8 A. It's about 10,000, I think. It's 72 times  
9 40.

10 Q. Now moving over to price. We covered price  
11 last time a little bit, and I think that's where we  
12 ended for the weekend.

13 Just in terms of, you know, giving the  
14 commissioners a sense of the forest for the trees, as  
15 we talk about forest, we've now talked about the  
16 expense case one CO2. We've talked about the volume  
17 case that you got from Dr. Davidson and how fits in.

18 This is from your deposition, and you  
19 were asked, "And economics can change also over time,  
20 right?"

21 And your answer was, "The biggest driver  
22 of economics for CO2 floods is the price of oil." Do  
23 you remember testifying to that?

24 A. Yes.

25 Q. Do you stand by that testimony today?

1           A. I don't have context here about what we were  
2 talking about, but it is. It's that, plus the price  
3 of CO2. Those are the two biggest things.

4           Q. And with respect to economics, you had two  
5 models, you didn't like Empire's pricing. And Empire  
6 started their pricing at 75 and then escalated it to  
7 the out-years at 1 percent annually, correct?

8           A. Yes.

9           Q. You held a flat \$75 deck, and at a \$75 deck,  
10 you understand we are not here reporting these to the  
11 SEC as part of reserves that Empire is reporting?  
12 You understand this is completely different than an  
13 SEC, PDP or PUD analysis, right?

14          A. Absolutely.

15          Q. Because we're not dealing in SEC, you also  
16 know that we're not asking a bank for money as part of  
17 this? We're not using our oil and gas lease as  
18 collateral, and so we don't have to have Netherland,  
19 Sewell satisfy JP Morgan? You understand that's not  
20 this environment either, right?

21          A. I really have no information on that.

22          Q. Different oil and gas operators, you know  
23 have internal price decks that they use, don't they?

24          A. That's true.

25          Q. And that's going to vary from operator to



1 operator, isn't it?

2 A. It can, and it can be based on hedging and a  
3 lot of different things.

4 Q. But, again, in terms of the internal price  
5 decks, so I'm setting aside bank lending, I'm setting  
6 aside SEC reserve reporting for PDP or PUD, and I'm  
7 just talking about the internal economic analyses, you  
8 know that operator to operator, they will have their  
9 own internal commodity deck where they forecast into  
10 the future that helps guide their internal investment  
11 decisions, don't they?

12 A. They do. As one of the runs, they usually  
13 do, yes.

14 Q. And obviously those internal decks will vary  
15 wildly between operator to operator, won't they?

16 A. Not wildly, no. I don't think so.

17 Q. In terms of just giving the commissioners  
18 the sense of how far out these out-years are, where  
19 does ends of economic life on the project terminate  
20 under your model?

21 A. Which version do you mean?

22 Q. I guess any. In terms of Empire's model  
23 that you began with, you know that that model runs  
24 over 40-something years in out-years, doesn't it?

25 A. Yes.

1 Q. Which would be consistent with how EOR  
2 tertiary projects are carried out. This is not you go  
3 in, you crack the Wolfcamp and the Spraberry and you  
4 wine-rack it and you're getting 80 percent of your  
5 production out in the first three years and you've  
6 moved on to something else. That is not how this kind  
7 of a project works?

8 A. They are usually long-lived, that's correct.

9 Q. So as we talk about long-lived, we showed  
10 this slide last time. And this was just saying -- I  
11 know you don't want to look at historical, but if  
12 you're looking back historically to '86, or wherever  
13 you want to cut it, there's a 2.77 percent escalation  
14 over that period of time, right?

15 A. According to this, you can also draw that  
16 line from the peak down to the -- and it would be a  
17 negative number.

18 Q. Just arbitrarily start in 2009?

19 A. You certainly have oil prices before '86, so  
20 there's some arbitrariness in the way you've drawn it,  
21 as well.

22 Q. Pre '86, were those good years for oil  
23 prices or were they lower?

24 A. I graduated in '87, so those were bad  
25 prices.

1 Q. I mean, you could have drawn your own line,  
2 if you wanted to.

3 A. My real concern about this is looking  
4 backwards and trying to say that that suggests what's  
5 going to happen with future price.

6 Q. Additionally, I mentioned EIA data last  
7 time. You know they have long term outlook price  
8 decks, don't they?

9 A. Yes.

10 Q. Have you done any analysis in terms of EIA's  
11 long term forecast looks like?

12 A. No, I have not. I don't use the EIA price  
13 deck.

14 Q. You know EIA price deck is going to be far  
15 more aggressive than what you used in your model,  
16 don't you?

17 A. Well, it's going to be more than flat,  
18 probably, yes.

19 Q. And these were some of the publications that  
20 have been admitted into evidence in the case at this  
21 point. Do you remember looking at the four-county  
22 appraisal of the San Andres fairway of the Permian  
23 Basin paper?

24 A. I'm not sure that I did.

25 Q. And, again, these have come into evidence

1 already. But here, they had oil price of 75 a barrel,  
2 escalating at 2.3 percent per year. The oil price  
3 selected for the analysis is consistent with the  
4 mid-term outlook for oil prices to the Energy  
5 Information Administration's 2018 annual energy  
6 outlook. The author had noted that EIA has a 2.3  
7 escalation on its mid-term outlook. And that  
8 escalation is 2.3 percent, right?

9 A. That's what he says here. I haven't double  
10 checked this.

11 Q. Conservative to the 2.77 that was shown on  
12 the earlier graph, and literally, a multiple of double  
13 of what Empire's built its economic case on, true?

14 A. Are you saying 2 percent is double  
15 1 percent? Yes.

16 Q. Yes. This is another one. This is a 1987  
17 Cobb & Associates paper that came out in evidence in  
18 the case already. And here they were using an \$18 a  
19 barrel deck, escalated to 20, price held constant  
20 until January '91, escalated to 22 bucks a barrel,  
21 held constant to '92, and then escalated at 5 percent  
22 per year. Do you see that?

23 A. Yes. This is the -- I was driving when this  
24 was presented. I thought I heard some discussion of a  
25 flat price, too. But if this is the Cobb stuff, I see

1 they escalated in part of their analysis, too.

2 Q. This escalation would be multiples more  
3 aggressive than what Empire has used here in its  
4 model, true?

5 A. That's true.

6 Q. And what they did there in '87, as they're  
7 predicting the future in 1987, they held it flat at  
8 \$45 once they got to the year 2006; do you see that?

9 A. Yeah, I do.

10 Q. So even in all of those escalations which  
11 reached 5 percent per year, that would have been quite  
12 conservative to what was achieved in 2006 and the  
13 average of commodity prices since 2006, wouldn't it?

14 A. I'm sorry. Compared to what?

15 Q. Compared to what actually -- so if we go  
16 back to 1987 and says, "Was Cobb & Associates, were  
17 these guys just crazy when they predicted this  
18 escalation through 2006?" they were actually  
19 conservative to what has borne out by way of  
20 experience history, weren't they?

21 A. Yeah. But they only escalated for a few  
22 years compared to the number of years that Empire did.

23 Q. Well, let's put this in terms of  
24 relativity so that the commissioners aren't misled.

25 They started at 18 a barrel, right?

1 A. Yes.

2 Q. And then not that distant out-years of 2006,  
3 they get to 45, right?

4 A. Apparently they do, yeah, in 2006.

5 Q. So a multiple of about 2.5? I'm eye-balling  
6 that. You're the math guy.

7 A. Yeah.

8 Q. A little over 2. Empire's case starts at  
9 75, right?

10 A. Yes.

11 Q. And what is the highest price that ever  
12 works its way into the Empire model at the 40-plus  
13 out-years?

14 A. I think it's 118.

15 Q. Which would be not even nearly double? That  
16 would be conservative to what Cobb & Associates  
17 predicted in '87 and what was experienced in actual  
18 reality. True?

19 A. With that sort of tortured comparison, yes.

20 Q. Now, I just want to put a little bit of the  
21 sensitivities here into focus for the commissioners.  
22 We've done some different sensitivity analysis to just  
23 show them how the numbers change. And, again, all the  
24 numbers that have been presented here by Empire have  
25 been in net present value, right? Those are

1 discounted dollars?

2 A. Actually, the model has both cash and  
3 present value numbers. As far as presented, I'm not  
4 sure.

5 Q. But if we put our hat on for the mineral  
6 owner being the State of New Mexico, they don't have  
7 to look at this in terms of net present value. This  
8 would be a royalty strain that would be established  
9 for the State of New Mexico and BLM that would  
10 continue for 40-plus years, with royalty dollars  
11 received in real time over the next four-plus decades,  
12 wouldn't it?

13 A. I'm confused by why you say they don't have  
14 to look at present values.

15 Q. The royalty owners would -- the State of  
16 New Mexico here would be receiving royalties on  
17 Empire's EOR and tertiary development of the  
18 San Andres for 40-plus more years, wouldn't they?

19 A. Under these hypotheticals, that's true. But  
20 I think you're confusing two concepts. If you wanted  
21 to say how much it's worth today to any royalty owner,  
22 you'd still have to do it on a present value basis.

23 Q. But the State of New Mexico isn't looking to  
24 sell these minerals to anybody. It doesn't need a net  
25 present value today in terms of selling these, right?

1 A. No. I don't think they sell royalties.

2 Q. Now, looking at the economic sensitivities,  
3 here on a base case, do you see we've got 300 percent  
4 thickness? We're looking at oil in place. The oil in  
5 price per barrel and CO2 price. With respect to  
6 varying those, even if we use your volumes -- are you  
7 with me so far on using your volumes?

8 A. So can you help me with what you guys did to  
9 make these adjustments to the model?

10 Q. This is actually Exxon's ROZ case. I  
11 grabbed the wrong slide. This was Exxon's ROZ case.  
12 I'm going to skip that one and go to the next one.  
13 I've got more slides that you can imagine.

14 So on the economic sensitivity, if you  
15 start with base case on a 100 percent CO2 injection  
16 versus a WAG, if you go at 49 million barrels in place  
17 per 640 section, at 75 bucks and a 1 percent escalator  
18 with dollar CO2, you see that's a net present value of  
19 585 million?

20 A. I see the number, but I have no idea how you  
21 did this. And if you were using that same economic  
22 model, it says 100 percent. I'm assuming there's WAG  
23 and not WAG. But that model isn't set up for that.

24 Q. If you can even use a flat price deck for  
25 Empire's volumes and at \$1 CO2, it's still profitable,



1 isn't it?

2 A. I don't know without looking at the model.  
3 I mean, this has a positive number.

4 Q. In terms of all of your work here, you  
5 really didn't run these models or check to see, let's  
6 say Empire's right on its CO2 price but I hold their  
7 deck flat at 75, are they profitable.

8 I mean, you did these calculations to  
9 see where these analyses land under the different  
10 variables that we're fussing over, haven't you?

11 A. I lumped them all together for the  
12 calculations I did.

13 Q. You didn't run them to see if I'm right on  
14 oil price but wrong to CO2, this is where it lands, or  
15 if I'm wrong on price, but correct on CO2, this is  
16 where it lands?

17 A. No. I was trying to look at the variables I  
18 thought were least supported with a price deck that  
19 goes up to about 120 bucks, the flat price. And, you  
20 know, we a ran these things about the time we did the  
21 rebuttal reports in early January. The prices have  
22 fallen since then, so I think the flat 75 is kind of  
23 strong today.

24 Q. You're saying everything should be rerun  
25 because of the tariff situation that on April 23rd we

1 have 64-ish WTI, or whatever it was this morning?

2 A. No. I'm saying that you want to get a sense  
3 for the economics of a project, you better keep up  
4 with what the market is saying the price of oil is.

5 Q. In terms of other sensitivities here, I  
6 might be able to shortcut a lot of this. Surely you  
7 ran this one to be able to confirm. You can take  
8 Dr. Davidson's volumes, your volumes that you use --  
9 are you with me so far?

10 A. Which line are you looking at?

11 Q. I'm actually off of this.

12 A. Okay.

13 Q. If we assume your volumes -- are you with me  
14 so far?

15 A. So my porosity and my oil saturations?

16 Q. Let's just assume that Dr. Davidson is right  
17 and that all of Exxon and NuTech and Ops Geologic are  
18 completely wrong. Are you with me so far?

19 A. Yes.

20 Q. So all of NuTech, all of Ops Geologic, all  
21 of Exxon, you guys just blew it, but Dr. Davidson did  
22 it right with his facies model.

23 If you used the \$1 CO2 price that we've  
24 already talked about, and if you used the 1 percent  
25 escalation off of 75 WTI -- are you with me on those

1 two assumptions?

2 A. I think so. I think you're on the second  
3 row of this exhibit.

4 Q. -- you can tell the commissioners it is a  
5 present net present value case here, isn't it?

6 A. Looks like it shows eight and a half million  
7 dollars for investing hundreds of millions of dollars.

8 Q. We don't have to invest hundreds of  
9 millions -- again, this is taking your volumes -- as  
10 we talk about why on earth wouldn't Empire get an  
11 opportunity to develop its and the State of New  
12 Mexico's minerals, using your volumes, if the a  
13 1 percent escalation off of 75 dollar WTI is applied  
14 and \$1 CO2 price, you can tell the commissioners that  
15 that is positive net present value case, isn't it?

16 A. That one looks like it calculates out  
17 slightly positive.

18 Q. And you can tell the commissioners that as  
19 pressure increases, that decreases the economic  
20 feasibility of the project; isn't that right?

21 A. That's a complicated question that has to do  
22 with miscibility.

23 Q. You're not willing to agree to the simple  
24 fact, to the commissioners, that as pressure in the  
25 San Andres builds, it will impair and impede the

1 economic project that Empire intends to carry out here  
2 in the San Andres?

3 A. Well, let me state this again. It's  
4 complicated because you want to ensure that you have  
5 miscibility. So I think what you're alluding to is,  
6 if you have really high pressure then you have to use  
7 more CO2 for each hydrocarbon pore volume.

8 But when we look at the disposal that  
9 has occurred and the relative lack of change of  
10 pressure in the San Andres disposal zone, I really  
11 don't think changes in pressure are a big concern.

12 Q. Does higher pressure mean that significantly  
13 more CO2 is required for compression?

14 A. That doesn't make any sense. I think I  
15 covered this just a second ago. If you have higher  
16 downhole pressure, you need more CO2 for every pore  
17 volume.

18 Q. And earlier I showed you your deposition  
19 where you said the biggest issue is WTI price. But  
20 then today, you said also cost of CO2 is the other one,  
21 isn't it?

22 A. Yes.

23 Q. I was already firmly waded out into your  
24 expertise and into your pool to be drowned, but I'm  
25 going further here, so I'm acknowledging this right

1 off the jump. We're going to talk about pressure.  
2 I'll move through this quickly.

3 We talked about this slide last time.  
4 In terms of this -- is it publishing? And this is a  
5 slide you're familiar with?

6 A. Yes, I can see it. I'm familiar with it.

7 Q. So we have from the Technical Committee  
8 Report, the original pressure reading from the  
9 San Andres. And in terms of just bringing that  
10 down -- I'm sorry, from the Grayburg. And in terms of  
11 bringing that down from the San Andres, do you agree  
12 that this would be a conservative gradient, pressure  
13 gradient, in terms of measuring that 1527 psi?

14 A. It doesn't say what gradient he used there,  
15 but I think he testified to a .38 gradient. It's more  
16 conservative than using a water gradient, I'll give  
17 you that.

18 Q. Do you dispute that what the RFT tool in the  
19 211 well, a pressure of 1245 psi was measured in the  
20 San Andres?

21 A. I don't dispute that it was measured at  
22 4006. There is a dispute about whether or not that's  
23 in the San Andres or not.

24 Q. Explain what that depletion -- how does that  
25 depletion occur?

1           A. That would be from production of oil, I  
2 believe, or lateral zones in other wells that  
3 penetrated that same zone nearby or within a few well  
4 locations.

5           Q. And fresh water, is that a gradient of .433?

6           A. Yes.

7           Q. And that would be worked out from the  
8 original point at subsea 250, right?

9           A. You mean for this adjustment?

10          Q. Yes.

11          A. I assume that's what he did, yes.

12          Q. And so your explanation in terms of that  
13 would be that that depletion is explained by the  
14 production from the Grayburg above, correct?

15          A. Well, I've got a couple comments about it.  
16 First of all, we don't have an original measurement in  
17 1921 or 1936 or whatever the beginning of time is for  
18 this area in the San Andres. The earliest measurement  
19 we have is in the Rice H-20 well, and it measures out  
20 to a gradient of about .38 of 1800 psi at 5000 feet.

21                 So when you're comparing those two  
22 numbers, you have to understand that there's  
23 uncertainty in the first number.

24          Q. Dr. Buchwalter, he didn't know that the Rice  
25 well that you're mentioning, that we were going to get

1 that pressure reading out, did he, when he prepared  
2 his model?

3 A. Probably not.

4 Q. Do you realize that that Rice well matches  
5 perfectly within 12 psi of Dr. Buchwalter's model?  
6 Have you tried to take that pressure reading and  
7 compare it against what's in his model?

8 A. He didn't give us the information to the  
9 that. He only gave us particular time steps. And so  
10 1959 was not one of them, so we weren't able to do  
11 that.

12 Q. So at depth layer 10 in his model, it says  
13 4921 feet. We're working off of the 1959 pressure  
14 calculation from the EME 20. In 1938, the pressure at  
15 4921 feet in the model is 2058 psi. In 1959, the  
16 pressure in the model at 4921 feet is 1754 psi. In  
17 1959, the corrected model pressure to 5000 feet,  
18 that's a function of that 1754 psi, plus 5000 minus  
19 4921, because we've got to make the depth adjustment,  
20 times .43, that would come out to 1788 psi. And in  
21 1959, you know that that measured pressure of 5000  
22 feet was 1800 psi, right? We agree?

23 A. That one I can agree on. But in 1959, it  
24 was measured at 1800 psi.

25 Q. Which would only be a pressure variance of

1 12 psi out of Dr. Buchwalter's model when he had no  
2 idea that Goodnight or Rice, or some combination of  
3 them, was going to pull out this Rice pressure reading  
4 from the EME Number 20?

5 A. But that assumes that he's correct about the  
6 beginning pressure, and every other pressure he  
7 delivered to us or charted was not over 2,000 psi.  
8 The San Andres pressure was identified at 1527.

9 Q. Can we agree that this variance of 12 psi --  
10 I mean, that is as close to be being dead on the money  
11 as you possibly could be?

12 A. I mean, 1788 is close to 1800. But we were  
13 not given the data or information to dig into this.

14 Q. Now, you've said you weren't given the data.  
15 You acknowledge you were provided all of the input and  
16 export files, weren't you?

17 A. That's not true.

18 Q. What import files did you not receive?

19 A. I'm focusing on the export files.

20 Q. What export files did you not receive?

21 A. We only received an initialization file. We  
22 received time steps at 1986, where we could look at  
23 the grids and figure out the pressures of 1986.

24 But he did not give us, like, annual  
25 time steps where we could go in and figure out at



1 different parts of the grid what the pressures were.

2 Q. And this is way past my technical ability  
3 here. For whatever you're claiming now that you  
4 lacked, did you ask for it.

5 A. I don't know. At this point, I don't know  
6 if it was asked for, if there was an obligation to  
7 provide it. I'm not sure.

8 Q. Going back to Dr. Buchwalter's model, do you  
9 remember a version of this was shown during Mr. West's  
10 testimony?

11 A. I thought you showed that to me a week and a  
12 half ago. Maybe not. Maybe not.

13 Q. I certainly needed to show it to you. I  
14 think the one that was shown during Mr. West -- so  
15 basically, you understand these comprise two-acre  
16 blocks. There's 34,500 grids that would have come out  
17 of the model. Do you generally understand that's what  
18 we're looking at here?

19 A. Yes.

20 Q. And what happened was, again with the  
21 confusion, when the zeros were turned into dots, to  
22 make this more readable, the program moved the decimal  
23 over by 2. This one is corrected for the program  
24 moving the decimal over by 2 on the vertical  
25 permeability. Do you see that?

1           A. Well, that's reassuring. Because I think I  
2 testified in my direct that I was prepared to say the  
3 range was .01 to 12.8.

4           Q. So these would be the range of vertical  
5 permeability, wouldn't they be?

6           A. Well, but this is in the entire -- this is a  
7 connection between layers 8 and 7.

8           Q. And just moving the --

9           A. Not --

10          Q. I'm sorry. Go ahead.

11          A. Not just a single well, but over the entire  
12 two-acre plot.

13          Q. And you understand it was not a uniform  
14 change in vertical permeability across 34,500 blocks.  
15 It was only 99 grid blocks that were changed by these  
16 intervals of permeability?

17          A. I understand that, yes.

18          Q. And then if we go up in terms of the  
19 vertical permeability distribution, there were only 99  
20 grids changed, and, again, just moving the decimal  
21 over two places to get the correct millidarcy here,  
22 those adjustments ranged from .05 millidarcy to 12.5  
23 millidarcy. You see that?

24          A. I see it. The numbers we pulled out were  
25 .01 to 12.8.

1 Q. Millidarcy?

2 A. Yes.

3 Q. Which would be very close here to what we  
4 have?

5 A. Very close, yes.

6 Q. Now, going back to Dr. Buchwalter's model,  
7 as we talk about vertical permeability, coming back to  
8 core, we have actual core measurements here to just  
9 put into perspective the vertical permeability that's  
10 been measured in core, is that the far right column,  
11 is what we're looking at, for vertical permeability  
12 out of the 649 core?

13 A. The far right in the black box?

14 Q. Yes. You can tell the commissioners that  
15 some of the vertical permeabilities measured in the  
16 EMSU 649 core are very high? We've got 181, 162, 196?

17 A. These seem pretty shallow to be attributable  
18 to the San Andres.

19 Q. And we're going to work our way down. In  
20 the left column, can you explain the left column, K  
21 max?

22 A. The maximum measured permeability in the  
23 core without regard to direction.

24 Q. Very high permeabilities there. Yes?

25 A. Yes. More than likely, they're horizontal.

1 Q. And then we move down. Other permeabilities  
2 measured in the EMSU 650?

3 A. Would you make it just a little bit bigger?

4 Q. I'm going to try.

5 A. Okay. Thank you.

6 Q. Is that any better?

7 A. Yes.

8 Q. Very large permeabilities in the 650 core,  
9 as well. Yes?

10 A. I messed myself up because now I can't see  
11 the label. If you tell me it's the 650, then the  
12 answer is yes.

13 Q. It's the 650.

14 A. Okay.

15 Q. The EMSU 653 core, again, vertical  
16 permeability, we've got 914, 1422. There's some very  
17 large vertical permeability numbers observed in there,  
18 aren't there?

19 A. According to this summary, that's true.

20 Q. As we talk about going back to -- and I'm  
21 close to wrapping up here. But on Dr. Buchwalter's  
22 model, again, Goodnight here is injecting vast sums of  
23 saltwater and is proposing to inject even more  
24 saltwater. You understand that's what this proceeding  
25 is over?

1 A. The additional wells, yes.

2 Q. In terms of a material balance simulation,  
3 is that anything you have ever prepared before as an  
4 expert?

5 A. Well, I've done material balance for sure.  
6 I guess you're saying kind of a rough -- using a  
7 simulator as a rough way to do material balance?

8 Q. Yes.

9 A. Yes, I've done that.

10 Q. How recently?

11 A. It's probably been six or seven years.

12 Q. There are certainly simulation modeling  
13 experts that are available to be hired out there, such  
14 as Dr. Buchwalter. Yes?

15 A. That's true.

16 Q. Do you know if Dr. Buchwalter has a good  
17 reputation in the industry for that work?

18 A. As far as I know, he does, yes.

19 Q. Would you hold yourself out as a simulation  
20 modeling expert?

21 A. Well, it seems like from listening to his  
22 testimony, that's kind of the vast majority of what he  
23 does. It's not the vast majority of what I do  
24 anymore. I've done that in the past, and so it's part  
25 of my practice, but not to the extent it is with

1 Dr. Buchwalter.

2 Q. And do I understand the direct testimony you  
3 gave here that basically you would have had and  
4 modeled the southeast quadrant of New Mexico and like  
5 half of Texas panhandle, or somewhere around that?  
6 How big of a model, according to you, should  
7 Dr. Buchwalter have built, geographically speaking?

8 A. So the size -- and you're going back to  
9 where I had highlighted the migration pathways in  
10 relationship to some of the testimony from Steve  
11 Melzer. And it's not that we want that model, but  
12 that's the size of the San Andres zone as evidence by  
13 the ability to dispose into it on a vacuum for long  
14 periods of time, as evidence by the water apply wells  
15 to produce without any change in their production  
16 characteristics for decades.

17 And so it's not that we want him to  
18 build a model the size of Texas. But where he bolted  
19 on a San Andres aquifer that was 38 miles by 17 miles,  
20 there needs to be orders of magnitude bigger than that  
21 so that when you inject into it or pull out of it, you  
22 honor the data we have that shows that the pressure  
23 response is much more muted than what his is.

24 Q. Who is the witness that built Goodnight's  
25 simulation model?

1           A. As far as I know, we do not have a competing  
2 model.

3           Q. So you remember the last time we visited  
4 here, it's easy to tear things down, rip them apart,  
5 critique, fuss, criticize. It's harder to build  
6 something. And if the commissioners would like to  
7 know as part of Goodnight's application here to inject  
8 into a designated oil recovery unit, where the model  
9 is, after the passage of time and all the expert work,  
10 there's no witness going to do that?

11           A. We didn't build an independent model.

12           MR. WEHMEYER: I would love five minutes to  
13 visit with my client just to make sure that if they  
14 have questions, that I've gotten them out. But I  
15 think I'm real close to being wrapped up here.

16                     If now would please the Commission for  
17 the afternoon break, that would be certainly welcome  
18 here. But if not, I can make due.

19           HEARING OFFICER HARWOOD: All right. Let's  
20 take our afternoon break. Let's be back by 2:55.

21                     (Recess held from 2:41 to 2:55 p.m.)

22           HEARING OFFICER HARWOOD: Mr. Wehmeyer, I  
23 hope we're close to the magic phrase.

24           MR. WEHMEYER: We're very close. We're  
25 within ten of it. I just can't say yet. I've got a

1 couple notes from my folks, and I'll go through those  
2 quickly.

3 HEARING OFFICER HARWOOD: All right.

4 BY MR. WEHMEYER:

5 Q. Mr. McBeath, you can hear me?

6 A. I can hear you.

7 Q. Earlier, as we were talking about the effect  
8 of pressuring out the San Andres, you gave me that it  
9 would require the use of more CO2 by Empire, right?

10 A. If the San Andres pressured up it would  
11 require more CO2.

12 Q. Additionally, it would require more cost to  
13 actually compress it down the hole, wouldn't it?

14 A. You mean to compress it so you could push it  
15 downhole? Yes.

16 Q. Now, earlier we talked about that Rice well  
17 and the bottom hole pressure report that came in late.  
18 And we talked about Buchwalter's model and how it fit  
19 into that.

20 Now I want to talk about how it fits  
21 into that 211 measurement from the RFT tool. Is it  
22 publishing? Can you see the Bottom Hole Pressure  
23 Survey Report?

24 A. Yes, I can.

25 Q. And do you see that it's calculated to



1 gradient here, overall gradient, of about .36 psi, and  
2 for sea water, we know that would be about .44 psi per  
3 foot?

4 A. You don't really have to do that because the  
5 different stations of that bottom hole pressure survey  
6 tell you fluid that's in the wellbore.

7 Q. How deep was this Rice bottom hole pressure  
8 taken?

9 A. The deepest measurement is 5000 feet.

10 Q. That's very deep here. Yes?

11 A. Yes.

12 Q. In relation to the depths we're talking  
13 about. And here I'm just publishing the arrow. Does  
14 that correspond with where you understood that  
15 pressure reading was taken from?

16 A. If that's 5000 feet, that's right. I can't  
17 really see it.

18 Q. You know it certainly was down into the  
19 Lower San Andres, correct?

20 A. Yes. For sure.

21 Q. Perfect. Now we're just going to go through  
22 the exercise of working the math the other way and  
23 work it up to.

24 If you have that EME depth, and we know  
25 that the top of the San Andres, if you do 1800 psi

1 minus 5000 feet minus 3896 feet times .442 psi per  
2 foot for a pressure gradient, as we work up to get it  
3 up here to where the 211 RFT was taken, that would be  
4 a psi of 1312 psi at that depth, wouldn't it?

5 A. You're doing it at the top of the  
6 San Andres?

7 Q. To get it up to the 211 RFT measurement in  
8 the San Andres, yes. I'm working the pressure the  
9 other way. Earlier we talked through it and worked it  
10 down from the Grayburg into the San Andres. Now we're  
11 working it from the 5000 feet it was taken up to the  
12 depth interval where the 211 was measured to get it  
13 here.

14 A. The 211's measurement was at 4006, the  
15 deepest measurement.

16 Q. So the 1312 psi calculated here, you're  
17 saying, is off?

18 A. I'm trying to understand what you're doing  
19 and trying to understand where the 3896 is coming from  
20 if you're trying to compare it to this RFT.

21 Q. And, again, this has been correlated for the  
22 different points on the structure. If the math works  
23 from the other way, if the commissioners want to do  
24 the math on this and work that back up on that  
25 pressure gradient to get it to the same place on

1 structure, if that works, the 1312 psi, the RFT  
2 measurement and the 211 and 1245, that would also  
3 indicate a depletion if you work it from the other  
4 direction as opposed to surface down, work it from  
5 down to up?

6 A. Well, it looks like about that. So the  
7 measurement in the H-20 was made in 1959.

8 Q. Right.

9 A. So, under your method, you would be  
10 disagreeing with Dr. Buchwalter and you'd say that the  
11 depletion had occurred by 1959. So the time aspect of  
12 these pressure measurements has to be considered as  
13 well.

14 Q. Have you given any considering to the Rice  
15 measurement? Have you done any work on the pressures  
16 off of the Rice measurement?

17 A. Yes. I've compared it to two other groups  
18 of pressures, and I call them the "undisturbed  
19 pressures." So we've got Rice 12 at -- it's noted on  
20 survey and we know that was only, like, four days  
21 after the log was run, but it was before injection, so  
22 it's a pristine measurement. We've got that in 1959.

23 We've got a group of water supply wells  
24 in 1987 and '87 that had fluid levels.

25 And then we had current pressures from a

1 well that Goodnight operates but it's been inactive  
2 for, in one case, one month and, in another case, two  
3 months.

4 So you have a nice static level, and all  
5 of those pressures are within about 30 psi of each  
6 other over that time period from 1959 to 2024. They  
7 all calculate out to about .37 or 38. I guess 1959  
8 is .36.

9 So the best measurements we have in the  
10 San Andres show that there's been very little change  
11 in the pressure.

12 Q. In terms of actually performing the  
13 calculations to bring it up to the location of this  
14 RFT measurement in the San Andres out of the 211 well,  
15 have you actually created any work product on that?

16 A. To adjust the Rice well?

17 Q. Yes.

18 A. No, because it's, you know, many, many years  
19 apart.

20 Q. If Empire's calculation brings it to 1312  
21 psi there and there's a difference of whatever that  
22 is, about 70 psi, that indicates depletion -- are you  
23 with me on the assumption?

24 A. Yeah. But it's confusing. But I'm with  
25 you.

1 Q. I give you that for sure. Again, the  
2 depletion, as I asked about the depletion reflected  
3 here on the slide on the bottom right, you explained  
4 that depletion as being attributable to drawdowns in  
5 the Grayburg above, correct?

6 A. Or lateral. Because you're only 7 feet --  
7 even under your top analysis, you're only 7 feet into  
8 the San Andres. And there have been work-overs,  
9 deepenings, completions of wells using nitroglycerin.  
10 So the chances that there's some lateral movement of  
11 fluid that could explain that, that's what I think  
12 happened.

13 Q. But when we visited before the break and I  
14 asked how would you explain that depletion, the only  
15 answer I heard was likely from lower pressure above in  
16 the Grayburg. Wasn't that the testimony before the  
17 break?

18 A. If I said that, I misspoke. I meant lateral  
19 aerial drainage around that.

20 MR. WEHMEYER: I'll pass the witness.

21 HEARING OFFICER HARWOOD: Thank you.

22 OCD.

23 MR. MOANDER: Thank you, Mr. Hearing  
24 Officer.

25

1 CROSS-EXAMINATION

2 BY MR. MOANDER:

3 Q. Good afternoon, Dr. McBeath. Thank you for  
4 coming back today.

5 A. Thank you for the honorific, but it's Mr.

6 Q. Sorry, Mr. McBeath. This hearing has gone  
7 on a while and I'm starting to get a little sloppy on  
8 that. This should be fairly brief.

9 So do you recall back on April 11th of  
10 2025, you were under oath. Do you recall that?

11 A. Yes, I do.

12 Q. And you were being cross-examined by counsel  
13 for Empire. Do you recall that?

14 A. I certainly do.

15 Q. And do you recall during that examination,  
16 Mr. Wehmeyer informed the OCC that you two were  
17 friends. Do you recall that?

18 A. I do.

19 MR. MOANDER: Thank you. I'll pass the  
20 witness.

21 HEARING OFFICER HARWOOD: Mr. Beck or Rice  
22 Operating and Permian Line Service.

23 CROSS-EXAMINATION

24 BY MR. BECK:

25 Q. Mr. McBeath, you discussed with Mr. Wehmeyer

1 a bit about the 45Q tax credits. Remember that?

2 A. Yes, I do.

3 Q. And how much is Empire getting its CO2 under  
4 those 45Q tax credits?

5 A. If you assume that their starting price is a  
6 correct and a reduction attributable to a tax credit  
7 is correct, it would become -- the net price is \$1 and  
8 MCF.

9 Q. And I'm not asking for any assumptions. I'm  
10 saying today, what are they getting their CO2 for?

11 A. I don't think they have any contracts for  
12 CO2, as far as I'm aware.

13 Q. That's what I'm aware of. And the 45Q tax  
14 credits, I'm not totally familiar with that, but I  
15 understand that to be part of the tax code. And 45Q  
16 is under the tax code; is that right?

17 A. That's right.

18 Q. And those tax credits are administered by  
19 the IRS, the Internal Revenue Service?

20 A. That's true.

21 Q. And the 45Q tax credits were created to push  
22 for more clean energy in the oil space; is that true?

23 A. That's true for mainly carbon sequestration  
24 in this particular application.

25 Q. And have you heard how the IRS is

1 administering that 45Q tax credit this year, under the  
2 new administration?

3 A. No. I don't have any information on that.

4 Q. So you don't know whether it will go up in  
5 use or down in use in the future?

6 MR. WEHMEYER: Objection. Lacks foundation.  
7 The witness has testified to lack of personal  
8 knowledge.

9 MR. BECK: I think that's what I'm asking  
10 him.

11 THE HEARING OFFICER: Overruled.

12 BY MR. BECK:

13 Q. So you don't have any information that would  
14 tell you whether those 45Q tax credit use will go up  
15 or down in the future?

16 A. That's right, I don't.

17 Q. You also talked with Mr. Wehmeyer, he talked  
18 with you about Empire's plan to go and exploit the oil  
19 all the way down to the bottom of the San Andres,  
20 right?

21 A. He questioned me about that. And that was  
22 an assumption that he directed me to make, yes.

23 Q. I think you said that you know that they  
24 wouldn't go and just spend that 1.5 or \$1.2 billion  
25 wholesale. They would do it maybe sequentially,



1 right?

2 A. Well, that is what's built into the economic  
3 model. The patterns are consequential. In a CO2  
4 flood, some of the things you have an opportunity to  
5 dribble the money out as you build patterns.

6 Other things, like building a CO2 lateral  
7 of building a recycle plant, you can't really do that  
8 in pieces. It's all or nothing.

9 Q. Part of that, I think he said and you agreed  
10 with, was that they would select the best location to  
11 start, right?

12 A. Yeah. I would expect that, yes.

13 Q. And then would you expect that if in that  
14 best location to start, they weren't able to exploit  
15 the oil out of the bottom of the San Andres, they'd  
16 stop?

17 A. Yeah, that's true. If you went to the best  
18 spot and it was a failure, there's no reason to go to  
19 the spots that are worse.

20 Q. And where is Empire starting this project to  
21 go to the bottom of the San Andres?

22 A. The information I had doesn't tell us that.  
23 We don't know the sequence of the patterns. They're  
24 just numbered patterns, 1 through 72, in the  
25 spreadsheet.

1 Q. So from the time that they acquired this  
2 property in 2021, sitting here today in 2025, you  
3 don't have any information that would tell you they  
4 even have a starting point for this project. Is that  
5 true?

6 A. If they do, they didn't share it in the  
7 discovery in this matter.

8 Q. Now, Mr. Wehmeyer said at the beginning of  
9 your examination last week that it would be -- it  
10 would be a great benefit to the people if Empire was  
11 permitted to do this project. Remember that?

12 A. He asked me to agree with that, yes.

13 Q. Okay. And you agreed, because the potential  
14 is immense and there would be no cost, at least as  
15 we're sitting here today, to the public, right?

16 A. If you assume success, yes, it would be a  
17 big benefit.

18 Q. And he asked you to assume that, right?

19 A. He did.

20 Q. Now, he talked about that Goodnight is a  
21 Texas company, and the profits presumably would go out  
22 to Texas, right?

23 A. He asked me some questions about that. Not  
24 this session, but ten days ago.

25 Q. Do you know that Empire is not a New Mexico

1 based company?

2 A. I don't really know for sure.

3 Q. Do you know that Goodnight employs people in  
4 New Mexico?

5 A. I would expect so, yes.

6 Q. To operate its operations here, right?

7 A. Yes.

8 Q. And those people pay taxes here in  
9 New Mexico, right?

10 A. I hope so, yes.

11 Q. And presumably, Goodnight pays gross  
12 receipts tax here in New Mexico?

13 A. You're getting on the edges of my accounting  
14 expertise, but I think so, yes.

15 Q. And my understanding of Goodnight's  
16 operations is that it takes wastewater from oil and  
17 gas operations in New Mexico. Right?

18 A. That is true, yes.

19 Q. We presume that those oil and gas operations  
20 that provide wastewater pay royalties and severance  
21 taxes, true?

22 A. Absolutely.

23 Q. So as I sit here today, I think the truth  
24 is, is that -- tell me if you agree with me, that  
25 there's nothing today preventing at least

1 regulatory-wise, this Commission preventing Empire  
2 from going and drilling down to the bottom of the  
3 San Andres and starting its project. True?

4 A. I think that's true. They have the rights  
5 to operate there.

6 Q. And did you hear the testimony that what's  
7 preventing them is an order from the company saying  
8 don't do this until all injection in the San Andres  
9 has stopped?

10 A. Yes, I heard that testimony.

11 Q. So if all disposal in the San Andres is  
12 stopped, then all operations of Goodnight are stopped,  
13 right?

14 A. I think that's correct.

15 Q. At least within the EMSU?

16 A. Yes.

17 Q. Right. And so the taxes we talked about  
18 that Goodnight and its employees pay, those aren't  
19 being paid?

20 MR. WEHMEYER: This is so far outside of  
21 anything that is in his opinions. Employee taxes  
22 would require rank speculation on number of  
23 employees, how much they're paying in taxes. This is  
24 so far afield of what a petroleum engineer has  
25 opinions on. And it's outside of his written

1 testimony. I don't want to have to go back and  
2 redirect him on this -- recross him on this.

3 HEARING OFFICER HARWOOD: You're not going  
4 to get the chance.

5 MR. WEHMEYER: So I would ask that this be  
6 limited to what's in his direct testimony and what  
7 was fairly in cross, which this is not.

8 THE HEARING OFFICER: All right. You  
9 brought up the issue. I think you opened to door.

10 Mr. Beck, by the same token, I think we  
11 get the point. So I'm not going to sustain or not  
12 sustain the objection. But I would ask you to move  
13 on.

14 BY MR. BECK:

15 Q. So just that last question, those taxes  
16 would not be paid when Goodnight is not operating.  
17 True?

18 A. Under that scenario, that's true.

19 Q. Now, so we talked about that there's nothing  
20 regulatory preventing Empire from going down and  
21 exploiting those minerals at the bottom of San Andres,  
22 right?

23 MR. WEHMEYER: I object. That  
24 mischaracterizes it. I think for an EOR project, we  
25 do have to go through a regulatory process.

1 HEARING OFFICER HARWOOD: Well, I think the  
2 objection was asked and answered, and I think it's  
3 been answered. So I'll sustain the objection.

4 BY MR. BECK:

5 Q. So, hypothetically, if Empire wanted to go  
6 and start a small test place in the best spot it  
7 picked, it could negotiate with injection operators  
8 down there to stop injecting into a portion of that  
9 space down in the San Andres?

10 MR. WEHMEYER: Two objections. One, rank  
11 speculation from this witness. Two, Empire is under  
12 no obligation to negotiate for just a little bit of  
13 waste or a lot of waste, but not as much waste.

14 There is no basis on the planet that  
15 Empire would have an obligation to negotiate with  
16 these people for only some amount of waste of  
17 New Mexico's resource.

18 MR. BECK: I can lay some more foundation.

19 THE HEARING OFFICER: Okay, Mr. Beck. But,  
20 again, I think we get the point. So do your best not  
21 belabor it.

22 BY MR. BECK:

23 Q. Mr. McBeath, I think we heard you provided  
24 consulting service to lots of oil and gas companies,  
25 right?

1 A. Yes, I have. And I continue to do so.

2 Q. Including for example, Exxon Mobile, right?

3 A. Yes, that's true.

4 Q. Have you seen, in your experience, when  
5 operators are in the same space, they negotiate to  
6 stop work in part of the space and exchange for  
7 concessions from the other party?

8 MR. WEHMEYER: Same objection. He's getting  
9 into 408 suggestions that Empire was under some  
10 obligation to allow waste of New Mexico minerals  
11 through a settlement. It's irrelevant. It's  
12 inappropriate.

13 HEARING OFFICER HARWOOD: Overruled.

14 BY MR. BECK:

15 Q. Do you remember my question, Mr. McBeath?

16 A. I do. I've been involved in a number of  
17 matters where producers and disposers work together  
18 with either shut-in agreements or other types of  
19 arrangements to provide co-existence of operations.

20 Q. You talked to counsel about who knows the  
21 most about the Grayburg and the San Andres, and you  
22 made a list. Do you remember that?

23 A. No, I don't. Can you remind me?

24 Q. Sure. I have written down that you agreed  
25 with him that the list included Chevron and Exxon

1 Mobile.

2 A. Okay. Yeah, we're talking about operators?  
3 Yes.

4 Q. And then he talked about the brochure from  
5 Exxon Mobile that we've all seen. Do you remember  
6 that?

7 A. Yes.

8 Q. And do you remember that the ROZ in that  
9 brochure went down to negative 700 subsea?

10 A. I think that's right. I can picture it. I  
11 think that's right.

12 Q. And then you talked at length about getting  
13 investors to invest in this ROZ recovery project,  
14 right?

15 A. I did in the context of the economic  
16 analysis that I did.

17 Q. Okay. And I think you talked about that it  
18 would be tough to do that if investors knew that there  
19 was saltwater going on, right?

20 A. I think I was careful that if it was in the  
21 same zone, yes, that could be a problem.

22 Q. And when Empire purchased the EMSU,  
23 saltwater disposal was going on in the San Andres,  
24 true?

25 A. True.



1 Q. I think Mr. Wehmeyer asked you about your  
2 experience with Exxon Mobile as a very successful oil  
3 and gas company, right?

4 A. Yes.

5 Q. One of the largest corporations in the  
6 United States?

7 A. That's true also, yes.

8 Q. And if it's not the largest, it's one of the  
9 top two largest oil and gas operations in the United  
10 States, right, corporations?

11 A. They're very big. I haven't double checked  
12 those numbers recently, but they're very big.

13 Q. And its duty as a corporation, if you know,  
14 is to provide return to its shareholders, right?

15 A. Absolutely. Yes.

16 Q. And you're aware, through your work on this,  
17 that Exxon Mobile decided to sell the EMSU, AGU and  
18 EMSU-B with this potential for ROZ, right?

19 A. Yes, I'm aware of the sale that occurred.

20 Q. And they decided to sell it instead of  
21 exploit it and take on that project itself, right?

22 A. That's true.

23 MR. BECK: No further questions.

24 HEARING OFFICER HARWOOD: Thank you,  
25 Mr. Beck.

1 Mr. Suazo for Pilot Water Solutions?

2 MR. SUAZO: No questions for Mr. McBeath,  
3 Mr. Hearing Officer.

4 HEARING OFFICER HARWOOD: Thank you, sir.

5 We're back to the Commission. This  
6 time, let me start at the top with the chairman.  
7 Chairman Rozatos, do you have questions for  
8 Mr. McBeath?

9 CHAIR ROZATOS: Thank you, Mr. Hearing  
10 Officer. No, I do not.

11 Mr. McBeath, thank you for your time.

12 HEARING OFFICER HARWOOD: Mr. Lamkin.

13 COMMISSIONER LAMKIN: I do have a couple  
14 questions.

15 EXAMINATION

16 BY COMMISSIONER LAMKIN:

17 Q. Good afternoon, Mr. McBeath. Thank you for  
18 returning to finish your cross-examination. Just one  
19 clarifying question in regard to something that  
20 Mr. Beck asked.

21 You understand that in order to  
22 implement a tertiary recovery project in the EMSU or  
23 for Goodnight to spot a new disposal well on or  
24 adjacent to State land, that they would need approval  
25 of the commissioner of Public Lands?

Page 202

1           A. Yes, I understand both of those things. The  
2 one nuance to that is, I don't know what the rules are  
3 for like a pilot project or something that wasn't a  
4 full-blown EOR project.

5           Q. My other question was regarding something  
6 that you testified about previously with regard to CO2  
7 loss to the formation. What is a reasonable  
8 percentage of CO2 that you would expect to lose to  
9 formation in an EOR project like this?

10          A. In one like this, that has disperse shows of  
11 oil, that they're not all bunched together in one  
12 zone, they could be very significant. Because the CO2  
13 is going to go into any porosity that has  
14 permeability, regardless of the oil saturation.

15                 So it would be a function of kind of the  
16 net to gross in a particular zone; very significant  
17 when you compare it to something like Tall Cotton or  
18 SSAU that had relatively continuous thick intervals of  
19 ROZ, where if you're putting CO2 in, you're contacting  
20 oil.

21          Q. Do you care to venture a ballpark  
22 percentage?

23          A. I think it could be, you know, factors of  
24 two or three times the expected amount. Really, to  
25 answer it well, I would need to look at a log and the

1 distribution of those CO2 volumes. But it's going to  
2 be on the order of two or three times the CO2.

3 COMMISSIONER LAMKIN: Thank you. That's all  
4 my questions.

5 HEARING OFFICER HARWOOD: Thank you  
6 Mr. Lamkin.

7 Dr. Ampomah.

8 EXAMINATION

9 BY COMMISSIONER AMPOMAH:

10 Q. Mr. McBeath, thanks so much for your  
11 testimony.

12 A. You're welcome.

13 Q. I don't have your slides, so I'm trying to  
14 mind myself, you know, all the testimony. But I'll  
15 try my best.

16 Now, I reviewed your direct testimony.  
17 I did review that, so I'm just going to start with  
18 Page 5 of that, and I'm reading on -- so it's going to  
19 be Number 6 and the potential impacts of EMSU's  
20 operations well integrity?

21 A. Okay. Yes.

22 Q. Okay.

23 MR. RANKIN: Dr. Ampomah, if it's helpful,  
24 I'm happy to anything on the screen of Mr. McBeath,  
25 if it's helpful.

1 COMMISSIONER AMPOMAH: That would be  
2 helpful.

3 MR. RANKIN: Please direct me to what to  
4 show. I can do that.

5 COMMISSIONER AMPOMAH: I'm looking at direct  
6 testimony, so I'm looking at a potential impacts of  
7 EMSU's operations well integrity. That would be  
8 Page 4 of his direct testimony.

9 MR. RANKIN: Commissioner Ampomah, just so  
10 you're aware, I've got this up, but it doesn't have  
11 every one of his exhibits because it's a very large  
12 file. So if there's a specific exhibit, let me know  
13 and I'll pull that up. I will share his testimony  
14 and then if we need to go to specific exhibits, I can  
15 do that, as well.

16 COMMISSIONER AMPOMAH: So this would be a  
17 self-affirmed statement. So let's go to Page 5.  
18 Yeah, right down there, A.

19 BY COMMISSIONER AMPOMAH:

20 Q. So I'm just going to pick a sentence after  
21 the API number, under A. So you said you have  
22 reviewed the video from the Ernie Banks Well 1. And  
23 then you're saying that indicates that injection is  
24 contained within the perforated interval in the  
25 San Andres.

1                   Now, my question to you is, if you're  
2 saying that it is contained, do you know the boundary  
3 condition for the San Andres?

4                   A. Are you talking about the tops and bottoms  
5 of the San Andres?

6                   Q. No. Even the lateral extent. Because  
7 you're saying that you've reviewed the wellbore  
8 analysis, the variable density log. And then you're  
9 saying that it indicates that injection is contained  
10 within the perforated interval within the San Andres.  
11 So I'm asking you, do you know the lateral extent of  
12 the San Andres?

13                  A. Can I give you a little context for this  
14 paragraph and others that relate to other wells, if  
15 that's all right?

16                  Q. Yeah. And even now, I was surprised that,  
17 you know, as I read through your testimony, I thought  
18 you were going to talk to the Commission taking of the  
19 wells, one after the other, telling the Commission  
20 about how these wells are not impeding into, let's  
21 say, or impacting Empire's operations.

22                  But instead, you more or less focused on  
23 criticizing what we already heard before, without even  
24 focusing on this particular so much important point.  
25 So yeah, I'm willing to listen to that?

1           A. So I kind of introduced this topic just  
2 above here, and I say that I've been involved in other  
3 disputes between, you know, producers and disposal  
4 companies. And one of the first things I do is to  
5 check the manmade penetrations.

6           So I did look at the bond logs,  
7 amplitude readings, the VDL forms for the wells  
8 that -- I had that available. I also looked at the  
9 water supply wells, which are a bit older, so they  
10 have kind of older versions of those logs. Where we  
11 didn't have logs, I had cement information. So I  
12 prepared to talk about that.

13           I went to my deposition and was asked,  
14 "Well, don't you know that that's not even an issue  
15 that Empire is worried about?"

16           And so in the interest of not belaboring  
17 it, although I do believe these wellbores show  
18 integrity, and I've eliminated them as a manmade path  
19 between the San Andres and Grayburg, it was basically  
20 a one-sided argument. So I didn't include it in my  
21 summary slide since we were already running short of  
22 time and taking up too much time with those direct  
23 summaries.

24           Q. I appreciate that. Now, my question to you  
25 is, so are you saying the fluid is more or less

1 contained within the wellbore, or, let's say, within  
2 that zone?

3 A. Yes.

4 Q. Do you know where the displaced fluid is  
5 going?

6 A. It's going out radially from the  
7 perforations into the zone.

8 Q. No, I'm asking about, you do have water  
9 already in there, and then you are injecting the water  
10 to displace. So you have to displace the water that  
11 is already there before you can fill that void with,  
12 let's say, the saltwater; is that correct?

13 A. I think there will be -- I don't think it  
14 will be a perfect piston-like displacement. I think  
15 there will be mixing and I think there will be some  
16 amount of the water that's already there that may not  
17 move. But there will be movement of water away from  
18 the wellbores into that zone and away from the wells.

19 Q. So, sir, you know, based on your testimony  
20 and even some of the testimonies that we've heard,  
21 when you test these injection wells, when you test the  
22 wells, or let's say when some of these wells were  
23 tested, some of the wells that were drilled were  
24 tested, it was producing, more or less, water, right?

25 A. The producing wells, yes.



1 Q. Yes. So what that means is that there is a  
2 movable water available in there. So my question to  
3 you is, you are saying that, you know, based on your  
4 analysis, the fluid that is being injected is all  
5 contained, my question is what about the native fluid?  
6 Where is it going? Did you do analysis to know the  
7 path where it is going?

8 A. I did not. I did not. This part of my  
9 testimony was designed to look at the possible  
10 movement up and down the wellbore based on the quality  
11 of the cement job. And looking at the quality of  
12 those bond logs, I eliminated that.

13 So the movement, when I say it's  
14 contained, it means it'll go into the perforations and  
15 then out into that zone as permitted, as the intention  
16 was in completing the well.

17 Q. Thank you.

18 COMMISSIONER AMPOMAH: Mr. Rankin, can we go  
19 to the slides that were shown, Slide Number 10.

20 BY COMMISSIONER AMPOMAH:

21 Q. And I have to look at it to just remind  
22 myself. Now, so let's talk a little bit about the  
23 economic analysis that Mr. West did that you  
24 criticized. And you have a lot of experience in the  
25 business, so I'm asking you, are you familiar with the

1 Kinder Morgan CO2 screening tool?

2 A. I am. Although it was not until at this  
3 hearing that I was made aware that this model was  
4 based on their tool.

5 Q. But you are aware of the tool; is that  
6 correct?

7 A. Yes.

8 Q. And the outputs that were shown from  
9 Mr. West's testimony, you couldn't attribute that to  
10 Kinder Morgan's CO2 screening tool outputs?

11 A. The outputs, no, I could not without hearing  
12 that it was from them.

13 Q. And don't you agree with me that in our  
14 business, that tool has been one of the most -- let's  
15 say the basic tool that most companies will normally  
16 use as a first-pass analysis to analyze a potential CO2  
17 project?

18 A. I agree with a main pay project. I don't  
19 know that I've seen that used for an ROZ.

20 Q. Okay. Now, in that CO2 screening tool, do  
21 you believe that there's any distinction between how  
22 you would handle an ROZ compared to main pay?

23 A. Yes, I do, because of the dimensionless  
24 curve that's implicit in that spreadsheet.

25 Q. Now, we talked about the oil prices. And

1 for folks that have a lot of experience in the CO2 EOR  
2 business, you know, let me ask you, what is a typical  
3 price for a successful CO2 EOR project?

4 A. It's generally much higher than primary  
5 production or current horizontal development. So, you  
6 know, a lot of these folks get into it and then the  
7 analysis becomes sort of a point forward sunk-cost  
8 analysis where you're not really considering what  
9 you've already spent because you're already in it.

10 But for new projects, you know, based on  
11 current prices and current -- I really haven't run  
12 those very recently, but I would guess that the  
13 starting prices would need to be in the  
14 hundred-dollar-a-barrel range.

15 Q. So you don't necessarily have a number that  
16 has been, more or less, utilized in the industry as a  
17 basic price?

18 A. No, no. I don't think there is a rule of  
19 thumb just straight up on what the price of oil is  
20 required to put in a new ROZ project or a new main pay  
21 project.

22 COMMISSIONER AMPOMAH: Mr. Rankin, let's go  
23 to Slide Number 14.

24 BY COMMISSIONER AMPOMAH:

25 Q. So on this slide, you are using, more or

1 less, 10 percent oil saturation. Now, my question to  
2 you is, why did you at least not try 20 percent?

3 A. Well, I wanted it to be based on rigorous  
4 analysis. I wanted it to be based on what we asked  
5 Mr. West at his deposition, where within the  
6 San Andres would this economic calculation relate to.

7 And the way I could do that is to take  
8 the log analysis from Dr. Davidson and average the  
9 saturations in the top 100 feet of San Andres, along  
10 with the porosity.

11 Q. Did you also average the oil saturation from  
12 the core?

13 A. Well, I didn't do that for my rebuttal  
14 statement, but I did it last night after you quizzed  
15 Mr. Knights about the oil saturation.

16 Q. Tell me about that. What was the number you  
17 got?

18 A. So if I averaged it two ways, and I got some  
19 help from some folks that were more familiar with the  
20 core, we averaged the oil saturation in the San Andres  
21 using -- first of all, using Empire's tops and also  
22 using Goodnight's tops.

23 The Goodnight top, the average was less  
24 than this 10.39 number, so I didn't feel like I needed  
25 to rerun that; it would just be further negative.

1                   If we averaged the entire San Andres  
2 using the Empire tops, the oil saturation number went  
3 to 14.86, I believe.

4                   Q. Okay. So if we go back to the number that  
5 Mr. Knights gave us, and if you say something  
6 different, then probably my counsel will step in and  
7 say, "No, no, no." So you gave me a number that I can  
8 work with, that is 14.86, which was similar to what  
9 Mr. Knights provided.

10                   But Mr. Knights also said that he  
11 included that to the Grayburg, to that number. So  
12 which one is which?

13                   A. Can I correct myself. You're right, the  
14 14.86 was from Mr. Knights' summary.

15                   When we did it with the tops from  
16 Empire, it was slightly less. It was 14.4.

17                   Q. Okay. I think the Commission will look into  
18 that. I do appreciate that.

19                   A. Do you want to hear the results of those  
20 economic runs?

21                   Q. No, I don't. My counsel doesn't want me to  
22 go there. So let me just hold it there. Thank you.

23                   But I was curious that at least if you  
24 could have tried 20 percent, which we all agree that  
25 that is the basic definition of the ROZ, and you did a

1 percent and you still got negative number, then that  
2 would be something that we could have really, really  
3 paid much attention. Would you agree with that?

4 A. I agree. If it showed that, that would be  
5 important. I think it would also be important to  
6 still consider how that 20 percent is distributed  
7 across the logs and consider that the model itself  
8 doesn't recognize that some part of the non -- you  
9 know, the non-oil-bearing zone that's going to take  
10 CO2.

11 Q. Let me ask you, did you review the core  
12 analysis for the EMSU 679 yourself?

13 A. No. That was not part of my work.

14 Q. So you did not calculate any saturations and  
15 compare to any of the core data?

16 A. I did not make those comparisons. Others on  
17 the team were focussed on the cores.

18 Q. You presented your criticisms of  
19 Dr. Buchwalter's model that he worked on. Based on  
20 the back and forth that we've heard, even Goodnight's  
21 counsel showed us the permeabilities from the core.  
22 It was shown to us today. Do you still believe that  
23 his permeabilities that he used in his model is not  
24 justified?

25 A. You're talking about Empire's counsel that

1 showed the permeabilities today?

2 Q. Yeah. Let me repeat that. So during the  
3 redirect of Mr. Knights, Goodnight's counsel showed us  
4 the permeability from the core where they were trying  
5 to establish the impermeable zones.

6 Were you around when we were going  
7 through the discussion?

8 A. Yes. I'm with you now. Yes.

9 Q. Thank you. So if you look at those  
10 permeability numbers, especially for the Kv is  
11 Dr. Buchwalter not justified?

12 A. Well, my problem with the way that he  
13 adjusted those Kv's is not so much the actual number  
14 he used, it's the fact that it was over the entire  
15 cell. So if the whole cell, two acres, gets its  
16 vertical permeability changed, not just at the  
17 wellbore, and the fact that its done sporadically, you  
18 know, sort of a heavy-handed way of adjusting.

19 We heard from Mr. Knights that there are  
20 other explanations for that water, based on the 1939  
21 paper. And I would have expected at least some  
22 analysis that tried to look at not just a single  
23 solution for getting that water, those water numbers  
24 to match, but other solutions, like stochastic array  
25 of permeability that could have had a channel coming

1 from any direction to get water into those wells.

2 So that's the main criticism I have, not  
3 the actual numbers he used.

4 You know, we went back and forth  
5 thinking that those were 0.01 to 12.8. And then there  
6 was an exhibit put up that said it was a darcy.  
7 Obviously that would have been something, but it turns  
8 out those numbers were shifted. So it's really not  
9 the number, it's just the fact that it's sporadically  
10 done throughout the reservoir to make those matches.

11 Q. So I got to know that you've also run  
12 simulation models in the past. And as a modeler  
13 myself, normally we list all the potential options  
14 that we have, you know, to be able to achieve a  
15 history match based on the data that we have  
16 available. Right?

17 A. Yes.

18 Q. So the strategy that Dr. Buchwalter used,  
19 don't you believe was an option?

20 A. It's an option, but I don't think he  
21 exhausted all the options of how it could have moved.

22 The other thing I'll say about the  
23 model, when he uses that high residual water  
24 saturation and he drops the oil-water contact, you're  
25 basically starving the Grayburg for water. And then



1 you go searching for that water and you find it in the  
2 San Andres.

3 Q. Did you review his relative perm curve?

4 A. I did, yes.

5 Q. When you say that he starved the water, do  
6 you have the residual oil saturation or the water on  
7 top of your head that he used for his model?

8 A. I think he used 35, from memory.

9 Q. And that is oil?

10 A. No, no, no. That would be the connate  
11 water.

12 Q. And are you saying that 35 percent connate  
13 water, which is the initial water saturation, is low,  
14 or high?

15 A. It's basically the irreducible water that  
16 doesn't move, and it's high. So he's freezing up that  
17 water. And based on information I've seen, it should  
18 be lower, 25, maybe even lower. That would free up  
19 water to move, which would solve some of his problem  
20 of not seeing water.

21 Q. So is it your testimony to the Commission  
22 that you are not aware of any reservoir that do have a  
23 quantity of water of, let's say, about 35 percent?

24 A. No. Any reservoir? No, I can't say that.  
25 But what I've seen in the published information that

1 was put on at the unitization hearing, he didn't use  
2 that number.

3 And at some point, in a model, you have  
4 to decide what are the numbers you're going to believe  
5 and not change everything. So he moved those numbers  
6 around. He starved it for gas by reducing the gas-oil  
7 ratio. Just a number of things that I was confused  
8 about why he chose to move those numbers as opposed to  
9 changing things like -- you know, that unitization  
10 hearing very clearly said they didn't have a good  
11 handle on the original oil in place, but he used that  
12 as an absolute ground truth and then forced other  
13 variables to fit that.

14 Q. So, sir, don't you believe that, you know,  
15 Goodnight could have done more by at least presenting  
16 an alternative model to dispute or at least present  
17 alternative strategy to the Commission for  
18 consideration?

19 A. Well, we did consider building our own  
20 model. But we looked at the available data -- now,  
21 Dr. Buchwalter's model has a lot of information in the  
22 Grayburg. But the real critical part of it is, is how  
23 the San Andres and the Grayburg interact. And we have  
24 just very little data to match the pressures in the  
25 San Andres.

1                   We have enough to say I know what it is  
2 in 1959. I know that it is in '87, '86, and I know  
3 what it is today, and those haven't changed very much.

4                   But as far as matching, I think it's a  
5 stretch for him to say that he pressured matched the  
6 San Andres, because he has so few points, and one of  
7 those points is assumed at the very beginning.

8                   So we looked at all of that and we said  
9 there's not enough data to have the appearance of  
10 precision by doing an alternative model. We're going  
11 to present the actual information.

12                   COMMISSIONER AMPOMAH: Can we go to Slide  
13 Number 23?

14 BY COMMISSIONER AMPOMAH:

15                   Q. So, sir, I just want to discuss this with  
16 you. I think, based on your discussion earlier on the  
17 last time, you said that there were not actual  
18 production history for each of the wells.

19                   Now, my question to you is, in our  
20 business, is it not possible to reallocate production  
21 data, you know, back to the wells?

22                   A. It is possible as long as you honor or have  
23 some information about how that allocation is done.

24                   There's a figure in Dr. Buchwalter's  
25 original statement where he shows a field-wide oil

1 rate. And if you look at that, the initial rate is  
2 10,000 barrels per day. But we know that -- and that  
3 goes all the way back to 1938. If you look at the  
4 history that's described in the unitization hearing,  
5 the biggest month's production, I think was in 1940,  
6 was about just shy of 800,000 barrels per month. That  
7 calculates out to about 25,000 barrels per day.

8 And so he missed the initial potential  
9 on average by a factor of about 2. And I think that's  
10 really important, that most of the withdrawal would  
11 have occurred in the first two decades. He spread it  
12 out over a much longer period, and that's got to have  
13 an impact on the model.

14 COMMISSIONER AMPOMAH: Can we go to the  
15 conclusion slide?

16 BY COMMISSIONER AMPOMAH:

17 Q. So on Number 3, you said RFT pressure  
18 measurements contradict both West and Buchwalter's  
19 conclusion.

20 Now, let me ask you, based on the  
21 redirect, the cross-examination, all the information  
22 that we've listened to today, is it your testimony  
23 that the San Andres is an under-pressured reservoir?

24 A. The disposal zone is, the zone that  
25 Goodnight is disposing into and Rice is disposing into

1 and where the water supply wells were.

2 Q. Even after counsel for Empire showed us the  
3 Rice well with those pressures, do you still stand by  
4 that?

5 A. Can you repeat that one more time?

6 Q. So I'm referring to Empire's counsel showed  
7 the pressure information at different ES from one of  
8 Rice wells that there was a discussion back and forth  
9 on that, with you on that. Do you remember that one?

10 A. I do. But that was the single measurement  
11 in that Rice well.

12 Q. So even with that particular information, is  
13 it still your testimony that the San Andres is an  
14 under-pressured reservoir?

15 A. Absolutely. The deepest pressure there is  
16 1800 psi at 5000 feet, which calculates out to .36 psi  
17 per foot. And there are published studies that show  
18 that the San Andres is under-pressured regionally.

19 Q. So is Goodnight going to show us actual  
20 reservoir pressures, you know, from other witnesses  
21 to, more or less, solidify that claim?

22 A. I think you're definitely going to see  
23 current pressures from Mr. McGuire on his wells. He  
24 has one well that has been inactive for a couple of  
25 months, and so it's a good static measurement. And it

1 calculates at an under-pressured gradient, as well.

2 Q. So I'm going to go to Page 18 of  
3 self-affirmed direct statement. I'm just going to  
4 look at the last statement where you bolded that. And  
5 then we'll probably pick it up from the next page.

6 So you're saying that without  
7 undertaking critical laboratory testing or other  
8 validation of MMP correlations -- that would be on  
9 19 -- MMP correlations, Empire's assumption of  
10 miscibility and, therefore, the estimated recovery  
11 factors are not reliable.

12 So is that not what they're asking, for  
13 the Commission to give them the opportunity to do  
14 this?

15 A. I don't know that you would need to acquire  
16 data to do that. To do the slim tube test, you would.  
17 But there are correlations you could use.

18 But my comment here related to, this is  
19 prior to us seeing their economic analysis, that we  
20 expected to see some discussion of this. There was  
21 none. And that's an important parameter in their  
22 analysis. And so it was surprising not to see it.

23 Q. So would you agree with me that when I say  
24 that they should at least be given the opportunity to  
25 embark on detailed analysis to fully understand the

1 feasibility of this project?

2 A. I mean, can you help me with what you mean  
3 by "this project"? If it's to the entire San Andres  
4 zone, I can't agree. If it's a portion of the Upper  
5 San Andres, I can agree to that.

6 Q. Now, you said if it is a portion of the  
7 San Andres, you will agree to that. Now, assuming  
8 that the Commission, more or less, aligns with your  
9 thoughts, saying that okay, focus on the Upper  
10 San Andres, do you believe there has been an  
11 established boundary between the Upper San Andres and  
12 then the Lower San Andres that will support the  
13 effective CO2 EOR in the Upper San Andres?

14 A. Yes. I do believe that the data shows that  
15 there's a separation between the disposal zone in the  
16 Upper San Andres. And it's because of that, that if  
17 Empire wanted to do an ROZ project in the Upper  
18 San Andres, that it can be done without impact from  
19 the Goodnight wells.

20 Q. So when Mr. Knights testified that he  
21 used -- you know, he supposed the permeability barrier  
22 based on, let's say, 0.1 millidarcy or even lower  
23 permeability. He classified that as a barrier. Do  
24 you also agree to that?

25 A. Well, I think so. But I didn't approach it

1 from that standpoint. I look at the characteristics  
2 of that disposal zone and the fact that it can take  
3 water on a vacuum for decades and decades and the  
4 water supply wells can supply -- must be very, very  
5 large. And the fact that we drill into it and have  
6 loses that you don't have above, to me, that's saying  
7 that there's a separation between those zones.

8 So I don't do it by looking at perms  
9 like he does, but I get to the same place.

10 Q. So assuming we are using the perm, you know,  
11 to delineate the barrier, I mean, the perm of 0.1, you  
12 and I agree that CO2 will, more or less, pass through  
13 that. So are they not going to lose CO2 into the  
14 bottom part of, let's say, the Lower -- or let's say,  
15 into the Lower San Andres?

16 A. I think gravity is going to help you in that  
17 case, because the CO2 is going to want to go up. So in  
18 the abstract, I agree that a gas can move through  
19 that. But I think it will more than likely move up  
20 structure.

21 Q. Mr. Beck tried to go back and forth with you  
22 on a subject that really concerns me. That is, has  
23 Goodnight done any analysis and presented it to the  
24 Commission of the impact that, lets say, if the  
25 Commission was to revoke the existing injection wells



1 and even deny the newly proposed wells, the actual  
2 impact that is going to have on Goodnight and then  
3 also on the State?

4 A. Well, I haven't done that and I don't think  
5 it's been done by any of the witnesses that have  
6 testified so far. But I think you're going to hear --  
7 I don't know about analysis, but I think you're going  
8 to hear testimony about that.

9 Q. Let me try to wrap up here. Now there was a  
10 discussion that I'm really, really interested in.

11 So I'll ask you, based on your  
12 experience, and you've also the economic analysis, can  
13 you comment on the subject that when I say that when a  
14 significant amount of water has been injected into the  
15 San Andres, using that scenario, can you describe to  
16 the Commission if there could be any impact on the  
17 economic value of the ROZ?

18 A. On the economic value, you say?

19 Q. Yes. Yes.

20 A. And for the purposes of this question, am I  
21 assuming it's in the disposal zone?

22 Q. It is in the San Andres, so both -- I mean,  
23 this question is from the fact that I think there has  
24 been -- I think Mr. Knights talked about and probably  
25 you also, that the ROZ and then injection cannot

1 coexist, right?

2 A. Right.

3 Q. So if they can coexist, I'm asking you if  
4 there is any impact on the economics, the economical  
5 value of that ROZ that is alleged to be there?

6 A. So I think there are two factors to  
7 consider. One would be whether or not the pressure  
8 would increase. And I think based on all the  
9 information we've seen, whether it's large withdrawals  
10 from water supply wells or large injections from  
11 disposal wells over time, the pressure has not  
12 changed. So from that standpoint, the change in  
13 pressure I think can be eliminated as a concern for  
14 the effect on the ROZ project.

15 The second thing would be whether or not  
16 the water that's injected could move any of the oil.  
17 I think most witnesses have said no. I think there's  
18 one witness that said it would move oil off the  
19 property, which doesn't make a lot of sense. If it's  
20 a residual oil zone, it's not going to move. So I  
21 think you can eliminate that as a concern, too.

22 So my conclusion is that the injection  
23 of water would not impact their ability.

24 Q. What about the amount of water that the  
25 operator has to remove before they can get to the oil?

1           A. So I know that's come up a couple of times.  
2     And I don't fully understand that assumption, and  
3     which water we're talking about. Because removing  
4     water is something that happens -- are you talking  
5     about what you would do with it after you remove it,  
6     where would you dispose of it? I'm not sure of the  
7     consequences or the real basis of that question.

8           Q. So don't you believe that, let's say, if you  
9     are injecting water into the system, we don't know the  
10    boundary -- you know, I've asked about whether we do  
11    know an established boundary for the San Andres. We  
12    don't know the boundary. So don't you believe that  
13    the operator would have to spend more money to  
14    remove -- or to produce more water before they get,  
15    let's say, a barrel of oil?

16          A. Okay. So the assumption is, if Goodnight  
17    injects water, that would cause Empire to remove more  
18    water in their operation?

19          Q. That is where I'm going with that.

20          A. Okay. Now I understand. I think I would  
21    fall back on the pressure again, that if there's no  
22    pressure increase and you're just displacing water, I  
23    don't see how that impacts Empire's ability to  
24    implement an ROZ project.

25          Q. So when Mr. West was testifying, I asked him

1 did he include the withdrawal of the water, the amount  
2 of water that needs to be withdrawn from the  
3 San Andres before they start producing one barrel of  
4 oil. He said yes. So do you disagree with that?

5 A. If he's saying that that's in the economic  
6 model, I disagree with that.

7 COMMISSIONER AMPOMAH: Thank you, sir. I do  
8 appreciate your time.

9 THE WITNESS: Thank you.

10 HEARING OFFICER HARWOOD: Okay. Redirect,  
11 Mr. McBeath.

12 MR. RANKIN: Thank you, Mr. Hearing Officer.

13 REDIRECT EXAMINATION

14 BY MR. RANKIN:

15 Q. Mr. McBeath, do you recall during your last  
16 session of cross-examination with Mr. Wehmeyer, you  
17 were asked questions about PPQ analysis, or -- do you  
18 recall that testimony?

19 A. I do.

20 Q. And what's your understanding of what PPQ  
21 stands for?

22 A. Production in paying quantities.

23 Q. And you understand that Mr. Wehmeyer was  
24 asking you about whether you've done that analysis.  
25 What's context in which that analysis is done?

1           A. It's usually done in the context of a lease  
2 that the lessor is alleging has lapsed because of a  
3 failure of production in paying quantities. It  
4 normally happens with the last well on the least,  
5 where there's very little production. And there's  
6 analyses that are laid out in case law and pattern  
7 jury charges that show what cost you should include  
8 and should not include to figure out whether or not  
9 the well is producing in paying quantities. And if it  
10 is, then the leases saved. And if it's not, with some  
11 other extenuating circumstances, like prong two, then  
12 the lease is lapsed.

13           But it has no applicability to a project  
14 that has not been implemented and considering large  
15 capital expenses and making a decision on whether to  
16 move forward.

17           Q. To that point, did Empire conclude capital  
18 expenses in its economic analysis?

19           A. Yes, they did. I didn't change any of  
20 those.

21           Q. Okay. And you just used what Empire had  
22 done and so you did not exclude any capital expenses  
23 from your analysis, right?

24           A. That's true, yes.

25           Q. I think you testified, as you just explained

1 to me, that you're familiar with PPQ analysis, at  
2 least under Texas law, right?

3 A. That's true. I've had a couple cases in  
4 New Mexico that never made it to trial. So we noodled  
5 on it, and I'm aware that maybe the case law is  
6 thinner in New Mexico on this issue.

7 Q. Based on your understanding of what PPQ  
8 analysis is, did Empire, itself, undertake a PPQ  
9 analysis?

10 A. No, they didn't. And I don't think it's  
11 appropriate here, but no, they did not.

12 Q. Okay. Do you recall questions during your  
13 last session from Mr. Wehmeyer about who was in the  
14 best position to do a coring analysis in the EMSU,  
15 Empire or Goodnight; do you recall that series of  
16 questions?

17 A. I do.

18 Q. And do you recall the previous testimony  
19 that Empire acquired the EMSU in March of 2021?

20 A. Yes, I do.

21 Q. Are you aware of any reason that Empire  
22 could not have cored a well at any time between the  
23 time they acquired the unit and today?

24 A. I'm not aware of any reason they couldn't  
25 have drilled a well and cored it.

1 Q. Are you aware of any reason that they cannot  
2 go out and core a well now?

3 A. No, I'm not.

4 Q. And that would be true for any of the three  
5 units that they operate, the EMSU, the EMSU-B or the  
6 AGU, correct?

7 A. That's correct.

8 Q. And, Mr. McBeath, you did some review of  
9 where Goodnight's injection wells are located,  
10 correct?

11 A. I did, yes.

12 Q. Do they have any disposal wells or injection  
13 wells operating within Empire's AGU unit?

14 A. No, they're all limited to the EMSU unit.

15 Q. Do they have any disposal wells operating  
16 within the EMSU-B unit?

17 A. They do not.

18 Q. Did you hear testimony from Empire's  
19 witnesses that they were ordered not to do any further  
20 work on their CO2 project until disposal was ceased in  
21 all of their units?

22 A. Ceased? I don't remember the distinction of  
23 all of their units, but yes, ceased.

24 Q. And do your knowledge, Goodnight is not  
25 injecting any disposal water or produced water the

1 EMSU-B or AGU, correct?

2 A. That's right. You're right, it's a moot  
3 point on those, yes.

4 Q. Okay. Today, Mr. McBeath, when Mr. Wehmeyer  
5 was asking you about whether you conducted any  
6 analysis to determine volumes of CO2 -- I'm sorry.  
7 Strike that.

8 Do you recall during Mr. Wehmeyer's  
9 cross-examination of you where he was asking you  
10 whether you evaluated or changed the amounts of CO2  
11 that might be needed under Mr. West's economic  
12 analysis?

13 A. I do with respect to the pressure issue,  
14 yes.

15 Q. And do you recall Commissioner Lamkin's  
16 questions about what your estimate is for what the  
17 additional volumes might be needed -- or how much  
18 volume of CO2 might be lost in the formation in this  
19 particular area? Do you recall that?

20 A. I do.

21 Q. And you said you expected it to be somewhere  
22 on the order of 2 to 3 times. My question is 2 to 3  
23 times what?

24 A. 2 to 3 times more than is assumed in the  
25 economic model of Empire, based on that dimensionless



1 curve.

2 Q. Okay. And you didn't run an economic  
3 analysis based on your estimate that 2 to 3 times more  
4 CO2 would be required, did you?

5 A. No, I did not.

6 Q. Okay. Do you recall Mr. Wehmeyer asking you  
7 today about the variables that you analyzed in  
8 Mr. West's economic models -- or model, rather?

9 A. I do, yes.

10 Q. Do you recall Mr. Wehmeyer stating that that  
11 economic model was representative of a project that  
12 Empire intended to carry out?

13 A. That was certainly the implication of his  
14 questions.

15 Q. Based on the economic model that you  
16 reviewed, in your opinion, Mr. McBeath, is there  
17 sufficient analysis in order to carry out a CO2 project  
18 based on that economic model that you reviewed?

19 A. No. I would characterize that calculation  
20 spreadsheet analysis as, at best, the beginnings of a  
21 scoping analysis.

22 Q. Now, do you recall Mr. Wehmeyer's  
23 cross-examination of you where he was asking whether  
24 you, yourself, had calculated a recovery factor? Do  
25 you recall that?

1 A. I do.

2 Q. And I want to make clear, Mr. McBeath, did  
3 Empire, itself, calculate a recovery factor?

4 A. I don't think I'd say they calculated one.  
5 There is one implicit in the dimensionless curve that  
6 they used. And I talked about the genesis of that  
7 curve. But if they just assumed three pore volumes,  
8 hydrocarbon pore volumes of CO<sub>2</sub>, it would equate to a  
9 recovery factor of 18.5 percent.

10 Q. You may not recall this, Mr. McBeath, but do  
11 you recall the slide that Mr. Wehmeyer showed you  
12 where he was asking you about whether or not or why  
13 you didn't use EIA pricing in your economic analysis?

14 A. I recall a slide with some yellow  
15 highlighting on it, yes.

16 Q. Do you recall below that yellow highlighting  
17 there was some information about what that four-county  
18 study used in terms of a price escalator for CO<sub>2</sub>?

19 A. I don't, no.

20 Q. Does Empire use a price escalator for CO<sub>2</sub>?

21 A. No. It was a flat CO<sub>2</sub> price. Whether it was  
22 \$1 or \$1.50, it was flat. Their's was flat at \$1.

23 Q. Whose was flat at \$1?

24 A. Empire's was flat at \$1.

25 Q. But they used a escalator for their oil

1 pricing, correct?

2 A. That's right.

3 Q. But they didn't use any escalator to account  
4 for increasing CO2 costs, did they?

5 A. That's correct.

6 Q. What's your opinion on whether it's  
7 reasonable to assume that CO2 pricing is going to stay  
8 flat? Is it conservative, or what's your opinion?

9 A. Well, it's -- the longest term CO2 contract  
10 I've seen in all the work I've done, whether it's  
11 sourced out of McElmo Dome or Bravo Dome or Sheep  
12 Mountain, is, I think 15 years. At some point you're  
13 going to be renegotiating. And I doubt very seriously  
14 that the price is going to be the same.

15 Q. During the cross-examination today from  
16 Mr. Wehmeyer, he mentioned, at least at one point,  
17 that Empire might be considering 10-acre to 40-acre  
18 spacing for it's CO2 injection project. Do you recall  
19 him asking you about that range of spacing?

20 A. I recall him mentioning 10 acres, yes.

21 Q. Have you seen anything in any of the  
22 materials records, testimony about Empire considering  
23 or looking at 10-acre spacing?

24 A. No, I have not. And economic model assumes  
25 40 acres.

1 Q. What would it do to the economics if you  
2 were to -- what would it require to go down to 10-acre  
3 spacing?

4 A. Requires a lot more wells, new wells, more  
5 expense, and you hope it increases the recovery.

6 Q. But you haven't seen any analysis from  
7 Empire reflecting any consideration of 10-acre  
8 spacing, correct?

9 A. That's right, I haven't.

10 Q. There was some discussion about your effort  
11 to substantiate CO2 pricing in your criticism of  
12 Mr. West's analysis. Do you recall that  
13 cross-examination today?

14 A. I do.

15 Q. Do you recall seeing anything in Mr. West's  
16 testimony or Empire's materials substantiating their  
17 basis for their assumption of their CO2 pricing?

18 A. I do not. Only that it was stated.

19 Q. Do you recall cross-examination today,  
20 Mr. McBeath, where Mr. Wehmeyer was discussing about  
21 the potential for high grading location for a  
22 one-section project within the EMSU? Do you recall  
23 that cross-examination?

24 A. I do, yes.

25 Q. Are you aware of any effort or report, study

1 analysis on Empire's part to identify or high grade  
2 locations with the EMSU?

3 A. Not in the documents I've seen in this  
4 matter or in the testimony so far.

5 Q. Do you recall the testimony from  
6 Mr. Wehmeyer about the potential benefits to  
7 New Mexico in terms of royalty?

8 A. Yes.

9 Q. And Mr. Wehmeyer asked you that -- that that  
10 would be a substantial benefit to the State to be able  
11 to -- he showed you a chart, I think, that had some  
12 royalty values on it. Do you recall that?

13 A. I don't recall the values. I remember him  
14 asking me about it, though.

15 Q. Now, isn't it true that in order to receive  
16 any royalties, there actually has to be production,  
17 correct?

18 A. That's right. You have to have a successful  
19 project for those great benefits.

20 Q. And referring to that chart, Mr. Wehmeyer  
21 was asking about the benefit of royalty over a 40-year  
22 period, which is a long period of time, isn't it?

23 A. It is, yes.

24 Q. And, again, you'd have to have production  
25 over that entire 40-year period to see any benefits,

1 wouldn't you?

2 A. You would for royalties or taxes or things  
3 like that.

4 Q. Mr. McBeath, during Dr. Ampomah's discourse  
5 with you, his questions, he asked you whether you had  
6 conducted an economic analysis using Empire's model to  
7 evaluate what the model would say about a 20 percent  
8 oil saturation. Do you recall that?

9 A. I do, yes.

10 Q. And you discussed some of the considerations  
11 about using a 20 percent oil saturation. But one  
12 thing you didn't mention was one of the assumptions  
13 you discussed in your testimony, which is the use of a  
14 dimensionless curve. Explain, if you would, how you  
15 would -- what consideration you would give to just  
16 relying on a 20 percent oil saturation analysis, and  
17 using Empire's economic model, while also relying on  
18 the dimensionless curve that's inherent in that model?

19 A. So the genesis of that curve is not well  
20 understood. When we asked about it, we were given a  
21 paper, and I've gone over this a couple of times, that  
22 principally uses the curve to calculate how much CO2  
23 would be needed to theoretically flood all the fields  
24 in Wyoming under miscible and immiscible conditions.

25 And in the curve that's presented in I

1 think it's Figure 4 of the paperwork, there's kind of  
2 a comparison to a San Andres curve. And there's no  
3 discussion of where that comes from.

4 Based on the age of the paper, it's more  
5 than likely that that's a main pay paper, because  
6 there weren't a lot of ROZ projects around when that  
7 paper was published.

8 So main pay is going to have a lot more  
9 continuous oil saturation. There will be a lot of  
10 data to back up the dimensionless curve like that.  
11 Many fields, many projects, much less so when you come  
12 to an ROZ project, and in particular, an ROZ project  
13 that starts getting on the boundaries of what's been  
14 shown to be economic.

15 So I have some real concerns of just  
16 blindly using that curve to estimate that.

17 Q. I think we'll hear more from Dr. Lake on  
18 some aspects of that, correct?

19 A. I believe so, that's true.

20 Q. Now, another question that Dr. Ampomah was  
21 asking about, it was about potential impacts to a CO2  
22 project relating to the need of Empire to have to  
23 remove additional water.

24 So if Goodnight continues to inject into  
25 the zone and if Empire would proceed with the CO2

1 project, wouldn't they have to remove water, and you  
2 responded that based on the pressures, it's not your  
3 expectation that that would be an impact, correct?

4 A. That's true, yes.

5 Q. Just so I'm understanding, is the point  
6 that -- the disagreement you have with Mr. West is  
7 because Mr. West is assuming that the San Andres  
8 disposal zone would be pressuring up? Is that the  
9 genesis of the disagreement?

10 A. I think so. I believe that's right. This  
11 issue kind of popped up near the end of his testimony,  
12 and all of a sudden there was discussion about  
13 removing water. I presume it has to do with his  
14 assumption that you'd be pressuring up and, therefore,  
15 have to remove water to get down to the same pressure.  
16 I don't think that's an issue based on the performance  
17 of the San Andres disposal zone.

18 HEARING OFFICER HARWOOD: Mr. Rankin, could  
19 you just stop screen-sharing so we could see the  
20 witness.

21 MR. RANKIN: Mr. Hearing Officer, I have no  
22 further questions of Mr. McBeath.

23 HEARING OFFICER HARWOOD: Thank you, then.  
24 May this witness be excused?

25 MR. WEHMEYER: For Empire, yes.



1 HEARING OFFICER HARWOOD: OCD?

2 MR. MOANDER: No objection, Mr. Hearing  
3 Officer.

4 HEARING OFFICER HARWOOD: Rice?

5 MR. BECK: No objection.

6 HEARING OFFICER HARWOOD: Pilot?

7 MR. SUAZO: No objection.

8 HEARING OFFICER HARWOOD: Mr. McBeath, thank  
9 you for your time here and last time we saw you.

10 THE WITNESS: Thank you.

11 HEARING OFFICER HARWOOD: All right. So  
12 it's 4:20 p.m. Let me look at see who I have on your  
13 witness list. Who would be your next witness?

14 MR. RANKIN: Mr. Hearing Officer, next  
15 witness would be Mr. Allman, who is available, I  
16 think. I would ask just for a moment so I could use  
17 the restroom and maybe talk to Mr. Allman and make  
18 sure he's also ready and make sure we have our  
19 materials ready to present.

20 I think we could probably get it done by  
21 5 o'clock, at least intro slides. That's my  
22 expectation.

23 HEARING OFFICER HARWOOD: That would  
24 certainly set a record in this case.

25 MR. RANKIN: There are some witnesses that

1 have more materials.

2 HEARING OFFICER HARWOOD: Let me hear from  
3 Mr. Rozatos. What are your thoughts on this?

4 CHAIR ROZATOS: I'm okay with that, if  
5 Mr. Rankin thinks that he will finish in time. As  
6 you said, Mr. Hearing Officer, that would be  
7 definitely a record if that were to happen.  
8 Especially with our track record in this case. So I  
9 leave it to your discretion.

10 MR. RANKIN: May I make a small  
11 interjection? I guess my thought is, if I take  
12 10-minute break, that's 4:30. I hate to disappoint  
13 anybody by going past 5:00. I know we have to  
14 start -- not start until 10:30 tomorrow, which is a  
15 factor, and totally understandable.

16 I'll leave it to the Hearing Officer.  
17 I'm happy to go forward at 4:30, but I'm also happy  
18 to start at 10:30 tomorrow morning.

19 HEARING OFFICER HARWOOD: Well, let me ask  
20 you. You guys haven't had much time to talk about  
21 the scheduling issue that we raised, that I raised  
22 earlier today. So one option is you could use the  
23 rest of -- we could clear out and you guys could use  
24 the rest of today to discuss those issues and maybe  
25 agree on time limits.

1           Since this case is heavy on modeling,  
2 I've done a middle modeling of my own in terms of  
3 time and numbers and of witnesses. I think we have  
4 either five or six witnesses left, four for Goodnight  
5 and possibly two for OCD, although it may be one.  
6 But if we err on the side of caution, it's a total of  
7 six more witnesses.

8           We have a total of about -- through  
9 Wednesday of next week, if my arithmetic is -- not  
10 next week, but next time we meet in May, if my  
11 arithmetic is correct, it's about 31 hours. So with  
12 six witnesses, that's about five hours per witness,  
13 and that would mean maybe an hour and a half on  
14 direct, an hour for cross for Empire, half an hour  
15 for cross for other parties and intervenors, an hour  
16 for the Commission and hour for redirect.

17           These are just numbers I'm throwing out  
18 for discussion purposes, although the amount of hours  
19 in our day are pretty well settled. So that's the  
20 option.

21           We can start with the witness today or  
22 you guys could use the time to discuss whether or not  
23 you could agree to time frames for the rest of this  
24 proceeding so that we can get through it by no later  
25 than Wednesday of the week of the 19th of May.

1 MR. RANKIN: Appreciate that, Mr. Hearing  
2 Officer, appreciate your modeling. Would you mind  
3 sharing your model with us so we can do some due  
4 diligence?

5 HEARING OFFICER HARWOOD: Let's do it. I'll  
6 give you my Post-it notes.

7 MR. WEHMEYER: And that was actually going  
8 to be the subject of = a motion from Empire, and  
9 we'll certainly confer. But just given the  
10 incredibly lengthy direct examinations that have  
11 occurred during the Goodnight case in chief, we were  
12 going to make a motion that directs be limited to an  
13 hour.

14 I eman, this started at 15 minutes.  
15 Some of these things have gone two and a half hours  
16 on direct, which is far afield of what was laid out  
17 additionally.

18 The cross-examination -- part of why  
19 we're at this place timewise, the cross-examination  
20 of the Empire witnesses were quite lengthy and  
21 meandering. And I think for the part of Empire,  
22 we've done a better job of keeping this narrowed down  
23 by way of time and focusing on relevant things.

24 So we will confer. I think there's  
25 going to be a motion to limit direct from here out to

1 hour so we can get these things done.

2 And, again, these are witness statements  
3 that have been filed, so the testimony that they're  
4 giving by way of their case in chief should be in the  
5 record. And that was reflected in the Empire case;  
6 the redirects were quite tight and compressed.

7 So we'll confer with Mr. Rankin, but I  
8 think what you'll be hearing back, failing agreement,  
9 is something in those lines.

10 HEARING OFFICER HARWOOD: Hopefully you guys  
11 will be able to agree on something, you know, given  
12 the time frame, so that you don't have to have a  
13 motion. But of course if you do, you do.

14 I do remember Ms. Hardy at the outset  
15 saying that direction examinations would be about  
16 15 minutes each. So I think there's enough guilt to  
17 go around on both sides for lengthy direct and  
18 cross-examinations.

19 You know, I've handled a lot of cases  
20 myself and, you know, significant, important, big  
21 cases, and I don't think I've ever seen  
22 cross-examinations that went this long. But, you  
23 know, my cases didn't involve these kind of complex,  
24 technical issues. So I understand the need for  
25 people to take time in these cases. But hopefully

1 you can work it out.

2 CHAIR ROZATOS: Mr. Hearing Officer, I  
3 apologize to interrupt. But, I mean, we've already  
4 now been talking for a little over five minutes, it's  
5 already pushing us to the 4:30 time mark, and then  
6 with a 10-minute break, it would probably be best  
7 that we follow your direction, we break here, let the  
8 parties meet together to try to find a consensus for  
9 the time frame, and then we can start up first thing  
10 in the morning at 10:30.

11 THE HEARING OFFICER: Works for me. I'll  
12 provide everybody my, quote, unquote, model and you  
13 guys can take it from there.

14 Thank you, everybody, for your time here  
15 today. We'll be off the record today. We'll be back  
16 tomorrow not so bright and early at 10:30 a.m.

17 Thank you.

18 (Proceedings adjourned 4:27 p.m.)

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AFFIRMATION OF COMPLETION OF TRANSCRIPT

I, Kelli Gallegos, DO HEREBY AFFIRM that on April 23, 2025, a hearing of the New Mexico Oil Conservation Commission was taken before me via video conference.

I FURTHER AFFIRM that I did report in stenographic shorthand the proceedings as set forth herein, and the foregoing is a true and correct transcript of the proceedings to the best of my ability.

I FURTHER AFFIRM that I am neither employed by nor related to any of the parties in this matter and that I have no interest in the final disposition of this matter.



Kelli Gallegos  
VERITEXT LEGAL SOLUTIONS  
500 Fourth Street, NW- Suite 105  
Albuquerque, New Mexico 87102

Dated: May 15, 2025

[& - 1921]

<b>&amp;</b>	149:8 151:3	<b>113</b> 98:7	<b>14.86</b> 213:3,8
<b>&amp;</b> 2:18 3:9,14 164:17 165:16 166:16	234:22 <b>1.50.</b> 128:25 <b>10</b> 21:12 30:22	100:11 102:1 104:10 134:4 135:23 136:5	213:14 <b>1422</b> 180:16 <b>15</b> 30:3 235:12
<b>0</b>	49:24 52:20	<b>118</b> 166:14	244:14 245:16
<b>0.01</b> 216:5 <b>0.1</b> 223:22 224:11 <b>01</b> 178:3,25 <b>05</b> 178:22	58:6,9,11,21 59:14,25 60:5 89:3,11 92:3 97:20 134:4	<b>11:21</b> 102:12 <b>11:30</b> 34:14 102:11,12	247:20 <b>1527</b> 173:13 176:8
<b>1</b>	145:24 146:16 175:12 209:19	<b>11th</b> 190:9	<b>159</b> 132:13
<b>1</b> 2:18 7:15 11:2 12:1 13:13 15:2,11 18:2 19:3,5 33:12 41:18 43:15 55:17 114:25 115:5,6 115:7 126:12 126:20 127:8 128:25 149:24 151:19 160:7 164:15 168:17 168:25 170:23 170:24 171:13 171:14 191:7 193:24 205:22 234:22,22,23 234:24 <b>1.2</b> 145:22 152:23 192:24 <b>1.5</b> 192:24 <b>1.50</b> 126:13,20 127:8 149:2,3	212:1 235:17 235:20,23 236:2,7 242:12 246:6 <b>10,000</b> 152:22 159:8 220:2 <b>10.39</b> 212:24 <b>100</b> 8:8,15 46:4 73:3 98:7,11 168:15,22 212:9 <b>105</b> 247:18 <b>108</b> 4:7 <b>10:30</b> 5:18,20 122:9 242:14 242:18 246:10 246:16 <b>11</b> 97:21 98:3 100:8 101:1,7 101:11,22 104:9,16,22 <b>110</b> 2:18 <b>112</b> 4:8	51:24 52:4 175:5 176:1,9 187:19 <b>12.5</b> 178:22 <b>12.8.</b> 178:3,25 216:5 <b>120</b> 4:9 169:19 <b>1220</b> 1:6 3:4 <b>124</b> 4:10 <b>12400</b> 2:14 <b>1245</b> 173:19 187:2 <b>12:00</b> 123:2 <b>13</b> 15:3 19:13 46:25 <b>130</b> 25:7 <b>1312</b> 186:4,16 187:1 188:20 <b>14</b> 47:10 51:4 211:23 <b>14,000</b> 152:21 <b>14.34</b> 102:5 103:23 104:3 <b>14.4.</b> 213:16	<b>16.2</b> 102:5 103:20 <b>162</b> 179:16 <b>17</b> 5:12 47:17 47:22 48:3 182:19 <b>17.2</b> 104:11 <b>175</b> 23:9 84:21 <b>1754</b> 175:16,18 <b>1788</b> 175:20 176:12 <b>179</b> 13:19 <b>18</b> 51:20 150:16 164:18 165:25 222:2 <b>18.5</b> 234:9 <b>1800</b> 174:20 175:22,24 176:12 185:25 221:16 <b>181</b> 179:16 <b>19</b> 222:9 <b>19.5</b> 104:22 <b>190</b> 4:11,11 <b>1921</b> 174:17



[1926 - 31]

<p><b>1926</b> 116:25  <b>1934</b> 54:6  <b>1936</b> 174:17  <b>1938</b> 175:14  220:3  <b>1939</b> 51:8,21  54:1,5 65:19  66:19,22 67:1  67:6 215:20  <b>1940</b> 220:5  <b>1959</b> 175:10,13  175:15,17,21  175:23 187:7  187:11,22  188:6,7 219:2  <b>196</b> 179:16  <b>1966</b> 60:25  <b>1970</b> 54:23  <b>1973</b> 54:11,22  <b>1984</b> 73:23  <b>1986</b> 61:5  62:10 176:22  176:23  <b>1987</b> 164:16  165:7,16  187:24  <b>19th</b> 103:3  243:25  <b>1:15</b> 122:20,25  123:2  <b>1:30</b> 122:2  <b>1st</b> 1:5</p>	<p style="text-align: center;"><b>2</b></p> <p><b>2</b> 11:2,3 15:11  18:2 33:13,18  43:15 48:2  74:20,23 115:5  164:14 166:8  177:23,24  220:9 232:22  232:22,24  233:3  <b>2,000</b> 176:7  <b>2.3</b> 164:2,6,8  <b>2.5</b> 166:5  <b>2.77</b> 162:13  164:11  <b>20</b> 9:3,10,17,20  9:25 10:1  20:22 40:23  41:3,4 42:4  43:21 61:9  88:6,7,12,20  89:6,7,13,24  90:13,21  136:12,20  137:8,18,19  146:9,9 164:19  174:19 175:14  176:4 187:7  212:2 213:24  214:6 238:7,11  238:16  <b>200</b> 98:17  111:13,24  112:3,4</p>	<p><b>2006</b> 165:8,12  165:13,18  166:2,4  <b>2009</b> 162:18  <b>2018</b> 164:5  <b>202</b> 4:13  <b>2021</b> 194:2  230:19  <b>2024</b> 7:24  188:6  <b>2025</b> 1:11 5:8  8:24 190:10  194:2 247:4,20  <b>204</b> 4:14  <b>2058</b> 175:15  <b>2068</b> 2:4  <b>20s</b> 147:4,5  <b>21.44</b> 97:16  <b>211</b> 49:17  132:9,14  173:19 184:21  186:3,7,12  187:2 188:14  <b>211's</b> 186:14  <b>21st</b> 103:6,9  <b>22</b> 42:6 164:20  <b>228</b> 4:12  <b>23</b> 1:11 219:13  247:4  <b>23.94</b> 97:15  <b>2307</b> 2:7  <b>23614</b> 5:12  <b>23775</b> 5:13  <b>239</b> 54:9</p>	<p><b>23rd</b> 5:8  169:25  <b>24018</b> 5:13  <b>24020</b> 5:13  <b>24025</b> 5:13  <b>24123</b> 5:12  <b>247</b> 4:15  <b>24th</b> 5:20  <b>25</b> 16:15,22  19:15 217:18  <b>25,000</b> 220:7  <b>250</b> 174:8  <b>2523</b> 2:10  <b>25245</b> 3:10  <b>281</b> 2:13  <b>28943</b> 247:16  <b>29</b> 13:20 23:8  <b>2:41</b> 183:21  <b>2:55</b> 183:20,21</p> <p style="text-align: center;"><b>3</b></p> <p><b>3</b> 11:2 12:1  220:17 232:22  232:22,24  233:3  <b>30</b> 9:3 10:12  59:5 89:3,4,10  89:10 147:4  188:5  <b>300</b> 2:14 11:7  22:16 111:13  120:3,4 168:3  <b>3050</b> 54:15  <b>30s</b> 147:2,3  <b>31</b> 243:11</p>
---	---	---	--

<p><b>32</b> 68:10  <b>34,500</b> 177:16  178:14  <b>35</b> 54:6 217:8  217:12,23  <b>35,000</b> 54:24  <b>350</b> 99:5  <b>36</b> 54:6 185:1  188:8 221:16  <b>37</b> 54:7 103:24  188:7  <b>38</b> 173:15  174:20 182:19  188:7  <b>3896</b> 186:1,19</p>	<p><b>4050</b> 40:21  <b>408</b> 199:9  <b>4170</b> 15:2  <b>4175</b> 23:4  <b>42</b> 23:4,5  <b>4200</b> 22:19  <b>4250</b> 19:10  <b>4295</b> 42:6,12  44:9  <b>43</b> 23:3 175:20  <b>4300</b> 22:20  <b>4315</b> 109:24  <b>433</b> 174:5  <b>4350</b> 23:4,5  <b>44</b> 185:2  <b>442</b> 186:1  <b>445</b> 44:7  <b>45</b> 44:11 165:8  166:3  <b>4500</b> 110:8  <b>4550</b> 110:8  <b>4560</b> 44:24  110:17  <b>4562</b> 43:11  109:20  <b>457</b> 132:13  <b>458</b> 132:13  <b>45q</b> 126:6  142:16,20  143:10,25  144:8 149:6,24  151:8,14,18,21  191:1,4,13,15  191:21 192:1  192:14</p>	<p><b>460</b> 22:6,12,13  23:16,17 84:20  115:14 120:4  <b>462</b> 22:8  <b>47</b> 60:22  <b>49</b> 168:16  <b>4921</b> 175:13,15  175:16,19  <b>4:20</b> 241:12  <b>4:27</b> 246:18  <b>4:30</b> 242:12,17  246:5</p>	<p><b>590</b> 15:13  <b>5:00</b> 242:13</p>
<p><b>4</b></p>	<p><b>5</b></p>	<p><b>6</b></p>	<p><b>6</b> 4:6 53:22  204:19  <b>60</b> 146:8  <b>600</b> 113:17  <b>64</b> 170:1  <b>640</b> 153:4  168:17  <b>649</b> 179:12,16  <b>65</b> 4:6 23:20  <b>650</b> 180:2,8,11  180:13  <b>653</b> 180:15  <b>665</b> 19:11  <b>679</b> 10:10,21  12:18 22:14  33:25 50:17  77:20 84:21  96:20 120:1  135:5 214:12  <b>69</b> 25:7</p>
<p><b>4</b> 17:5 21:12  56:3 205:8  239:1  <b>4,000</b> 41:11,19  41:20 109:22  109:24  <b>40</b> 92:24 93:2  105:12 145:25  146:16 159:9  161:24 166:12  167:10,18  235:17,25  237:21,25  <b>400</b> 145:12  157:12  <b>4006</b> 173:22  186:14  <b>4010</b> 40:21</p>	<p><b>5</b> 4:3 21:12  164:21 165:11  204:18 205:17  241:21  <b>5'6</b> 90:24  <b>50</b> 46:5 111:13  126:7,11  142:16 143:17  143:19 149:7  149:12,16,20  152:8 156:22  <b>500</b> 3:14 12:12  21:19 46:10  247:18  <b>5000</b> 174:20  175:17,18,21  185:9,16 186:1  186:11 221:16  <b>52</b> 15:4  <b>5760</b> 43:24,25  <b>585</b> 168:19</p>	<p><b>7</b></p>	<p><b>7</b> 26:4 62:16  178:7 189:6,7  <b>70</b> 188:22  <b>700</b> 12:13  21:19 46:11  200:9  <b>72</b> 155:10  156:25,25  158:6 159:7,8  193:24</p>

[73 - actual]

<p><b>73</b> 54:25  <b>740</b> 43:23  <b>75</b> 160:6,9,9  164:1 166:9  168:17 169:7  169:22 170:25  171:13  <b>78216</b> 2:14</p>	<p><b>91</b> 164:20  <b>914</b> 180:16  <b>92</b> 93:22 94:24  95:15 164:21  <b>99</b> 178:15,19  <b>9:00</b> 5:1  <b>9:36</b> 30:25  <b>9:45</b> 30:24  <b>9:46</b> 30:25</p>	<p><b>absolute</b>  218:12  <b>absolutely</b>  27:18 29:23  34:11 48:16  59:7 79:10  133:4 145:2  160:14 195:22  201:15 221:15  <b>abstract</b> 224:18  <b>accept</b> 49:1  151:17  <b>accommodate</b>  5:18  <b>account</b> 235:3  <b>accounting</b>  142:24 195:13  <b>accumulate</b>  129:4  <b>accuracy</b> 48:18  85:25 99:4  <b>accurate</b> 36:7  37:17 51:16  85:11,16 105:1  126:23  <b>accurately</b>  37:20 98:22  <b>accusing</b> 9:25  <b>achieve</b> 216:14  <b>achieved</b>  165:12  <b>acknowledge</b>  176:15  <b>acknowledging</b>  172:25</p>	<p><b>acquire</b> 222:15  <b>acquired</b> 194:1  230:19,23  <b>acre</b> 142:4  145:25 146:16  177:15 178:12  235:17,17,23  236:2,7  <b>acreage</b> 60:19  <b>acres</b> 152:22,22  153:4,12 159:6  215:15 235:20  235:25  <b>acted</b> 63:4  <b>acting</b> 5:4,6  <b>active</b> 52:13  53:11  <b>activities</b>  122:17  <b>acts</b> 109:8  <b>actual</b> 5:15  21:24 51:18  54:5 76:15,22  77:14 96:20  98:16,17 99:2  99:5 101:18  114:13,13  133:16 138:19  139:19 142:23  143:3 144:4  153:9 156:4  166:17 179:8  215:13 216:3  219:11,17  221:19 225:1</p>
<p><b>8</b></p>	<p><b>a</b></p>		
<p><b>8</b> 178:7  <b>80</b> 162:4  <b>800,000</b> 220:6  <b>81</b> 54:25  <b>83</b> 61:5  <b>86</b> 61:5 162:12  162:19,22  219:2  <b>87</b> 162:24  165:6 166:17  187:24 219:2  <b>87102</b> 247:18  <b>87125-5245</b>  3:10  <b>87504</b> 2:10  <b>87504-2068</b> 2:4  <b>87504-2208</b>  2:19  <b>87504-2307</b> 2:8  <b>87505</b> 3:4,15  <b>8:00</b> 122:5</p>	<p><b>a.m.</b> 5:1 30:25  102:12 246:16  <b>ability</b> 31:10  61:24 177:2  182:13 226:23  227:23 247:11  <b>able</b> 26:23 28:5  30:6 35:12,17  67:3 71:19  92:13 103:12  116:15 122:7  153:17 170:6,7  175:10 193:14  216:14 237:10  245:11  <b>above</b> 25:22  41:24 42:2  50:24 75:10  76:12 108:8  109:9,22 110:5  116:11 174:14  189:5,15 207:2  224:6  <b>absence</b> 138:1</p>		
<p><b>9</b></p>			
<p><b>9</b> 22:4 83:15  <b>90</b> 18:8 20:22  21:9 66:25</p>			

[actually - agree]

<p><b>actually</b> 12:7 12:17 13:11 15:6 26:14 37:7 45:4 54:15 56:16 66:14 67:19 72:13 81:7 92:18,25 98:7 105:11 107:7 128:16 129:22 131:25 133:7 137:14 139:6 142:19 143:24 155:10 157:6 158:11 165:15 165:18 167:2 168:10 170:11 184:13 188:12 188:15 237:16 244:7 <b>adam</b> 2:19 <b>add</b> 58:21 59:24 99:9 148:23 <b>added</b> 34:6 41:11 66:14 <b>adding</b> 142:3,4 <b>addition</b> 15:16 67:23 <b>additional</b> 21:16 31:17,24 32:8 43:6 49:7 106:15 120:17 142:4 181:1 232:17 239:23</p>	<p><b>additionally</b> 26:1 27:21 75:24 80:8 87:22 135:15 163:6 184:12 244:17 <b>address</b> 28:4 52:23 <b>addressed</b> 28:3 51:1 92:6 <b>addresses</b> 42:4 51:25 <b>addressing</b> 27:5,5 52:16 <b>adjacent</b> 202:24 <b>adjectives</b> 90:9 <b>adjourned</b> 122:25 246:18 <b>adjust</b> 10:18 104:11 127:25 128:12 130:3 188:16 <b>adjusted</b> 24:8 97:12 129:13 129:15 215:13 <b>adjusting</b> 215:18 <b>adjustment</b> 174:9 175:19 <b>adjustments</b> 97:9 155:12 156:10 168:9 178:22</p>	<p><b>adjusts</b> 128:1 <b>administered</b> 191:18 <b>administering</b> 192:1 <b>administration</b> 192:2 <b>administratio...</b> 164:5 <b>admissibility</b> 94:9 <b>admission</b> 33:11 48:2,7,9 48:10,19 <b>admit</b> 34:18 <b>admitted</b> 163:20 <b>adopted</b> 132:24 <b>advance</b> 8:4 124:7 <b>aerial</b> 45:20 82:16 189:19 <b>aerially</b> 71:9 157:13 <b>affect</b> 100:18 120:25 <b>affects</b> 130:1 <b>affirm</b> 247:3,7 247:12 <b>affirmation</b> 247:1 <b>affirmed</b> 205:17 222:3 <b>afford</b> 141:25</p>	<p><b>afield</b> 196:24 244:16 <b>afternoon</b> 122:1,2 183:17 183:20 190:3 202:17 <b>age</b> 239:4 <b>aggregate</b> 13:22 19:15,19 21:18 45:23 46:2,9 73:8 114:17 117:22 <b>aggressive</b> 163:15 165:3 <b>ago</b> 26:8 27:20 172:15 177:12 194:24 <b>agrarkin</b> 2:20 <b>agree</b> 66:24 67:2 77:3,4 80:4 88:10,23 89:22 97:19 100:8 101:14 101:16,21 102:1 104:3 111:3,20,21 116:7 125:10 137:13 146:14 158:20,23 159:4 171:23 173:11 175:22 175:23 176:9 194:12 195:24 210:13,18 213:24 214:3,4</p>
--	---	---	--

[agree - andre]

<p>222:23 223:4,5                  223:7,24                  224:12,18                  242:25 243:23                  245:11  <b>agreed</b> 67:4                  193:9 194:13                  199:24  <b>agreement</b>                  103:12 245:8  <b>agreements</b>                  199:18  <b>agu</b> 201:17                  231:6,13 232:1  <b>ahead</b> 12:20                  30:21 33:7                  52:4 88:25                  103:13 178:10  <b>albuquerque</b>                  3:10 122:4                  247:18  <b>alcoholic</b>                  123:12  <b>align</b> 76:6 80:5                  103:21  <b>aligns</b> 75:16                  223:8  <b>allegations</b>                  141:2  <b>alleged</b> 76:5                  79:8,9 226:5  <b>alleging</b> 229:2  <b>allergic</b> 11:12  <b>allman</b> 121:24                  122:6 241:15</p>	<p>241:17  <b>allocate</b> 102:25                  103:7  <b>allocation</b>                  219:23  <b>allow</b> 10:16                  29:25 59:3,18                  60:9 94:8                  95:13 118:15                  199:10  <b>allowed</b> 147:22                  152:5  <b>allows</b> 16:25  <b>alluding</b> 172:5  <b>alternative</b>                  119:4 218:16                  218:17 219:10  <b>ambush</b> 27:18                  28:16 29:8  <b>amount</b> 88:15                  99:11 127:18                  153:25 198:16                  203:24 208:16                  225:14 226:24                  228:1 243:18  <b>amounts</b> 100:1                  232:10  <b>amplitude</b>                  207:7  <b>ampomah</b> 1:20                  4:8,14 5:16                  12:10 91:11,24                  103:18 112:13                  112:15 120:16                  204:7,9,23</p>	<p>205:1,5,9,16,19                  209:18,20                  211:22,24                  219:12,14                  220:14,16                  228:7 239:20  <b>ampomah's</b>                  91:3 238:4  <b>analogy</b> 17:7  <b>analyses</b> 57:25                  78:12,13,14,14                  146:20 161:7                  169:9 229:6  <b>analysis</b> 8:4 9:3                  9:12 12:1,18                  16:10 26:9,15                  47:22 49:13                  50:17 51:8                  56:16 57:10,13                  57:22 58:2,5                  58:20,21,23,25                  59:4,13,24,25                  60:4,5,12,15,20                  69:1 77:11,13                  77:16 78:24                  85:7,25 87:7                  88:13,19 90:6                  90:7 98:10,13                  99:21 101:14                  101:20,25                  102:2 105:15                  105:25 114:8                  114:18 124:11                  125:25 127:11                  130:8 131:8</p>	<p>148:6,7 150:8                  153:21 154:16                  155:24,25                  156:2 158:23                  159:1 160:13                  163:10 164:3                  165:1 166:22                  189:7 200:16                  206:8 209:4,6                  209:23 210:16                  211:7,8 212:4                  212:8 214:12                  215:22 222:19                  222:22,25                  224:23 225:7                  225:12 228:17                  228:24,25                  229:18,23                  230:1,8,9,14                  232:6,12 233:3                  233:17,20,21                  234:13 236:6                  236:12 237:1                  238:6,16  <b>analyze</b> 117:4                  210:16  <b>analyzed</b>                  133:20 158:2                  233:7  <b>analyzing</b>                  15:17 132:22  <b>andre</b> 39:20,21                  40:24,25,25                  42:11 109:13</p>
--	--	--	--

[andres - approval]

<p><b>andres</b> 11:6,10  11:14,17,18,19  11:20,21,22,23  19:23 20:1,11  24:7 30:17  37:15 38:19  39:11,13 40:1  40:5 42:16,16  43:17,19 44:17  45:2,5,8 46:20  46:21 50:5,14  54:11,14,17,21  55:4,8,10,11,14  55:14,17,20,21  55:22,23,24,25  56:12 57:18  60:19 61:7  62:9,13,23  63:12,19,24  71:16 73:18  74:3 75:8  79:17 84:25  87:1 97:15  102:6 103:25  104:2 109:25  110:6,19,23  111:6,14  117:15,16,21  118:1,1 120:3  120:12 132:5,6  134:8 140:20  144:23 145:8  145:12,14  148:11 154:9  154:13 157:12</p>	<p>163:22 167:18  171:25 172:2  172:10 173:9  173:11,20,23  174:18 176:8  179:18 182:12  182:19 184:8  184:10 185:19  185:25 186:6,8  186:10 188:10  188:14 189:8  192:19 193:15  193:21 196:3,8  196:11 197:21  198:9 199:21  200:23 205:25  206:3,5,10,12  207:19 212:6,9  212:20 213:1  217:2 218:23  218:25 219:6  220:23 221:13  221:18 223:3,5  223:7,10,11,12  223:13,16,18  224:15 225:15  225:22 227:11  228:3 239:2  240:7,17</p> <p><b>anhydrite</b>  15:23 16:3,6,8  16:9,11 17:17  20:24 67:15,16  67:19 69:10,12  69:19,20,23</p>	<p>112:25 113:9  113:16,20,25  114:1,10,10</p> <p><b>anhydrites</b>  47:18,20 69:14  69:25 112:24  113:6,12,14  114:3</p> <p><b>annual</b> 164:5  176:24</p> <p><b>annually</b> 160:7</p> <p><b>answer</b> 25:11  26:4 29:1  83:20 93:18  129:3 134:7  138:6 141:8  142:11,14  153:6 155:7  159:21 180:12  189:15 203:25</p> <p><b>answered</b> 91:5  91:25 96:15  198:2,3</p> <p><b>answering</b>  143:21</p> <p><b>antonio</b> 2:14</p> <p><b>anybody</b> 67:3  167:24 242:13</p> <p><b>anymore</b>  181:24</p> <p><b>apart</b> 49:25  183:4 188:19</p> <p><b>api</b> 37:2 205:21</p> <p><b>apologize</b> 124:7  138:6,7 246:3</p>	<p><b>apparently</b>  68:14 166:4</p> <p><b>appear</b> 95:2</p> <p><b>appearance</b>  53:3 219:9</p> <p><b>appears</b> 17:19  52:13</p> <p><b>appended</b>  48:14</p> <p><b>appendix</b>  134:11</p> <p><b>applicability</b>  229:13</p> <p><b>application</b>  155:14,18,23  156:7 183:7  191:24</p> <p><b>applied</b> 155:3  171:13</p> <p><b>apply</b> 182:14</p> <p><b>appraisal</b>  163:22</p> <p><b>appreciate</b> 33:9  64:15 121:8  207:24 213:18  228:8 244:1,2</p> <p><b>appreciated</b>  122:24</p> <p><b>approach</b>  117:18 223:25</p> <p><b>appropriate</b>  94:6 129:13  230:11</p> <p><b>approval</b>  202:24</p>
---	---	--	---

[approving - available]

<p><b>approving</b> 65:9</p> <p><b>approximate</b> 22:13</p> <p><b>approximately</b> 12:12,25 22:16 40:20 44:23 46:19 47:4,24 66:25 110:3 146:8</p> <p><b>april</b> 1:11 5:8 169:25 190:9 247:4</p> <p><b>aquifer</b> 25:18 55:20 182:19</p> <p><b>arbitrarily</b> 162:18</p> <p><b>arbitrariness</b> 162:20</p> <p><b>archie's</b> 133:24 134:13,16 136:8</p> <p><b>area</b> 25:7 30:18 55:19 109:16 115:3 118:16 145:3 147:2 158:16 174:18 232:19</p> <p><b>area's</b> 63:20</p> <p><b>areas</b> 16:10,20 18:23 56:20 81:19 101:18 146:1 152:25 157:7</p> <p><b>argue</b> 132:20</p>	<p><b>argued</b> 29:3</p> <p><b>argument</b> 207:20</p> <p><b>arithmetic</b> 243:9,11</p> <p><b>arrange</b> 5:19</p> <p><b>arrangements</b> 199:19</p> <p><b>array</b> 215:24</p> <p><b>arrive</b> 122:2</p> <p><b>arriving</b> 122:4</p> <p><b>arrow</b> 185:13</p> <p><b>arrows</b> 51:14 66:13,14</p> <p><b>artesian</b> 139:11</p> <p><b>aside</b> 161:5,6</p> <p><b>asked</b> 7:6 12:10 13:7 26:1 35:18 56:6 65:7 71:5,25 73:20 81:16 83:24,24 84:3 85:8 156:11 159:19 177:6 189:2,14 194:12,18,23 198:2 201:1 202:20 207:13 212:4 227:10 227:25 228:17 237:9 238:5,20</p> <p><b>asking</b> 45:12 51:3,7 56:11 57:4 60:7 62:25 83:12</p>	<p>91:11 119:22 141:16 143:21 156:3 160:16 191:9 192:9 206:11 208:8 209:25 222:12 226:3 228:24 232:5,9 233:6 233:23 234:12 235:19 237:14 237:21 239:21</p> <p><b>aspect</b> 187:11</p> <p><b>aspects</b> 239:18</p> <p><b>assess</b> 85:6 156:4</p> <p><b>assessment</b> 117:5 119:18 154:25</p> <p><b>assisting</b> 142:19</p> <p><b>associates</b> 164:17 165:16 166:16</p> <p><b>assume</b> 23:12 37:24 75:18 121:2 146:23 146:24 170:13 170:16 174:11 191:5 194:16 194:18 235:7</p> <p><b>assumed</b> 219:7 232:24 234:7</p> <p><b>assumes</b> 176:5 235:24</p>	<p><b>assuming</b> 115:2 116:24 152:5 168:22 223:7 224:10 225:21 240:7</p> <p><b>assumption</b> 37:20 54:20 126:5,9 143:16 151:10 188:23 192:22 222:9 227:2,16 236:17 240:14</p> <p><b>assumptions</b> 124:22,23 149:19 156:12 171:1 191:9 238:12</p> <p><b>attached</b> 33:13</p> <p><b>attention</b> 8:21 22:11 214:3</p> <p><b>attributable</b> 179:17 189:4 191:6</p> <p><b>attribute</b> 117:5 210:9</p> <p><b>attributed</b> 116:18</p> <p><b>author</b> 164:6</p> <p><b>automatically</b> 128:1</p> <p><b>availability</b> 119:3</p> <p><b>available</b> 64:4 103:1 121:22 121:25 141:17</p>
--	---	---	---

[available - barriers]

150:9 181:13 207:8 209:2 216:16 218:20 241:15 <b>ave</b> 2:14 3:14 <b>average</b> 89:14 89:15 91:6,8 92:25,25 93:2 93:13 97:14 103:18,19,23 157:13,15 158:1,4,19 159:2 165:13 212:8,11,23 220:9 <b>averaged</b> 157:10 212:18 212:20 213:1 <b>averages</b> 102:4 136:23 158:21 <b>averaging</b> 131:5 <b>aware</b> 60:8 61:11,16 65:8 145:2 147:14 155:25 191:12 191:13 201:16 201:19 205:10 210:3,5 217:22 230:5,21,24 231:1 236:25 <b>axis</b> 96:23	<b>b</b> <b>b</b> 22:4 40:23 41:3,4 42:4 43:21 53:11,18 58:15 60:22 62:16 83:15 99:22 201:18 231:5,16 232:1 <b>back</b> 5:22 15:11 21:23 23:1,18 30:24 41:19 42:3,10 42:12,24 44:6 45:9 46:13 51:17 53:21 77:8 78:1,17 85:12,13 91:7 91:23 93:17 97:20 98:5,15 98:17,18 102:10 103:11 110:10 112:12 114:12 122:11 122:19,20 125:12 134:16 134:19,23 136:7 143:19 145:21 146:5 147:17 149:2 150:3 154:2 162:12 165:16 177:8 179:6,7 180:20 182:8 183:20 186:24 190:4,9 197:1	202:5 213:4 214:20 216:4 219:21 220:3 221:8 224:21 227:21 239:10 245:8 246:15 <b>backwards</b> 163:4 <b>bad</b> 17:7 42:7 162:24 <b>baffle</b> 46:1 81:23 <b>baffles</b> 45:13 45:20,23 50:19 79:25 <b>bailey</b> 77:24 <b>baker</b> 3:9 <b>balance</b> 25:4 68:7 76:19 181:2,5,7 <b>ball</b> 30:9 <b>balling</b> 166:5 <b>ballpark</b> 203:21 <b>bank</b> 160:16 161:5 <b>banks</b> 205:22 <b>barrel</b> 164:1,19 164:20 165:25 168:5 211:14 227:15 228:3 <b>barrels</b> 23:20 25:7 42:6 54:24 144:15 168:16 220:2,6	220:7 <b>barrier</b> 11:19 13:15 15:7,14 19:18 20:12,17 20:23 23:7,13 23:15 25:2 27:24 33:25 43:13 44:14 46:1,4 47:4 49:25 55:24 66:7 68:17 70:4,14,22 71:9,20 72:3,6 72:20 73:6,16 74:2 75:8,21 75:22,24 76:10 77:2 79:8,9,11 79:13,14,15,18 79:19 80:2 81:19 82:2 83:3,7 86:8 106:25 108:6 108:12,25 109:4 113:1,22 114:4,7,21,25 115:4,5,12 116:9 117:22 119:14,19 223:21,23 224:11 <b>barriers</b> 11:16 12:11 13:7,19 13:21,22,23 16:17,22,24 17:1,12 19:12
---	---	---	--



[barriers - best]

<p>19:14,16,20  20:5,21 21:8  21:10,21 23:8  24:19,23 26:2  26:20 28:14  29:20 34:13,13  45:13,21,22,23  45:24 46:8,9  47:5,14,19  49:17 50:15,19  68:13 69:10,20  73:8 74:23  75:1,4,5,10  76:5 77:20  78:19 79:2,3  80:5 82:6,7,23  83:10 84:23  108:24 111:7  113:14 114:16  114:19 115:10  116:1,12,19  117:9,13,19  120:2,8 130:20  <b>base</b> 21:5 23:3  23:3 63:19  149:8 168:3,15  <b>based</b> 7:15,22  9:7 14:20  33:14 37:10  58:10,11,13  59:15 60:4  84:9 86:12,12  86:17 87:8,23  88:10 91:7  92:23 93:21</p>	<p>94:25 95:2  96:14 99:16  106:14 133:21  135:25 146:1  154:5,18 158:1  158:16 161:2  195:1 208:19  209:3,10 210:4  211:10 212:3,4  214:19 215:20  216:15 217:17  219:16 220:20  223:22 225:11  226:8 230:7  232:25 233:3  233:15,18  239:4 240:2,16  <b>basic</b> 26:7  210:15 211:17  213:25  <b>basically</b> 11:1  15:13 18:23  23:4 47:11  54:8 59:22  63:14 66:16  93:10 109:1  111:13,17  113:3 126:1,12  144:9 177:15  182:3 207:19  216:25 217:15  <b>basin</b> 163:23  <b>basis</b> 26:11,22  26:24 28:6,12  28:18 63:4</p>	<p>67:6 82:20,25  83:2 134:20  142:17 167:22  198:14 227:7  236:17  <b>bates</b> 33:23  <b>baylen</b> 1:19  <b>bear</b> 10:17  <b>bearing</b> 214:9  <b>beat</b> 135:3  138:25  <b>beatty</b> 3:14  <b>beck</b> 3:11 4:7  4:11 6:6 108:1  108:3 112:5,8  119:12 190:21  190:24 192:9  192:12 197:10  197:14 198:4  198:18,19,22  199:14 201:23  201:25 202:20  224:21 241:5  <b>bedded</b> 47:18  47:20 67:15,15  <b>bedding</b> 69:19  <b>beds</b> 16:18  <b>beg</b> 92:19,23  95:3,8  <b>began</b> 161:23  <b>beginning</b> 41:8  41:11 174:17  176:6 194:8  219:7</p>	<p><b>beginnings</b>  233:20  <b>behalf</b> 121:12  <b>belabor</b> 198:21  <b>belaboring</b>  207:16  <b>believe</b> 24:5  38:3 39:10  44:11,24 45:1  49:2 51:14  54:25 55:22  66:11 70:17  72:24 80:22  95:19 96:2  115:1,22,23  120:6 123:3  174:2 207:17  210:21 213:3  214:22 216:19  218:4,14  223:10,14  227:8,12  239:19 240:10  <b>beneath</b> 113:16  <b>benefit</b> 118:4,7  194:10,17  237:10,21  <b>benefits</b> 237:6  237:19,25  <b>best</b> 95:5 146:1  146:21 154:6  154:18 188:9  193:10,14,17  198:6,20  204:15 230:14</p>
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[best - buchwalter's]

<p>233:20 246:6 247:10 <b>better</b> 22:22 35:1 105:14 121:14 126:22 170:3 180:6 244:22 <b>beyond</b> 31:10 <b>big</b> 43:18 111:19 172:11 182:6 194:17 201:11,12 245:20 <b>bigger</b> 153:5 180:3 182:20 <b>biggest</b> 68:6 159:21 160:3 172:19 220:5 <b>billion</b> 145:22 152:23 192:24 <b>birkhead</b> 100:22,23,25 101:10,21 104:7 <b>birkhead's</b> 104:23 <b>bit</b> 22:23 43:24 57:24 65:4 94:11 111:2,18 132:21 147:25 158:6 159:11 166:20 180:3 191:1 198:12 207:9 209:22</p>	<p><b>bite</b> 145:22 <b>black</b> 44:25 70:17 179:13 <b>blanket</b> 71:9,20 154:25 <b>blew</b> 170:21 <b>blind</b> 99:3 <b>blindly</b> 239:16 <b>blm</b> 146:9 167:9 <b>blocks</b> 67:20 69:20 78:23 177:16 178:14 178:15 <b>blown</b> 203:4 <b>blue</b> 13:12,13 13:14 14:10,11 14:22 34:6 37:12 42:15 67:14,20 69:20 78:23 105:17 105:22 106:6,8 106:9 112:21 114:22,23 148:18 <b>blues</b> 105:10 <b>board</b> 27:23 <b>bolded</b> 222:4 <b>bolted</b> 182:18 <b>bond</b> 207:6 209:12 <b>borne</b> 165:19 <b>bottom</b> 52:3 63:18 79:16 90:12 92:18</p>	<p>93:14 99:18,25 105:5 148:19 184:17,22 185:5,7 189:3 192:19 193:15 193:21 196:2 197:21 224:14 <b>bottoms</b> 206:4 <b>bouncing</b> 65:3 <b>boundaries</b> 65:10 153:20 239:13 <b>boundary</b> 70:9 153:14 206:2 223:11 227:10 227:11,12 <b>box</b> 2:4,7,10 3:10 14:11 179:13 <b>boxes</b> 13:14 14:10,22 16:23 17:19 112:21 114:22,24 <b>bracket</b> 126:16 <b>brand</b> 34:12,15 64:11 74:16 77:23 92:1 <b>bravo</b> 235:11 <b>break</b> 30:22 31:7 69:14,22 121:16,22 148:1 183:17 183:20 189:13 189:17 242:12 246:6,7</p>	<p><b>brief</b> 190:8 <b>briefly</b> 26:25 27:8 86:22 131:1 <b>bright</b> 246:16 <b>bring</b> 92:1 97:19 144:8 146:5 151:9,18 188:13 <b>bringing</b> 145:21 148:9 148:20 173:9 173:11 <b>brings</b> 141:10 188:20 <b>brochure</b> 200:4 200:9 <b>broggi</b> 2:20 <b>broke</b> 64:18 <b>broken</b> 69:12 126:24 <b>brought</b> 8:11 8:20 55:4 91:23 92:7 116:14 149:10 197:9 <b>brown</b> 70:4,15 <b>bubble</b> 76:18 <b>buchwalter</b> 174:24 181:14 181:16 182:1,7 187:10 215:11 216:18 <b>buchwalter's</b> 76:19 175:5</p>
--	---	---	--

[buchwalter's - cash]

<p>176:1 177:8  179:6 180:21  184:18 214:19  218:21 219:24  220:18  <b>buck</b> 142:16,16  144:9 149:3,7  149:12,16,20  151:9 152:2,8  156:22  <b>bucket</b> 17:7  <b>bucks</b> 164:20  168:17 169:19  <b>bug</b> 113:18,21  114:1  <b>bugs</b> 113:18,24  <b>build</b> 125:13,16  125:22 129:11  155:13 182:18  183:5,11 193:5  <b>building</b> 1:5  2:13 193:6,7  218:19  <b>builds</b> 69:2  171:25  <b>built</b> 133:12  147:19 155:24  156:5 157:25  158:1,15  164:13 182:7  182:24 193:2  <b>bunched</b>  203:11  <b>bureau</b> 105:11</p>	<p><b>business</b>  209:25 210:14  211:2 219:20  <b>bwenergylaw...</b>  3:16  <b>bwenertylaw....</b>  3:17</p> <hr/> <p style="text-align: center;"><b>c</b></p> <hr/> <p><b>c</b> 2:1 3:1 53:12  53:18  <b>calculate</b> 91:8  114:7 134:23  188:7 214:14  234:3 238:22  <b>calculated</b> 7:15  103:22 104:1  184:25 186:16  233:24 234:4  <b>calculates</b>  171:16 220:7  221:16 222:1  <b>calculating</b>  134:16,19  136:7  <b>calculation</b>  7:14 88:22  137:3 157:11  175:14 188:20  212:6 233:19  <b>calculations</b>  7:20 9:19,21  10:2 22:18  98:1,14 138:17  150:22 152:6  169:8,12</p>	<p>188:13  <b>calendar</b> 103:2  <b>call</b> 70:3,5  72:21 90:24  93:17 95:21  142:23 154:17  187:18  <b>called</b> 27:24  39:20 111:23  114:9  <b>calling</b> 70:5  126:3  <b>capacity</b> 25:19  <b>capex</b> 124:24  127:4 145:23  <b>capital</b> 145:24  229:15,17,22  <b>capture</b> 153:17  157:13  <b>carbon</b> 191:23  <b>carbonate</b>  71:15,18 136:8  <b>care</b> 106:11  203:21  <b>career</b> 87:18  <b>careful</b> 200:20  <b>carefully</b>  135:20  <b>carried</b> 162:2  <b>carry</b> 30:9  130:23 145:23  158:25 172:1  233:12,17  <b>cartoon</b> 80:9,11  80:15,21 81:5</p>	<p>81:9,13 85:15  115:20  <b>cartoons</b> 85:6  85:23,24 86:1  86:4  <b>case</b> 5:10,11,12  17:21 28:15  32:3 34:12  37:22 49:20  62:18 65:20  88:2,3 97:4,13  103:8 124:12  124:20,22  125:3,14 127:3  127:7 128:22  133:17 136:14  136:19 142:15  144:21 146:15  147:20 151:18  154:24,24  159:16,17  163:20 164:13  164:18 166:8  168:3,10,11,15  171:5,15 188:2  188:2 224:17  229:6 230:5  241:24 242:8  243:1 244:11  245:4,5  <b>cases</b> 5:8 230:3  245:19,21,23  245:25  <b>cash</b> 167:2</p>
--	--	---	---

[categories - clarify]

<p><b>categories</b> 130:17</p> <p><b>category</b> 126:21</p> <p><b>cause</b> 227:17</p> <p><b>caused</b> 55:2</p> <p><b>caution</b> 30:14 123:17 243:6</p> <p><b>ceased</b> 231:20 231:22,23</p> <p><b>cell</b> 215:15,15</p> <p><b>cement</b> 207:11 209:11</p> <p><b>centre</b> 2:13</p> <p><b>cents</b> 126:7,11 143:17,19</p> <p><b>certain</b> 108:11 113:22 128:18 144:8,12</p> <p><b>certainly</b> 63:6 76:7 77:5 106:17 134:23 158:24 162:19 177:13 181:12 183:17 185:18 190:14 233:13 241:24 244:9</p> <p><b>certainty</b> 90:16 126:9</p> <p><b>certificate</b> 4:15</p> <p><b>certification</b> 131:19</p> <p><b>chair</b> 1:18 5:3,6 6:14 73:21 121:7 122:20</p>	<p>123:11 202:9 242:4 246:2</p> <p><b>chairman</b> 102:16 122:18 202:6,7</p> <p><b>challenged</b> 26:22 28:7</p> <p><b>chance</b> 35:22 77:23 146:6 150:4 197:4</p> <p><b>chances</b> 189:10</p> <p><b>change</b> 9:1 18:22 19:1 72:12 127:1,4 127:6 128:25 129:3,6 143:13 159:19 166:23 172:9 178:14 182:15 188:10 218:5 226:12 229:19</p> <p><b>changed</b> 126:14 127:15 127:17 129:20 145:14 156:20 178:15,20 215:16 219:3 226:12 232:10</p> <p><b>changes</b> 15:8 25:17 129:4,24 130:24 131:8 140:7 142:4 172:11</p> <p><b>changing</b> 9:1 218:9</p>	<p><b>channel</b> 215:25</p> <p><b>characteristic</b> 16:11</p> <p><b>characteristics</b> 182:16 224:1</p> <p><b>characterizati...</b> 80:11 89:5</p> <p><b>characterize</b> 233:19</p> <p><b>charge</b> 74:20 74:23</p> <p><b>charges</b> 229:7</p> <p><b>chart</b> 35:2 38:7 93:15 95:23 136:4 237:11 237:20</p> <p><b>charted</b> 176:7</p> <p><b>cheaper</b> 126:7</p> <p><b>check</b> 139:15 169:5 207:5</p> <p><b>checked</b> 94:18 164:10 201:11</p> <p><b>checks</b> 140:8 145:21</p> <p><b>chevron</b> 23:23 24:3,5,7 76:15 76:22 199:25</p> <p><b>chief</b> 97:4 126:1 244:11 245:4</p> <p><b>chiefly</b> 156:14</p> <p><b>chino</b> 1:5</p> <p><b>choices</b> 74:9</p> <p><b>chose</b> 70:23 78:22 133:5</p>	<p>218:8</p> <p><b>chris</b> 3:5</p> <p><b>chris.moander</b> 3:5</p> <p><b>chronostratig...</b> 84:11</p> <p><b>circulation</b> 17:1 18:13,25 21:14 29:14 38:3,18,24 39:7,9,25 40:3 40:13,15,19 41:25 42:5,19 42:25 43:7,14 44:8,13,22 46:15,17 47:3 50:4,13,14,23 85:1 86:12 109:21 110:2 115:25</p> <p><b>circulations</b> 44:4 46:18,19</p> <p><b>circumstances</b> 229:11</p> <p><b>claim</b> 117:8 221:21</p> <p><b>claimed</b> 75:3</p> <p><b>claiming</b> 177:3</p> <p><b>clarification</b> 56:2 125:10 127:14 128:6</p> <p><b>clarified</b> 108:15</p> <p><b>clarify</b> 26:21 28:18 40:13</p>
---	---	---	--

[clarify - commission]

<p>112:19,23  <b>clarifying</b>  56:23 59:15  202:19  <b>clarity</b> 46:7  <b>classes</b> 5:17  <b>classified</b>  113:14 114:4  223:23  <b>clean</b> 141:13  191:22  <b>clear</b> 11:25  14:9 16:2 18:4  23:16 31:25  32:6,17 42:22  42:23 57:20  59:16,17 73:4  91:2 106:22  108:16 122:12  234:2 242:23  <b>cleared</b> 108:6  <b>clearly</b> 218:10  <b>client</b> 87:7  142:8,19 143:5  143:25 183:13  <b>clients</b> 142:22  <b>close</b> 21:5 54:8  111:5 115:15  128:23 176:10  176:12 179:3,5  180:21 183:15  183:23,24  <b>closely</b> 107:17  <b>closer</b> 15:13</p>	<p><b>clue</b> 75:15  <b>co2</b> 89:17,18  90:11,14 125:7  126:2,3,7,20,24  127:8,8,10,18  127:22 128:2  128:11,16,23  128:25 129:3,6  129:15 130:21  137:22 140:1  142:15 143:1  143:17 144:9  144:18 145:5  146:4 149:5,14  149:16 150:24  151:9 152:1  153:17,19  156:15 159:16  159:22 160:3  168:5,15,18,25  169:6,14,15  170:23 171:14  172:7,13,16,20  184:9,11 191:3  191:10,12  193:3,6 203:6  203:8,12,19  204:1,2 210:1  210:10,16,20  211:1,3 214:10  223:13 224:12  224:13,17  231:20 232:6  232:10,18  233:4,17 234:8</p>	<p>234:18,20,21  235:4,7,9,18  236:11,17  238:22 239:21  239:25  <b>cobb</b> 164:17,25  165:16 166:16  <b>code</b> 191:15,16  <b>coded</b> 105:5  <b>coexist</b> 226:1,3  <b>collateral</b>  160:18  <b>collective</b> 73:2  <b>color</b> 74:9  82:11 85:9  105:5 109:15  <b>colored</b> 27:23  85:6  <b>colors</b> 96:22  105:7 110:4  <b>column</b> 14:5,6  18:4,5,18 44:2  46:19 106:1  179:10,20,20  <b>columns</b> 15:19  34:6  <b>combination</b>  176:2  <b>come</b> 26:8  28:24 30:24  34:14 38:6  45:9 59:4 76:7  77:8,17,25  91:15 102:10  103:11 104:22</p>	<p>114:15,18  116:8,16 119:4  122:20 138:24  156:6 163:25  175:20 177:16  227:1 239:11  <b>comes</b> 94:13  126:5 150:3  239:3  <b>comfortable</b>  141:22  <b>coming</b> 52:23  65:21 76:21  78:17 101:7  118:24 125:12  140:5 147:17  149:2 154:2  179:7 186:19  190:4 215:25  <b>commenced</b>  60:25  <b>comment</b> 44:5  104:24 222:18  225:13  <b>comments</b>  125:5 174:15  <b>commercial</b> 9:8  60:9,17 61:14  61:20 65:9  144:14  <b>commission</b> 1:3  1:17,21 4:8,13  5:6 6:14 7:8  26:24 29:4,6  29:22,25 31:8</p>
--	---	--	---

[commission - concepts]

<p>31:17,20 32:14  34:25 42:22  56:24 58:19,25  59:23 63:4  64:22 65:8  70:23,24 72:16  76:20 77:6  79:1,13 85:11  92:4 112:25  113:20 114:23  116:5 118:14  118:14,23  119:2,9,10,15  122:9 130:22  132:23 138:10  141:4 142:8  143:9,11 144:3  148:4,9 150:8  151:12 152:2  153:3 156:24  183:16 196:1  202:5 206:18  206:19 213:17  217:21 218:17  222:13 223:8  224:24,25  225:16 243:16  247:5  <b>commission's</b>  31:11  <b>commissioner</b>  4:8,9,13,14  5:16 112:15  120:19,22  121:4 202:13</p>	<p>202:16,25  204:3,9 205:1  205:5,9,16,19  209:18,20  211:22,24  219:12,14  220:14,16  228:7 232:15  <b>commissioner's</b>  5:19  <b>commissioners</b>  6:15 106:21  124:18 126:17  128:21 138:19  144:20 155:22  157:5,16,19  159:14 161:17  165:24 166:21  171:4,14,18,24  179:14 183:6  186:23  <b>commit</b> 73:3  <b>committee</b>  76:16 173:7  <b>commodity</b>  124:11 156:15  156:18,19  161:9 165:13  <b>common</b> 84:8  84:13  <b>communication</b>  12:9 74:3  76:18,23 77:6  108:7,19 109:9  117:1 119:14</p>	<p>119:19  <b>companies</b>  61:22 198:24  207:4 210:15  <b>company</b> 3:8  80:25 194:21  195:1 196:7  201:3  <b>comparable</b>  118:16  <b>compare</b> 9:7  99:1 128:8,10  148:24 175:7  186:20 203:17  214:15  <b>compared</b>  165:14,15,22  187:17 210:22  <b>comparing</b>  174:21  <b>comparison</b>  76:8 166:19  239:2  <b>comparisons</b>  214:16  <b>compatibility</b>  118:22,24  119:3  <b>competing</b>  183:1  <b>complete</b> 61:24  <b>completed</b>  54:11  <b>completely</b>  18:3 107:8</p>	<p>160:12 170:18  <b>completing</b>  209:16  <b>completion</b>  247:1  <b>completions</b>  189:9  <b>complex</b> 71:18  245:23  <b>complicated</b>  171:21 172:4  <b>component</b>  68:11  <b>components</b>  150:10  <b>compress</b>  184:13,14  <b>compressed</b>  245:6  <b>compression</b>  172:13  <b>comprise</b>  177:15  <b>compute</b> 103:4  <b>computer</b>  131:17  <b>concentrated</b>  19:12 79:25  108:18 109:8  119:13,18  <b>concept</b> 45:9  71:4 146:14,17  <b>concepts</b>  167:20</p>
---	--	---	---

[concern - conversation]

<p><b>concern</b> 73:9 98:4 107:16 133:12,18,23 134:4 163:3 172:11 226:13 226:21</p> <p><b>concerned</b> 126:8 145:2</p> <p><b>concerns</b> 224:22 239:15</p> <p><b>concessions</b> 199:7</p> <p><b>conclude</b> 10:23 229:17</p> <p><b>conclusion</b> 32:2 46:16 220:15 220:19 226:22</p> <p><b>conclusions</b> 11:1 77:18 101:2</p> <p><b>condition</b> 206:3</p> <p><b>conditions</b> 238:24</p> <p><b>conducted</b> 232:5 238:6</p> <p><b>confer</b> 31:7 244:9,24 245:7</p> <p><b>conference</b> 247:6</p> <p><b>confident</b> 35:21 76:9 82:22 129:7 149:23</p> <p><b>confirm</b> 29:5 37:17 74:23 170:7</p>	<p><b>confirmed</b> 109:5,7</p> <p><b>conflict</b> 5:16</p> <p><b>conform</b> 49:22</p> <p><b>confused</b> 167:13 218:7</p> <p><b>confusing</b> 11:22 167:20 188:24</p> <p><b>confusion</b> 108:5 177:21</p> <p><b>connate</b> 217:10 217:12</p> <p><b>connected</b> 123:12</p> <p><b>connection</b> 81:25 178:7</p> <p><b>consensus</b> 246:8</p> <p><b>consequences</b> 227:7</p> <p><b>consequential</b> 193:3</p> <p><b>conservation</b> 1:3 3:2 5:5,6 72:16 247:5</p> <p><b>conservative</b> 89:23 90:3,7 90:20 141:24 164:11 165:12 165:19 166:16 173:12,16 235:8</p> <p><b>consider</b> 13:15 16:16 19:13</p>	<p>45:23 46:18 118:23 119:2,9 119:10 144:7 214:6,7 218:19 226:7</p> <p><b>consideration</b> 218:18 236:7 238:15</p> <p><b>considerations</b> 238:10</p> <p><b>considered</b> 46:1 187:12</p> <p><b>considering</b> 187:14 211:8 229:14 235:17 235:22</p> <p><b>consistent</b> 43:17 71:9 95:3 162:1 164:3</p> <p><b>consolidated</b> 5:8</p> <p><b>constant</b> 117:1 164:19,21</p> <p><b>constraint</b> 32:4</p> <p><b>consultation</b> 121:19</p> <p><b>consulting</b> 198:24</p> <p><b>cont'd</b> 3:1 4:10 124:3</p> <p><b>contact</b> 54:16 54:17 55:18,19 137:22,24 216:24</p>	<p><b>contacting</b> 203:19</p> <p><b>contain</b> 146:3</p> <p><b>contained</b> 205:24 206:2,9 208:1 209:5,14</p> <p><b>context</b> 50:10 160:1 200:15 206:13 228:25 229:1</p> <p><b>contiguous</b> 75:25</p> <p><b>continue</b> 29:1 94:6 136:10 167:10 199:1</p> <p><b>continues</b> 239:24</p> <p><b>continuing</b> 5:7 12:8 32:11 111:1 118:19</p> <p><b>continuity</b> 46:23 115:17</p> <p><b>continuous</b> 85:2 120:13 203:18 239:9</p> <p><b>contoured</b> 47:12</p> <p><b>contract</b> 235:9</p> <p><b>contracts</b> 191:11</p> <p><b>contradict</b> 220:18</p> <p><b>control</b> 41:12</p> <p><b>conversation</b> 26:3</p>
--	--	---	--

[conveying - correlate]

<p><b>conveying</b> 144:10</p> <p><b>convince</b> 116:5</p> <p><b>convinced</b> 56:15,17</p> <p><b>core</b> 10:10,24 12:17,22 13:4 13:11 14:3,12 14:16 15:13,17 15:23 16:1 21:24 22:18,24 23:2 24:25 33:22 38:21,22 41:15 45:25 50:17 56:19,20 56:21 58:16 67:9,10,11,14 67:16 69:11,11 69:18 77:20,24 77:25 78:1,5,5 78:6,17,18 79:18 84:20 85:13,18 91:7 91:17 94:25 95:1 96:8,18 96:20,21,24 97:7,9,19 98:6 98:17,19 99:8 99:8,9,10,14,18 99:19,20,24,25 100:4,16,17 101:5,13,19 103:18 104:8 104:15,19 105:6 106:10</p>	<p>106:14 111:4 111:10 112:20 113:3,7,23 114:13 117:14 119:24 120:1,8 133:1 134:20 135:3,4,5,16 179:8,8,10,12 179:16,23 180:8,15 212:12,20 214:11,15,21 215:4 231:2</p> <p><b>cored</b> 22:14,17 47:5 230:22,25</p> <p><b>cores</b> 11:8 15:21 18:7 67:8 133:16 135:13,14,19 214:17</p> <p><b>corey</b> 2:15</p> <p><b>coring</b> 230:14</p> <p><b>corporation</b> 201:13</p> <p><b>corporations</b> 201:5,10</p> <p><b>correct</b> 7:9,11 7:12,13,17,18 7:20,25 8:1,5,6 8:9,10,12,13,16 8:17,21,22,24 8:25 9:3,4,8,9 9:12,13,15,16 9:22,23 10:2,3 10:10 13:3</p>	<p>14:8,13,14,17 14:18,21 17:22 18:6 19:4 20:6 20:12,13 22:3 23:12,23,24 32:8 34:1 35:10,11 36:8 36:9 37:2,3,5,6 37:8,9,18,23 38:13,14 39:16 39:23 40:5 41:2,23 47:10 52:8,15,17,18 52:24,25 53:8 53:9,13,14,20 53:22,23 56:3 56:4,10 57:18 57:22,23 58:17 58:21 60:1,2,5 60:6,15,16 61:2,9,10 62:5 62:6,19 63:22 63:25 64:1 65:15,18 66:8 67:11,12 69:4 69:6 71:11,13 74:14 86:2,4,5 89:8,21 94:14 94:16,17 99:12 106:19 107:4 108:9,13,20 109:6,11,18 110:14,25 111:4,25 114:5 116:20 118:3</p>	<p>119:20 127:9 128:18 132:7 145:19 148:11 154:25 160:7 162:8 169:15 174:14 176:5 178:21 185:19 189:5 191:6,7 196:14 208:12 210:6 213:13 231:6,7,10 232:1 235:1,5 236:8 237:17 239:18 240:3 243:11 247:9</p> <p><b>corrected</b> 14:19 96:23,25 97:2 175:17 177:23</p> <p><b>correcting</b> 7:21 97:14</p> <p><b>correction</b> 8:19 99:15 103:20</p> <p><b>corrections</b> 7:10 58:16 125:6,18 127:15</p> <p><b>correctly</b> 6:9 45:1 52:7,14 53:4,19 63:21 119:21</p> <p><b>correlatable</b> 120:5</p> <p><b>correlate</b> 79:18 98:18</p>
---	---	---	---



[correlated - cross]

<p><b>correlated</b> 85:19 186:21</p> <p><b>correlates</b> 17:20 78:6</p> <p><b>correlating</b> 133:2</p> <p><b>correlation</b> 84:23</p> <p><b>correlations</b> 23:10 85:13 222:8,9,17</p> <p><b>correlative</b> 29:6 120:8</p> <p><b>correspond</b> 42:19 185:14</p> <p><b>corresponds</b> 43:1</p> <p><b>corroborate</b> 47:2 114:14 115:22 116:21 120:5</p> <p><b>corroborating</b> 101:17 113:13</p> <p><b>cost</b> 129:15 150:24 156:15 172:20 184:12 194:14 211:7 229:7</p> <p><b>costs</b> 124:24 235:4</p> <p><b>cotton</b> 138:17 138:23 139:3,9 140:4,16 203:17</p>	<p><b>counsel</b> 1:21 7:5 26:6 29:3 34:14 65:5 121:20 122:13 190:12 199:20 213:6,21 214:21,25 215:3 221:2,6</p> <p><b>counted</b> 89:4</p> <p><b>county</b> 163:21 234:17</p> <p><b>couple</b> 7:2 12:6 21:11 52:11 124:17 125:5 129:20 174:15 184:1 202:13 221:24 227:1 230:3 238:21</p> <p><b>course</b> 37:22 54:3 245:13</p> <p><b>cover</b> 32:16 124:17 129:17 155:11 157:15 159:7</p> <p><b>covered</b> 67:9 88:18 92:17 125:20 129:11 130:24 131:22 146:7 159:10 172:15</p> <p><b>crack</b> 69:3 162:3</p> <p><b>cracked</b> 69:7 91:1</p>	<p><b>crazy</b> 101:10 165:17</p> <p><b>create</b> 36:4 47:12 48:18 62:22 81:4,13</p> <p><b>created</b> 36:2 38:7,17 40:19 61:3 62:9 71:6 80:21 81:5,7 82:2 83:9,18 84:7 85:15 188:15 191:21</p> <p><b>creates</b> 80:1</p> <p><b>creating</b> 86:4</p> <p><b>creation</b> 81:9</p> <p><b>credibly</b> 117:20</p> <p><b>credit</b> 144:4,8 149:24 151:14 191:6 192:1,14</p> <p><b>credits</b> 126:6 142:17,20 143:4,10 149:6 151:9,18,21,23 191:1,4,14,18 191:21</p> <p><b>criteria</b> 118:13</p> <p><b>critical</b> 68:10 218:22 222:7</p> <p><b>criticism</b> 126:1 147:18 216:2 236:11</p> <p><b>criticisms</b> 214:18</p> <p><b>criticize</b> 183:5</p>	<p><b>criticized</b> 209:24</p> <p><b>criticizing</b> 206:23</p> <p><b>critique</b> 183:5</p> <p><b>critiqued</b> 125:21 129:12</p> <p><b>critiques</b> 125:13</p> <p><b>critiquing</b> 77:10</p> <p><b>cross</b> 4:10,11 4:11 7:3,5 21:22 22:5,19 24:12 29:15,24 32:13,15 34:19 35:7,24 36:16 36:20,22,23 37:8,10,13 38:16 39:4 40:4 41:25 43:2 44:12 45:11 47:12,17 49:9 51:2,4,5 51:20 56:6 57:4 58:1 59:16 70:6,7 70:12 84:14 87:10 94:2 103:14 108:2 111:19 115:16 117:17 119:15 119:23,23 120:6,7,10 121:21 123:20</p>
--	---	--	--

[cross - decided]

<p>124:3 190:1,12  190:23 197:7  202:18 220:21  228:16 232:9  233:23 235:15  236:13,19,23  243:14,15  244:18,19  245:18,22  <b>crossed</b> 45:10  94:3  <b>crossing</b> 94:6  <b>cuff</b> 85:14  <b>cum</b> 139:12  <b>cumbersome</b>  124:8  <b>curious</b> 213:23  <b>current</b> 187:25  211:5,11,11  221:23  <b>cursor</b> 38:2  41:22 44:7  81:17  <b>curve</b> 104:17  125:6,7,22,22  139:19,24  140:6 141:11  141:12,21  210:24 217:3  233:1 234:5,7  238:14,18,19  238:22,25  239:2,10,16  <b>curves</b> 21:2  106:4 124:24</p>	<p>140:4  <b>cut</b> 162:13  <b>cutoff</b> 9:2,11,18  <b>cutting</b> 7:19  <b>cwehmeyer</b>  2:15</p> <hr/> <p style="text-align: center;"><b>d</b></p> <hr/> <p><b>d</b> 4:1  <b>daily</b> 38:10,11  <b>dana</b> 2:5  <b>darcy</b> 17:5  216:6  <b>dark</b> 106:6  <b>data</b> 12:24  20:15,17 21:24  22:18,24 24:25  25:3 36:4  38:21,22 43:18  49:17 56:19,20  56:21 68:5  76:10,25,25  77:14,17 83:5  84:10,20 85:18  86:14,18 87:12  87:19 94:19,25  95:1 96:18,20  97:24 98:4,5,8  98:16,18,19  99:2,2,3,5  101:2,3,5,6,12  101:18,19,22  104:12,21  105:24 106:3  106:11 111:4  111:10 112:20</p>	<p>113:3 114:13  114:15 115:14  120:8 134:5  135:24 136:3  138:3 139:19  140:1,18  142:14 148:5  149:14,17  151:1 163:6  176:13,14  182:22 214:15  216:15 218:24  219:9,21  222:16 223:14  239:10  <b>date</b> 218:20  <b>dated</b> 247:20  <b>davidson</b> 16:4  16:9 30:3  47:21 48:23  57:5,8,9,12  69:9 79:3  81:12 86:3  91:1 92:18  93:17,25 94:2  94:4 95:12  96:6 98:7,21  100:11 114:8  130:10,12  131:3 133:5  135:24 136:14  136:25 138:24  157:11 158:2  159:17 170:16  170:21 212:8</p>	<p><b>davidson's</b>  47:16 48:3,22  58:5,12,21  59:14,25 60:4  79:9 80:3 88:2  91:16 94:7,13  95:24 96:3,10  96:12,14  101:20 104:10  107:12 113:13  134:10,22  154:16 170:8  <b>dawson</b> 39:20  39:21 40:6,9  40:24,25,25  42:11 44:6  109:13,22  <b>day</b> 90:8,8  152:22,23  220:2,7 243:19  <b>days</b> 123:16  187:20 194:24  <b>dead</b> 135:3  138:25 176:10  <b>deal</b> 20:3 91:1  <b>dealing</b> 160:15  <b>decades</b> 150:6  167:11 182:16  220:11 224:3,3  <b>december</b> 7:24  145:11  <b>decent</b> 42:7,7  <b>decide</b> 218:4  <b>decided</b> 64:18  83:15 201:17</p>
---	--	--	---

[decided - dhardy]

<p>201:20  <b>deciding</b> 82:13  <b>decimal</b> 177:22  177:24 178:20  <b>decision</b> 79:2  229:15  <b>decisions</b>  144:21 161:11  <b>deck</b> 129:21,23  129:25 160:9,9  161:9 163:13  163:14 164:19  168:24 169:7  169:18  <b>decks</b> 160:23  161:5,14 163:8  <b>decline</b> 139:22  141:19  <b>decreases</b>  171:19  <b>deep</b> 185:7,10  <b>deepened</b> 54:25  <b>deepening</b>  54:14,21 55:3  <b>deepenings</b>  189:9  <b>deeper</b> 40:14  40:15 43:17  111:9 115:19  <b>deepest</b> 185:9  186:15 221:15  <b>defeat</b> 118:17  <b>defer</b> 27:2  110:10</p>	<p><b>define</b> 47:13  87:20,21 125:8  <b>defines</b> 45:20  <b>definitely</b> 19:6  130:1 221:22  242:7  <b>definition</b> 9:7  46:2 88:14  213:25  <b>definitions</b>  45:17  <b>degrees</b> 18:8  <b>delineate</b> 115:3  224:11  <b>delivered</b> 25:20  176:7  <b>demilitarized</b>  111:24  <b>demonstrate</b>  21:25  <b>demonstrative</b>  34:24 35:5,9  41:20 42:10,20  46:14,16 47:3  114:21  <b>demonstratives</b>  48:6  <b>density</b> 114:9  206:8  <b>deny</b> 225:1  <b>dependent</b>  133:18  <b>depending</b> 19:5  46:2 47:13  106:16 121:23</p>	<p><b>depends</b> 137:21  <b>depicted</b> 24:17  46:15  <b>depletion</b>  117:11 173:24  173:25 174:13  187:3,11  188:22 189:2,2  189:4,14  <b>depo</b> 132:1  <b>deposed</b> 7:24  <b>deposited</b>  16:18  <b>deposition</b> 8:4  8:12,19 126:6  131:22 145:11  159:18 172:18  207:13 212:5  <b>depositional</b>  107:9,14,18  <b>dept</b> 3:3  <b>depth</b> 13:17  14:20 19:10  20:6,9 22:17  22:21,24 23:2  23:3 25:12  40:20 41:21  43:4 44:14  46:20 47:5,24  85:1 110:3  115:14 175:12  175:19 185:24  186:4,12  <b>depths</b> 12:3  14:16 23:1</p>	<p>38:8 43:1  185:12  <b>describe</b> 13:25  67:10 225:15  <b>described</b>  35:20 113:6  220:4  <b>description</b>  15:17,19,20  53:25 69:18  <b>descriptions</b>  67:15,16  <b>designated</b>  82:4 183:8  <b>designed</b> 209:9  <b>detailed</b> 222:25  <b>details</b> 115:21  <b>determination</b>  56:7 72:18  <b>determine</b> 36:7  42:24 232:6  <b>determining</b>  26:2 114:9  <b>develop</b> 147:9  147:14 171:11  <b>developed</b>  134:12  <b>development</b>  138:20 152:10  152:16,21  167:17 211:5  <b>developments</b>  147:9  <b>dhardy</b> 2:5</p>
---	--	--	---

[dial - disposal]

<p><b>dial</b> 129:14  <b>dials</b> 129:13  <b>difference</b>  17:23 45:17  93:8 116:23  126:12 142:17  142:18 188:21  <b>differences</b>  116:16 130:18  <b>different</b> 11:13  11:18 35:17  36:12 49:5  50:23 51:1  76:1,5 77:1,3  79:4 96:21,22  97:8 98:21,24  99:17,19,22  100:1 105:4  107:8,13,18  110:4 112:17  114:18 116:10  116:16 117:11  128:3,4 129:20  133:20 134:11  139:10 152:1  160:12,22  161:3 166:22  169:9 177:1  185:5 186:22  213:6 221:7  <b>differential</b>  89:11 117:2  <b>differentials</b>  50:3,12 58:14</p>	<p><b>differently</b>  20:18 136:18  <b>difficult</b> 16:6  19:19 116:8  <b>dig</b> 115:19  130:13 141:15  156:13 176:13  <b>digital</b> 37:1  <b>diligence</b> 77:13  77:15 244:4  <b>dimensionless</b>  125:7,21  210:23 232:25  234:5 238:14  238:18 239:10  <b>direct</b> 7:7,11  18:25 21:23  22:11 28:3,3  29:13 33:14  46:24 47:1,9  48:15 121:24  178:2 182:2  197:6 204:16  205:3,5,8  207:22 222:3  243:14 244:10  244:16,25  245:17  <b>directed</b> 192:22  <b>direction</b> 18:8  179:23 187:4  216:1 245:15  246:7  <b>directional</b>  18:10</p>	<p><b>directly</b> 136:24  <b>director</b> 5:5  <b>directs</b> 244:12  <b>disadvantage</b>  31:14  <b>disagree</b> 11:4  90:19 101:3  104:3,13  147:13 228:4,6  <b>disagreeing</b>  187:10  <b>disagreement</b>  240:6,9  <b>disappoint</b>  242:12  <b>disclosed</b> 26:6  26:11 27:11  <b>discounted</b>  167:1  <b>discourse</b> 238:4  <b>discovery</b>  33:23 37:22  38:12 147:5  194:7  <b>discretion</b>  242:9  <b>discuss</b> 26:15  122:22 219:15  242:24 243:22  <b>discussed</b> 11:17  18:14 24:10  29:9 67:16  190:25 238:10  238:13</p>	<p><b>discusses</b>  134:13  <b>discussing</b> 20:1  22:15 47:15,19  51:21 120:24  236:20  <b>discussion</b>  87:25 116:14  134:10 145:17  164:24 215:7  219:16 221:8  222:20 225:10  236:10 239:3  240:12 243:18  <b>discussions</b>  133:19 142:21  <b>disperse</b> 203:10  <b>displace</b> 208:10  208:10  <b>displaced</b> 208:4  <b>displacement</b>  208:14  <b>displacing</b>  227:22  <b>disposal</b> 12:3  22:7 29:18,18  37:5 60:18  61:13,14,20,25  63:15 65:9  108:7,8 118:8  144:14 147:22  148:10,24  155:15,19  172:8,10  196:11 200:23</p>
--	---	--	--

[disposal - drilled]

<p>202:23 207:3                  220:24 223:15                  224:2 225:21                  226:11 231:12                  231:15,20,25                  240:8,17  <b>disposals</b> 60:9  <b>dispose</b> 182:13                  227:6  <b>disposed</b> 145:6  <b>disposers</b>                  199:17  <b>disposing</b> 60:18                  220:25,25  <b>disposition</b>                  247:14  <b>dispute</b> 173:18                  173:21,22                  218:16  <b>disputes</b> 207:3  <b>distance</b> 22:13                  82:16 83:1  <b>distant</b> 166:2  <b>distinct</b> 15:7                  55:23  <b>distinction</b>                  210:21 231:22  <b>distinguish</b>                  103:25  <b>distributed</b>                  214:6  <b>distribution</b>                  58:6 178:19                  204:1</p>	<p><b>dividing</b> 97:23  <b>division</b> 3:2 5:5  <b>dmz</b> 111:23  <b>document</b>                  12:21 33:21  <b>documentation</b>                  117:25  <b>documented</b>                  95:8  <b>documents</b>                  62:13,17 237:3  <b>doing</b> 9:25                  124:8 153:13                  186:5,18                  219:10  <b>dollar</b> 126:2                  149:5 151:14                  168:18 171:13                  211:14  <b>dollars</b> 167:1                  167:10 171:7,7  <b>dolomite</b> 69:5                  79:14 113:24  <b>dome</b> 235:11                  235:11  <b>dominated</b>                  92:23 93:2  <b>don</b> 3:14  <b>door</b> 30:7                  31:19,21 32:12                  197:9  <b>dots</b> 105:6,17                  177:21  <b>double</b> 123:12                  164:9,12,14</p>	<p>166:15 201:11  <b>doubt</b> 235:13  <b>downhole</b>                  172:16 184:15  <b>downside</b>                  153:13  <b>dr</b> 1:20 10:5,8                  10:20 12:1,10                  13:5 16:4,9                  33:22 47:16,21                  48:3 57:5,9,12                  58:5,12,21                  59:14,25 60:4                  66:3 69:9                  76:16,19 78:1                  79:3,9 80:3                  81:12 86:3                  88:2,13 91:1,3                  91:11,16,24                  92:18 93:17,25                  94:2,4,7,13                  95:12,24 96:3                  96:6,10,12,14                  98:7,21 100:11                  102:18 103:18                  104:10 107:12                  112:13 113:5                  113:13 114:8                  120:16 122:8                  130:10,12                  131:3 133:5                  134:10,22                  135:24 136:14                  136:25 138:24                  154:16 157:11</p>	<p>158:2 159:17                  170:8,16,21                  174:24 175:5                  176:1 177:8                  179:6 180:21                  181:14,16                  182:1,7 187:10                  190:3 204:7,23                  212:8 214:19                  215:11 216:18                  218:21 219:24                  238:4 239:17                  239:20  <b>drainage</b>                  189:19  <b>dramatically</b>                  50:23 116:10  <b>drastic</b> 15:7  <b>drastically</b> 67:1                  141:12  <b>draw</b> 85:6                  101:2 141:13                  162:15  <b>drawdowns</b>                  189:4  <b>drawn</b> 162:20                  163:1  <b>dreamt</b> 59:1  <b>dribble</b> 193:5  <b>drill</b> 224:5  <b>drilled</b> 23:23                  38:19 43:23                  52:6 54:10                  116:25 208:23                  230:25</p>
--	---	---	---

[drilling - empire]

<p><b>drilling</b> 18:17 18:20 19:4 38:10,11 39:15 39:21 40:9,23 40:24 41:1,8 41:10,14 42:3 42:9,18 43:11 43:24,25 60:24 84:25 109:17 196:2</p> <p><b>drive</b> 1:6 3:4 52:13 151:6</p> <p><b>driver</b> 159:21</p> <p><b>driving</b> 164:23</p> <p><b>dropping</b> 17:9</p> <p><b>drops</b> 216:24</p> <p><b>drove</b> 150:12</p> <p><b>drowned</b> 172:24</p> <p><b>dry</b> 43:12,24</p> <p><b>due</b> 26:7,7 27:18 77:13,15 183:18 244:3</p> <p><b>duly</b> 6:17 124:2</p> <p><b>duty</b> 201:13</p> <p><b>dysfunctional</b> 31:5</p>	<p><b>earliest</b> 174:18</p> <p><b>early</b> 122:7 147:4,5 169:21 246:16</p> <p><b>earth</b> 83:18 84:6 171:10</p> <p><b>easier</b> 9:6,6</p> <p><b>easily</b> 69:7</p> <p><b>east</b> 36:17 51:10 52:23 53:13,17 66:5 66:12 70:25 71:1,2 107:4</p> <p><b>easy</b> 119:8 132:3,3 183:4</p> <p><b>economic</b> 61:24 63:16 105:11 124:12,16,20 124:22 125:3 125:14 133:17 136:19 147:20 149:23 150:22 150:23 153:23 154:24,24 155:3,24 156:2 156:12 161:7 161:19 164:13 168:2,14,21 171:19 172:1 193:2 200:15 209:23 212:6 213:20 222:19 225:12,17,18 228:5 229:18 232:11,25</p>	<p>233:2,8,11,15 233:18 234:13 235:24 238:6 238:17 239:14</p> <p><b>economical</b> 226:4</p> <p><b>economically</b> 150:21</p> <p><b>economics</b> 126:10 130:19 130:21,25 136:22 137:7 138:14,16,18 143:14,18 150:11,12 151:6 154:1 159:3,19,22 160:4 170:3 226:4 236:1</p> <p><b>edge</b> 51:9 52:1 52:17,23 53:7 53:25 54:13,19 65:24</p> <p><b>edges</b> 52:12 146:4 195:13</p> <p><b>education</b> 131:19</p> <p><b>effect</b> 28:10 69:24 130:5 140:3 143:18 184:7 226:14</p> <p><b>effective</b> 46:8 137:24 223:13</p> <p><b>effectively</b> 9:19 137:22</p>	<p><b>effects</b> 153:14</p> <p><b>efficiently</b> 137:21</p> <p><b>effort</b> 236:10 236:25</p> <p><b>eia</b> 163:6,12,14 164:6 234:13</p> <p><b>eia's</b> 163:10</p> <p><b>eight</b> 171:6</p> <p><b>either</b> 59:1 76:8 84:10 129:5 131:16 134:17 151:5 160:20 199:18 243:4</p> <p><b>eliminate</b> 57:1 101:10 226:21</p> <p><b>eliminated</b> 207:18 209:12 226:13</p> <p><b>eliminating</b> 101:5 104:14</p> <p><b>else's</b> 32:15</p> <p><b>eman</b> 244:14</p> <p><b>embark</b> 222:25</p> <p><b>eme</b> 175:14 176:4 185:24</p> <p><b>emnrd.nm.gov</b> 3:5,6</p> <p><b>empire</b> 2:2 5:9 6:1 12:23 22:5 29:3 30:8 33:17,23 34:25 35:6,23 37:22 38:7,16 40:18 41:20 43:2</p>
<p><b>e</b></p>			
<p><b>e</b> 2:1,1 3:1,1 4:1 33:13,18 48:2</p> <p><b>earlier</b> 88:3 110:11 152:20 164:12 172:18 184:7,16 186:9 219:16 242:22</p>			

[empire - engineering]

48:13 49:18 110:1 117:17 119:6 120:11 121:12 124:21 125:4 126:1 128:10 129:12 130:15,22 138:2,12 145:16 146:6 147:18,22 148:5,8,13 149:22 151:8 151:17 152:3 154:19 158:24 160:5,11 165:3 165:22 166:12 166:24 171:10 172:1 184:9 190:13 191:3 193:20 194:10 194:25 196:1 197:20 198:5 198:11,15 199:9 200:22 207:15 213:2 213:16 221:2 223:17 227:17 229:17,21 230:8,15,19,21 232:25 233:12 234:3,20 235:17,22 236:7 239:22 239:25 240:25 243:14 244:8	244:20,21 245:5 <b>empire's</b> 7:5 8:2 9:7,14 33:4 39:10,13 42:15 42:20 46:13 47:3 62:4 121:19 125:17 127:24 141:1 145:7 149:21 155:3,12 156:10 158:16 160:5 161:22 164:13 166:8 167:17 168:25 169:6 188:20 192:18 206:21 212:21 214:25 221:6 222:9 227:23 231:13 231:18 234:24 236:16 237:1 238:6,17 <b>employed</b> 247:12 <b>employee</b> 196:21 <b>employees</b> 196:18,23 <b>employs</b> 195:3 <b>ems</b> 22:8 <b>emsu</b> 10:10,21 12:17 19:18 22:6,7,12,13,13 23:14,22 24:23	25:14 30:19 33:25 36:17,24 37:4 38:17,20 44:15 46:10,23 47:7,23,25 49:17 54:3,9 60:14,20 61:3 61:6 62:9,22 63:13,24 65:8 68:20 70:9,25 71:10,21 84:25 85:1,3 107:4 108:7 115:13 115:18 117:23 120:4,9,13 138:20 147:1,1 148:20 154:25 155:11,20 157:6,24 158:5 158:6 179:16 180:2,15 196:15 200:22 201:17,18 202:22 214:12 230:14,19 231:5,5,14,16 232:1 236:22 237:2 <b>emsu's</b> 204:19 205:7 <b>emulate</b> 33:5 <b>encountered</b> 38:19 <b>encourage</b> 33:5	<b>encroached</b> 53:18 <b>encroaches</b> 54:7 <b>encroaching</b> 51:9 52:10 53:2 65:24 66:9 <b>encroachment</b> 52:1,17 53:7 53:11,13 54:6 <b>ended</b> 159:12 <b>ends</b> 100:25 135:23 161:19 <b>energy</b> 3:3 164:4,5 191:22 <b>engaged</b> 85:5 91:21 <b>engagement</b> 68:4 <b>engineer</b> 131:20,24 139:17 140:9 141:10,13 155:25 156:5 196:24 <b>engineering</b> 68:9 78:11 86:13,18 87:12 87:19 139:20 140:11 141:19 146:19 148:14 152:14 154:5 158:16
---	--	--	--

[ensure - examination]

<p><b>ensure</b> 172:4  <b>enter</b> 90:14  <b>entering</b> 67:5  <b>entire</b> 15:12  18:3 19:18  25:13,14 30:18  36:24 38:17,20  39:5 44:1  46:23 50:20  82:19 115:12  116:24 133:13  140:24 145:8  154:25 178:6  178:11 213:1  215:14 223:3  237:25  <b>entry</b> 42:4  <b>environment</b>  71:22 107:9,18  160:20  <b>environments</b>  107:14  <b>eor</b> 89:25 90:11  107:12 130:21  137:14 138:19  139:18 145:3  153:9 162:1  167:17 197:24  203:4,9 211:1  211:3 223:13  <b>equals</b> 136:5  <b>equate</b> 234:8  <b>equates</b> 128:14  <b>equation</b>  133:25</p>	<p><b>ernest</b> 2:11  <b>ernie</b> 205:22  <b>err</b> 123:16  243:6  <b>erroneous</b>  97:24,25  <b>error</b> 8:7,18  <b>es</b> 221:7  <b>escalated</b> 160:6  164:19,20,21  165:1,21  <b>escalating</b>  164:2  <b>escalation</b>  162:13 164:7,8  165:2,18  170:25 171:13  <b>escalations</b>  165:10  <b>escalator</b>  168:17 234:18  234:20,25  235:3  <b>especially</b> 6:24  11:7 16:7 46:4  46:17 99:3  215:10 242:8  <b>esq</b> 1:22  <b>establish</b> 113:2  115:5,11  119:15,25  215:5  <b>established</b>  116:6 119:23  120:7 150:5</p>	<p>167:8 223:11  227:11  <b>establishes</b>  120:1  <b>establishing</b>  86:7  <b>estimate</b> 58:20  232:16 233:3  239:16  <b>estimated</b>  222:10  <b>estimates</b> 58:13  <b>eunice</b> 52:6  <b>evaluate</b> 238:7  <b>evaluated</b>  232:10  <b>evaluating</b>  84:15  <b>evaluation</b> 68:8  133:14  <b>evaluations</b>  68:11  <b>evaporation</b>  135:16  <b>evening</b> 65:16  122:5  <b>events</b> 50:4  <b>everybody</b> 5:3  5:24 30:10  32:15 64:21  118:5 246:12  246:14  <b>everybody's</b>  32:22</p>	<p><b>evidence</b> 10:10  12:11 18:25  21:24 24:25  29:7,9 48:16  49:8 76:17,21  77:4,5,15  117:21 163:20  163:25 164:17  182:12,14  <b>evidentiary</b> 5:7  5:15  <b>exact</b> 110:3  <b>exactly</b> 28:19  36:4 79:10  80:7 84:18  93:5 137:4  146:13 158:12  <b>examination</b>  4:6,6,7,8,10,11  4:11,12,13  6:19 7:3,5  24:12 29:15  32:13,13 34:19  35:7,24 37:10  45:11 49:9  51:2,5 57:4  59:16 65:1  74:17 108:2  112:14 120:21  123:20 124:3  131:14 190:1  190:15,23  194:9 202:15  202:18 204:8  220:21 228:13</p>
---	---	---	--



[examination - explored]

<p>228:16 232:9                  233:23 235:15                  236:13,19,23                  244:18,19  <b>examinations</b>                  244:10 245:15                  245:18,22  <b>examine</b> 27:19                  103:14  <b>examined</b> 56:6                  190:12  <b>examiner</b> 27:25  <b>examining</b>                  45:14 51:4                  58:1 74:16  <b>example</b> 82:25                  157:17 199:2  <b>exceedingly</b>                  118:15  <b>except</b> 32:22                  127:7 132:8  <b>excerpted</b> 13:1  <b>excerpts</b> 12:22                  33:22  <b>exchange</b> 199:6  <b>exclude</b> 91:16                  229:22  <b>excluded</b> 89:6                  89:16 90:22                  105:24 136:13                  136:21 137:9                  137:13  <b>excluding</b>                  101:22 104:11</p>	<p><b>exclusively</b>                  130:11  <b>excused</b> 121:11                  121:15 240:24  <b>exercise</b> 185:22  <b>exhausted</b>                  216:21  <b>exhibit</b> 21:7                  22:4 24:21                  33:12,13 35:9                  35:18,23 36:21                  40:23 41:3,4,6                  43:21 46:14,16                  46:25 47:1,3                  51:20 55:13                  60:22,23 62:16                  62:20 80:11                  83:15 171:3                  205:12 216:6  <b>exhibited</b> 44:4  <b>exhibits</b> 8:3                  22:2 29:12                  30:4,4 48:16                  49:7 55:9                  103:24 205:11                  205:14  <b>exist</b> 12:12  <b>existed</b> 66:22  <b>existence</b>                  199:19  <b>existing</b> 22:7                  61:13,20 65:10                  224:25  <b>expanded</b>                  64:20</p>	<p><b>expect</b> 19:3                  139:22 148:5                  193:12,13                  195:5 203:8  <b>expectation</b>                  240:3 241:22  <b>expected</b>                  105:12 146:22                  203:24 215:21                  222:20 232:21  <b>expenditure</b>                  145:24  <b>expense</b> 125:25                  126:3,4,21,25                  127:3 128:22                  129:9,10,14,16                  149:3 159:16                  236:5  <b>expenses</b>                  125:24 229:15                  229:18,22  <b>expensive</b>                  135:20  <b>experience</b>                  135:19 143:9                  143:12 144:2                  153:9 165:20                  199:4 201:2                  209:24 211:1                  225:12  <b>experienced</b>                  166:17  <b>expert</b> 63:6                  77:1 85:5                  181:4,20 183:9</p>	<p><b>expertise</b> 121:3                  172:24 195:14  <b>experts</b> 8:2 9:7                  9:14 74:17                  181:13  <b>explain</b> 12:1                  15:18 17:20                  24:20 28:5                  41:6 46:6,14                  49:20 50:2,12                  53:24 55:10                  63:10 80:17                  113:20 118:14                  141:19 149:11                  173:24 179:20                  189:11,14                  238:14  <b>explained</b>                  26:16 174:13                  189:3 229:25  <b>explaining</b>                  18:15  <b>explains</b> 54:1  <b>explanation</b>                  26:8 27:16                  139:21 140:11                  174:12  <b>explanations</b>                  215:20  <b>exploit</b> 192:18                  193:14 201:21  <b>exploiting</b>                  197:21  <b>explored</b> 31:22</p>
--	--	--	---

[exploring - feet]

<p><b>exploring</b> 87:3  <b>export</b> 176:16  176:19,20  <b>expulsion</b>  106:17 135:11  <b>extend</b> 12:2  16:19  <b>extended</b> 23:13  <b>extending</b>  117:13  <b>extensive</b> 12:6  24:22 25:8  26:20 28:14  29:16 46:9  71:21  <b>extensively</b>  58:1,24 94:4  <b>extent</b> 29:19  31:12,18 45:20  69:9 181:25  206:6,11  <b>extenuating</b>  229:11  <b>external</b> 118:15  <b>extract</b> 81:1  <b>extraordinarily</b>  16:24  <b>extrapolate</b>  47:6 84:19  142:6  <b>extrapolated</b>  142:13  <b>extrapolating</b>  83:5,8 84:12  141:22</p>	<p><b>extremely</b>  105:20 106:12  <b>extremes</b>  135:18  <b>exxon</b> 170:17  170:21 199:2  199:25 200:5  201:2,17  <b>exxon's</b> 168:10  168:11  <b>eye</b> 166:5  <b>eyeballing</b>  104:12  <b>eyes</b> 133:16</p> <hr/> <p style="text-align: center;"><b>f</b></p> <hr/> <p><b>f</b> 2:15  <b>face</b> 123:4  <b>facies</b> 78:14  92:16,17 94:15  95:4,5 131:8  131:18 133:5  133:13 170:22  <b>fact</b> 9:14,17  10:8 26:18  27:11 43:5  57:9 58:9 59:1  67:18 71:14  72:3,19 77:6  82:22 91:15  95:12 171:24  215:14,17  216:9 224:2,5  225:23  <b>factor</b> 90:2  124:25 126:10</p>	<p>128:15 138:11  138:22 220:9  233:24 234:3,9  242:15  <b>factors</b> 99:17  135:10 203:23  222:11 226:6  <b>failing</b> 245:8  <b>failure</b> 147:14  193:18 229:3  <b>failures</b> 141:6  <b>fair</b> 95:15,16  129:1 147:18  <b>fairly</b> 190:8  197:7  <b>fairness</b> 31:19  64:21  <b>fairway</b> 163:22  <b>fall</b> 227:21  <b>fallen</b> 169:22  <b>falls</b> 139:3  <b>familiar</b> 40:9  44:18 62:12  123:4 136:16  139:14 173:5,6  191:14 209:25  212:19 230:1  <b>fane</b> 2:6  <b>far</b> 13:10 15:16  15:18 30:5  84:16 86:3  93:21 121:14  144:24 145:24  151:10,22  161:18 163:14</p>	<p>167:3 168:7  170:9,14,18  179:10,13  181:18 183:1  191:12 196:20  196:24 219:4  225:6 237:4  244:16  <b>farther</b> 107:3  141:15  <b>fashion</b> 81:24  83:4  <b>fast</b> 33:5  <b>fault</b> 87:17  138:9  <b>faults</b> 11:6  <b>fe</b> 1:7 2:4,7,10  2:19 3:4,15  122:2  <b>feasibility</b>  88:11 171:20  223:1  <b>features</b> 15:25  <b>fee</b> 146:10  <b>feel</b> 77:18  212:24  <b>feet</b> 11:7 12:7  13:15,20 15:11  16:22 18:2  19:13,13 21:11  21:12,19 22:16  23:9 41:19,20  46:5 49:24  84:22 89:3  109:22 111:13</p>
---	--	--	--

[feet - foot]

<p>111:24 112:3,4  115:5,5 116:11  120:4 145:12  157:12 174:20  175:13,15,16  175:17,22  185:9,16 186:1  186:1,11 189:6  189:7 212:9  221:16  <b>feldewert</b> 2:21  <b>felt</b> 35:21  <b>fiber</b> 41:12  <b>field</b> 15:15  23:11 38:20  39:6 52:6,13  53:17 76:15,22  99:3 140:19  147:1 153:1,12  219:25  <b>fields</b> 98:21,24  238:23 239:11  <b>figure</b> 30:23  46:25 47:10  52:20 53:22  56:2,3 83:17  102:25 176:23  176:25 219:24  229:8 239:1  <b>file</b> 23:25  132:23 176:21  205:12  <b>filed</b> 8:23 25:24  148:4 149:11  245:3</p>	<p><b>files</b> 131:4  136:24,25  137:5 176:16  176:18,19,20  <b>filing</b> 141:4  <b>filings</b> 142:24  <b>fill</b> 208:11  <b>filling</b> 113:24  <b>final</b> 247:14  <b>find</b> 67:3 73:1  155:23 217:1  246:8  <b>finding</b> 105:13  <b>fine</b> 10:15 96:9  124:6  <b>finger</b> 157:21  <b>finish</b> 122:6  202:18 242:5  <b>finite</b> 32:4  <b>firm</b> 2:9 68:10  <b>firmly</b> 172:23  <b>first</b> 6:17 7:13  14:25 15:2  30:20 36:13  41:5 44:7,10  44:22 52:5,7  54:20 65:23  68:16 74:20  84:1,1 109:16  109:24 124:2  124:21 129:25  135:25 152:22  162:5 174:16  174:23 207:4  210:16 212:21</p>	<p>220:11 246:9  <b>fit</b> 96:19 106:3  184:18 218:13  <b>fits</b> 105:11  159:17 184:20  <b>five</b> 16:22  32:24 98:21,23  183:12 243:4  243:12 246:4  <b>flag</b> 106:25  136:2 139:19  140:13 141:17  <b>flags</b> 105:22  <b>flat</b> 129:5,21,23  141:14 160:9  163:17 164:25  165:7 168:24  169:7,19,22  234:21,22,22  234:23,24  235:8  <b>flight</b> 122:3  <b>flood</b> 90:12  144:18 145:3,5  145:8 153:19  193:4 238:23  <b>floods</b> 159:22  <b>floor</b> 1:5  <b>flow</b> 13:23 15:9  17:12 19:21  20:23 25:2  45:24 50:20  <b>flows</b> 25:15  <b>fluid</b> 15:7 17:3  17:5,10 18:18</p>	<p>18:20 25:20  39:2 44:1 82:3  86:12 108:25  109:1,1 185:6  187:24 189:11  207:25 208:4  209:4,5  <b>fluids</b> 39:1  <b>fly</b> 122:2  <b>focus</b> 166:21  223:9  <b>focused</b> 129:9  152:12 206:22  <b>focusing</b> 28:8  176:19 206:24  244:23  <b>focussed</b>  214:17  <b>fodder</b> 32:12  <b>folks</b> 184:1  211:1,6 212:19  <b>follow</b> 158:8  246:7  <b>following</b> 21:2  <b>follows</b> 6:18  124:2  <b>foot</b> 7:15,16,22  11:3 15:2  16:15 19:3,5  19:15 21:12  41:18 43:15  55:17 99:22  115:6,7 120:3  185:3 186:2  221:17</p>
---	---	---	--

[forced - geology]

<p><b>forced</b> 218:12  <b>forecast</b> 161:9  163:11  <b>foregoing</b>  247:9  <b>foregone</b> 32:2  <b>forest</b> 159:14  159:15  <b>forget</b> 110:2  <b>form</b> 132:14  <b>formation</b>  11:12 18:21  57:6,7,8 60:21  87:11,19,21  89:19,21  120:25 134:6  203:7,9 232:18  <b>formations</b>  63:19 86:14  87:8,10,10,14  87:23,24  <b>formed</b> 61:12  <b>forms</b> 207:7  <b>forth</b> 214:20  216:4 221:8  224:21 247:8  <b>forward</b> 146:24  211:7 229:16  242:17  <b>found</b> 68:10  108:17  <b>foundation</b>  27:22 192:6  198:18</p>	<p><b>foundational</b>  74:19  <b>fountain</b> 48:17  <b>four</b> 16:16 25:9  71:1,2 107:5,6  117:8 163:21  167:11 187:20  234:17 243:4  <b>fourth</b> 14:6  247:18  <b>frac</b> 69:1,21  <b>fracking</b>  139:16  <b>fracture</b> 10:5,9  10:21,24 12:24  13:1,5 18:1  <b>fractures</b> 10:23  11:5,7,25 12:2  12:9 17:25  <b>frame</b> 245:12  246:9  <b>framed</b> 129:18  <b>frames</b> 243:23  <b>francis</b> 1:6 3:4  <b>free</b> 217:18  <b>freezing</b> 217:16  <b>frequent</b>  117:19  <b>fresh</b> 69:13  174:5  <b>friends</b> 190:17  <b>front</b> 141:20  <b>fuchsia</b> 38:1  110:22</p>	<p><b>fulfill</b> 156:11  <b>full</b> 46:19 203:4  <b>fully</b> 31:22  222:25 227:2  <b>function</b>  175:18 203:15  <b>funny</b> 74:15  <b>further</b> 32:13  49:9 64:3  150:17 172:25  201:23 212:25  231:19 240:22  247:7,12  <b>fuss</b> 77:22  127:10 128:22  138:13 148:3  183:5  <b>fussing</b> 126:18  151:20 169:10  <b>future</b> 141:23  142:6 161:10  163:5 165:7  192:5,15  <b>futures</b> 129:5</p>	<p><b>gaspar</b> 3:14  <b>general</b> 103:21  <b>generally</b> 24:11  125:2 128:25  135:12 177:17  211:4  <b>generic</b> 153:19  <b>genesis</b> 234:6  238:19 240:9  <b>geographically</b>  182:7  <b>geography</b>  153:4  <b>geologic</b> 9:15  54:20 68:8,11  97:1 104:1  114:7 170:17  170:20  <b>geologic's</b> 56:7  56:16 97:4  <b>geologically</b>  78:11  <b>geologist</b> 15:21  20:8 27:11  71:6 78:10  84:8 85:5 87:6  94:16 99:7  133:8,9,11,14  <b>geologists</b> 71:6  120:11  <b>geology</b> 16:18  27:6,12 68:6  78:2,3,4,9  105:12 133:7  146:19</p>
		<b>g</b>	
		<p><b>gallegos</b> 247:3  247:17  <b>gamma</b> 70:8  106:24  <b>gas</b> 81:1 118:8  135:10 147:8,8  160:17,22  195:17,19  198:24 201:3,9  218:6,6 224:18</p>	

[geomechanical - going]

<p><b>geomechanical</b> 68:17 69:22</p> <p><b>gerasimos</b> 1:18 5:4</p> <p><b>getting</b> 68:16 96:5,9 129:8 144:8 151:8 156:23 162:4 191:3,10 195:13 199:8 200:12 215:23 239:13</p> <p><b>give</b> 30:3 31:15 57:8 64:13 92:9 98:3 107:16 133:12 133:18,22 134:4 139:12 149:19 173:16 175:8 176:24 189:1 206:13 222:13 238:15 244:6</p> <p><b>given</b> 87:6 107:17 122:17 128:9 133:5 150:4,4,24 157:11 176:13 176:14 187:14 222:24 238:20 244:9 245:11</p> <p><b>giving</b> 28:19 146:6 159:13 161:17 245:4</p>	<p><b>gnm</b> 19:24</p> <p><b>go</b> 10:13 11:6 12:20 13:16,17 13:19 15:10 17:6,6,8,13 20:16 21:23 23:1 30:21 32:24 33:7 37:8 41:7,19 42:3,10,12,24 43:8 47:22 52:4 53:21 59:20 68:12 73:22 79:15 85:12,13 88:25 91:7 98:5,15 98:20 103:13 104:16 111:18 114:12 115:20 116:13 117:15 139:19 140:10 141:5,7 143:22 146:16 152:14 152:22 155:23 157:17,19 158:24 162:2 165:15 168:12 168:16 176:25 178:10,18 184:1 185:21 192:4,14,18,24 193:18,21 194:21 197:1 197:25 198:5 203:13 205:14</p>	<p>205:17 209:14 209:18 211:22 213:4,22 217:1 219:12 220:14 222:2 224:17 224:21 231:2 236:2 242:17 245:17</p> <p><b>goal</b> 64:17 103:8</p> <p><b>goes</b> 18:20 19:15 22:7 24:8 36:16 37:12 52:9,19 53:1,10,15 70:7 71:20 72:3 89:19 94:9 97:20 121:23 131:25 153:24 169:19 220:3</p> <p><b>going</b> 7:1 12:20 14:1,4 17:3,4,6 17:6,10 22:10 22:11,21 27:2 31:15,21 32:1 32:1,10 33:12 34:17,23,25 36:10,24 42:11 42:12 46:13,24 49:25 50:25 55:8 60:22 64:11,13,23 65:3,5 66:5 68:12 70:3</p>	<p>73:22 74:1 80:9 84:25 89:18,24 90:11 90:12 92:9,13 95:1 97:10 98:3 99:13,17 99:19,25 102:25 105:9 115:3 121:20 121:21 123:17 125:20 127:19 130:11 131:24 132:19 137:14 138:25 140:2 140:10 141:4 141:14,24 142:2 143:1 144:18 146:19 146:20,24 149:23 152:13 152:23 153:15 153:17 154:4 154:10 156:6 156:13 157:7 158:9,17,24 160:25 163:5 163:14,17 168:12 172:25 173:1 174:25 176:3 177:8 179:6,19 180:4 180:20 182:8 183:10 185:21 196:2 197:3,11 197:20 200:19</p>
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[going - guessing]

<p>200:23 203:13  204:1,17,18  205:20 206:18  208:5,6 209:6  209:7 214:9  215:6 218:4  219:10 221:19  221:22 222:2,3  224:13,16,17  225:2,6,7  226:20 227:19  235:7,13,14  239:8 242:13  244:7,12,25</p> <p><b>good</b> 5:3,23  6:14,21,24  55:12 56:5  131:18 134:9  141:13 149:24  162:22 181:16  190:3 202:17  218:10 221:25</p> <p><b>goodnight</b> 2:17  5:9 6:2 11:20  12:3,23 19:25  20:4,11 24:6  24:16 33:12  37:21 38:12  39:9,17 45:4  46:21 48:2  51:20 62:16  74:24 76:6,11  79:12 86:7  102:21 110:1  111:14 112:1</p>	<p>117:16 139:2,4  148:19 155:18  156:6 176:2  180:22 188:1  194:20 195:3  195:11 196:12  196:18 197:16  202:23 212:23  218:15 220:25  221:19 223:19  224:23 225:2  227:16 230:15  231:24 239:24  243:4 244:11</p> <p><b>goodnight's</b>  11:15 20:8  22:6 37:7,14  39:25 40:4  41:3 42:16  44:17 57:17  60:22 75:3  102:17 111:5  155:14 182:24  183:7 195:15  212:22 214:20  215:3 231:9</p> <p><b>gotten</b> 150:16  183:14</p> <p><b>grabbed</b>  168:11</p> <p><b>grade</b> 237:1</p> <p><b>graded</b> 154:20  157:7 158:16</p> <p><b>gradient</b> 18:22  49:22 69:1,21</p>	<p>116:24 173:12  173:13,14,15  173:16 174:5  174:20 185:1,1  186:2,25 222:1</p> <p><b>gradients</b> 50:24  116:17</p> <p><b>grading</b> 146:1  154:17,23  156:24 236:21</p> <p><b>graduated</b>  162:24</p> <p><b>graph</b> 139:1,6  139:8,10 140:9  142:9 148:17  148:18 164:12</p> <p><b>gravity</b> 224:16</p> <p><b>gray</b> 74:7,8  82:9 83:9</p> <p><b>grayburg</b> 11:22  20:2 49:16  50:3,8,12,16,16  54:3,4 65:25  66:4 70:17  72:21 73:17  74:4 75:9  79:16 87:2  102:5 103:19  103:25 104:12  116:17,24  117:11,13,14  119:1 173:10  174:14 186:10  189:5,16  199:21 207:19</p>	<p>213:11 216:25  218:22,23</p> <p><b>great</b> 6:8  194:10 237:19</p> <p><b>greater</b> 99:11  109:19</p> <p><b>green</b> 139:8,12</p> <p><b>gremlins</b> 32:23</p> <p><b>grid</b> 177:1  178:15</p> <p><b>grids</b> 176:23  177:16 178:20</p> <p><b>gross</b> 195:11  203:16</p> <p><b>ground</b> 77:11  77:14 81:2  125:14,25  130:8 155:24  156:5 158:11  218:12</p> <p><b>group</b> 117:17  187:23</p> <p><b>groups</b> 187:17</p> <p><b>guadalupe</b> 2:18</p> <p><b>guess</b> 28:23  30:1,22 33:19  44:6 64:5  75:22 111:23  146:18 150:2  151:19 152:6  161:22 181:6  188:7 211:12  242:11</p> <p><b>guessing</b> 34:8  75:19</p>
--	--	---	---

[guide - hearing]

<p><b>guide</b> 74:17 161:10</p> <p><b>guilt</b> 245:16</p> <p><b>guy</b> 83:14 131:24 166:6</p> <p><b>guys</b> 165:17 168:8 170:21 242:20,23 243:22 245:10 246:13</p>	<p>189:12</p> <p><b>happens</b> 34:18 141:3 152:15 227:4 229:4</p> <p><b>happy</b> 48:9 204:24 242:17 242:17</p> <p><b>hard</b> 24:24 36:25 77:14</p> <p><b>harder</b> 183:5</p> <p><b>hardy</b> 2:5 245:14</p> <p><b>hart</b> 2:18</p> <p><b>harwood</b> 1:15 5:23 6:8 10:15 28:20 30:1 31:1,25 32:9 32:19 33:2,16 33:24 34:8,17 48:4,12,20 49:4 59:11,18 63:7 64:8,13 72:25 73:11 80:12,18 92:8 94:8 96:11 102:10,13 107:22,25 112:7,12 120:15 121:5,9 121:16 122:10 122:16,21 123:3,8,15 147:25 155:5,8 183:19,22 184:3 189:21</p>	<p>190:21 197:3 198:1 199:13 201:24 202:4 202:12 204:5 228:10 240:18 240:23 241:1,4 241:6,8,11,23 242:2,19 244:5 245:10</p> <p><b>hat</b> 167:5</p> <p><b>hatched</b> 54:5</p> <p><b>hate</b> 30:7 242:12</p> <p><b>head</b> 139:20 142:10 217:7</p> <p><b>heading</b> 14:6</p> <p><b>headings</b> 14:5</p> <p><b>hear</b> 10:13 29:7 29:22 30:15 62:7 123:10,13 124:5,6 131:11 133:7 149:14 149:18 184:5,6 196:6 213:19 225:6,8 231:18 239:17 242:2</p> <p><b>heard</b> 1:14 30:12,20 62:3 64:10 65:20 73:12 78:6 131:2,7 133:6 136:11,15 141:1 145:7,10 145:14 164:24 189:15 191:25</p>	<p>196:10 198:23 206:23 208:20 214:20 215:19</p> <p><b>hearing</b> 1:1,15 5:7,12,15,21,22 5:23 6:4,8,13 10:15 26:12,14 27:1,9,25 28:20 29:2 30:1 31:1,3,4 31:23,25 32:5 32:9,19 33:2,8 33:15,16,20,24 34:2,5,8,17 48:1,4,12,20,25 49:4,11 59:9 59:11,18 63:7 64:2,8,13,15,17 64:25 72:22,25 73:11 80:10,12 80:18 86:19,23 87:4 91:19 92:8 93:3,24 94:8 96:2,11 102:10,13 107:22,24,25 112:5,7,10,12 120:15 121:5,9 121:13,16,20 122:10,13,16 122:21 123:3,6 123:8,15 146:23 147:25 155:5,8 183:19 183:22 184:3</p>
<b>h</b>			
<p><b>h</b> 174:19 187:7</p> <p><b>half</b> 7:16,20,22 82:18 102:19 150:16 171:6 177:12 182:5 243:13,14 244:15</p> <p><b>hall</b> 1:5</p> <p><b>hand</b> 14:15 17:15 123:18</p> <p><b>handed</b> 215:18</p> <p><b>handle</b> 210:22 218:11</p> <p><b>handled</b> 100:5 100:17 106:11 106:16 135:6 135:20 245:19</p> <p><b>hanson</b> 3:9</p> <p><b>happen</b> 8:11 122:6 163:5 242:7</p> <p><b>happened</b> 54:6 67:19 148:21 148:25 177:20</p>			

[hearing - hour]

189:21,23 190:6,21 192:11 197:3,8 198:1,19 199:13 201:24 202:3,4,9,12 204:5 210:3,11 218:1,10 220:4 228:10,12 240:18,21,23 241:1,2,4,6,8 241:11,14,23 242:2,6,16,19 244:1,5 245:8 245:10 246:2 246:11 247:4 <b>heavy</b> 215:18 243:1 <b>hedging</b> 161:2 <b>held</b> 30:25 102:12 123:1 147:11 160:9 164:19,21 165:7 183:21 <b>help</b> 50:4,12 74:17 93:9 143:20 168:8 212:19 223:2 224:16 <b>helped</b> 142:25 <b>helpful</b> 91:3,11 92:3 128:6,7 204:23,25 205:2	<b>helpfully</b> 34:24 38:17 <b>helps</b> 161:10 <b>heterogeneity</b> 18:9 71:15 120:23 <b>heterogeneous</b> 71:22 <b>high</b> 16:24 17:13 18:1,18 20:5 21:11 38:23 40:14 41:17 43:14 50:22 54:10,12 55:4 56:18,21 58:19 59:23 88:3 97:13 104:6,10 106:12 108:23 111:7,12 114:9 118:15 119:6,7 124:17 125:21 129:17 136:1 145:25 154:17 154:20,23 156:23 157:7 158:15 172:6 179:16,24 216:23 217:14 217:16 236:21 237:1 <b>higher</b> 93:12 95:14 151:6 154:11 158:18 159:2 172:12	172:15 211:4 <b>highest</b> 56:8 95:4,9 166:11 <b>highlight</b> 13:12 <b>highlighted</b> 60:24 63:10 70:15 112:24 182:9 <b>highlighting</b> 41:9,21 67:14 234:15,16 <b>highlights</b> 113:17 <b>highly</b> 97:21 <b>highway</b> 2:13 <b>hinkle</b> 2:3 <b>hinklelawfir...</b> 2:5 <b>hired</b> 181:13 <b>historical</b> 162:11 <b>historically</b> 148:21,23 162:12 <b>history</b> 54:3 60:13 87:18 116:22 165:20 216:15 219:18 220:4 <b>hit</b> 17:5,9 18:18 124:17 <b>hold</b> 72:25 102:15 169:6 181:19 213:22	<b>holder</b> 118:5,9 118:10 <b>hole</b> 17:9 43:23 44:1 184:13,17 184:22 185:5,7 <b>holes</b> 17:7 <b>holland</b> 2:18 <b>hollandhart.c...</b> 2:20,21,22 <b>holloman</b> 102:18 <b>honest</b> 6:24 <b>honestly</b> 76:20 136:4 <b>honor</b> 182:22 219:22 <b>honorific</b> 190:5 <b>hope</b> 75:10 85:10 94:18 122:16 183:23 195:10 236:5 <b>hopefully</b> 32:15 64:19 102:14 245:10,25 <b>hoping</b> 121:25 <b>horizontal</b> 13:10 17:21,23 18:5 179:25 211:5 <b>horizontally</b> 16:19 <b>horse</b> 135:3 138:25 <b>hour</b> 42:7 243:13,14,14
---	--	--	---



[hour - inconsistent]

<p>243:15,16 244:13 245:1 <b>hours</b> 243:11 243:12,18 244:15 <b>huge</b> 25:19 135:13 <b>hundred</b> 211:14 <b>hundreds</b> 144:15 171:7,8 <b>hydrocarbon</b> 15:25 21:3,17 62:8 63:16 127:16,19,21 128:2,11,13 130:3,7 139:23 140:12 156:16 172:7 234:8 <b>hypothetical</b> 145:5 151:13 151:22 153:18 <b>hypothetically</b> 198:5 <b>hypotheticals</b> 167:19</p>	<p><b>identical</b> 157:3 <b>identification</b> 67:18 <b>identified</b> 7:25 8:14,18 10:24 12:7 16:10 40:4 42:18 43:1 47:21 49:15 54:1 101:11 104:8 176:8 <b>identifies</b> 12:22 <b>identify</b> 16:7 35:15,17 58:5 60:17 115:25 237:1 <b>identifying</b> 45:3 <b>imagine</b> 90:4 168:13 <b>immediate</b> 14:10 <b>immediately</b> 75:9 83:6 93:22 94:23 <b>immense</b> 194:14 <b>immiscible</b> 238:24 <b>impact</b> 140:6 220:13 223:18 224:24 225:2 225:16 226:4 226:23 240:3</p>	<p><b>impacting</b> 206:21 <b>impacts</b> 204:19 205:6 227:23 239:21 <b>impair</b> 171:25 <b>impede</b> 42:9 171:25 <b>impeding</b> 206:20 <b>impermeable</b> 72:20 74:2 82:1 215:5 <b>impermissible</b> 108:12 109:4 <b>implement</b> 152:25 155:4 202:22 227:24 <b>implemented</b> 229:14 <b>implication</b> 51:18 233:13 <b>implicit</b> 210:24 234:5 <b>import</b> 176:18 <b>importance</b> 28:10 138:5 <b>important</b> 15:25 16:1 21:23 25:4 28:5 29:6 79:1 130:16 206:24 214:5,5 220:10 222:21 245:20</p>	<p><b>impractical</b> 116:11 <b>improved</b> 66:25 <b>inaccurate</b> 85:17 89:6 <b>inactive</b> 188:1 221:24 <b>inappropriate</b> 199:12 <b>inches</b> 11:2 12:1 <b>inclined</b> 30:2,2 31:8 <b>include</b> 40:22 57:17 61:19,23 62:1 63:20 118:6 145:14 207:20 228:1 229:7,8 <b>included</b> 58:5 59:13 61:6,7 61:13 62:14,23 63:12,14,24 95:24 96:1 118:2 199:25 213:11 <b>includes</b> 22:6 <b>including</b> 64:22 74:11 135:10 199:2 <b>inconsistency</b> 120:24 <b>inconsistent</b> 66:2</p>
<b>i</b>			
<p><b>ibc</b> 2:13 <b>idea</b> 27:13,14 27:15 71:8 76:4 82:15 83:12,20 86:11 87:11 168:20 176:2</p>			

[incorporate - integrity]

<p><b>incorporate</b> 99:21 148:14</p> <p><b>incorporating</b> 77:17</p> <p><b>increase</b> 90:1 226:8 227:22</p> <p><b>increases</b> 171:19 236:5</p> <p><b>increasing</b> 17:16 235:4</p> <p><b>increasingly</b> 117:19</p> <p><b>incredibly</b> 19:20 92:3 115:9 244:10</p> <p><b>increment</b> 19:3</p> <p><b>increments</b> 7:16,16 15:3</p> <p><b>independent</b> 98:22 125:16 183:11</p> <p><b>index</b> 105:3,8 105:19</p> <p><b>indicate</b> 16:8 38:8 46:21 49:22 50:18 187:3</p> <p><b>indicated</b> 11:5 19:22 21:15 25:7 41:25</p> <p><b>indicates</b> 25:21 38:3 85:2 188:22 205:23 206:9</p>	<p><b>indicating</b> 38:1 106:6 117:12</p> <p><b>indication</b> 17:24 18:21 21:4 42:17,18 44:15 46:22 57:17 68:6 83:3</p> <p><b>indications</b> 12:5 17:16 25:16 83:10</p> <p><b>indicative</b> 38:24</p> <p><b>individual</b> 11:8 13:20 16:17 49:23 50:15 117:23 140:23</p> <p><b>individually</b> 13:21</p> <p><b>indulge</b> 70:10</p> <p><b>indulging</b> 92:2</p> <p><b>industry</b> 115:25 181:17 211:16</p> <p><b>infinite</b> 20:14</p> <p><b>influence</b> 24:13</p> <p><b>influenced</b> 24:17</p> <p><b>information</b> 13:5 14:4 38:6 87:3 134:21 150:9 151:5 160:21 164:5 175:8 176:13 192:3,13</p>	<p>193:22 194:3 207:11 217:17 217:25 218:21 219:11,23 220:21 221:7 221:12 226:9 234:17</p> <p><b>informed</b> 24:18 26:19 27:6 29:19 85:22 190:16</p> <p><b>informs</b> 63:11</p> <p><b>inherent</b> 238:18</p> <p><b>inhibit</b> 50:20 109:1</p> <p><b>initial</b> 152:10 217:13 220:1,8</p> <p><b>initialization</b> 176:21</p> <p><b>initials</b> 19:25</p> <p><b>inject</b> 60:10 180:23 182:21 183:7 239:24</p> <p><b>injected</b> 24:16 26:17 28:12 29:18 81:20 148:10 209:4 225:14 226:16</p> <p><b>injecting</b> 25:10 61:8 75:8 143:1 144:14 180:22 198:8 208:9 227:9 231:25</p>	<p><b>injection</b> 24:16 25:10 60:13,25 61:24 69:24 72:21 76:11 81:21 85:20 89:17 109:9 125:8 139:16 144:17 145:3 147:21 168:15 187:21 196:8 198:7 205:23 206:9 208:21 224:25 225:25 226:22 231:9 231:12 235:18</p> <p><b>injections</b> 25:17 226:10</p> <p><b>injectors</b> 140:2 153:16</p> <p><b>injects</b> 11:20 227:17</p> <p><b>input</b> 81:8,12 86:4 176:15</p> <p><b>inquire</b> 33:19</p> <p><b>inside</b> 155:19</p> <p><b>insignificant</b> 28:22</p> <p><b>instance</b> 19:2 124:21 135:22</p> <p><b>instances</b> 132:23</p> <p><b>integrity</b> 204:20 205:7 207:18</p>
---	---	---	---

[intelligent - january]

<p><b>intelligent</b> 26:3  <b>intended</b>  233:12  <b>intends</b> 130:23  172:1  <b>intention</b> 145:8  209:15  <b>interact</b> 218:23  <b>interest</b> 207:16  247:14  <b>interested</b>  225:10  <b>interests</b> 32:16  <b>interior</b> 153:18  <b>interjection</b>  242:11  <b>internal</b> 160:23  161:4,7,9,10,14  191:19  <b>internship</b>  80:25  <b>interpolate</b>  84:9  <b>interpret</b> 23:14  25:12  <b>interpretation</b>  9:2 11:4 21:20  21:25 24:12,18  24:22 26:16,19  27:6 28:9,13  43:13,22 47:21  51:15 57:22  84:17 101:8,15  114:16</p>	<p><b>interpretations</b>  76:24  <b>interpreted</b>  79:12 114:10  <b>interpreting</b>  15:21  <b>interpretive</b>  8:3 57:16  <b>interrupt</b> 89:1  246:3  <b>interval</b> 15:14  16:8,15 17:5  18:3 20:22  23:6,6,7,8,14  23:21 25:18  38:18 42:13  46:4,10 47:6  47:18 57:2  60:10 61:7,21  62:1,2 63:15  63:19 80:1  81:21 84:22  89:8,16 90:14  90:14 108:23  108:24 110:5  110:20 114:2  114:20 115:6,8  120:4,7,23  136:13 137:9  186:12 205:24  206:10  <b>intervals</b> 7:22  11:18,24 16:7  16:16 17:11,13  25:22 38:23</p>	<p>45:25 47:25  56:18 85:20,20  85:21 90:22  99:20 111:12  115:7 117:12  133:20 134:14  137:18 178:16  203:18  <b>intervenors</b>  243:15  <b>intro</b> 241:21  <b>introduced</b>  207:1  <b>invest</b> 115:2  171:8 200:13  <b>investigate</b>  141:7 142:10  151:4  <b>investigated</b>  140:14  <b>investing</b> 171:7  <b>investment</b>  161:10  <b>investor</b> 143:15  144:7,11,22  145:1 149:4  <b>investors</b>  145:15 200:13  200:18  <b>involve</b> 245:23  <b>involved</b>  142:23 199:16  207:2  <b>irreducible</b>  217:15</p>	<p><b>irregular</b> 53:12  <b>irregularly</b>  53:18  <b>irrelevant</b>  199:11  <b>irrespective</b>  98:16  <b>irs</b> 191:19,25  <b>ish</b> 105:12  170:1  <b>isolate</b> 74:3  <b>isolated</b> 49:23  49:24 115:5  <b>isolates</b> 73:17  <b>isolation</b>  117:11  <b>issue</b> 28:4  30:23 91:24  100:21 118:22  172:19 197:9  207:14 230:6  232:13 240:11  240:16 242:21  <b>issued</b> 100:22  <b>issues</b> 27:2  122:3 242:24  245:24  <b>it'll</b> 209:14  <b>items</b> 28:8</p>
			<b>j</b>
			<p><b>j</b> 4:5 6:16  <b>james</b> 3:16  <b>january</b> 8:23  164:20 169:21</p>

[jbroggi - know]

<p><b>jbroggi</b> 2:21  <b>jesse</b> 3:6  <b>jessek.tremaine</b>  3:6  <b>jibe</b> 43:9  <b>jim</b> 101:20  <b>job</b> 209:11  244:22  <b>john</b> 4:10 123:4  124:1  <b>jp</b> 160:19  <b>jparrot</b> 3:17  <b>julia</b> 2:20  <b>jump</b> 78:2  173:1  <b>jumped</b> 152:8  <b>jumps</b> 111:19  139:24  <b>jury</b> 229:7  <b>justified</b> 214:24  215:11</p>	<p>133:2 135:25  136:2 140:10  149:9 153:20  153:21 154:1  156:2 162:6  169:22 181:6  181:22 203:15  207:1,10 239:1  240:11 245:23  <b>kinder</b> 210:1  210:10  <b>kinds</b> 69:23  <b>king</b> 77:24  78:17  <b>knew</b> 200:18  <b>knights</b> 4:5  6:10,11,16,21  7:1 10:4,20  12:21 22:10  24:10 26:15  28:2,9 29:9,22  30:17 31:24  32:18 33:14  34:23 36:13  37:10 41:6  46:6 49:1,14  50:2 51:1 55:6  56:15 57:3  59:12,22 60:12  62:16 63:9  64:4 72:23  73:5,7 86:21  91:22 94:3,7  108:4 112:9,16  120:18 121:6,8</p>	<p>121:14 130:10  136:6 138:24  139:10 212:15  213:5,9,10,14  215:3,19  223:20 225:24  <b>know</b> 11:11  12:6 16:13,18  20:13,15 21:18  22:12 24:4  30:11,17 31:14  32:3,15 36:1,2  40:19 57:15  61:18 63:14  69:20,21,22  73:22 75:3,5,9  75:19,22 76:13  79:12 80:24  81:3,7,12 83:9  83:22,22 85:15  86:3,8,25,25  87:16 90:10,21  91:10,21 93:12  93:16,18 95:21  96:8 97:22  98:6 99:7,9,13  99:24 100:4,17  103:11 105:2  106:10,11,14  111:13 112:17  112:17,18  113:9,11,25  114:3,24 116:4  118:17 121:2  122:8 126:18</p>	<p>128:23 131:11  131:12 132:22  134:15,19  135:4,5,9,12  136:17,19,25  137:3,7,10  139:18,22  140:18 141:6  142:23 144:12  144:13,22  145:20,25  147:10 148:13  150:10 151:5  153:10,15  154:18 155:22  156:24 159:13  160:16,22  161:8,23  162:11 163:7  163:14 169:2  169:20 174:24  175:21 177:5,5  181:16,18  183:1,7 185:2  185:18,24  187:20 188:18  192:4,23  193:23 194:25  195:2,3 201:13  203:2,23  204:14 205:12  206:2,11,17  207:3,14 208:4  208:19 209:3,6  210:19 211:2,6</p>
<b>k</b>			
<p><b>k</b> 3:6 179:20  <b>karsting</b> 43:19  43:19  <b>keep</b> 44:1 170:3  <b>keeping</b> 244:22  <b>kelli</b> 247:3,17  <b>kicking</b> 143:15  <b>kind</b> 12:8 21:24  45:3 55:8  57:10 68:17  70:11 79:19  103:12 120:13  129:4 130:13</p>			

[know - lindsay's]

<p>211:10 214:9                  215:18 216:4                  216:11,14                  218:9,14 219:1                  219:2,2,21                  220:2 221:20                  222:15 223:21                  224:10 225:7                  227:1,9,10,11                  227:12 242:13                  245:11,19,20                  245:23  <b>knowing</b>                  139:17  <b>knowledge</b>                  63:5 65:13,17                  192:8 231:24  <b>knows</b> 199:20  <b>kv</b> 14:20                  114:24 215:10  <b>kv's</b> 215:13</p>	<p>244:16  <b>lake</b> 102:18                  121:25 122:8                  239:17  <b>lamkin</b> 1:19 4:9                  4:13 120:17,19                  120:22 121:4                  202:12,13,16                  204:3,6  <b>lamkin's</b>                  232:15  <b>land</b> 154:10,12                  169:9 202:24  <b>lands</b> 169:14                  169:16 202:25  <b>lapsed</b> 229:2,12  <b>large</b> 25:18                  28:11,11 43:13                  43:19 52:21                  118:19 180:8                  180:17 205:11                  224:5 226:9,10                  229:14  <b>larger</b> 92:14  <b>largest</b> 201:5,8                  201:9  <b>larry</b> 102:18  <b>las</b> 136:24,25  <b>late</b> 147:4                  184:17  <b>lateral</b> 26:20                  29:19 46:8                  111:1,18                  115:17 146:4                  174:2 189:6,10</p>	<p>189:18 193:6                  206:6,11  <b>laterally</b> 16:19                  17:6,10 28:14  <b>law</b> 2:9 229:6                  230:2,5  <b>lawsuits</b> 147:15  <b>lawyer</b> 27:17                  150:18  <b>lay</b> 133:16                  198:18  <b>layer</b> 175:12  <b>layers</b> 16:17                  49:23 76:1,5                  114:10,11                  115:9 178:7  <b>lead</b> 135:17  <b>leading</b> 10:12                  10:14  <b>leaning</b> 134:18  <b>lease</b> 147:9,11                  160:17 229:1                  229:12  <b>leases</b> 150:5                  229:10  <b>leave</b> 98:12                  121:10 242:9                  242:16  <b>leeway</b> 64:14                  64:23 91:20                  92:9  <b>left</b> 14:4,15                  18:4 22:5                  37:13 83:6                  92:18 95:23</p>	<p>98:8 102:20                  106:2 111:3                  124:10,13                  138:22 179:20                  179:20 243:4  <b>legal</b> 247:17  <b>legend</b> 83:11  <b>lending</b> 161:5  <b>length</b> 26:20                  68:14 156:21                  200:12  <b>lengthy</b> 244:10                  244:20 245:17  <b>lessor</b> 229:2  <b>level</b> 119:7                  125:21 129:17                  188:4  <b>levels</b> 187:24  <b>life</b> 121:15                  161:19  <b>likelihood</b>                  90:17  <b>likely</b> 146:15                  154:7,8 179:25                  189:15 224:19                  239:5  <b>limit</b> 244:25  <b>limited</b> 25:17                  30:4,8,12                  45:20 197:6                  231:14 244:12  <b>limits</b> 242:25  <b>lindsay</b> 78:1  <b>lindsay's</b> 10:5,8                  10:20 12:1,24</p>
<p><b>I</b></p>			
<p><b>I</b> 2:11  <b>label</b> 180:11  <b>labeled</b> 35:20  <b>labels</b> 33:23  <b>laboratory</b>                  222:7  <b>labs</b> 135:21  <b>lack</b> 172:9                  192:7  <b>lacked</b> 177:4  <b>lacks</b> 192:6  <b>laid</b> 48:17                  100:17 229:6</p>			

[lindsay's - looking]

13:5 33:22 66:3 76:16 113:5 <b>line</b> 3:8 10:16 36:23 37:12 38:1 44:25 67:19 69:10 110:8,21,22 111:2,16 112:2 141:13,22 162:16 163:1 170:10 190:22 <b>lines</b> 12:13 35:18 36:12 54:5,5 82:9 83:10 111:11 245:9 <b>list</b> 49:6 102:17 199:22,25 216:13 241:13 <b>listen</b> 206:25 <b>listened</b> 220:22 <b>listening</b> 181:21 <b>literally</b> 106:20 164:12 <b>literature</b> 66:4 78:2 133:15 <b>lithological</b> 78:13 <b>lithology</b> 15:20 78:14 113:4 <b>lithostratigra...</b> 84:11	<b>little</b> 19:11 21:10,14 22:23 25:16 45:25 57:24 65:3 81:20 109:16 110:11 111:2 111:18 125:5 132:21 140:5 149:13,17 152:11 158:6 159:11 166:8 166:20 180:3 188:10 190:7 198:12 206:13 209:22 218:24 229:5 246:4 <b>live</b> 20:2 <b>lived</b> 162:8,9 <b>llc</b> 3:8,13 <b>llp</b> 2:3,6 <b>localized</b> 18:2 <b>located</b> 57:18 231:9 <b>location</b> 40:18 154:3,4 188:13 193:10,14 236:21 <b>locations</b> 174:4 237:2 <b>log</b> 16:10,11 20:17 43:1 47:21 66:21,22 83:6,8 84:10 110:10 114:8 114:15 115:14	131:4,23 139:11 187:21 203:25 206:8 212:8 <b>logging</b> 66:20 <b>logical</b> 54:18 <b>logs</b> 8:3 18:24 42:24 57:16,16 66:18,23 71:14 82:17,23 83:2 85:12,19 119:24,25 133:2 157:10 207:6,10,11 209:12 214:7 <b>long</b> 11:11 25:8 100:17 118:18 121:23 133:22 135:6,15 145:4 145:5 146:3 147:10 153:15 162:8,9 163:7 163:11 182:13 219:22 237:22 245:22 <b>longer</b> 148:22 220:12 <b>longest</b> 235:9 <b>look</b> 11:17 17:25 22:22 23:5 41:5 42:11,24 67:10 77:23 78:4,18 85:9,12,14 98:5,13,15,20	99:1 100:14 103:2 104:5,25 106:2 109:12 109:19 111:16 112:1 131:23 140:4,9,18 141:5,7,11,21 142:13,25 143:14 149:22 150:9 158:3 162:11 167:7 167:14 169:17 172:8 176:22 203:25 207:6 209:9,21 213:17 215:9 215:22 220:1,3 222:4 224:1 241:12 <b>looked</b> 51:17 74:21 76:10 85:18,18,19,21 110:12 132:17 135:1 140:16 140:25 150:11 207:8 218:20 219:8 <b>looking</b> 24:25 39:3,4,5 47:16 58:19 76:25 79:11 84:15,20 85:12 102:17 103:18 105:3,9 106:23 132:22 133:1 135:13
---	--	--	---

[looking - make]

<p>139:18 140:1  140:10 141:11  142:7 150:22  162:12 163:3  163:21 167:23  168:2,4 169:2  170:10 177:18  179:11 205:5,6  209:11 224:8  235:23  <b>looks</b> 28:20  31:4 32:21  33:2 75:23  84:16 111:8  134:25 163:11  171:6,16 187:6  <b>loop</b> 152:8  <b>loose</b> 153:15  <b>lose</b> 39:2 50:22  153:20 203:8  224:13  <b>loses</b> 28:3  86:18 87:23  224:6  <b>losing</b> 18:20  21:13  <b>loss</b> 17:1 18:13  18:24 21:14  29:13 38:3,18  38:24 39:6,8  39:24 40:3,13  40:15,19 41:24  42:5,7,19,25  43:7,14 44:4,7  44:13,21 46:14</p>	<p>46:17,18,19  47:3 50:4,13  50:13 86:12  99:16 109:16  109:19,21  110:2,8,15  111:16,17  115:25 135:17  203:7  <b>losses</b> 27:13,15  39:1 87:8,12  87:20 99:19  100:1  <b>lost</b> 43:12  44:24 84:25  99:18 102:8  135:9 232:18  <b>lot</b> 30:13 67:24  69:5 71:15  73:15 74:10  85:12 97:22  98:14 99:4  106:9 112:17  136:15 146:19  146:19,20,22  146:25 150:25  152:13,14  161:3 170:6  198:13 209:24  211:1,6 218:21  226:19 236:4  239:6,8,9  245:19  <b>lots</b> 198:24</p>	<p><b>love</b> 71:6  183:12  <b>lovington</b> 87:1  132:5  <b>low</b> 17:4,11  45:25 46:5  52:22 56:25  60:3 84:22  88:2 104:15,18  105:21 114:1  120:25 149:9  149:12 151:4  217:13  <b>lower</b> 11:20,21  15:5 17:23  18:19 30:16  43:17,19 45:2  49:15 50:3,5,7  50:12,16 55:24  95:15 105:9,10  105:13,14,18  106:2 110:5,18  110:23 111:2  127:19 132:6  145:9 162:23  185:19 189:15  217:18,18  223:12,22  224:14,15  <b>lowest</b> 56:9  <b>lucia</b> 97:20  104:17  <b>lumped</b> 140:21  169:11</p>	<p><b>lunch</b> 121:17  121:22 122:10  122:23 123:1</p> <hr/> <p style="text-align: center;"><b>m</b></p> <hr/> <p><b>m</b> 3:11  <b>macbeath</b>  123:10,13,15  124:5  <b>made</b> 7:10 8:15  8:19 9:1 17:18  53:3 54:24  55:1 125:17  129:2,24  130:24 137:3  157:11 187:7  199:22 210:3  230:4  <b>magenta</b> 93:20  <b>magic</b> 183:23  <b>magma</b> 41:12  <b>magnitude</b>  104:25 182:20  <b>main</b> 15:14  39:4,6,8  140:21 210:18  210:22 211:20  216:2 239:5,8  <b>major</b> 44:13  66:16  <b>majority</b> 95:17  181:22,23  <b>make</b> 14:24  37:1 48:7  59:17,19 63:15  64:4,5 73:4</p>
---	--	---	---

[make - measured]

78:5 89:22 91:4 106:21 108:16 121:21 126:25 127:13 144:20 168:9 172:14 175:19 177:22 180:3 183:13,18 192:22 214:16 216:10 226:19 234:2 241:17 241:18 242:10 244:12 <b>makes</b> 141:18 <b>making</b> 25:6 49:6 229:15 <b>manmade</b> 207:5,18 <b>map</b> 19:19 21:21 22:1 36:14,15,20 38:17 47:12,13 51:15 54:7 55:1 70:2,4,5,6 71:7,12 75:21 79:7 82:22,22 84:24 85:9 109:12 136:16 <b>mapped</b> 71:10 77:19 87:22,24 <b>mapping</b> 23:11 27:22 47:8,11 70:2,10,11 71:5,21 84:13	<b>maps</b> 47:13 70:12 71:6 76:18 <b>march</b> 230:19 <b>mark</b> 33:11,13 246:5 <b>marked</b> 15:22 15:22,24 42:20 44:23 51:20 <b>markers</b> 27:23 <b>market</b> 170:4 <b>marking</b> 41:21 <b>massive</b> 29:16 <b>match</b> 47:15,20 49:14 111:11 215:24 216:15 218:24 <b>matched</b> 219:5 <b>matches</b> 79:8 107:12 175:4 216:10 <b>matching</b> 107:17 219:4 <b>material</b> 25:4 31:10,13,15,16 68:7 76:19 181:2,5,7 <b>materials</b> 235:22 236:16 241:19 242:1 <b>math</b> 97:22 103:10 166:6 185:22 186:22 186:24	<b>mathematically</b> 15:6 <b>matter</b> 26:6 63:3 98:25 99:23 194:7 237:4 247:13 247:15 <b>matters</b> 5:25 199:17 <b>matthew</b> 3:11 <b>max</b> 179:21 <b>maximum</b> 18:8 179:22 <b>mbeck</b> 3:11 <b>mcbeath</b> 4:10 49:15 102:19 121:21 122:11 122:14 123:5,7 123:8 124:1 143:20 184:5 190:3,6,25 198:23 199:15 202:2,8,11,17 204:10,24 228:11,15 231:8 232:4 233:16 234:2 234:10 236:20 238:4 240:22 241:8 <b>mcbeath's</b> 155:2,2 <b>mcelmo</b> 235:11 <b>mcf</b> 126:2,7 143:17 191:8	<b>mcguire</b> 20:8 29:11,12 40:22 80:22,23,24 81:13 82:9 84:18 102:18 221:23 <b>mcguire's</b> 22:2 22:4 43:20 60:23 115:16 115:19 <b>mean</b> 19:24 30:8 50:7 82:1 88:25 97:5 98:2 103:8 108:21 113:16 117:10 119:14 132:2 136:1 139:24 148:12 148:19,22 151:19 161:21 163:1 169:3,8 172:12 174:9 176:10,12 184:14 223:2,2 224:11 225:22 243:13 246:3 <b>meandering</b> 244:21 <b>means</b> 18:15 49:25 108:22 130:4 209:1,14 <b>meant</b> 189:18 <b>measure</b> 18:7 <b>measured</b> 13:17 14:12,16
--	---	--	---



[measured - mischaracterization]

<p>19:10 22:17 23:2,3 99:10 173:19,21 175:21,24 179:10,15,22 180:2 186:12</p> <p><b>measurement</b> 96:22 114:15 174:16,18 184:21 185:9 186:7,14,15 187:2,7,15,16 187:22 188:14 221:10,25</p> <p><b>measurements</b> 18:6 100:18 106:15 135:2 179:8 187:12 188:9 220:18</p> <p><b>measures</b> 174:19</p> <p><b>measuring</b> 135:7 173:13</p> <p><b>meet</b> 243:10 246:8</p> <p><b>melzer</b> 88:13 139:16 182:11</p> <p><b>member</b> 1:19 1:20</p> <p><b>members</b> 1:17 31:8</p> <p><b>memorialize</b> 141:5</p> <p><b>memory</b> 6:9 132:13 217:8</p>	<p><b>mention</b> 5:14 19:17 238:12</p> <p><b>mentioned</b> 11:14 18:11,13 21:3,18 38:16 40:8 68:2 129:25 132:8 163:6 235:16</p> <p><b>mentioning</b> 174:25 235:20</p> <p><b>mentions</b> 11:23</p> <p><b>merit</b> 30:12 32:10</p> <p><b>mess</b> 138:21</p> <p><b>messed</b> 150:10 180:10</p> <p><b>method</b> 26:2 101:23 114:8,8 187:9</p> <p><b>methodology</b> 68:3 79:4 80:4 86:6,9 101:4,9 101:14,16 132:15</p> <p><b>methods</b> 59:2</p> <p><b>mexico</b> 1:2,7 2:2,4,7,10,19 3:2,4,10,15 5:9 72:16 146:8 167:6,9,16,23 182:4 194:25 195:4,9,12,17 199:10 230:4,6 237:7 247:4,18</p>	<p><b>mexico's</b> 22:6 171:12 198:17</p> <p><b>mfeldewert</b> 2:22</p> <p><b>mic</b> 31:1</p> <p><b>michael</b> 2:21</p> <p><b>microphone</b> 28:25 32:21,22</p> <p><b>microphones</b> 28:21 33:3,6</p> <p><b>mid</b> 164:4,7</p> <p><b>middle</b> 25:9 53:16 243:2</p> <p><b>midstream</b> 2:17 5:9 51:20</p> <p><b>midweek</b> 103:9</p> <p><b>migrate</b> 89:18</p> <p><b>migration</b> 108:25 109:1,2 182:9</p> <p><b>migratory</b> 56:13</p> <p><b>miguel</b> 3:15</p> <p><b>mile</b> 82:18,18 82:19 83:2</p> <p><b>miles</b> 71:1,2 107:5,6 182:19 182:19</p> <p><b>millidarcies</b> 15:3,4</p> <p><b>millidarcy</b> 13:13 15:11,12 114:25 178:21 178:22,23 179:1 223:22</p>	<p><b>million</b> 23:20 25:7 168:16,19 171:6</p> <p><b>millions</b> 171:7 171:9</p> <p><b>mind</b> 10:17 56:23 75:11 204:14 244:2</p> <p><b>mine</b> 28:21 32:22 139:11 149:21</p> <p><b>mineral</b> 167:5</p> <p><b>minerals</b> 3:3 146:7 167:24 171:12 197:21 199:10</p> <p><b>minimum</b> 88:15</p> <p><b>minor</b> 38:25 40:13 41:11,16</p> <p><b>minus</b> 12:12,13 46:10,10 58:6 58:9,11 113:17 175:18 186:1,1</p> <p><b>minute</b> 30:22 131:15 242:12 246:6</p> <p><b>minutes</b> 30:3 32:24 59:5 92:3 102:9,14 183:12 244:14 245:16 246:4</p> <p><b>mischaracteri...</b> 72:23 96:3</p>
--	--	---	---

[mischaracterizes - moved]

<b>mischaracteri...</b> 197:24	107:12,20 124:16 125:9	238:17,18 244:3 246:12	<b>morgan's</b> 210:10
<b>mischaracteri...</b> 155:1	125:13,16 126:25 127:2,7	<b>modeled</b> 182:4 <b>modeler</b> 216:12	<b>morning</b> 5:3,24 6:3,14,21,22
<b>miscibility</b> 137:23 138:2,5 171:22 172:5 222:10	127:20,23,24 127:25 128:3 128:17 129:11 129:12 133:6	<b>modeling</b> 181:12,20 243:1,2 244:2	31:13 64:19 122:8 170:1 242:18 246:10
<b>miscible</b> 238:24	133:13,17	<b>models</b> 97:8 134:12 138:11	<b>morning's</b> 122:17
<b>mislead</b> 42:23 165:24	145:12 149:6 149:19,20	147:19 160:5 169:5 216:12	<b>motion</b> 244:8 244:12,25
<b>mispronounce</b> 78:13	152:3 155:3,10 155:11,14	233:8	245:13
<b>misremember...</b> 92:6	156:5,7,10 157:3 158:14	<b>modifications</b> 34:3	<b>mountain</b> 235:12
<b>missed</b> 136:5 152:18 220:8	161:20,22,23 163:15 165:4	<b>moment</b> 18:15 47:15 112:21	<b>movable</b> 209:2
<b>missing</b> 157:16	166:12 167:2	241:16	<b>move</b> 10:16 14:1 25:24
<b>misspoke</b> 189:18	168:9,22,23 169:2 170:22	<b>money</b> 74:10 145:18 160:16	26:10 33:10,11 34:23 48:2,7
<b>mistake</b> 7:25	175:2,5,7,12,15 175:16,17	176:10 193:5 227:13	50:25 65:4 69:19 81:23,24
<b>misuse</b> 66:5	176:1 177:8,17	<b>monitor</b> 31:5	81:24,25 82:3
<b>mixing</b> 208:15	179:6 180:22	<b>monitoring</b> 131:12	99:24 110:21
<b>mmp</b> 222:8,9	182:6,11,18,25 183:2,8,11	<b>monitors</b> 102:8	110:23 121:23
<b>moander</b> 3:5 4:11 6:4 107:24 189:23 190:2,19 241:2	184:18 193:3 210:3 214:7,19 214:23 216:23	<b>month</b> 117:8 140:25 188:2 220:6	128:23 129:22 143:22 152:7 158:10 173:2 180:1 197:12
<b>mobile</b> 199:2 200:1,5 201:2 201:17	217:7 218:3,16 218:20,21 219:10 220:13	<b>month's</b> 220:5	208:17 217:16 217:19 218:8 224:18,19
<b>model</b> 93:21 94:1,15 95:20 97:1 98:22 99:4,6 100:15	228:6 232:25 233:8,11,15,18 235:24 238:6,7	<b>months</b> 26:7 27:20 188:3 221:25	226:16,18,20 229:16
		<b>moot</b> 232:2	<b>moved</b> 48:8,10 49:7 124:10
		<b>morgan</b> 160:19 210:1	

[moved - nomenclature]

<p>162:6 177:22 216:21 218:5 <b>movement</b> 189:10 208:17 209:10,13 <b>moves</b> 153:24 <b>moving</b> 111:18 126:20 142:15 159:10 177:24 178:8,20 <b>msuazo</b> 3:16 <b>mud</b> 18:20 21:13 27:13,14 28:3 42:24 43:1 44:1 86:18 87:8,12 87:20,23 92:23 93:1 109:16 110:10 119:24 <b>mullins</b> 3:9 <b>multiple</b> 13:19 44:21 45:3 46:18 73:8 114:17 117:12 139:7 164:12 166:5 <b>multiples</b> 165:2 <b>mute</b> 123:9 <b>muted</b> 140:4 182:23</p>	<p>99:5 100:7,8 100:11,13 101:7,11,22 102:1 104:9,16 106:12 133:24 134:3,16,19,23 136:1,4 <b>n's</b> 104:21 136:7 <b>name</b> 5:4 33:4 <b>names</b> 37:2 <b>narrative</b> 148:1 <b>narrow</b> 64:19 <b>narrowed</b> 244:22 <b>nate</b> 102:18 121:24 <b>native</b> 209:5 <b>natural</b> 3:3 <b>near</b> 70:8 240:11 <b>nearby</b> 174:3 <b>nearly</b> 61:8 166:15 <b>necessarily</b> 32:4 63:16 75:5 87:9 211:15 <b>necessary</b> 122:1 <b>need</b> 5:18 10:13 11:8 20:3 30:15 35:3 52:10 88:15 142:10 145:18</p>	<p>167:24 172:16 202:24 203:25 205:14 211:13 222:15 239:22 245:24 <b>needed</b> 177:13 212:24 232:11 232:17 238:23 <b>needs</b> 140:14 182:20 228:2 <b>negative</b> 19:11 54:15 150:17 162:17 200:9 212:25 214:1 <b>negotiate</b> 198:7 198:12,15 199:5 <b>neither</b> 247:12 <b>net</b> 89:2,16 166:25 167:7 167:24 168:18 171:5,15 191:7 203:16 <b>netherland</b> 72:2,19 73:21 74:1 85:24 88:18 160:18 <b>network</b> 47:14 47:19 <b>never</b> 71:10,12 82:21 85:5 87:19,22 95:13 103:22 131:24 230:4</p>	<p><b>new</b> 1:2,7 2:2,4 2:7,10,19 3:2,4 3:10,15 5:9 22:6 26:9 30:6 31:9,12,15,16 31:19,21 34:12 34:13,15 59:4 59:7 64:9,11 68:14 72:8,11 72:16 74:16 77:23 92:1 146:8 155:18 167:6,9,16,23 171:11 182:4 192:2 194:25 195:4,9,12,17 198:17 199:10 202:23 211:10 211:20,20 230:4,6 236:4 237:7 247:4,18 <b>newly</b> 225:1 <b>nice</b> 141:13 142:14 188:4 <b>nicely</b> 105:11 106:4 107:11 <b>night</b> 34:7,10 34:14 78:18,22 91:7 212:14 <b>nitroglycerin</b> 189:9 <b>nm</b> 3:3 <b>nomenclature</b> 20:18</p>
<b>n</b>			
<p><b>n</b> 2:1 3:1 4:1 91:14,15 97:18 97:19,20 98:2 98:3,10,16</p>			

[non - officer]

<p><b>non</b> 214:8,9  <b>nonresponsive</b>  74:6  <b>noodled</b> 230:4  <b>normally</b>  139:25 210:15  216:13 229:4  <b>north</b> 2:13,18  54:13 107:5  <b>northeast</b> 53:7  65:21,25 66:10  66:15 67:5  <b>northeastern</b>  53:3  <b>northwest</b>  36:17 47:22  <b>note</b> 59:19  153:23  <b>noted</b> 52:20  138:1 164:6  187:19  <b>notes</b> 30:15  73:1 184:1  244:6  <b>noticed</b> 41:11  44:12  <b>nsai</b> 58:2  <b>nsai's</b> 58:20  59:13,24 60:3  <b>nuance</b> 203:2  <b>number</b> 14:10  17:14,16 21:20  37:4 45:2  47:17 51:4,20  54:13,19 70:12</p>	<p>74:20,23 99:1  114:6,19 115:7  135:10 140:24  142:21 149:8  162:17 165:22  168:20 169:3  174:23 176:4  196:22 199:16  204:19 205:21  209:19 211:15  211:23 212:16  212:24 213:2,4  213:7,11 214:1  215:13 216:9  218:2,7 219:13  220:17  <b>numbered</b>  193:24  <b>numbers</b> 5:11  5:11,12 37:2  89:23 90:20  97:24 98:1,14  105:7 127:2  146:11 166:23  166:24 167:3  174:22 178:24  180:17 201:12  215:10,23  216:3,8 218:4  218:5,8 243:3  243:17  <b>nutech</b> 55:16  170:17,20  <b>nw</b> 247:18</p>	<p><b>nymex</b> 129:22  <hr/> <b>o</b>  <hr/> <b>o</b> 58:15  <b>o'clock</b> 241:21  <b>oath</b> 6:12 83:14  123:17 190:10  <b>object</b> 26:10  34:16 48:17  49:2 72:22  80:10 197:23  <b>objection</b> 10:11  10:14 25:23  30:12 31:9,24  33:17 48:12  58:22 59:8  62:24 73:12  80:16 147:23  155:1 192:6  197:12 198:2,3  199:8 241:2,5  241:7  <b>objections</b> 32:7  198:10  <b>obligation</b>  177:6 198:12  198:15 199:10  <b>obligations</b>  29:4  <b>observed</b> 54:2  180:17  <b>obvious</b> 150:12  <b>obviously</b>  53:12 117:2  124:20,25  125:12 146:18</p>	<p>152:13 153:18  158:17 161:14  216:7  <b>occ</b> 107:22  190:16  <b>occur</b> 173:25  <b>occurred</b> 98:23  137:2,2 172:9  187:11 201:19  220:11 244:11  <b>occurring</b> 12:4  <b>ocd</b> 6:4 30:8  32:14 102:21  189:22 241:1  243:5  <b>offered</b> 94:19  151:12  <b>offering</b> 65:24  <b>officer</b> 1:15  5:21,23 6:5,8  6:13 10:15  26:12,14 27:1  27:9 28:20  29:2 30:1 31:1  31:3,4,23,25  32:5,9,19 33:2  33:8,15,16,21  33:24 34:2,5,8  34:17 48:1,4  48:12,20 49:1  49:4,11 59:9  59:11,18 63:7  64:2,8,13,16,17  64:25 72:22,25  73:11 80:10,12</p>
---	---	---	---

[officer - operation]

80:18 86:19,23 87:4 91:19 92:8 93:24 94:8 96:2,11 102:10,13 107:22,24,25 112:6,7,11,12 120:15 121:5,9 121:13,16,20 122:10,13,16 122:21 123:3,7 123:8,15 147:25 155:5,8 183:19,22 184:3 189:21 189:24 190:21 192:11 197:3,8 198:1,19 199:13 201:24 202:3,4,10,12 204:5 228:10 228:12 240:18 240:21,23 241:1,3,4,6,8 241:11,14,23 242:2,6,16,19 244:2,5 245:10 246:2,11 <b>oh</b> 156:19 <b>oil</b> 1:3 3:2 5:5,6 7:14,20 8:8,16 9:2,11,11,18,18 9:19,20,21 10:1,2 54:16 54:16 55:18,19	56:8,12,16,16 56:20,21 57:2 60:14 65:11 72:16 75:9 80:25 81:1 88:2,7,12,15,19 88:19,20,22 89:3,3,4,5,9,23 89:24 90:1,15 90:20,22 91:6 91:8,17 92:19 92:23 93:1,6,6 93:7,8,8,10,11 93:11,13 95:4 95:5,10 97:2 97:14 99:9,16 100:1,18 103:18 104:2 104:18,22 106:15 118:8 124:25 127:13 128:12 129:22 130:4 134:13 135:9 136:8,12 136:13,14,20 136:21,23 137:3,6,8,14,16 137:17 139:9 147:7,8 154:11 156:17 157:1,6 157:8,22 158:9 158:18 159:1 159:22 160:17 160:22 162:19 162:22 164:1,2	164:4 168:4,4 169:14 170:4 170:15 174:1 183:8 191:22 192:18 193:15 195:16,19 198:24 201:2,9 203:11,14,20 210:25 211:19 212:1,11,15,20 213:2 214:9 216:24 217:6,9 218:6,11 219:25 226:16 226:18,20,25 227:15 228:4 234:25 238:8 238:11,16 239:9 247:4 <b>okay</b> 6:8 12:8 16:21 27:9 28:4 30:1,4 31:17,22 36:19 44:20 51:24 61:3 68:12 69:14 70:22 77:22 78:17 80:23 82:25 87:4 91:13 94:22 95:11 100:3 113:9 124:5 125:12 126:3 128:16 130:13 131:6 146:5,14	152:16 155:17 170:12 180:5 180:14 194:13 198:19 200:2 200:17 204:21 204:22 210:20 213:4,17 223:9 227:16,20 228:10 229:21 230:12 232:4 233:2,6 242:4 <b>older</b> 207:9,10 <b>omits</b> 88:19 <b>once</b> 54:24 137:2 165:8 <b>ones</b> 30:6 39:17 50:17 106:6,8 150:12 <b>open</b> 30:7 91:1 91:23 <b>opened</b> 31:18 31:20 32:12 197:9 <b>operate</b> 195:6 196:5 231:5 <b>operates</b> 24:17 188:1 <b>operating</b> 3:8 124:23 125:24 125:25 126:4 190:22 197:16 231:13,15 <b>operation</b> 227:18
---	--	---	--

[operational - page]

<p><b>operational</b> 140:11</p> <p><b>operations</b> 61:13 140:14 141:22 195:6 195:16,17,19 196:12 199:19 201:9 204:20 205:7 206:21</p> <p><b>operator</b> 23:23 61:19 62:22 76:22 118:6,11 144:14 147:8 160:25 161:1,8 161:8,15,15 226:25 227:13</p> <p><b>operators</b> 38:18 76:15 132:18,24 141:5 160:22 198:7 199:5 200:2</p> <p><b>opex</b> 126:21 127:2,7 141:25</p> <p><b>opine</b> 133:9</p> <p><b>opining</b> 20:9</p> <p><b>opinion</b> 12:2 20:18 27:7 28:6,18 29:4 29:19 46:8 54:1 55:2 65:24 73:9 77:1 90:23 233:16 235:6,8</p>	<p><b>opinions</b> 13:6 74:16 85:22 136:19 151:13 196:21,25</p> <p><b>opportunities</b> 140:18</p> <p><b>opportunity</b> 27:19 31:16 34:16 36:6 122:22 171:11 193:4 222:13 222:24</p> <p><b>oppose</b> 48:18</p> <p><b>opposed</b> 111:19 139:21 140:11 157:23 187:4 218:8</p> <p><b>opposition</b> 114:1</p> <p><b>ops</b> 9:14 45:2,4 46:20 56:7,16 97:1,4 104:1 110:5,19 114:7 141:19 142:11 170:17,20</p> <p><b>optimistic</b> 56:19</p> <p><b>option</b> 216:19 216:20 242:22 243:20</p> <p><b>options</b> 216:13 216:21</p> <p><b>orange</b> 148:18</p> <p><b>order</b> 65:5 104:25 196:7</p>	<p>202:21 204:2 232:22 233:17 237:15</p> <p><b>ordered</b> 231:19</p> <p><b>orders</b> 182:20</p> <p><b>orient</b> 14:2</p> <p><b>oriented</b> 10:24 15:1</p> <p><b>original</b> 7:11 54:16 132:9,18 134:10 173:8 174:8,16 218:11 219:25</p> <p><b>os</b> 99:22</p> <p><b>outcrops</b> 133:15</p> <p><b>outlook</b> 163:7 164:4,6,7</p> <p><b>outlook.com</b> 2:11</p> <p><b>outputs</b> 210:8 210:10,11</p> <p><b>outset</b> 245:14</p> <p><b>outside</b> 70:9 83:5 101:3 196:20,25</p> <p><b>overall</b> 12:18 56:19 185:1</p> <p><b>overestimate</b> 8:8</p> <p><b>overestimation</b> 8:15</p> <p><b>overnight</b> 26:5 26:8 27:16 59:1</p>	<p><b>overruled</b> 63:7 80:19 87:4 92:10 96:16 155:9 192:11 199:13</p> <p><b>overs</b> 189:8</p> <p><b>own</b> 9:7 125:14 125:22 129:11 147:8,10 150:4 155:13 161:9 163:1 218:19 243:2</p> <p><b>owned</b> 146:7</p> <p><b>owner</b> 167:6,21</p> <p><b>owners</b> 147:12 167:15</p> <hr/> <p style="text-align: center;"><b>p</b></p> <hr/> <p><b>p</b> 2:1,1 3:1,1</p> <p><b>p.m.</b> 123:2 183:21 241:12 246:18</p> <p><b>p.o.</b> 2:4,7,10 3:10</p> <p><b>pa</b> 3:9</p> <p><b>packstone</b> 92:23 93:2</p> <p><b>padilla</b> 2:9,11</p> <p><b>padillalawnm</b> 2:11</p> <p><b>page</b> 4:2 16:12 16:21 19:8 20:20 21:6 33:21 41:5 43:8,20 51:24 52:4 127:1</p>
--	---	--	--

[page - percent]

<p>145:4 204:18 205:8,17 222:2 222:5 <b>pages</b> 12:25 13:18 16:14 52:11 <b>paid</b> 196:19 197:16 214:3 <b>panhandle</b> 182:5 <b>paper</b> 51:17 54:4 65:19 66:9 67:1,6 92:19 95:4,8 105:12 163:23 164:17 215:21 238:21 239:4,5 239:7 <b>papers</b> 148:4 <b>paperwork</b> 239:1 <b>paragraph</b> 52:19 53:10,17 206:14 <b>parameter</b> 222:21 <b>parameters</b> 103:21 <b>parentheses</b> 19:23 <b>parrot</b> 3:16 <b>part</b> 10:9 12:18 24:11 35:6 40:24,25 48:10 48:21,23,24</p>	<p>49:2 52:5,6,11 52:21 60:12,14 60:20 62:17,18 62:23 68:4,7 84:1,2 86:15 90:4,8 124:11 124:22 125:14 130:1 131:15 131:16 133:3 133:25 135:23 141:21 148:3 155:14,17,22 156:6 160:11 160:16 165:1 181:24 183:7 191:15 193:9 199:6 209:8 214:8,13 218:22 224:14 237:1 244:18 244:21 <b>particular</b> 5:11 19:2 40:18 48:8 125:8 135:22 157:17 157:23 159:1 175:9 191:24 203:16 206:24 221:12 232:19 239:12 <b>parties</b> 64:23 243:15 246:8 247:13 <b>parting</b> 120:25</p>	<p><b>parts</b> 141:12 177:1 <b>party</b> 199:7 <b>pass</b> 28:22 107:21 189:20 190:19 210:16 224:12 <b>passage</b> 183:9 <b>passed</b> 124:9 <b>past</b> 128:5 129:7 148:24 177:2 181:24 216:12 242:13 <b>path</b> 12:9 96:5 207:18 209:7 <b>pathways</b> 56:13 182:9 <b>pattern</b> 127:16 130:3 153:24 153:24,25 155:10 156:25 156:25 157:3 158:6 159:7 229:6 <b>patterns</b> 159:4 193:3,5,23,24 <b>pause</b> 33:1 <b>paused</b> 138:9 <b>pay</b> 89:2,16 140:21 195:8 195:20 196:18 210:18,22 211:20 239:5,8 <b>paying</b> 196:23 228:22 229:3,9</p>	<p><b>pays</b> 195:11 <b>pc</b> 2:12 3:14 <b>pdp</b> 160:13 161:6 <b>peak</b> 162:16 <b>pecos</b> 1:5 <b>pedro</b> 2:14 <b>peifer</b> 3:9 <b>peiferlaw.com</b> 3:11 <b>pen</b> 110:24 <b>pencil</b> 150:14 <b>pending</b> 80:13 <b>penetrated</b> 54:15 174:3 <b>penetrating</b> 55:18,20 <b>penetrations</b> 157:14 207:5 <b>people</b> 20:1,3 45:7 77:10 90:24 142:25 143:6 194:10 195:3,8 198:16 245:25 <b>percent</b> 8:8,15 9:3,3,11,17,20 9:25 10:1 20:22 21:9 26:4 46:5 58:6 58:9,11,21 59:14,25 60:5 73:3 88:6,7,12 88:20 89:3,6,7 89:10,10,11,13</p>
--	---	---	---

[percent - pick]

<p>89:24 90:13,21  92:25 93:2,22  94:24 95:15  97:15,16 102:5  102:5 103:20  104:3,11  105:12 136:12  136:20 137:8  137:18,19  146:8,9,9  150:16 160:7  162:4,13 164:2  164:8,14,15,21  165:11 168:3  168:15,17,22  170:24 171:13  212:1,2 213:24  214:1,6 217:12  217:23 234:9  238:7,11,16</p> <p><b>percentage</b>  108:23 203:8  203:22</p> <p><b>perfect</b> 159:6  185:21 208:14</p> <p><b>perfectly</b> 175:5</p> <p><b>perforated</b>  85:20,21  205:24 206:10</p> <p><b>perforations</b>  208:7 209:14</p> <p><b>perform</b> 77:11  85:13</p> <p><b>performance</b>  117:5 240:16</p>	<p><b>performed</b>  68:17 85:25</p> <p><b>performing</b>  188:12</p> <p><b>perfs</b> 23:18</p> <p><b>period</b> 117:8  162:14 188:6  220:12 237:22  237:22,25</p> <p><b>periods</b> 182:14</p> <p><b>perm</b> 13:19,21  13:21,22 15:5  15:6,14 16:16  16:22,24 17:2  17:4,5,11,13,19  17:21,23,24  18:1,5,5,8,12  19:18 20:16,16  20:21,22 21:11  23:7,8,13,15  24:19 25:1  27:24 33:25  34:13,13 41:17  43:13 44:14  45:21,22,23,24  46:1,5 47:4,5  49:25 50:15,19  50:22 55:24  70:14,22 75:21  75:22,24 76:5  76:10 77:19  80:1,5 82:6,7  83:10 84:22  86:8 108:25  111:7,8,12</p>	<p>113:1,4 114:1  114:4,7,14,16  114:19,21,25  115:4,5,10,12  116:9,12,18  117:9,12,18,22  120:2,8 217:3  224:10,11</p> <p><b>permeabilities</b>  13:12 179:15  179:24 180:1,8  214:21,23  215:1</p> <p><b>permeability</b>  11:15,19 12:11  13:7,9,10,11,15  14:6,11 15:3,8  18:9,10,19  19:1,12,14,20  20:5,12 21:8,9  21:20 24:22  25:19 26:19  28:14 29:20  38:23 43:14  45:25 46:3  49:16 70:4  108:24 113:2  120:25 177:25  178:5,14,16,19  179:7,9,11,22  180:16,17  203:14 215:4  215:10,16,25  223:21,23</p>	<p><b>permian</b> 3:8  163:22 190:22</p> <p><b>permitted</b>  194:11 209:15</p> <p><b>perms</b> 17:25  224:8</p> <p><b>person</b> 98:25</p> <p><b>personal</b>  143:11 192:7</p> <p><b>personally</b>  135:8</p> <p><b>perspective</b>  140:15 149:23  179:9</p> <p><b>petroleum</b>  155:24 196:24</p> <p><b>petrophysical</b>  57:13 58:20  59:24,25 98:13  101:25 102:2  131:8 133:14  146:20 154:19</p> <p><b>ph.d.</b> 76:16</p> <p><b>phone</b> 131:16</p> <p><b>photo</b> 113:23</p> <p><b>phrase</b> 108:18  183:23</p> <p><b>phrased</b> 87:15</p> <p><b>physical</b> 18:25  21:23 24:25  77:14,17 84:11  114:13 116:10</p> <p><b>physics</b> 99:24</p> <p><b>pick</b> 20:6,17,18  24:7,7 39:13</p>
--	--	---	--



[pick - possible]

<p>39:25,25 40:5  44:17 57:7  86:14 87:11  110:6,19,23  111:6 112:4  132:2 146:21  154:4 205:20  222:5  <b>picked</b> 20:11  24:3,6 87:7,19  114:22 117:16  117:17 120:12  132:18 198:7  <b>picking</b> 20:14  45:7 57:5  77:10 86:13  87:14 131:25  132:5,15,19  152:14  <b>picks</b> 37:21  87:3 112:1  <b>picture</b> 200:10  <b>piece</b> 74:20  <b>pieces</b> 91:13  193:8  <b>pilot</b> 3:13 6:7  30:9 32:14  112:9 153:13  202:1 203:3  241:6  <b>pinching</b> 66:4,6  <b>piston</b> 208:14  <b>place</b> 7:14,20  8:9,16 9:11,18  9:21 10:2</p>	<p>42:12 88:2,19  88:22 89:4,23  90:1,20,22  124:25 136:14  136:21,23  137:3,6 144:17  154:11 157:1,8  157:17,22  158:9,18 159:1  168:4,16  186:25 198:6  218:11 224:9  244:19  <b>placed</b> 67:20  <b>places</b> 15:24  100:1 104:9  115:9 156:25  178:21  <b>placing</b> 22:18  <b>plan</b> 147:9  192:18  <b>planet</b> 198:14  <b>planned</b> 155:4  <b>plant</b> 193:7  <b>platform</b>  122:15 123:4,7  <b>play</b> 27:14  <b>please</b> 5:19  46:14 59:11  183:16 205:3  <b>pleasure</b>  122:18 147:10  <b>plenty</b> 106:3  <b>plethora</b> 79:25</p>	<p><b>plot</b> 135:22,24  142:5 178:12  <b>plots</b> 95:2,12  98:6 105:16  <b>plotted</b> 105:6  139:8  <b>plotting</b> 135:2  <b>plug</b> 23:18  <b>plugged</b> 94:19  <b>plus</b> 58:6,9,11  160:2 166:12  167:10,11,18  175:18  <b>point</b> 10:13  14:23 15:4  17:18 22:1  24:9 26:23  32:1 43:18  90:10 102:24  112:24 125:17  128:24 130:16  130:21 136:3  151:20 157:14  158:4,9 163:21  174:8 177:5  194:4 197:11  198:20 206:24  211:7 218:3  229:17 232:3  235:12,16  240:5  <b>pointed</b> 8:7  <b>pointing</b> 29:13  <b>points</b> 14:23  47:11 96:22</p>	<p>98:8 104:21  106:3,12  124:18 126:18  139:19 186:22  219:6,7  <b>pool</b> 172:24  <b>poor</b> 105:17  134:17  <b>popped</b> 240:11  <b>pore</b> 127:16,19  127:21,22  128:2,11,13,14  130:3 172:7,16  234:7,8  <b>porosities</b>  56:25  <b>porosity</b> 18:24  26:4 28:8 56:9  56:12 57:1  127:17 128:12  170:15 203:13  212:10  <b>portion</b> 41:8  49:15 52:22  57:1 135:13  198:8 223:4,6  <b>portions</b> 13:1  <b>position</b> 56:23  108:5 230:14  <b>positive</b> 169:3  171:15,17  <b>possibility</b>  119:7  <b>possible</b> 109:3  119:11 146:3</p>
---	---	--	--

[possible - price]

<p>152:25 209:9 219:20,22 <b>possibly</b> 61:16 102:21 176:11 243:5 <b>post</b> 244:6 <b>poster</b> 27:23 <b>potential</b> 43:18 66:21 116:18 194:13 201:18 204:19 205:6 210:16 216:13 220:8 236:21 237:6 239:21 <b>ppq</b> 228:17,20 230:1,7,8 <b>practical</b> 143:9 <b>practice</b> 84:8 135:13 181:25 <b>pre</b> 162:22 <b>precision</b> 219:10 <b>predicted</b> 98:23 99:5 165:17 166:17 <b>predicting</b> 165:7 <b>predominant</b> 84:22 <b>preliminary</b> 5:25 <b>preparation</b> 12:16 <b>prepare</b> 27:19 74:17</p>	<p><b>prepared</b> 12:22 124:21 175:1 178:2 181:3 207:12 <b>prerogatives</b> 147:7 <b>presence</b> 16:3 <b>present</b> 15:23 16:23 62:4 79:21 166:25 167:3,7,14,22 167:25 168:18 171:5,5,15 218:16 219:11 241:19 <b>presentation</b> 139:2,4 <b>presented</b> 10:9 20:15 21:21 31:13 34:24 35:6,23 37:21 48:22,24 130:22 138:2 138:19 164:24 166:24 167:3 214:18 224:23 238:25 <b>presenting</b> 51:19 218:15 <b>pressure</b> 17:9 18:18,19,22,22 19:1 25:17,21 27:2,5,14 49:22,23 50:1 50:3,11 58:14</p>	<p>68:5,7 86:12 116:13,15,23 117:1 121:1 171:19,24 172:6,10,11,12 172:16 173:1,8 173:12,19 175:1,6,13,14 175:16,17,21 175:25 176:3,6 176:6,8 182:22 184:17,22 185:5,7,15 186:2,8,25 187:12 188:11 189:15 220:17 221:7,15 226:7 226:11,13 227:21,22 232:13 240:15 <b>pressured</b> 184:10 219:5 220:23 221:14 221:18 222:1 <b>pressures</b> 25:5 25:15 26:18 49:21 50:24 67:24,25 68:1 68:2,4 69:2,25 117:2 176:23 177:1 187:15 187:18,19,25 188:5 218:24 221:3,20,23 240:2</p>	<p><b>pressuring</b> 184:8 240:8,14 <b>preston</b> 20:7 80:22,23,23 102:18 115:16 <b>preston's</b> 47:6 120:6 <b>presumably</b> 75:7 194:21 195:11 <b>presume</b> 195:19 240:13 <b>pretty</b> 28:22 64:10 117:20 128:23 135:21 143:16 179:17 243:19 <b>prevent</b> 108:19 109:9 <b>preventing</b> 195:25 196:1,7 197:20 <b>prevents</b> 108:7 <b>previous</b> 23:22 120:12 230:18 <b>previously</b> 6:17 29:2 34:4 41:1 47:9 51:19 203:6 <b>price</b> 124:11,14 129:3,5,5,20,24 130:1 143:17 152:1 156:14 156:15,17,18 156:19 159:10</p>
--	---	--	--

[price - projects]

<p>159:10,22  160:2,23 161:4  163:5,7,12,14  164:1,2,19,25  166:11 168:5,5  168:24 169:6  169:14,15,18  169:19 170:4  170:23 171:14  172:19 191:5,7  211:3,17,19  234:18,20,21  235:14  <b>prices</b> 129:22  149:14,16  162:19,23,25  164:4 165:13  169:21 210:25  211:11,13  <b>pricing</b> 124:23  160:5,6 234:13  235:1,7 236:11  236:17  <b>primary</b> 211:4  <b>principally</b>  238:22  <b>prior</b> 54:23  60:21 65:8  142:2 146:22  222:19  <b>pristine</b> 187:22  <b>probably</b> 19:6  19:6 20:21  21:9,13 32:1  52:6 64:11</p>	<p>78:13 79:10  80:4 82:18  90:18 118:21  140:3 145:23  153:17 158:12  163:18 175:3  181:11 213:6  222:5 225:24  241:20 246:6  <b>problem</b> 97:25  101:12 140:6  140:22 154:21  200:21 215:12  217:19  <b>problems</b> 141:2  <b>procedure</b>  124:8 138:7  <b>proceed</b> 29:25  31:6 64:24  149:24 239:25  <b>proceeding</b>  103:1 146:12  155:18 180:24  243:24  <b>proceedings</b>  1:10 4:3 5:2  33:1 73:24  131:13 246:18  247:8,10  <b>process</b> 26:7  27:18 61:22  77:16 116:10  137:1 143:3  197:25</p>	<p><b>produce</b> 81:1  141:24 182:15  227:14  <b>produced</b>  24:14 52:5,21  55:2 60:18  130:2 231:25  <b>producers</b>  140:2 153:16  199:17 207:3  <b>producing</b>  54:16 55:17,19  62:2 130:4  147:2 208:24  208:25 228:3  229:9  <b>product</b> 188:15  <b>production</b>  54:2 60:13,14  62:8 63:17,20  66:17 75:9  99:2 101:19  116:22 117:3  139:3,9,23  140:18,23,24  162:5 174:1,14  182:15 211:5  219:18,20  220:5 228:22  229:3,5 237:16  237:24  <b>profitable</b>  168:25 169:7  <b>profits</b> 194:21</p>	<p><b>program</b>  177:22,23  <b>progressively</b>  111:8  <b>prohibiting</b>  32:11  <b>project</b> 115:3  130:22 139:25  140:1 143:5,25  144:23 145:18  145:23 146:24  153:10 158:25  161:19 162:7  170:3 171:20  172:1 193:20  194:4,11 196:3  197:24 200:13  201:21 202:22  203:3,4,9  210:17,18  211:3,20,21  223:1,3,17  226:14 227:24  229:13 231:20  233:11,17  235:18 236:22  237:19 239:12  239:12,22  240:1  <b>projects</b> 107:12  139:18 153:9  153:14 162:2  211:10 239:6  239:11</p>
--	--	--	--

[prolific - questions]

<p><b>prolific</b> 63:20  <b>prong</b> 229:11  <b>proof</b> 142:25  <b>property</b> 194:2  226:19  <b>proposed</b> 225:1  <b>proposing</b>  180:23  <b>protect</b> 29:5  <b>provide</b> 81:8,12  177:7 195:20  199:19 201:14  246:12  <b>provided</b> 12:23  33:23 34:4  38:12 49:17  75:21 120:10  153:24 176:15  198:23 213:9  <b>proving</b> 146:17  <b>psi</b> 173:13,19  174:20 175:5  175:15,16,18  175:20,22,24  176:1,7,9  185:1,2,25  186:1,4,4,16  187:1 188:5,21  188:22 221:16  221:16  <b>public</b> 1:1 63:3  149:13 151:1  194:15 202:25  <b>publications</b>  163:19</p>	<p><b>publicly</b> 141:17  145:16,20  <b>publish</b> 70:3  <b>published</b>  217:25 221:17  239:7  <b>publishing</b>  173:4 184:22  185:13  <b>pud</b> 160:13  161:6  <b>pull</b> 46:24  60:23 176:3  182:21 205:13  <b>pulled</b> 178:24  <b>purchased</b>  200:22  <b>purple</b> 38:1  70:17 109:15  110:22 111:11  111:16 112:2  <b>purport</b> 133:8  <b>purpose</b> 118:17  150:21  <b>purposes</b> 14:2  56:1 101:13  225:20 243:18  <b>pursue</b> 145:18  <b>push</b> 184:14  191:21  <b>pushing</b> 246:5  <b>put</b> 13:16 19:22  19:23 27:23  34:25 35:2  44:6 50:10</p>	<p>67:13,23 70:4  76:1 78:23  82:10 90:10  123:17 126:21  141:21 143:18  157:21 165:23  166:20 167:5  179:9 211:20  216:6 218:1  <b>puts</b> 40:19  93:22  <b>putting</b> 20:10  83:3 203:19</p> <hr/> <p style="text-align: center;"><b>q</b></p> <hr/> <p><b>qc</b> 23:12  <b>quadrant</b> 182:4  <b>quagmire</b>  20:19  <b>quality</b> 44:16  45:3 94:18  105:3,4,8,9,10  105:13,14,17  105:18,21  106:2 209:10  209:11  <b>quantify</b>  127:11  <b>quantities</b>  228:22 229:3,9  <b>quantity</b>  217:23  <b>question</b> 10:12  29:1 40:2  59:19 65:11  73:13 74:5,19</p>	<p>80:13 83:19,23  84:6 85:4,23  87:16 91:24  95:7 96:15  99:23 103:17  106:21 119:12  119:16 120:20  129:4 130:1  135:25 137:5  141:9 142:7  143:21,24  150:7 152:19  171:21 197:15  199:15 202:19  203:5 206:1  207:24 209:2,5  212:1 219:19  225:20,23  227:7 232:22  239:20  <b>questioned</b>  10:5 192:21  <b>questions</b> 7:2,6  12:10,14 31:17  31:20 32:16  49:9 56:7 64:3  64:11 81:16  83:24 84:3  88:1 91:3  93:18 107:23  108:1 112:9,10  112:17 120:17  121:6 136:15  183:14 194:23  201:23 202:2,7</p>
--	--	--	--

[questions - recall]

<p>202:14 204:4                  228:17 230:12                  230:16 232:16                  233:14 238:5                  240:22  <b>quicker</b> 143:23  <b>quickly</b> 135:21                  173:2 184:2  <b>quite</b> 23:19                  165:11 244:20                  245:6  <b>quizzed</b> 212:14  <b>quote</b> 86:7                  108:11 151:1                  246:12</p>	<p>26:12 27:4,25                  29:2 30:21                  31:2,3,14,23                  32:5,17 33:7,8                  33:20 34:1,10                  34:22 48:1,6                  48:21 49:11,12                  59:3,9,12,21                  62:25 63:8                  64:2,15 65:16                  70:23 72:22                  73:4 80:8,10                  80:14 81:11,16                  84:3 86:19                  91:19 92:1,5                  93:24 96:2                  121:13,19                  122:12 123:6                  123:10,11,13                  147:23 155:1                  204:23 205:3,9                  209:18 211:22                  228:12,14                  240:18,21                  241:14,25                  242:5,10 244:1                  245:7  <b>rankin's</b> 88:1  <b>rate</b> 139:11                  141:23 220:1,1  <b>rated</b> 78:11  <b>rather</b> 233:8  <b>ratio</b> 15:6                  218:7</p>	<p><b>rationale</b> 9:6  <b>rays</b> 70:8  <b>reach</b> 103:12                  127:17  <b>reached</b> 165:11  <b>read</b> 35:12                  39:14 52:4,7                  52:14 53:4,19                  63:9,21 92:14                  118:1 206:17  <b>readable</b>                  177:22  <b>reading</b> 73:23                  173:8 175:1,6                  176:3 185:15                  204:18  <b>readings</b> 207:7  <b>ready</b> 241:18                  241:19  <b>real</b> 125:21                  163:3 167:11                  183:15 218:22                  227:7 239:15  <b>realistic</b> 90:23  <b>reality</b> 139:15                  140:8 145:21                  166:18  <b>realize</b> 175:4  <b>reallocate</b>                  219:20  <b>really</b> 7:16                  21:21 35:16                  39:14 54:10                  97:24 106:5                  119:15 125:6</p>	<p>128:22,24                  134:9 136:8                  142:5 150:19                  150:20 151:19                  153:6,11                  156:14 160:21                  169:5 172:6,10                  185:4,17 193:7                  195:2 203:24                  211:8,11 214:2                  214:2 216:8                  220:10 224:22                  225:10,10  <b>reason</b> 62:22                  84:4 140:16                  143:13 150:10                  193:18 230:21                  230:24 231:1  <b>reasonable</b>                  58:13 84:16                  101:13,24                  153:5 156:8                  203:7 235:7  <b>reasons</b> 154:6  <b>reassuring</b>                  178:1  <b>rebut</b> 34:16  <b>rebuttal</b> 53:22                  56:3 74:12                  169:21 212:13  <b>recall</b> 7:4 10:6                  12:13 35:7                  39:22 40:10,12                  40:16 44:3                  45:11,12,14</p>
<b>r</b>			
<p><b>r</b> 2:1 3:1  <b>rack</b> 162:4  <b>radially</b> 208:6  <b>railroad</b> 141:4  <b>raise</b> 123:18                  145:18  <b>raised</b> 7:2                  242:21,21  <b>ran</b> 126:10                  127:7 169:20                  170:7  <b>range</b> 178:3,4                  211:14 235:19  <b>ranged</b> 178:22  <b>rank</b> 63:4                  196:22 198:10  <b>rankin</b> 2:19 4:6                  4:12 6:2,13,20                  10:17,18,19</p>			

[recall - relationship]

<p>51:3,7,12 56:5  56:11 57:3,25  58:4,7 60:7  61:4 88:4  132:1 146:13  190:9,10,13,15  190:17 228:15  228:18 230:12  230:15,18  232:8,15,19  233:6,10,22,25  234:10,11,14  234:16 235:18  235:20 236:12  236:15,19,22  237:5,12,13  238:8  <b>receipts</b> 195:12  <b>receive</b> 176:18  176:20 237:15  <b>received</b> 48:15  77:5 167:11  176:21,22  <b>receiving</b>  167:16  <b>recently</b> 53:2  181:10 201:12  211:12  <b>recess</b> 30:25  102:12 123:1  183:21  <b>recognize</b>  214:8  <b>recollected</b>  39:21</p>	<p><b>recollection</b>  73:2  <b>recommence</b>  103:3  <b>record</b> 5:1 14:2  14:9 32:24  46:7 48:5,11  49:1,3 52:4  56:1 59:15,17  63:3 64:5  73:10,22 74:1  102:11,24  241:24 242:7,8  245:5 246:15  <b>records</b> 16:2  110:16 235:22  <b>recoverable</b>  130:7  <b>recovered</b>  89:25 127:13  137:15,20  140:12  <b>recovering</b>  137:19  <b>recovery</b> 90:2  124:24 125:6,9  128:14 138:11  138:17,22  144:16 147:18  150:15 153:15  157:4 183:8  200:13 202:22  222:10 233:24  234:3,9 236:5</p>	<p><b>recross</b> 4:6,7  30:3 31:16,24  64:4,6 65:1  91:20 197:2  <b>recycle</b> 193:7  <b>red</b> 16:24 17:19  39:10,12 42:14  136:2  <b>redirect</b> 4:6,12  6:9,19 28:17  29:24 32:8  64:18,20 86:20  91:22 92:7  94:6 197:2  215:3 220:21  228:10,13  243:16  <b>redirects</b> 245:6  <b>reduce</b> 56:25  90:2,11  <b>reduced</b> 127:20  128:11  <b>reducing</b> 89:18  218:6  <b>reduction</b>  137:1 191:6  <b>refer</b> 18:15  <b>reference</b> 20:10  51:9 116:3,6  <b>referencing</b>  24:20  <b>referred</b> 45:13  <b>referring</b> 14:12  55:7,13 62:21  221:6 237:20</p>	<p><b>reflect</b> 37:21  <b>reflected</b> 42:25  68:5 69:11  189:2 245:5  <b>reflecting</b>  236:7  <b>regard</b> 179:23  202:19 203:6  <b>regarding</b>  203:5  <b>regardless</b>  203:14  <b>regionally</b>  221:18  <b>regulatory</b>  196:1 197:20  197:25  <b>rehash</b> 125:20  <b>relate</b> 11:15  16:4 36:21  38:15,20 41:13  43:10,22 50:22  53:13 98:17  206:14 212:6  <b>related</b> 58:16  222:18 247:13  <b>relates</b> 19:9  22:24 91:21  94:5 96:8  <b>relating</b> 140:1  239:22  <b>relation</b> 70:25  185:12  <b>relationship</b>  182:10</p>
---	--	---	---

[relative - respect]

<p><b>relative</b> 148:16 172:9 217:3</p> <p><b>relatively</b> 16:6 43:16 50:1 115:7 139:25 148:25 203:18</p> <p><b>relativeness</b> 165:24</p> <p><b>relevant</b> 29:7 58:23 244:23</p> <p><b>reliability</b> 134:5</p> <p><b>reliable</b> 222:11</p> <p><b>relied</b> 29:10,11 51:8 57:5 113:3 145:13</p> <p><b>relies</b> 96:14</p> <p><b>rely</b> 57:9,21 99:6</p> <p><b>relying</b> 238:16 238:17</p> <p><b>remainder</b> 126:17</p> <p><b>remaining</b> 103:1 122:23</p> <p><b>remains</b> 103:14</p> <p><b>remember</b> 33:3 65:7,11 67:21 72:1,5 73:18 73:19 74:21,24 88:1,7 92:20 93:3,5 107:10 125:3 133:10 139:2 146:6 159:23 163:21</p>	<p>177:9 183:3 191:1 194:11 199:15,22 200:5,8 221:9 231:22 237:13 245:14</p> <p><b>remembered</b> 44:21</p> <p><b>remind</b> 6:11 199:23 209:21</p> <p><b>reminded</b> 146:11</p> <p><b>remote</b> 131:12 138:7</p> <p><b>remotely</b> 124:8</p> <p><b>remove</b> 143:16 226:25 227:5 227:14,17 239:23 240:1 240:15</p> <p><b>removing</b> 227:3 240:13</p> <p><b>render</b> 90:20</p> <p><b>renegotiating</b> 235:13</p> <p><b>renew</b> 34:19</p> <p><b>repeat</b> 40:2 72:9,13 83:23 95:7 117:6 119:16 215:2 221:5</p> <p><b>rephrase</b> 73:13</p> <p><b>reply</b> 26:25 27:8</p>	<p><b>report</b> 12:17,22 13:5,11 14:16 33:22 39:21 40:9,23,24 41:1,8,10,14,15 42:3 51:8,21 51:22,25 53:25 74:13,21 76:16 173:8 184:17 184:23 236:25 247:7</p> <p><b>reported</b> 92:24</p> <p><b>reporting</b> 160:10,11 161:6</p> <p><b>reports</b> 38:10 38:12 39:15 42:18 74:12 169:21</p> <p><b>represent</b> 16:11</p> <p><b>representative</b> 78:25 233:11</p> <p><b>represented</b> 47:9</p> <p><b>represents</b> 119:13,19</p> <p><b>reputation</b> 181:17</p> <p><b>request</b> 34:19 122:9</p> <p><b>require</b> 71:21 106:12 184:9 184:11,12 196:22 236:2</p>	<p><b>required</b> 104:9 127:18 142:25 172:13 211:20 233:4</p> <p><b>requires</b> 236:4</p> <p><b>rerun</b> 169:24 212:25</p> <p><b>research</b> 116:21</p> <p><b>reserve</b> 49:8 130:8 161:6</p> <p><b>reserves</b> 160:11</p> <p><b>reservoir</b> 25:8 25:13,13 30:19 44:2,16 45:4 46:22 84:12 134:17,17 216:10 217:22 217:24 220:23 221:14,20</p> <p><b>reservoirs</b> 68:11 76:12 87:9,10</p> <p><b>residual</b> 21:3 21:17 93:6,8 93:10,11,13 216:23 217:6 226:20</p> <p><b>residue</b> 15:25</p> <p><b>resource</b> 198:17</p> <p><b>resources</b> 3:3</p> <p><b>respect</b> 13:6 27:21 65:19 67:8 68:4</p>
---	---	--	--

[respect - right]

70:22 71:8 86:11 88:6 94:22 97:18 99:8 125:24 133:13,24 134:22 135:2,4 137:5,23 148:7 154:24 158:14 160:4 168:5 232:13 <b>respects</b> 79:8 <b>respond</b> 26:13 33:20 59:10 64:7 86:22 <b>responded</b> 240:2 <b>response</b> 24:11 26:18 182:23 <b>responses</b> 74:18 <b>rest</b> 33:5 242:23,24 243:23 <b>restricted</b> 11:8 <b>restriction</b> 15:8 <b>restroom</b> 241:17 <b>result</b> 147:21 148:9 <b>resulted</b> 7:19 8:8 <b>results</b> 19:4 99:1 100:14 213:19	<b>resume</b> 121:20 122:7 <b>retread</b> 96:6 <b>return</b> 201:14 <b>returning</b> 202:18 <b>returns</b> 43:12 44:24 <b>revenue</b> 129:8 129:19,25 130:2,5 191:19 <b>reverse</b> 17:7 65:5 <b>review</b> 10:8,20 12:17 13:4 35:23 113:5 115:21 204:17 214:11 217:3 231:8 <b>reviewed</b> 8:2 22:2,25 23:25 29:11 38:10,11 38:21 39:15,18 41:1 47:2 62:17 68:5 94:21 110:16 204:16 205:22 206:7 233:16 233:18 <b>reviewing</b> 25:1 41:15 51:16 101:17 111:4 115:15 <b>revise</b> 152:5	<b>revised</b> 8:23 47:1 <b>revisions</b> 7:6 <b>revoke</b> 224:25 <b>rft</b> 49:17 173:18 184:21 186:3,7,20 187:1 188:14 220:17 <b>rice</b> 3:8 6:6 30:9 32:14 107:25 174:19 174:24 175:4 176:2,3 184:16 185:7 187:14 187:16,19 188:16 190:21 220:25 221:3,8 221:11 241:4 <b>right</b> 5:23 7:22 13:2 14:4,7,11 14:20 15:16,19 17:15 20:4,24 20:25 23:2 28:24 37:13 40:1 41:22 42:1,14 44:9 44:11,25 53:5 65:14 70:18 71:2 73:24 76:2 77:4 78:7 79:20 83:1,3 84:15,21 85:16 88:20 89:12 90:15 91:17	92:8 93:21 94:13,20,23 95:10,18,25 99:11 100:2 103:13 104:17 105:23 106:1 106:12,18 108:8,19 109:10,17,20 109:25 110:4 110:13,18,20 110:20,24 111:24 112:2,3 122:11,24 123:18 124:15 126:4,15 128:19 130:10 131:9,10,20,25 135:6 144:5,19 145:9 146:10 146:21 148:5 148:21 149:7 149:21,25 151:2 152:4,6 152:15,24 155:15 156:16 157:17,18 158:7,11,13 159:20 160:13 160:20 162:14 164:8 165:25 166:3,9,25 167:25 169:6 169:13 170:16 170:22 171:20
--	--	--	---



[right - san]

<p>172:25 174:8  175:22 179:10  179:13 183:19  184:3,9 185:16  187:8 189:3  191:16,17  192:16,20  193:1,11  194:15,18,22  195:6,9,17  196:13,17  197:8,22  198:25 199:2  200:10,11,14  200:19 201:3  201:10,14,18  201:21 205:18  206:15 208:24  213:13 216:16  226:1,2 229:23  230:2 232:2,2  235:2 236:9  237:18 240:10  241:11  <b>rights</b> 29:6  196:4  <b>rigorous</b>  133:21 212:3  <b>rip</b> 183:4  <b>ripley</b> 1:15  <b>rock</b> 23:9 46:5  56:9 69:3,5,7  93:1 94:23  95:4,5,9,13,17  96:8,21 105:3</p>	<p>105:5,8,9,10,13  105:14,17,18  105:21 106:3  <b>room</b> 131:14  <b>rough</b> 104:25  153:3 181:6,7  <b>roughly</b> 124:12  <b>round</b> 125:20  <b>route</b> 122:4  <b>row</b> 171:3  <b>royalties</b>  167:16 168:1  195:20 237:16  238:2  <b>royalty</b> 147:12  167:8,10,15,21  237:7,12,21  <b>roz</b> 9:8 21:4,5  88:11,12,16,17  140:19 168:10  168:11 200:8  200:13 201:18  203:19 210:19  210:22 211:20  213:25 223:17  225:17,25  226:5,14  227:24 239:6  239:12,12  <b>rozatos</b> 1:18  5:3,4 102:16  121:5,7 122:20  123:11 202:7,9  242:3,4 246:2</p>	<p><b>rozs</b> 140:21  <b>rudimentary</b>  66:20  <b>rule</b> 211:18  <b>rules</b> 203:2  <b>ruling</b> 32:6,6  33:17 49:8  <b>run</b> 128:9  169:5,13  187:21 211:11  216:11 233:2  <b>running</b> 129:20  207:21  <b>runs</b> 127:19  128:10,18  129:2 161:12  161:23 213:20  <b>rushed</b> 147:21  <b>ryan</b> 77:24  <b>ryno</b> 44:19  110:13</p> <hr/> <p style="text-align: center;"><b>s</b></p> <hr/> <p><b>s</b> 1:6 2:1,5 3:1  142:7 158:8  <b>saint</b> 1:6  <b>sale</b> 201:19  <b>salinity</b> 118:16  <b>saltwater</b> 37:5  60:9,17 61:20  65:9,10 69:12  144:14,15  145:2,6 147:22  148:10 155:15  155:19 180:23  180:24 200:19</p>	<p>200:23 208:12  <b>san</b> 2:14,14  11:6,10,14,17  11:18,19,20,21  11:22,23 19:23  20:1,11 24:7  30:17 37:15  38:19 39:11,13  40:1,5 42:16  42:16 43:17,19  44:17 45:2,5,8  46:20,21 50:5  50:14 54:11,14  54:17,21 55:4  55:8,10,11,14  55:14,17,20,21  55:22,23,24,25  56:12 57:18  60:19 61:7  62:9,13,23  63:12,19,24  71:16 73:18  74:3 75:8  79:17 84:25  87:1 97:15  102:6 103:25  104:2 109:25  110:6,19,23  111:6,14  117:15,16,21  118:1,1 120:3  120:12 132:5,6  134:8 140:20  144:23 145:8  145:12,14</p>
--	--	--	---

[san - seat]

148:11 154:9 154:13 157:12 163:22 167:18 171:25 172:2 172:10 173:9 173:11,20,23 174:18 176:8 179:18 182:12 182:19 184:8 184:10 185:19 185:25 186:6,8 186:10 188:10 188:14 189:8 192:19 193:15 193:21 196:3,8 196:11 197:21 198:9 199:21 200:23 205:25 206:3,5,10,12 207:19 212:6,9 212:20 213:1 217:2 218:23 218:25 219:6 220:23 221:13 221:18 223:3,5 223:7,10,11,12 223:13,16,18 224:15 225:15 225:22 227:11 228:3 239:2 240:7,17 <b>sand</b> 87:1 132:6 <b>santa</b> 1:7 2:4,7 2:10,19 3:4,15	122:2 <b>santoyo</b> 2:12 <b>sat</b> 135:6,16 <b>satisfaction</b> 147:20 <b>satisfactory</b> 30:10 <b>satisfied</b> 142:12 <b>satisfy</b> 160:19 <b>saturation</b> 9:2 9:11,18,21 10:1 56:20,22 57:2 88:8,12 88:20 89:3,7,9 89:14,15 93:7 93:22 94:24 95:15 96:24 97:15 104:2,18 127:17 128:12 134:12 136:12 137:9,18 157:13 203:14 212:1,11,15,20 213:2 216:24 217:6,13 238:8 238:11,16 239:9 <b>saturation</b> 9:20 56:8,18 91:6,8,17 92:19,24 93:1 93:11,14 95:5 95:6,10 98:23 103:19 104:8 104:15,22	105:13,14,20 136:20 170:15 212:9 214:14 <b>saved</b> 229:10 <b>saw</b> 93:20 95:11 129:13 241:9 <b>saying</b> 28:1 32:9 33:18 41:8 76:1 77:3 92:22 104:24 109:3 113:12 116:18 128:8 133:10 137:19 162:10 164:14 169:24 170:2,4 181:6 186:17 191:10 196:7 205:23 206:2,7 206:9 207:25 209:3 217:12 222:6 223:9 224:6 228:5 245:15 <b>says</b> 41:10 53:17 63:18 100:25 120:4 141:11 142:10 164:9 165:16 168:22 175:12 <b>scale</b> 139:11 152:24 <b>scales</b> 119:8 148:20	<b>scenario</b> 116:9 197:18 225:15 <b>schedule</b> 5:19 <b>scheduled</b> 122:1 <b>scheduling</b> 5:16 122:22 242:21 <b>science</b> 27:24 34:15 152:13 154:5 158:16 <b>scientific</b> 85:7 <b>scope</b> 29:23 64:6,19 86:20 <b>scoping</b> 233:21 <b>scott</b> 100:21,22 100:25 101:10 101:21 104:7 104:23 <b>screen</b> 12:20 28:2 33:25 35:1 204:24 240:19 <b>screening</b> 210:1,10,20 <b>scroll</b> 14:23 16:12 52:3,10 55:8 62:20 <b>sea</b> 185:2 <b>searches</b> 133:15 <b>searching</b> 217:1 <b>seat</b> 35:3 72:3
--	--	---	--

[sec - separate]

<p><b>sec</b> 160:11,13 160:15 161:6</p> <p><b>second</b> 44:10 54:20 72:25 110:12 171:2 172:15 226:15</p> <p><b>secondly</b> 58:23</p> <p><b>section</b> 18:2 21:22 22:5,19 36:16,20,22,23 37:8,13 38:16 39:4 40:4 41:25 44:12 47:12,18 50:20 70:6,7 84:14 115:16 117:17 119:15,23,23 120:6,7,10 145:25 146:16 152:11,11,12 152:15,17 157:23,23 158:5,5,10,10 159:2 168:17 236:22</p> <p><b>sections</b> 13:20 70:12 154:10 154:11 157:8 158:17,24 159:5</p> <p><b>secure</b> 143:4</p> <p><b>securing</b> 142:20 143:10 144:1</p>	<p><b>see</b> 12:5 13:18 13:24 17:13,16 17:22 19:4,6 19:11,14 20:23 20:25 21:19 23:18 32:24 34:18 35:1,2 36:25 42:17 43:3,21,23 54:7 67:14 73:12 76:25 78:19 79:1,17 81:17,20 82:3 84:16 85:23 93:13 94:5 96:21,23 97:16 98:18 102:6 103:10 105:4,6 105:7 106:2,5 106:7,8,8 111:5 113:16 123:3,5 136:4 138:11 140:7 142:5 143:18 146:22 150:9 164:22,25 165:8 168:3,18 168:20 169:5,9 169:13 173:6 177:25 178:23 178:24 180:10 184:22,25 185:17 221:22 222:20,22 227:23 237:25</p>	<p>240:19 241:12</p> <p><b>seeing</b> 19:9 21:10 22:23 33:25 39:7 41:7 76:18,19 84:14 93:3 98:3 112:25 117:14 134:3 136:1 143:3,25 217:20 222:19 236:15</p> <p><b>seek</b> 61:19</p> <p><b>seem</b> 115:16 179:17</p> <p><b>seems</b> 31:6 54:18 84:23 104:5,14 107:19 108:4 181:21</p> <p><b>seen</b> 30:5 35:9 66:4 68:24 71:14 75:20 76:24 77:16 79:21 148:17 156:9 199:4 200:5 210:19 217:17,25 226:9 235:10 235:21 236:6 237:3 245:21</p> <p><b>seepage</b> 41:11 41:16</p> <p><b>select</b> 193:10</p> <p><b>selected</b> 164:3</p>	<p><b>selecting</b> 154:3</p> <p><b>selection</b> 131:18</p> <p><b>self</b> 205:17 222:3</p> <p><b>sell</b> 167:24 168:1 201:17 201:20</p> <p><b>selling</b> 167:25</p> <p><b>seminole</b> 92:20 93:3 95:3 140:20</p> <p><b>sense</b> 80:16 153:3 159:14 161:18 170:2 172:14 226:19</p> <p><b>sensitivities</b> 58:2 59:13 166:21 168:2 170:5</p> <p><b>sensitivity</b> 57:25 58:24 59:4 90:7 126:10 166:22 168:14</p> <p><b>sent</b> 135:21</p> <p><b>sentence</b> 52:7 52:12,16,19 53:1,16,16 63:10,18 205:20</p> <p><b>separate</b> 16:16 23:8 25:13 30:18 126:24</p>
---	--	---	--

[separated - significantly]

<p><b>separated</b> 11:21 25:21 <b>separates</b> 72:20 <b>separation</b> 223:15 224:7 <b>sequence</b> 193:23 <b>sequentially</b> 153:1,2 192:25 <b>sequestration</b> 191:23 <b>series</b> 230:15 <b>serious</b> 80:16 <b>seriously</b> 235:13 <b>serves</b> 6:9 <b>service</b> 3:8 190:22 191:19 198:24 <b>session</b> 194:24 228:16 230:13 <b>set</b> 49:17 101:6 103:4 127:20 168:23 241:24 247:8 <b>setting</b> 161:5,5 <b>settled</b> 243:19 <b>settlement</b> 199:11 <b>seven</b> 181:11 <b>several</b> 93:25 <b>severance</b> 195:20 <b>sewell</b> 72:2,19 73:21 74:2</p>	<p>85:24 160:19 <b>sewell's</b> 88:18 <b>shade</b> 82:13,20 <b>shaded</b> 81:19 82:11 <b>shaheen</b> 2:8 <b>shallow</b> 179:17 <b>shandler</b> 1:22 121:9 <b>shanor</b> 2:3 <b>share</b> 12:20 58:25 143:11 152:2 194:6 205:13 <b>shareholders</b> 201:14 <b>sharing</b> 240:19 244:3 <b>sharon</b> 2:8 <b>sharpened</b> 150:14 <b>sheep</b> 235:11 <b>shifted</b> 216:8 <b>short</b> 90:24 148:25 207:21 <b>shortcut</b> 170:6 <b>shorthand</b> 247:8 <b>show</b> 20:20 21:7 26:23 36:15 70:13,14 70:23 105:22 119:14,22 126:9,9 148:17 156:11 166:23</p>	<p>177:13 188:10 205:4 207:17 221:17,19 229:7 <b>showed</b> 76:14 80:8 81:11 106:23 110:10 112:21 113:23 117:11 139:1,8 162:9 172:18 177:11 214:4 214:21 215:1,3 221:2,6 234:11 237:11 <b>showing</b> 28:2 38:17,18 47:18 136:6 <b>shown</b> 82:7 113:6 115:20 139:7 164:11 177:9,14 209:19 210:8 214:22 239:14 <b>shows</b> 13:6 15:18 20:21 21:8 36:16,23 38:22 70:7 83:7 120:11 171:6 182:22 203:10 219:25 223:14 <b>shr</b> 15:24 21:1 21:2,16 <b>shut</b> 127:21 199:18</p>	<p><b>shy</b> 220:6 <b>side</b> 14:15 17:15 20:24 21:1 30:19 53:17 59:23 60:4 70:6 97:13 106:9 123:16 129:9 129:10,14,16 129:19 149:3 157:24 243:6 <b>sided</b> 207:20 <b>sides</b> 54:8 245:17 <b>signature</b> 247:16 <b>significance</b> 16:3 <b>significant</b> 13:22 16:13,20 18:22 19:4,7 19:16 21:20 23:7 39:2 42:8 50:17,18 108:22,25 111:16,17 114:19 203:12 203:16 225:14 245:20 <b>significantly</b> 15:5 42:2 93:12 106:15 107:3 109:22 111:6,12 172:12</p>
---	--	--	---

[similar - spend]

<p><b>similar</b> 44:14 44:16 46:20 85:1 213:8 <b>simple</b> 25:11 141:9 171:23 <b>simplify</b> 126:17 <b>simply</b> 26:21 28:17 128:21 <b>simulation</b> 76:19 181:2,12 181:19 182:25 216:12 <b>simulator</b> 181:7 <b>single</b> 10:12 19:18 25:13 49:22 71:7 73:6 115:6 131:15 178:11 215:22 221:10 <b>sir</b> 115:24 152:18 154:2 155:8 202:4 208:19 218:14 219:15 228:7 <b>sit</b> 36:11 76:20 85:14 137:11 153:6 195:23 <b>sitting</b> 35:13 72:15 73:21 194:2,15 <b>situation</b> 45:6 132:4 169:25 <b>six</b> 12:25 33:21 181:11 243:4,7</p>	<p>243:12 <b>size</b> 182:8,12 182:18 <b>skeptical</b> 56:22 <b>skip</b> 53:15 168:12 <b>slept</b> 59:1 <b>slide</b> 47:17,22 48:3,8 51:4 53:21 56:2 67:13 96:19 110:22 162:10 168:11 173:3,5 189:3 207:21 209:19 211:23 211:25 219:12 220:15 234:11 234:14 <b>slides</b> 47:16 48:5 92:2 168:13 204:13 209:19 241:21 <b>slightly</b> 171:17 213:16 <b>slim</b> 222:16 <b>sloppy</b> 190:7 <b>small</b> 57:1 114:19 139:25 198:6 242:10 <b>smaller</b> 140:5 145:24 152:24 153:5 158:6 <b>smooth</b> 142:14 <b>solid</b> 15:24 21:2,17</p>	<p><b>solidify</b> 221:21 <b>solution</b> 215:23 <b>solutions</b> 3:13 202:1 215:24 247:17 <b>solve</b> 32:10 217:19 <b>somebody</b> 11:23 27:3,23 134:25 141:10 <b>somewhat</b> 46:22 110:3 <b>sorry</b> 87:15 88:25 152:7,18 158:8 165:14 173:10 178:10 190:6 232:6 <b>sort</b> 14:2 111:1 131:8 132:14 143:15 150:17 166:19 211:7 215:18 <b>sorted</b> 96:20 <b>sorts</b> 99:17 <b>sought</b> 62:22 <b>sound</b> 123:12 <b>source</b> 38:9 54:18 61:23,25 62:14 63:15 <b>sourced</b> 235:11 <b>sources</b> 118:21 <b>south</b> 3:4 36:17 107:3,6 150:13 <b>southeast</b> 36:18 47:23 52:12,17</p>	<p>53:2 66:10,11 66:14 67:5 182:4 <b>southwest</b> 52:5 52:12,14 <b>space</b> 191:22 198:9 199:5,6 <b>spacing</b> 145:25 146:16 235:18 235:19,23 236:3,8 <b>speak</b> 28:25 75:25 90:3 126:22 <b>speaking</b> 90:6 92:19 182:7 <b>specific</b> 84:17 205:12,14 <b>specifically</b> 39:20 67:21 75:14 85:8 86:10 118:9,10 <b>spectral</b> 70:8 106:24 <b>spectrum</b> 92:16 92:17 <b>speculation</b> 62:24 63:2,5 196:22 198:11 <b>spencer</b> 2:6 <b>spencerfane.c...</b> 2:8 <b>spend</b> 18:14 192:24 227:13</p>
--	--	--	--

[spent - stretch]

<p><b>spent</b> 59:5 73:15 74:10 211:9 <b>spoke</b> 33:4 154:6 <b>spontaneous</b> 66:21 <b>sporadically</b> 215:17 216:9 <b>spot</b> 146:21 154:6 193:18 198:6 202:23 <b>spots</b> 154:18,20 193:19 <b>spraberry</b> 162:3 <b>spread</b> 220:11 <b>spreadsheet</b> 153:23 193:25 210:24 233:20 <b>square</b> 124:12 125:2 <b>ssau</b> 203:18 <b>sshaheen</b> 2:8 <b>st</b> 2:18 3:4 <b>stacked</b> 148:18 <b>staged</b> 154:1 <b>stand</b> 6:25 159:25 221:3 <b>standard</b> 82:13 <b>standards</b> 133:21 <b>standing</b> 72:7 72:10</p>	<p><b>standpoint</b> 143:15 224:1 226:12 <b>stands</b> 228:21 <b>start</b> 5:10,18,20 5:24 14:22,25 18:19 21:13 24:24 49:6 65:5 78:2 88:12,16,17 97:23 122:8 125:1 130:17 145:24 152:24 153:22 154:3 162:18 168:15 193:11,14 198:6 202:6 204:17 228:3 242:14,14,18 243:21 246:9 <b>started</b> 5:15 24:6 129:12 135:25 160:6 165:25 244:14 <b>starting</b> 24:9 51:24 125:17 144:22 190:7 191:5 193:20 194:4 196:3 211:13 <b>starts</b> 22:5 78:1 88:11 94:24 166:8 239:13 <b>startup</b> 153:10</p>	<p><b>starved</b> 217:5 218:6 <b>starving</b> 216:25 <b>state</b> 1:2 114:6 116:25 146:8 167:6,9,15,23 171:11 172:3 202:24 225:3 237:10 <b>stated</b> 29:10 39:24 40:3,12 136:18 236:18 <b>statement</b> 41:13 43:11 119:25 132:9 134:10 205:17 212:14 219:25 222:3,4 <b>statements</b> 74:11 149:11 245:2 <b>states</b> 201:6,10 <b>static</b> 188:4 221:25 <b>stating</b> 62:13 233:10 <b>stations</b> 185:5 <b>statutory</b> 61:11 <b>stay</b> 143:1 235:7 <b>ste</b> 2:14,18 <b>stenographic</b> 247:8 <b>step</b> 213:6</p>	<p><b>stepping</b> 138:6 <b>steps</b> 175:9 176:22,25 <b>steve</b> 182:10 <b>stochastic</b> 215:24 <b>stop</b> 125:7 193:16 198:8 199:6 240:19 <b>stopped</b> 128:13 196:9,12,12 <b>stops</b> 128:1 <b>straight</b> 131:3 211:19 <b>strain</b> 167:8 <b>strata</b> 108:19 109:8,8 111:22 119:13,19 <b>strategy</b> 216:18 218:17 <b>stratigraphic</b> 11:9 23:14 78:12 80:1 84:10 114:20 115:8 <b>streaks</b> 18:1 41:17 50:22 111:8 <b>street</b> 149:15 149:18 151:2 247:18 <b>strenuously</b> 29:3 34:16 <b>stretch</b> 219:5</p>
---	--	--	--

[stricken - surprising]

<p><b>stricken</b> 26:10  <b>strike</b> 25:24  232:7  <b>striking</b> 32:18  32:19  <b>stringer</b> 79:23  <b>strong</b> 19:20  25:1 46:3  115:9 117:21  150:15 169:23  <b>structurally</b>  52:22  <b>structure</b> 39:9  54:22 111:14  186:22 187:1  224:20  <b>struggle</b> 150:8  <b>studies</b> 68:18  69:17,21,22  76:14 78:3  98:22 133:16  137:23 138:2  149:10 221:17  <b>study</b> 10:5,9,21  10:25 12:24  13:1,6 51:25  60:13 69:24  78:5 99:8  234:18 236:25  <b>stuff</b> 30:15  31:19,21 32:11  95:25 97:22  141:3 142:2  149:14 164:25</p>	<p><b>suazo</b> 3:15 6:7  112:10 202:1,2  241:7  <b>sub</b> 58:15  99:22  <b>subject</b> 33:16  224:22 225:13  244:8  <b>submitted</b> 7:7  <b>subsea</b> 12:12  12:13 13:17  14:19 19:11  20:2 46:10,11  174:8 200:9  <b>subsequent</b>  137:2  <b>substantial</b>  40:15 43:6  44:4 49:16  50:11 237:10  <b>substantiate</b>  73:9 236:11  <b>substantiates</b>  63:23  <b>substantiating</b>  236:16  <b>subtract</b> 60:5  <b>success</b> 194:16  <b>successful</b>  143:10 144:1  151:8,14 201:2  211:3 237:18  <b>sudden</b> 240:12  <b>sufficient</b> 26:9  27:17 233:17</p>	<p><b>suggesting</b>  103:4 111:15  137:1  <b>suggestions</b>  199:9  <b>suggests</b> 133:20  163:4  <b>suite</b> 247:18  <b>summaries</b>  207:23  <b>summary</b> 47:17  48:3,23,25  53:21 56:2  70:16 180:19  207:21 213:14  <b>summations</b>  136:17  <b>sums</b> 180:22  <b>sunk</b> 211:7  <b>supplied</b> 59:3  <b>suppliers</b> 151:5  <b>supply</b> 22:8  23:17 24:14,15  25:6,12 62:14  85:21 118:2,7  118:18 132:11  187:23 207:9  221:1 224:4,4  226:10  <b>support</b> 33:15  47:2 50:1  117:8 119:18  223:12  <b>supported</b>  119:24,24,25</p>	<p>169:18  <b>supports</b> 24:21  46:16 76:10  77:1 113:1  <b>suppose</b> 134:25  135:18  <b>supposed</b>  223:21  <b>sure</b> 23:19 38:9  48:8 50:6  59:17 64:5  78:5 84:17  86:23 91:4  92:13 97:4  106:21 108:16  113:8 121:13  121:21 126:25  136:16 139:14  144:11 148:14  153:7 163:24  167:4 177:7  181:5 183:13  185:20 189:1  195:2 199:24  227:6 241:18  241:18  <b>surely</b> 170:6  <b>surface</b> 187:4  <b>surprise</b> 98:9  98:11  <b>surprised</b>  206:16  <b>surprising</b>  222:22</p>
---	---	--	--

[surrebuttal - tear]

<p><b>surrebuttal</b> 74:13 100:22 <b>surround</b> 132:9 <b>surrounding</b> 153:16 <b>survey</b> 184:23 185:5 187:20 <b>suspect</b> 101:2 101:12 141:18 154:15 <b>suspicious</b> 97:21 104:8,12 104:21 105:20 <b>sustain</b> 31:8 50:4 197:11,12 198:3 <b>sustaining</b> 32:7 <b>swd</b> 3:13 110:13 157:18 157:19,21 158:3 <b>swds</b> 60:9 156:7 <b>swenergylaw...</b> 2:15 <b>sworn</b> 6:17 26:3 48:15 72:7,8,10,11 83:15 94:20 124:2 <b>system</b> 17:4 61:25 71:18 79:24 227:9 <b>systems</b> 71:16</p>	<p style="text-align: center;"><b>t</b></p> <p><b>t</b> 2:8 <b>table</b> 14:3 26:21 <b>tags</b> 129:21 <b>take</b> 30:22 39:6 91:13 100:21 104:7,20,24 112:22 122:3 123:19 131:1 142:12 146:13 149:5 156:24 159:6 170:7 175:6 183:20 201:21 212:7 214:9 224:2 242:11 245:25 246:13 <b>takeaway</b> 39:4 39:8 <b>taken</b> 89:13 185:8,15 186:3 186:11 247:5 <b>takes</b> 195:16 <b>talk</b> 11:13 55:7 55:14 57:24 65:20 67:9 68:12 69:10 70:2 76:4 80:3 81:4 84:18 95:1 100:7,16 105:4 127:3 136:10 139:13 141:2 149:3,16 149:18 150:23</p>	<p>152:10 154:18 154:23 158:22 159:15 162:9 171:10 173:1 179:7 180:20 184:20 206:18 207:12 209:22 241:17 242:20 <b>talked</b> 43:5 67:24 69:1 71:4 77:9 79:3 79:14 107:11 109:4,13 117:24 119:13 125:19 128:20 129:7 132:21 138:23 148:3 152:16 156:21 159:15,16 170:24 173:3 184:16,18 186:9 192:17 192:17 194:20 196:17 197:19 199:20 200:4 200:12,17 210:25 225:24 234:6 <b>talking</b> 11:24 14:9 18:12,16 53:6 55:15 61:1 73:15 79:20,23 82:11 82:19 83:1 91:14 107:1</p>	<p>124:11,13 128:5 129:9 130:17,20 134:15 137:16 139:4 144:21 144:24 150:18 152:20 153:4 154:13,20 156:22 160:2 161:7 184:7 185:12 200:2 206:4 214:25 227:3,4 246:4 <b>talks</b> 119:6 <b>tall</b> 90:24 138:17,23 139:3,8 140:4 140:16 203:17 <b>tariff</b> 169:25 <b>tax</b> 126:6 142:24 144:4,8 191:1,4,6,13,15 191:16,18,21 192:1,14 195:12 <b>taxes</b> 195:8,21 196:17,21,23 197:15 238:2 <b>tds</b> 118:15 <b>teaching</b> 5:17 <b>teals</b> 105:10 <b>team</b> 214:17 <b>teams</b> 122:14 <b>tear</b> 183:4</p>
---	--	--	--



[technical - testimony]

<p><b>technical</b> 30:23 31:10 32:23 76:16 122:17 139:21 140:10 140:14 141:18 142:11 173:7 177:2 245:24</p> <p><b>technique</b> 84:13</p> <p><b>techniques</b> 84:12 114:18</p> <p><b>technology</b> 66:25</p> <p><b>tell</b> 22:23 35:3 37:11 58:10 59:5 70:24 75:1,13 76:20 85:10 121:17 134:6 144:3 145:1 146:23 157:5 171:4,14 171:18 179:14 180:11 185:6 192:14 193:22 194:3 195:24 212:16</p> <p><b>telling</b> 142:8 143:8 148:12 206:19</p> <p><b>tells</b> 99:3 142:5</p> <p><b>ten</b> 142:4 183:25 194:24</p> <p><b>tend</b> 10:16 17:20</p>	<p><b>term</b> 18:13,16 80:19 118:18 148:14 154:22 163:7,11 164:4 164:7 235:9</p> <p><b>terminate</b> 161:19</p> <p><b>terminology</b> 66:6</p> <p><b>terms</b> 45:18 63:3 69:2,17 69:24 71:15,19 78:12 83:25 86:6 90:3,6 91:6 92:16 94:12 105:8,12 122:19 124:16 125:3 128:21 131:7 132:4 133:16 135:15 136:18 138:18 140:8 142:19 143:8,24 145:15 146:17 146:18 147:17 148:16 153:10 159:13 161:4 161:17,22 163:10 165:23 167:7,25 169:4 170:5 173:4,9 173:10,13 174:12 178:18 181:2 188:12 234:18 237:7</p>	<p>243:2</p> <p><b>tertiary</b> 144:23 145:3 147:18 153:9 158:25 162:2 167:17 202:22</p> <p><b>test</b> 58:2 99:3 198:6 208:21 208:21 222:16</p> <p><b>tested</b> 208:23 208:24</p> <p><b>testified</b> 6:18 12:12 28:16 29:12,16 41:14 43:9 49:2,5 59:2,12 83:13 93:25 96:13 107:7 119:17 124:2 152:3 173:15 178:2 192:7 203:6 223:20 225:6 229:25</p> <p><b>testify</b> 28:9 48:24 71:24 72:4 73:5 93:4</p> <p><b>testifying</b> 72:15 73:7 107:10 122:14 147:23 159:23 227:25</p> <p><b>testimonies</b> 208:20</p> <p><b>testimony</b> 7:7 7:11 8:3,20,23 10:10 12:16</p>	<p>13:10 16:4 25:25 26:24 28:3,4 29:10 29:11,13 32:8 32:18 33:14,15 39:19,22 40:23 43:7 46:12,25 47:1,9,17 48:3 48:15,16,22,23 48:25 49:13,14 51:12 53:22 56:3,5 58:4,12 62:3,4,7 66:3,3 68:1,15 70:16 72:2,7,8,10,11 72:23 73:18 78:7 83:15 88:10 92:1 94:12,20 96:4 96:6,10,12,13 96:15 100:12 102:20 113:5 113:13 114:23 115:24 121:24 126:18 133:8 136:11 138:25 139:15 145:7 145:10 155:2,2 159:25 177:10 181:22 182:2 182:10 189:16 196:6,10 197:1 197:6 204:11 204:14,16 205:6,8,13</p>
--	--	--	--

[testimony - think]

206:17 208:19 209:9 210:9 217:21 220:22 221:13 225:8 228:18 230:18 231:18 235:22 236:16 237:4,5 238:13 240:11 245:3 <b>testing</b> 222:7 <b>texas</b> 2:14 140:22 182:5 182:18 194:21 194:22 230:2 <b>thank</b> 6:3,6,13 33:8 34:1 49:11 64:24 92:11 103:15 112:6,7,16 120:14,15 121:4,7 122:24 180:5 189:21 189:23 190:3,5 190:19 201:24 202:4,9,11,17 204:3,5 209:17 213:22 215:9 228:7,9,12 240:23 241:8 241:10 246:14 246:17 <b>thanks</b> 204:10 <b>their's</b> 234:22 <b>theoretically</b> 238:23	<b>thick</b> 111:12 203:18 <b>thicker</b> 39:1 43:15 111:9 <b>thickness</b> 168:4 <b>thin</b> 38:25 41:17 50:1 115:7,9 <b>thing</b> 5:14 9:24 16:23 17:15 20:25 39:3 44:12 45:25 48:9 50:21 74:11 78:1 81:16 83:13,16 83:18,25 85:11 85:16 103:2 104:14 114:5 129:19 131:9 154:20 216:22 226:15 238:12 246:9 <b>things</b> 10:16 13:24 15:22 16:25 19:20 85:2 97:23 108:23 121:14 133:25 135:10 160:3 161:3 169:20 183:4 193:4,6 203:1 207:4 218:7,9 238:2 244:15 244:23 245:1	<b>think</b> 13:20,24 14:5 15:14 16:9,17 20:14 21:6 22:17 24:8 25:1,3 29:23 30:12 38:22 39:14 42:8,15 43:18 44:18,22,24,25 45:6,22 46:3 50:15,21 51:16 51:24 54:23 55:12 56:17 64:9 67:22 68:2 70:16 74:15 77:9 78:10 80:14,15 85:8 91:2,25 92:2,15 95:11 98:25 101:8,8 101:15,19 102:14 103:23 107:5 108:14 109:12,15,20 110:19,19,22 111:11,22 113:23,25 114:5,12,14 116:12 117:20 117:25 118:20 119:2,10 120:1 120:3,10 124:9 124:13,15 125:10 126:24 128:5 129:2	130:11,16 131:22 132:21 133:10 134:9 136:2,7 137:4 139:6,7 141:8 142:22 143:6 144:11 146:1 146:11 147:5 149:8 150:7,15 151:3,4 154:5 156:8,10 157:16 158:2 159:8,11 161:16 166:14 167:20 168:1 169:22 171:2,2 172:5,11,14 173:15 177:14 178:1 183:15 189:11 191:11 192:9,23 193:9 195:14,23 196:4,14 197:9 197:10,24 198:1,2,20,23 200:10,11,17 200:20 201:1 203:23 208:13 208:13,14,15 211:18 213:17 214:5 216:20 217:8 219:4,16 220:5,9 221:22 223:25 224:16 224:19 225:4,6
---	---	--	---

[think - top]

225:7,23,24	132:10,11	202:6,11	159:25 167:21
226:6,8,13,17	150:10,11,12	207:22,22	167:25 169:23
226:17,21	162:5 203:24	219:17 221:5	172:20 190:4
227:20 229:25	204:2 231:4	226:11 228:8	191:10 194:2
230:10 234:4	234:7	230:22,23	194:15 195:23
235:12 237:11	<b>threshold</b>	237:22 241:9,9	195:25 214:22
239:1,17	90:13	242:5,20,25	215:1 219:3
240:10,16	<b>throw</b> 134:20	243:3,10,22,23	220:22 230:23
241:16,20	<b>throwing</b>	244:23 245:12	232:4 233:7
243:3 244:21	243:17	245:25 246:5,9	235:15 236:13
244:24 245:8	<b>thumb</b> 211:19	246:14	236:19 242:22
245:16,21	<b>thursday</b> 5:20	<b>times</b> 93:25	242:24 243:21
<b>thinking</b> 20:16	<b>tie</b> 152:8	139:7 142:3	246:15,15
102:23 135:14	<b>tight</b> 245:6	159:8 175:20	<b>together</b> 76:2
216:5	<b>till</b> 122:9,25	186:1 203:24	102:24 103:10
<b>thinks</b> 126:7	<b>time</b> 30:20 32:3	204:2 227:1	169:11 199:17
242:5	34:18,20 36:1	232:22,23,24	203:11 246:8
<b>thinner</b> 230:6	36:7 48:2	233:3 238:21	<b>token</b> 197:10
<b>third</b> 110:7	51:13,14 62:9	<b>timewise</b>	<b>tom</b> 102:19
<b>thought</b> 16:1	64:3 69:15,23	244:19	<b>tomastik</b>
21:22 48:5	73:15 74:10	<b>timing</b> 147:10	102:19
67:24 68:13	90:4 103:1,5,7	<b>tired</b> 6:23	<b>tomorrow</b> 5:17
78:25 108:6,10	121:8 122:22	<b>tires</b> 143:15	5:18,20 103:11
164:24 169:18	124:9,10 125:8	<b>titled</b> 47:17	242:14,18
177:11 206:17	125:19 133:22	<b>today</b> 5:7 28:19	246:16
242:11	148:22,25	36:11 59:4	<b>took</b> 20:7 27:16
<b>thoughts</b> 223:9	153:25 159:11	64:10 67:9,13	132:23 136:23
242:3	159:19 162:10	67:23 70:18,19	141:23
<b>thousands</b>	162:14 163:7	70:20 71:25	<b>tool</b> 173:18
144:15	167:11 169:20	72:8 75:3,25	184:21 210:1,4
<b>three</b> 11:18,23	173:3 174:17	77:19 85:4	210:5,10,14,15
55:22 71:1,2	175:9 176:22	86:24 87:2	210:20
92:2 107:6	176:25 182:14	92:1 108:4,14	<b>tools</b> 66:20
109:21 127:21	183:3,9 187:11	108:18 109:12	<b>top</b> 19:23 20:4
128:2,14 132:8	188:6 194:1	112:19 116:15	20:11,14,16,17

[top - two]

<p>23:2,3 24:3,5  36:14 37:15  39:9,10,13  40:1,5 42:14  42:15,16 44:16  45:2,4,5,7  46:20,21 54:17  54:22 55:3,16  55:17 57:17  79:17 87:2,20  87:21 90:12  99:18,24  111:14 117:16  117:21 120:2  132:5,19  145:12 148:18  185:25 186:5  189:7 201:9  202:6 212:9,23  217:7  <b>topic</b> 33:10  51:1 207:1  <b>tops</b> 11:12 47:6  55:7 57:6,7,8  57:10,13 86:13  86:14,24,25  87:3,7,9,10,12  87:14,19  109:25,25  131:25 132:2  132:16,18  206:4 212:21  212:22 213:2  213:15</p>	<p><b>tortured</b>  166:19  <b>total</b> 43:12  44:24 93:6,8  110:2,7,15  243:6,8  <b>totally</b> 96:9  191:14 242:15  <b>touch</b> 19:8  127:12  <b>tough</b> 200:18  <b>towards</b> 117:15  120:2 134:18  <b>track</b> 96:9  242:8  <b>tracks</b> 139:2  <b>traded</b> 145:16  145:20  <b>training</b> 131:19  <b>transcript</b> 1:10  4:3,15 5:2  247:1,10  <b>transcripts</b>  73:23  <b>transfer</b> 5:22  <b>trapping</b> 66:6  <b>treat</b> 119:8  <b>trees</b> 159:14  <b>tremaine</b> 3:6  <b>tremendously</b>  25:18 42:8  <b>trentham</b> 88:13  <b>trial</b> 230:4  <b>triangle</b> 83:4  132:14</p>	<p><b>tried</b> 71:12  82:21 175:6  213:24 215:22  224:21  <b>trigger</b> 142:9  <b>true</b> 27:4 28:1  76:13,14 77:17  87:13 129:16  131:21 132:25  133:4 136:22  138:16,20,21  153:1 155:16  156:1 159:3  160:24 164:13  165:4,5 166:18  167:19 176:17  180:19 181:15  191:20,22,23  193:17 194:5  195:18,21  196:3,4 197:17  197:18 199:3  200:24,25  201:7,22  229:24 230:3  231:4 237:15  239:19 240:4  247:9  <b>truly</b> 114:25  <b>truth</b> 195:23  218:12  <b>try</b> 18:9 61:23  65:4 70:3 73:1  78:19 80:9  84:9 102:15</p>	<p>144:18 146:21  150:9 180:4  204:15 212:2  225:9 246:8  <b>trying</b> 17:8  28:17 59:5  73:5 81:15  83:17 92:5  96:6,19 105:16  126:16 128:6  153:3 163:4  169:17 186:18  186:19,20  204:13 215:4  <b>tube</b> 222:16  <b>turned</b> 177:21  <b>turns</b> 153:11  216:7  <b>tvd</b> 13:17 19:11  20:2  <b>tvdss</b> 113:17  <b>two</b> 7:10 15:22  20:21 30:4  45:7,18 70:7  75:16 97:6  102:9,14,22  140:3,5 145:10  160:3,4 167:20  171:1 174:21  177:15 178:12  178:21 187:17  188:2 190:16  198:10,11  201:9 203:24  204:2 212:18</p>
---	--	--	---

[two - upper]

<p>215:15 220:11  226:6 229:11  243:5 244:15  <b>type</b> 56:12  66:18 79:23  113:9  <b>types</b> 96:21  134:11 199:18  <b>typical</b> 139:22  211:2  <b>typically</b> 141:3  141:6</p>	<p>161:20 167:19  169:9 187:9  189:7 190:10  191:3,16 192:1  197:18 198:11  199:9 205:21  220:23 221:14  221:18 222:1  230:2 232:11  238:24  <b>underscored</b>  24:18  <b>understand</b>  7:14 9:5 20:10  29:21 31:10  36:14 37:12  59:23 60:3  62:21 64:6  72:14 78:3,4  81:15 86:20  91:20 92:5  104:23 105:16  124:18 136:9  145:16 148:8  155:17,20  160:10,12,19  174:22 177:15  177:17 178:13  178:17 180:24  182:2 186:18  186:19 191:15  202:21 203:1  222:25 227:2  227:20 228:23  245:24</p>	<p><b>understandable</b>  242:15  <b>understanding</b>  24:6,13 27:1  28:10,13 34:5  36:11,20 37:14  37:25 38:5  39:12 43:10  45:16,19 57:12  57:21 58:10  63:1,11,23  93:16 96:12  150:17,19  195:15 228:20  230:7 240:5  <b>understands</b>  122:13  <b>understood</b>  7:15 185:14  238:20  <b>undertake</b>  230:8  <b>undertaking</b>  222:7  <b>undertook</b> 47:8  58:2  <b>undisturbed</b>  187:18  <b>uniform</b> 46:22  157:2 178:13  <b>uniformly</b>  99:18  <b>unique</b> 45:6  140:17</p>	<p><b>unit</b> 60:21  61:12,12,19  62:23 63:16  65:11 79:7  118:2,5,6,8,9  118:10,11  140:24 144:16  150:5 183:8  230:23 231:13  231:14,16  <b>united</b> 201:6,9  <b>unitization</b>  61:6 62:12,17  63:12 117:24  146:12 218:1,9  220:4  <b>unitized</b> 60:10  61:21  <b>unitizing</b> 61:22  <b>units</b> 11:9  55:23 60:8  231:5,21,23  <b>unquote</b> 86:8  246:12  <b>unreasonable</b>  100:7,9,13  101:1 102:2  <b>unsuccessful</b>  143:10 144:1  <b>unsupported</b>  143:16  <b>upper</b> 11:19,21  55:22,23 145:9  157:12 223:4,9  223:11,13,16</p>
<b>u</b>			
<p><b>unadjusted</b>  97:10 128:9  <b>uncertain</b>  150:25  <b>uncertainties</b>  149:18  <b>uncertainty</b>  149:5,20  174:23  <b>unconventional</b>  134:18  <b>uncorrected</b>  102:4 104:2,11  104:20,22  <b>under</b> 6:12  83:14 88:13,19  89:12 104:23  123:17 127:7  137:8 151:13  154:16 157:6  157:22 158:11  158:25 159:1</p>			

[upper - vertical]

<p>223:17  <b>upwards</b> 89:18  <b>urgency</b> 148:8  148:13  <b>use</b> 28:25 57:21  77:15 86:7  94:1 111:17  114:7 115:4,25  116:15 126:2  128:16 129:5  133:25 160:23  163:12 168:6  168:24 170:8  172:6 184:9  192:5,5,14  210:16 218:1  222:17 234:13  234:20 235:3  238:13 241:16  242:22,23  243:22  <b>used</b> 9:10,17  11:10 36:4  38:7,10 57:13  58:14 79:4  80:19 84:14,18  90:9 91:18  94:15 98:7  101:15,21  108:18 114:8  116:23 125:17  130:9 132:15  132:18,24  134:5 135:24  136:22 137:6</p>	<p>158:5 159:2  163:15 165:3  170:23,24  173:14 210:19  214:23 215:14  216:3,18 217:7  217:8 218:11  223:21 229:21  234:6,18,25  <b>uses</b> 95:13  100:11 216:23  238:22  <b>using</b> 22:17  87:12,19 102:1  106:11 113:1,3  114:8,15  115:11,14  118:13 134:20  136:7 160:17  164:18 168:7  168:21 171:12  173:16 181:6  189:9 211:25  212:21,21,22  213:2 224:10  225:15 238:6  238:11,17  239:16  <b>usually</b> 69:13  161:12 162:8  229:1  <b>ut</b> 92:19,23  105:11  <b>utility</b> 134:19  136:9</p>	<p><b>utilize</b> 117:7  <b>utilized</b> 118:25  211:16</p> <hr/> <p style="text-align: center;"><b>v</b></p> <hr/> <p><b>vacuum</b> 182:13  224:3  <b>valid</b> 77:18  101:9,14,16,22  <b>validate</b> 99:2  100:15 101:19  107:19  <b>validated</b> 98:18  <b>validation</b>  222:8  <b>value</b> 7:21  18:12,16 98:11  100:8,11,13  101:7 104:16  166:25 167:3,7  167:22,25  168:18 171:5  171:15 225:17  225:18 226:5  <b>values</b> 91:14,15  97:18 98:3  100:8 102:1  106:12 133:24  134:3 167:14  237:12,13  <b>variability</b>  99:16  <b>variable</b> 99:13  138:12 142:16  143:13 150:24  156:14 206:8</p>	<p><b>variables</b>  126:14 128:20  130:14 150:11  156:20 169:10  169:17 218:13  233:7  <b>variance</b>  175:25 176:9  <b>variation</b> 49:21  <b>variations</b>  13:14 154:15  <b>various</b> 82:23  84:12  <b>vary</b> 13:14  135:9 160:25  161:14  <b>varying</b> 168:6  <b>vast</b> 30:19  148:10 180:22  181:22,23  <b>vastly</b> 148:20  <b>vdl</b> 207:7  <b>vector</b> 98:16  <b>venture</b> 203:21  <b>veritext</b> 247:17  <b>version</b> 37:1  145:10 161:21  177:9  <b>versions</b> 207:10  <b>versus</b> 93:8  127:13 128:25  130:15 139:11  149:3 168:16  <b>vertical</b> 13:11  13:23 14:6,11</p>
--	--	--	--

[vertical - water]

<p>15:9 17:2,12  17:19,24 18:5  18:12 19:21  20:23 25:2  33:25 43:23  45:24 46:3  49:16 50:20  80:1 82:6,7  84:23 108:25  113:4 114:21  120:2 177:24  178:4,14,19  179:7,9,11,15  180:15,17  215:16  <b>vertically</b> 17:10  <b>viability</b> 150:23  <b>viable</b> 150:21  <b>video</b> 205:22  247:5  <b>viewed</b> 77:9  <b>viscosity</b> 89:19  90:12  <b>visit</b> 183:13  <b>visited</b> 58:24  68:13 88:3  183:3 189:13  <b>visiting</b> 88:7  <b>visualization</b>  78:24  <b>void</b> 208:11  <b>volume</b> 1:12  55:4 68:7  127:16,19  128:11 130:2,3</p>	<p>156:15,15  159:16 172:7  172:17 232:18  <b>volumes</b> 24:14  24:15 25:5,20  26:17,17 28:11  28:12 29:16,17  89:13 91:24  92:6 94:11,12  124:25 125:1  127:10,12,21  127:22 128:2  128:13,14,23  130:6,6,7,9  131:1 136:10  136:21 137:6  137:20 148:10  148:16,19  157:24 158:15  158:22 168:6,7  168:25 170:8,8  170:13 171:9  171:12 204:1  232:6,17 234:7  234:8</p>	<p><b>wag</b> 168:16,22  168:23  <b>wait</b> 84:1  <b>want</b> 14:24  29:22 38:15  45:9 48:7 55:9  57:24 59:17  60:3 62:1 70:5  71:24 72:11,20  73:4 75:25  78:4 86:13  91:2,4 106:21  108:16 112:19  112:22,23  115:20 116:13  118:4 121:10  123:11 124:17  130:13 135:3  139:14 141:14  144:7,11,13,22  148:17 149:6  150:1 152:7  154:4 155:7  157:17,19,21  162:11,13  166:20 170:2  172:4 182:11  182:17 184:20  186:23 197:1  213:19,21  219:15 224:17  234:2  <b>wanted</b> 5:14  26:21,23 27:20  59:23 67:8</p>	<p>69:18 70:10  74:7 80:15  94:2 126:25  143:17 152:8  155:22 163:2  167:20 198:5  212:3,4 223:17  <b>wanting</b> 55:7  <b>wants</b> 69:9  80:17 96:7  138:10 156:24  <b>wasson</b> 140:20  <b>waste</b> 29:5  150:19,20  156:4 198:13  198:13,13,16  199:10  <b>wastewater</b>  195:16,20  <b>water</b> 3:13 17:8  17:9 22:8  23:17,20 24:13  24:15,16 25:6  25:10,12 28:11  28:12 29:17  30:19 51:9  52:1,5,9,13,17  52:20,23 53:1  53:6,7,11,18,25  54:2,10,12,13  54:16,16,19,19  54:24 55:1,4  55:18,19 60:13  60:18 61:23,23  61:25,25 62:14</p>
	<p><b>w</b></p>		
	<p><b>wackestone</b>  92:22 93:1,21  94:22,23 95:14  95:17,19,22  96:1  <b>wackestones</b>  94:1  <b>waded</b> 172:23</p>		

[water - wells]

63:15,15,20 65:21,24 66:9 66:16 67:4 69:13,14,22,24 81:19,23 85:21 93:22 94:24 95:15 96:24 118:2,7,7,15,18 118:21,24,24 119:3,4 132:11 173:16 174:5 182:14 185:2 187:23 202:1 207:9 208:8,9 208:10,16,17 208:24 209:2 215:20,23,23 216:1,23,24,25 217:1,5,6,11,13 217:13,15,17 217:19,20,23 221:1 224:3,4 225:14 226:10 226:16,23,24 227:3,4,9,14,17 227:18,22 228:1,2 231:25 231:25 239:23 240:1,13,15 <b>waterflood</b> 61:12 117:4,7 117:10 118:19 118:25 119:4 <b>way</b> 11:6,13 20:14 70:24	71:20 72:4,5 79:14,19 82:2 87:15 89:17 101:9 105:22 126:22 128:4 130:6 131:18 133:19 137:7 137:10 143:4,5 154:9 157:24 158:1,15 162:20 165:19 166:12 177:2 179:19 181:7 185:22 186:9 186:23 192:19 212:7 215:12 215:18 220:3 244:23 245:4 <b>ways</b> 114:6 212:18 <b>we've</b> 11:17 27:18 30:5,12 30:20 66:4 74:11 80:19 88:18 91:1 120:24 129:10 129:18 142:21 142:22,24 156:21 159:15 159:16 166:22 168:3 170:23 175:19 179:16 180:16 187:19 187:22,23 200:5 208:20	214:20 220:22 226:9 244:22 246:3 <b>wednesday</b> 103:6 243:9,25 <b>week</b> 32:3 103:4,6 177:11 194:9 243:9,10 243:25 <b>weekend</b> 159:12 <b>wehmeyer</b> 2:12 2:15 4:6,10 6:1 7:5 9:24 10:6 10:11 12:10 25:23 26:25 27:8,10 28:1,7 28:15 29:21 31:15 33:18 34:3,7,11,21 37:11 45:10,12 45:20 48:14 51:3 56:6 57:4 58:1,22 59:19 60:8 62:24 63:2 64:7,9,14 64:22,24 65:2 73:5,11,14 80:14,20 86:22 86:24 87:5 91:23 92:9,11 92:12 94:2,10 96:17 102:8 103:13,15,16 107:21 109:4	121:12 123:19 124:4 147:24 148:1,2 183:12 183:22,24 184:4 189:20 190:16,25 192:6,17 194:8 196:20 197:5 197:23 198:10 199:8 201:1 228:16,23 230:13 232:4 233:6,10 234:11 235:16 236:20 237:6,9 237:20 240:25 244:7 <b>wehmeyer's</b> 31:9 32:7 45:17 232:8 233:22 <b>weight</b> 21:13 43:24 94:9 <b>welcome</b> 183:17 204:12 <b>wellbore</b> 83:5 185:6 206:7 208:1 209:10 215:17 <b>wellbores</b> 207:17 208:18 <b>wells</b> 12:7 22:7 23:19 24:14,15 24:16 25:6,9 25:10,12 27:12
---	---	--	--



[wells - work]

<p>35:15 36:23  37:4,5,8 39:5  39:16 40:6  44:3 60:9,18  70:8,13,24  75:16 84:9,19  85:22 111:2  118:18 132:8  132:10,11  139:16 140:2,3  140:5 141:2  142:4 147:6  155:15,19  158:2 174:2  181:1 182:14  187:23 189:9  206:14,19,20  207:7,9 208:18  208:21,22,22  208:23,25  216:1 219:18  219:21 221:1,8  221:23 223:19  224:4,25 225:1  226:10,11  231:9,12,13,15  236:4,4  <b>wendell</b> 1:5  <b>went</b> 15:12  44:2 51:16  65:6 79:13  98:7,7 112:18  132:17,23  193:17 200:9  207:13 213:2</p>	<p>216:4 245:22  <b>west</b> 52:12  53:11 62:3,7  128:9 145:11  177:14 209:23  212:5 220:18  227:25 240:6,7  <b>west's</b> 126:5  177:9 210:9  232:11 233:8  236:12,15  <b>wet</b> 134:13  136:8  <b>whack</b> 98:15  <b>whatsoever</b>  103:20  <b>wheeler</b> 62:8  <b>wholesale</b>  192:25  <b>wholly</b> 133:17  <b>wide</b> 64:14,23  86:20 91:20  219:25  <b>wildly</b> 161:15  161:16  <b>william</b> 1:20  4:5 6:16  <b>willing</b> 149:4  151:17 171:23  206:25  <b>wine</b> 162:4  <b>wiped</b> 9:19  <b>wiping</b> 9:25  <b>wise</b> 196:1</p>	<p><b>withdrawal</b>  25:16 220:10  228:1  <b>withdrawals</b>  226:9  <b>withdrawn</b>  23:20 26:17  28:11 29:17  228:2  <b>witness</b> 9:14  10:14 33:4,4  34:6 48:18  49:5,10 59:8  63:5 64:3  65:23 96:7,11  96:13 102:17  107:21 121:11  121:17 155:7  182:24 183:10  189:20 190:20  192:7 198:11  226:18 228:9  240:20,24  241:10,13,13  241:15 243:12  243:21 245:2  <b>witnesses</b> 4:4  62:4 65:20  102:22 103:5  122:23 141:1  221:20 225:5  226:17 231:19  241:25 243:3,4  243:7,12  244:20</p>	<p><b>wolfcamp</b>  162:3  <b>word</b> 146:13  151:2  <b>words</b> 11:10,14  30:17  <b>work</b> 26:5  27:17,20 34:15  62:18 67:25  68:3,22,24  70:18 76:8,9  76:16 77:8,10  78:9,10 79:15  81:5,6 89:18  90:4,8 91:16  94:7,13 96:7  104:10,23  108:17 125:15  130:9,15,15  131:6 132:2  133:2,7,18  134:1,13,22  136:1 138:2,12  138:13,13  145:13 146:25  148:15 150:15  153:2 154:19  158:21 169:4  179:19 181:17  183:9 185:23  186:2,24 187:3  187:4,15  188:15 189:8  199:6,17  201:16 213:8</p>
---	--	--	--

[work - zone]

<p>214:13 231:20 235:10 246:1 <b>worked</b> 11:11 68:9 80:25 174:7 186:9 214:19 <b>working</b> 28:21 28:21 31:2,6 33:3,6 34:14 98:10 151:1 175:13 185:22 186:8,11 <b>works</b> 90:11 125:9 154:9 157:6 162:7 166:12 186:22 187:1 246:11 <b>world</b> 20:2 <b>worried</b> 207:15 <b>worse</b> 94:23,23 95:14,18,21,22 193:19 <b>worst</b> 93:1 95:4 95:5,9,13 <b>worth</b> 167:21 <b>wozniak</b> 3:14 <b>wrap</b> 225:9 <b>wrapped</b> 183:15 <b>wrapping</b> 180:21 <b>write</b> 51:18 69:18 <b>writing</b> 26:7</p>	<p><b>written</b> 8:3 12:16 25:25 48:22 74:11,18 149:11 196:25 199:24 <b>wrong</b> 78:21 136:3 151:15 168:11 169:14 169:15 170:18 <b>wti</b> 170:1,25 171:13 172:19 <b>wyoming</b> 238:24</p>	<p>165:11 192:1 237:21,25 <b>years</b> 61:9 66:25 68:10 160:7 161:18 161:24,24 162:5,22 165:22,22 166:2,13 167:10,18 181:11 188:18 235:12 <b>yellow</b> 41:9 234:14,16 <b>yesterday</b> 6:12 7:3,4 10:6 12:9 13:8 18:14 19:17 21:19 24:10 26:1,15 28:17 29:15 30:16 34:25 35:2,6,10,13,22 35:24 37:16 39:19 40:8 43:7,9 45:10 56:6 57:3,25 58:24 59:16 60:7 64:17 67:9,24 68:2 68:14 70:20 71:5 72:1,1,11 72:14 73:15 74:7,21 77:9 86:25 88:11 91:4,14,25</p>	<p>92:17 93:20,25 94:4 95:11 103:17 108:5 108:10 111:22 112:18</p>
	<b>x</b>		<b>z</b>
	<p><b>x</b> 4:1 96:23 <b>xiv</b> 1:12</p>		<p><b>zachary</b> 1:22 <b>zero</b> 89:4,24 137:17,18 141:23,25 <b>zeros</b> 177:21 <b>zone</b> 18:19,19 18:25 21:12 29:18 38:4 40:14 41:25 43:14 50:14 52:22 53:3,11 53:12 61:8 63:21 72:21 76:11 93:6,8 93:10,13 108:8 108:8 109:9 111:24 115:17 134:18 144:17 145:5 172:10 174:3 182:12 200:21 203:12 203:16 208:2,7 208:18 209:15 214:9 220:24 220:24 223:4 223:15 224:2 225:21 226:20 239:25 240:8 240:17</p>
	<b>y</b>		
	<p><b>yaw</b> 155:13 <b>yeah</b> 12:5 14:25 19:5 80:18 88:14 93:15 104:18 116:13 118:11 119:2 133:22 147:2 150:1 154:21 158:20 165:9,21 166:4 166:7 188:24 193:12,17 200:2 205:18 206:16,25 215:2 <b>year</b> 61:3 66:18 164:2,22 165:8</p>		

**[zones - zoom]**

**zones** 29:18  
38:25 43:6,15  
44:13,22 49:24  
53:18 109:21  
120:25 134:16  
174:2 215:5  
224:7

**zoom** 22:21  
35:4,4 36:25