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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
February 27, 2025
VOLUME V

HEARD BEFORE:
HEARING OFFICER RIPLEY HARWOOD

COMMISSION MEMBERS:
GERASIMOS ROZATOS, Chair
BAYLEN LAMKIN, Member
DR. WILLIAM AMPOMAH, Member

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20
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22
23
24
25

I N D E X

PAGE

TRANSCRIPT OF PROCEEDINGS.....	707
THE WITNESSES	
JAMES LEE BUCHWALTER	
Direct Examination by Ms. Hardy.....	718
ADMITTED EXHIBITS	
Empire New Mexico Exs. E, E-1 through E-21, M, M-1 through M-20.....	721
ROBERT CRAIG TRENTAM (appearing virtually)	
Direct Examination by Mr. Padilla.....	786
Cross-Examination by Mr. Rankin.....	812
Cross-Examination by Mr. Moander.....	818
EXAMINATION BY THE COMMISSION	
By Commissioner Ampomah.....	820
By Commissioner Lamkin.....	830
ADMITTED EXHIBITS	
Empire New Mexico Exs. D-1 through D-22 and Tables D-1 through D-6.....	790
LORD STEPHEN MELZER	
Direct Examination by Mr. Padilla.....	833
Cross-Examination by Mr. Rankin.....	864
ADMITTED EXHIBITS	
Empire New Mexico Exs. C-1 through C-17.....	838
TRANSCRIPT CERTIFICATE.....	889

1 (On the record at 9:03 a.m.)

2 TRANSCRIPT OF PROCEEDINGS

3 CHAIR ROZATOS: Good morning to everybody.
4 We'll get our hearing started here.

5 Again, I'm Gerry Rozatos. I am the
6 acting director of the OCD. I'm also the acting
7 Chair for the Oil Conservation Commission.

8 We are here continuing our evidentiary
9 hearing. These are the consolidated cases by
10 Goodnight Midstream and Empire New Mexico. They are
11 Case Numbers 24123, 23614 through 17, Case Number
12 23775, and Case Numbers 24018 through 24020, and Case
13 Number 24025.

14 All the parties are present, correct? I
15 believe everybody is present.

16 Is Pilot on the platform, Mr. Suazo?

17 MR. PARROT: Good morning, Mr. Hearing
18 Examiner, this is James Parrot with Beatty & Wozniak.
19 I'll be representing Pilot this morning.

20 CHAIR ROZATOS: Excellent. Thank you,
21 Mr. Parrot. Appreciate it.

22 So we're back on the record.
23 Mr. Harwood, I transfer over back to you.

24 HEARING OFFICER HARWOOD: I'll probably kick
25 it straight back to you, because I suspect that after

1 yesterday afternoon's discussion, there may well be
2 preliminary matters.

3 CHAIR ROZATOS: Yeah, okay. We'll do it
4 that way.

5 So last night, we had the motion -- the
6 objection that was brought up, and all parties stated
7 what they needed to state. I believe what we'll do
8 as the Commission, we'll go into closed hearing. And
9 so we will excuse ourselves, we'll go upstairs and we
10 will discuss the topic and then come back and bring
11 an answer.

12 Mr. Rubin, please.

13 MR. RUBIN: Yes. So if I could have a
14 motion to enter into closed session, pursuant to
15 Section 10-15-1.H(3) and (1) of the Open Meetings Act
16 to discuss the pending adjudication.

17 CHAIR ROZATOS: I motion to go into closed
18 session.

19 COMMISSIONER AMPOMAH: I second.

20 MR. RUBIN: Roll call vote, please.

21 COMMISSIONER AMPOMAH: Approved.

22 COMMISSIONER LAMKIN: Aye.

23 CHAIR ROZATOS: And approved.

24 (Motion approved.)

25 MR. RUBIN: All right. We hope to not take

1 too long with this. So we will let you all stay and
2 we will find a room.

3 CHAIR ROZATOS: Make yourselves comfortable.

4 (Commission convened
5 to closed session.)

6 CHAIR ROZATOS: We have just finished being
7 in closed session. We're now back in open session.

8 MR. RUBIN: Mr. Chair, standard, what may be
9 boilerplate, but I need to put on the record that the
10 matters discussed in closed session were only those
11 regarding this adjudication as stated in the motion,
12 and no final actions were taken.

13 CHAIR ROZATOS: Excellent. I was just going
14 to transfer it over to you and let you say all of
15 that. I'll let you talk, Mr. Rubin.

16 MR. RUBIN: Thank you, Mr. Chairman, Members
17 of the Commission.

18 Based on our deliberations, I understand
19 that the commission would entertain a motion to deny
20 the renewed motion of Goodnight to strike what it
21 contends is the rebuttal testimony of Mr. Bailey and
22 Dr. Birkhead with the caveat that Goodnight would be
23 entitled to file whatever it deems fit as a surreply
24 in writing by March 15th.

25 Do I have a motion to that effect?

1 CHAIR ROZATOS: I move with that motion.

2 COMMISSIONER AMPOMAH: I second.

3 MR. RUBIN: All those in favor?

4 ALL MEMBERS: Aye.

5 MR. RUBIN: All right. I hear three ayes.

6 No need to ask for opposition. That motion passes.

7 (Motion approved.)

8 MR. RUBIN: And then let me turn it over to
9 the Commission if they have any other concerns they
10 wish to express to the parties regarding the issues
11 that were somewhat valid as raised by Goodnight.

12 CHAIR ROZATOS: Thank you, Mr. Rubin.
13 Appreciate it.

14 So the Commission also has the concern
15 about the way information is coming over towards the
16 Commission and the way the whole thing is just giving
17 us data and how our data is coming about. I know
18 Commissioner Ampomah had a concern.

19 So, Commissioner Ampomah, please.

20 COMMISSIONER AMPOMAH: Thank you, Mr. Chair.

21 You know, the concern that I do have is
22 that, you know, we started three days, now on the
23 fourth day, listening to, let's say, saturation, site
24 characterization, geology. And today we're going to
25 go into the simulation.

1 But I do see that there is still some
2 testimony on geological site characterization,
3 saturations that we've not heard yet, you know, but
4 we're going to listen to the simulation. I mean,
5 that is a little bit confusing to me, you know, the
6 way the whole thing is structured.

7 When I review some of the Empire's
8 earlier testimony that has not been presented yet,
9 you know, it sounds to me that that probably was the
10 case, right? So we did not listen to the actual case
11 and we listened to rebuttals, and the rebuttals more
12 or less being the case here.

13 So I'm a little bit confused if, let's
14 say, we're going to go through simulation today, and
15 then next witnesses come back still talking about the
16 input that went into the simulation or probably not
17 into the simulation. It just confuses the
18 Commission.

19 But I'm good, because I can still follow
20 what is going on. But I feel like the structure is
21 not really well presented to the Commission for us to
22 more or less be able to fully understand the whole
23 thing as of now. Four days into it, and it's still
24 gray. Thank you.

25 CHAIR ROZATOS: So I'll give you a second to

1 be able to respond. We definitely want to hear it
2 from your end as well about the case.

3 But it is a flood of information and it
4 is a little bit on the disconnected, because we've
5 started off, especially with rebuttals right off the
6 bat, and we haven't heard everything the way we
7 should.

8 Now, we've got all the paperwork. I
9 know everybody submitted, and we've got it all the
10 way it was submitted to us. But I must concur with
11 the doctor, the information is kind of difficult to
12 comprehend or to follow sometimes.

13 So I would definitely -- we definitely
14 would like to hear from the parties and see your
15 thoughts on the matter. Conversation is always good.
16 But we do have that concern and we wanted to pose it
17 to you all.

18 Would Empire like to start?

19 MS. SHAHEEN: I think we may want to confer
20 with our client before we respond.

21 CHAIR ROZATOS: That's fine.

22 Goodnight, are you in the same thought
23 process?

24 MR. RANKIN: Probably. You know, I might
25 like to hear what they have to say first, since --

1 yeah, I think maybe just a break to allow them to get
2 their thoughts together and respond. But I think I
3 would like to do the same.

4 CHAIR ROZATOS: Okay. OCD?

5 MR. MOANDER: I didn't quite catch all of
6 what the Empire said.

7 CHAIR ROZATOS: Empire stated that they
8 would like to have some time to confer with their
9 client.

10 MR. MOANDER: OCD has no objection to that.

11 But the comments that I want to put on
12 the record, I've tried my share of cases, I've been
13 around a lot of hearings in my career. One of the
14 unfortunate realities for parties is that witness
15 sequencing is not always optimal.

16 And it's not an issue of -- and I'm
17 defending the Bar here generally. There can be
18 reasons for stuff to come out of sequence. I confess
19 a personal desire to try to make everything
20 sequential because it does -- it's a story, it makes
21 more sense.

22 So I think this happens more often than
23 the decision-makers like, but it's also a nature of
24 litigation, schedules, various other things.

25 So I do hear your concern, Dr. Ampomah.

1 I've heard it many times, and I can assure you, and
2 I'm comfortable speaking for the attorneys here,
3 everyone has worked extraordinarily hard on trying to
4 make this as organized as possible so it's coherent
5 for your consideration.

6 So that's my little bit. Thank you.

7 CHAIR ROZATOS: Thank you.

8 MR. RUBIN: Mr. Chair, echoing the
9 sentiments of Mr. Moander, we don't want to give the
10 impression that we thought there was any gamesmanship
11 involved by any of the parties that we considered for
12 this decision.

13 It is complicated and it's not
14 straightforward how the rebuttal works when it's
15 pre-filed. I totally agree.

16 CHAIR ROZATOS: Agreed. Thank you.

17 Mr. Rice -- I'm sorry, Mr. Beck. You
18 just became your own entity, Mr. Beck. My apologies.

19 MR. BECK: That's right. I'm used to
20 four-letter names. Matt and Beck, so Rice is
21 appropriate.

22 But I have no input, no objection to
23 Empire speaking with its client.

24 CHAIR ROZATOS: Thank you.

25 Mr. Parrot, with Pilot?

1 MR. PARROT: Thank you. No objection.

2 CHAIR ROZATOS: Ms. Shaheen, Ms. Hardy,
3 would 10 minutes be good for you? You're ready to
4 go. Even better. It's a good thing I asked
5 everybody. Please.

6 MS. SHEEN: Thank you. It might be helpful
7 to have a little context.

8 The parties had conferred about this at
9 one point. Mr. Rankin suggested that Empire go first
10 with all of our witnesses, and we agreed to do that.
11 So that's why we've been approaching it this way.

12 I completely understand the confusion
13 that can arise from that. We've immersed ourselves
14 in this for well over a year now, so I understand how
15 that could be confusing.

16 So our question is back to you. How
17 would you like to have us present the evidence?

18 CHAIR ROZATOS: Commissioner Ampomah, I'll
19 let you state your thoughts.

20 COMMISSIONER AMPOMAH: Well, I think where
21 we are now, it doesn't really matter, you know,
22 because we've already listened to, let's say, all the
23 characterization.

24 But I will probably suggest, if it's
25 possible, for us to get through all the site

1 characterization before we get into the simulation,
2 at least we'll get the site characterization out of
3 the way, and then focus on the simulation.

4 But if it's not possible, I'm still fine
5 with it. You know, I'm okay.

6 CHAIR ROZATOS: I believe it was just the
7 concern that the Commissioner had and we, as the
8 Commission, also had. And so we were just bringing
9 it up.

10 If we proceed the way we're going, I
11 think we understand the limitations. We get that.
12 We're just sharing our concern as well. So we can
13 proceed the way we are. I don't think we necessarily
14 have to change everything. But as the doctor
15 mentioned, I think the order may have facilitated it
16 for us a little bit better. But if this is the way
17 we have to go, we have to go. But we did want to put
18 our concern, as well, on the record.

19 So, if you all are okay with that -- is
20 that okay?

21 MS. SHAHEEN: Yes. Thank you.

22 CHAIR ROZATOS: Mr. Rankin, you heard what
23 Empire had to say. Do you still need time to confer
24 with your client?

25 MR. RANKIN: No, I don't think so, Chair

1 Rozatos. I don't believe so. I think that, as
2 Mr. Moander stated, presentation of cases is a story,
3 and each party should, I guess, to some extent, be
4 able to present their case in the order they want. I
5 understand that.

6 I do intend or believe that we'll be
7 following the witness sequence in our prehearing
8 statement. So I think that may help a little bit
9 with just understanding Goodnight's story. But no
10 other comments from my perspective.

11 CHAIR ROZATOS: Okay. Excellent.

12 Mr. Moander.

13 MR. MOANDER: I'm sorry, I had some messages
14 come in requiring my attention. I apologize for that
15 disrespect to the Commission. What did I miss out
16 on?

17 CHAIR ROZATOS: Ms. Shaheen stated that
18 they're good to go the way they are. Commissioner
19 Ampomah stated, well, that's fine, we're all good on
20 our end. Are you good, as well, from what you've
21 heard?

22 MR. MOANDER: Absolutely. OCD is ready to
23 proceed.

24 CHAIR ROZATOS: Okay. Mr. Beck.

25 MR. BECK: Rice is ready.

1 CHAIR ROZATOS: Excellent.

2 Mr. Parrot.

3 MR. PARROT: We are ready. Thank you.

4 CHAIR ROZATOS: Beautiful. Let's turn right
5 over to our hearing officer, Mr. Harwood.

6 HEARING OFFICER HARWOOD: All right. With
7 all that said then, Ms. Hardy or Ms. Shaheen, does
8 Empire have a next witness?

9 MS. HARDY: Yes, we do, Mr. Examiner. Our
10 next witness is Dr. Jim Buchwalter.

11 HEARING OFFICER HARWOOD: All right.

12 THE WITNESS: Good morning.

13 HEARING OFFICER HARWOOD: Good morning,
14 Dr. Buchwalter. If you'll please raise your right
15 hand.

16 JAMES LEE BUCHWALTER,
17 having first been duly sworn, testified as follows:

18 DIRECT EXAMINATION

19 BY MS. HARDY:

20 Q. Good morning, Dr. Buchwalter.

21 A. Good morning.

22 Q. Can you please state your full name for the
23 record.

24 A. My name is James Lee Buchwalter.

25 Q. By whom are you employed and in what

1 capacity?

2 A. I'm employed by Gemini, and I'm the gem in
3 Gemini. Gemini also means twins, so I had a partner
4 when I started the company.

5 Q. Have you previously testified before the
6 Commission?

7 A. I have not.

8 Q. What is your area of expertise?

9 A. I would say reservoir simulation,
10 compositional simulation as well.

11 Q. Have you provided a summary of your
12 education, training and experience as Attachment 1 to
13 your direct testimony?

14 A. Yes, I have.

15 MS. HARDY: Based on those qualifications, I
16 request that Dr. Buchwalter be qualified as an expert
17 in reservoir engineering and simulation.

18 HEARING OFFICER HARWOOD: Mr. Rankin, any
19 objection?

20 MR. RANKIN: No objection.

21 HEARING OFFICER HARWOOD: OCD?

22 MR. MOANDER: No objection.

23 HEARING OFFICER HARWOOD: Rice?

24 MR. BECK: No objection.

25 HEARING OFFICER HARWOOD: Pilot? Pilot?

1 Mr. Parrot? Parrot for Pilot.

2 MR. PARROT: I apologize. I thought I was
3 off mute. No objection. Thank you.

4 HEARING OFFICER HARWOOD: He'll be so
5 recognized.

6 MS. HARDY: Thank you.

7 BY MS. HARDY:

8 Q. Dr. Buchwalter, have you provided direct and
9 rebuttal testimony and exhibits in these cases?

10 A. Yes, I have.

11 Q. Do you affirm today under oath that your
12 testimony is true and correct?

13 A. Yes, I do.

14 MS. HARDY: Mr. Hearing Examiner,
15 Commissioners, I request that Dr. Buchwalter's direct
16 and rebuttal testimony and exhibits, which are marked
17 as E, E-1 through E-21, M and M-1 through M-20 be
18 admitted into the record.

19 HEARING OFFICER HARWOOD: Any objection from
20 Goodnight?

21 MR. RANKIN: No objection.

22 HEARING OFFICER HARWOOD: OCD?

23 MR. MOANDER: No objection.

24 HEARING OFFICER HARWOOD: Pilot?

25 MR. PARROT: No objection.

1 HEARING OFFICER HARWOOD: They'll be so
2 admitted.

3 MS. HARDY: Thank you.

4 (Admitted: Empire New Mexico
5 Exhibits E, E-1 through E-21,
6 M and M-1 through M-20.)

7 BY MS. HARDY:

8 Q. Dr. Buchwalter, let's go through some of the
9 highlights of your testimony, and I'll go through
10 these slides that I have up on the screen.

11 A. Okay.

12 CHAIR ROZATOS: Ms. Hardy, sorry to
13 interrupt. Did you tender the doctor as an expert?

14 MS. HARDY: I did.

15 CHAIR ROZATOS: Okay. Sorry. I missed it.
16 My apologies.

17 MS. HARDY: No problem. Thank you.

18 BY MS. HARDY:

19 Q. Dr. Buchwalter, looking at this slide, can
20 you provide an overview of what you did in this case?

21 A. Okay. Before I get into the details of the
22 case, I'd just like to outline what we do. I know we
23 have a mixed audience here, and some people are very
24 proficient in reservoir simulation, others probably
25 don't even know why I'm here.

1 So I have a Ph.D. from Rice University.
2 And I created what's called a compositional model.
3 And there's basically three pieces of information that
4 are in the model. The first is $PV = nRT$, which
5 basically says we have a box and we take so much of
6 the fluid out of the box and measure the pressure
7 change, we can figure out what was originally in the
8 box.

9 So we use that relationship to take
10 production and pressure measurements in the reservoir.
11 And once we understand that relationship of the
12 production -- is that me?

13 CHAIR ROZATOS: No. It's on the platform,
14 someone. Just one second, Doctor. Let's make sure
15 we find who it is. If we can just make sure even
16 here in the audience, just turn off your microphones,
17 speakers on your laptops so we don't get the
18 feedback.

19 Also on the platform, please make sure
20 that you keep yourselves muted.

21 My apologies, Doctor. Please proceed.

22 THE WITNESS: That's okay. I'm not used to
23 being called Doctor, but I think I'll get used to it.

24 A. So anyhow, if we've got production in the
25 reservoir and we understand the average pressure at

1 different points, we can actually figure out with very
2 good certainty what the original oil in place is.
3 Okay?

4 Now, there's two other relationships
5 that we have in the simulator. The first is simple.
6 In minus out is equal to accumulation.

7 And the third relationship, which I
8 could go into, it's a fractional flow equation called
9 Darcy's Law.

10 Now, you may be surprised that I went to
11 a very good university. Rice University, gave me a
12 Ph.D., and the only thing I did was use those three
13 pieces of information, which I just explained to you.
14 So anyhow, that's what's in the simulator.

15 So how do we put a model together and
16 how does it work, okay? Well, if you think about the
17 testimony you've heard today, the way I think of it,
18 it's like pieces of a puzzle. The reservoir
19 simulation model is the only place where you put all
20 the different pieces of reservoir engineering and
21 geology together in one place and actually see what
22 the puzzle looks like. And it's really that simple.

23 And so in this case, we put all the data
24 that I was given together in one place, build what we
25 call a model that represents the fluid flow and

1 production and so forth in the reservoir, and then
2 adjust parameters until we can fit the historical
3 production, pressure history in the reservoir. Okay.

4 So basically, the way this whole process
5 starts is -- I don't know anything about the client's
6 reservoir. Okay? I'm just a consultant. So I ask
7 the client to provide maps to me that I integrate in.
8 They provide production and pressure history. And the
9 most important thing they provide to me are
10 uncertainties. Okay?

11 So there's certain things that we put in
12 the model that we know with certainty. For example,
13 the production pressure data, hopefully. There's
14 other things we know with certainty, the fluid data
15 can be measured in the lab. And there's a lot of
16 things that have a lot of uncertainty, to be honest,
17 depending on how good the geology is. And primarily,
18 geology is the big thing.

19 So I put all that data in, and then
20 essentially what we do is we build a representation of
21 the reservoir underground. We turn the wells on, and
22 the fluids all move around, and the physics represent
23 that. And then the first time we run the model,
24 nothing works, typically. And it's always the
25 geologist's fault, of course.

1 And so what I do is I adjust the
2 parameters within ranges I've been given, and if and
3 when I achieve a fit, we can then use that model to
4 run what we call forecasts. So we can say, what if in
5 the future we do this and that and so forth.

6 Now, in this case, I honestly did not
7 think I was going to be here. And the reason was I
8 spent, I don't know, four to six weeks to put a model
9 together -- and this is a very complex model. I mean,
10 to be honest, to do this model justice and to history
11 match all 638 wells, and we're talking several
12 man-years. I mean, that would be one great consulting
13 project. Unfortunately, I didn't do that.

14 But I put the data in, I spent four to
15 six weeks on this thing. And you know what? I went
16 to Empire, I showed them a model that fit all the
17 data, and you know what? The one thing it did not fit
18 was the saltwater disposal volumes. I only had about
19 half of them in.

20 And I told Darrell, I said, "Darrell,
21 you can take this model, you figure out how to take
22 this model and, you know, testify and so forth. I
23 can't testify to this model."

24 So Darrell said, "Look, Jim, let me come
25 over to" -- Darrell Davis, I'm sorry, using it as the

1 first name. So Darrell came over to my office and he
2 said, "Look, give me the model. Let me look at all
3 the data."

4 You know, as I said earlier, to me, it's
5 just a pile of data. I don't know what the quality of
6 data is. It's up to the client who studies this for
7 years that understands all these intricacies that are
8 built into the model.

9 So anyhow, Darrell came over. He spent
10 a week or two. I actually gave him a computer with
11 the model and the match. It was a great match, at
12 least for a first-order match. And he looked at it
13 for a couple weeks, and after a couple weeks said,
14 "Jim, you put 638 wells in, but you screwed up on six
15 of them."

16 And the six wells are actually very
17 important wells; they're the water-supply wells. And
18 if you're a reservoir engineer, this is like -- for
19 me, it was like winning the jackpot, literally.
20 Because I put in the corrected water-supply well data
21 and I turned on all the saltwater disposal wells we
22 had in the model, and we had such -- an almost perfect
23 fit.

24 So that gave me confidence, at least,
25 that we had a good model. And fortunately or

1 unfortunately, that's why I'm here.

2 So I think I've kind of explained most
3 of the things. Let's see if I've missed anything.

4 Oh, the one thing I would say, this
5 model has almost 90 years of production and pressure
6 history. So with that much data, it doesn't matter
7 who builds this model. If you build this model
8 correctly, you have to fit that relationship between
9 production and pressures.

10 And whoever builds this model -- all
11 these models can be a little different. They're never
12 going to be the same, but what they will have is they
13 will ultimately have the same amount of oil, water,
14 gas originally in the model in 1938, and we'll all
15 have slightly different parameters for relative
16 permeabilities and, you know, things in the model.
17 But at the end of day, all those models that are good
18 will have a good fit, at least on a first order, of
19 the production and pressures over that, at least on a
20 field-wide basis.

21 The last thing I'll say -- a couple
22 other things I'll say. When you build a model like
23 that, it's like eating an elephant. You don't eat an
24 elephant in one bite. You have to eat it one bite at
25 a time.

1 And so the way I approach a model like
2 this is, you know, if you're trying to win the
3 lottery, you've got ten numbers. This thing has got
4 literally thousands of things that you need to fit to
5 get things to work.

6 So the first step is we try to establish
7 a field match. And we do that by, as I said, running
8 the model and establish the field-wide oil, water, gas
9 volumes, and matching the rates and pressures. In
10 this case, we also matched the leak between the
11 San Andres up into the Grayburg. Once we've got that,
12 we've got the volumes right, because if you don't have
13 the volumes right, you can't do anything else.

14 The second step, and we did this in the
15 model, is we actually try to match production and
16 rates and pressures and so forth in groups. So as big
17 as this model is, it's 17 miles high and 10 miles
18 wide, I thought originally I could just match the
19 EMSU. And I thought, this ain't so big. I can just
20 match the wells in the EMSU, except maybe some wells
21 on the edge here, and we'll have a good match.

22 I could not do it. I literally had to
23 put all three leases in here before I could even come
24 close to a history match. And I guess that's because
25 of the 90 years and how big this thing is. It's

1 surprising the fluids do move between these different
2 leases.

3 So once you've established that, you've
4 got the right volumes, you can start to look at the
5 details. And the next level of detail that I look at
6 is I try to say, well, I got 630 wells here. I can
7 spend the next two years trying to figure this out.
8 You know, I'm going to run out of time and money, and
9 I wouldn't be here today.

10 So what I do is I create groups of
11 wells. So I'll say maybe the groups of wells up in
12 the AGU and the EMSU and so forth, the group of wells
13 down there. And I try to match the production for
14 those wells within the groups. And I did that. For
15 example, I've got a customized porosity field that
16 fits -- basically has a different porosity for every
17 cell in the model.

18 And the third thing I did was try to
19 figure out what is the purpose of this simulation
20 study. Well, the purpose of this simulation study is
21 not to figure out, at least for now, where to infill
22 drill wells. It's basically on a field-wide basis to
23 just understand the communication between the
24 San Andres and the Grayburg, if there was some. And
25 so to do that, you just need to have a good field

1 match. And that's what I did.

2 But to take it one step further, I
3 identified, as I'll show later, where there were leaks
4 between the San Andres and the Grayburg. And I
5 essentially customized a permeability leak to
6 represent a fracture so that, I think at almost 100
7 different wells, we've created leaks that are
8 customized to try to fit the water leak at those
9 individual wells with reasonable certainty.

10 Q. Are you ready for the next slide, or are
11 you done?

12 A. Yeah, I'm almost ready.

13 Q. Do you have anything else on this one?

14 A. I don't -- let's see. No, I don't really
15 have anything else on here.

16 I'm sorry about that, but I just didn't
17 want to be talking up here and you all not know what
18 I'm doing. So go ahead.

19 Q. What's on this, which is marked as
20 Exhibit M-2, please.

21 A. Okay. This is the model itself. It's
22 actually a detailed model in terms of cells. In terms
23 of geology, I started this in the middle last year.
24 So what I was given was the top of the structure for
25 the Penrose. I think I was given the top of the

1 structure for two different intervals in the Grayburg.
2 And then the top of the structure for the San Andres,
3 and the thickness for these respective layers. We
4 have 638 wells in the model. We have 10 layers,
5 345,000 cells. The way it's constructed is we have
6 two Penrose layers, five Grayburg and three
7 San Andres.

8 We've integrated 24,000 startups going
9 all the way back to 1938 and into 2025. And the view
10 you see on the right here, you can see the gas on the
11 top here that's primarily in the Penrose, which is in
12 communication with the Grayburg. Underneath it,
13 you're going to see the Grayburg itself, and
14 underneath that, the blue is essentially the
15 San Andres Aquifer, which is 1,000-plus feet thick.

16 You're only seeing a part of the aquifer
17 here, the aquifer that's under the Grayburg. We
18 actually had to extend this aquifer out to the west to
19 get a history match, and that's the grid that you're
20 looking at. We had to rotate the grid as well, and
21 you're seeing the saltwater disposal wells in that
22 grid.

23 Q. What is shown on this slide, which is
24 Exhibit M-3?

25 A. Okay. When you've got 638 wells and almost

1 90 years of production, I honestly didn't know what
2 would come out of this model. I didn't know if there
3 was going to be an answer that Goodnight would like or
4 we would like, or whatever.

5 So the first thing I do is I kind of do
6 what I call data mining. I try to look at all the
7 data I've been given. I was given some reports. And
8 this is one of the earlier reports in 1989 that
9 suggests that we have a solution gas-drive reservoir
10 here, and that there is some communication between the
11 San Andres and the Grayburg itself. And you can see
12 it from these documents here.

13 So the other thing I did was that the
14 pressure dropped in the San Andres from, at least from
15 this report, from 1527 to 1245. So this gave me an
16 idea of what might be going on in terms of the
17 physics, and this is before I built the model.

18 Q. What's shown on this slide?

19 A. Okay. If you going to fall asleep, fall
20 asleep later, but pay attention to this slide, okay,
21 because this is really important.

22 Now, the way I figured out what was
23 going on in this reservoir, was I said, let's look at
24 1987 and let's look at the cumulative water-oil ratio
25 of all producing wells prior to waterflooding. Once

1 there's waterflooding, everything gets mixed up,
2 right?

3 And so what you're seeing on the right
4 side here is, I've got highlighted squares over the
5 wells that have abnormally high water-oil ratios, some
6 as high as 13. A lot of these wells are, you know, 1
7 or less.

8 Okay. And now, if you look, let's
9 look -- I guess I don't have a pointer, huh? You can
10 point for me?

11 Q. I can point for you.

12 A. Okay. So, if we look at the top set of
13 squares I have over there on the right-hand side, what
14 I've displayed on the map on the right shows the
15 average thickness of the reservoir. In that area, the
16 thickness of the reservoir is somewhere between 60 and
17 100 feet.

18 And if we look over on the left in that
19 same square volume, we've got, I don't know, 20 or 30
20 wells. And they're all low water-oil ratio wells. In
21 other words, it's the thinnest part of the reservoir,
22 and we're not seeing any water production or very
23 small water production.

24 Now, keep in mind, if there is an
25 aquifer, a significant aquifer attached to the

1 Grayburg, you should see that water coming in and an
2 edge water drive from left to right. And the wells on
3 the left side of this reservoir, you could say the
4 west side of this reservoir, should be the wells where
5 the water hits first. Now, obviously there could be
6 some water coming up from the bottom as well, but this
7 is a very big aquifer that's coming into this
8 reservoir, the Grayburg, so it would have to come in
9 not just from the bottom, but from many miles to the
10 west as well. You're not seeing that. So this shows
11 that there's no evidence of a strong aquifer attached
12 to the Grayburg itself.

13 Now, if you look at the second set of
14 boxes, here's an area of the reservoir that's really
15 thick, so we've got somewhere between 525 and 570 feet
16 from the top of the reservoir there, all the way down
17 to the history match water-oil contact. And you can
18 see on the left-hand side there, we've got five wells
19 in that area that produce extremely high water-oil
20 ratios and, I don't know, probably 40 or 50 wells that
21 produce very low water-oil ratios. So that's
22 inconsistent.

23 If you're in the thinnest part of the
24 reservoir, in the deepest part of the reservoir, you
25 should see more water. And similarly, if you're high

1 on structure, you should see, you know, water coming
2 up into all the wells in that area, not just some of
3 those wells.

4 And I would challenge anyone, if you're
5 not sleeping tonight, I suggest that you, if you can
6 get the production records, put the cumulative
7 water-oil ratio map -- excuse me, put the cumulative
8 water-oil ratio for all the individual wells, put that
9 in Excel, and then look at the depth of the deepest
10 perforation at all 638 wells and then plot it and see
11 if there's a correlation.

12 Because there should be a correlation
13 that the deeper wells, the deeper in the reservoir and
14 the thinner part of the reservoir, they're closer to
15 the aquifer, if there's bottom water drive, it's going
16 to come up much faster in those wells or deeper in the
17 reservoir, and you'll see a clear trend. And I don't
18 think you'll see that.

19 So, actually, the real -- so these
20 highlighted wells that you see here, these are the
21 wells where I put the leaks in, and this is basically
22 the way I constructed the model, assuming these were
23 the fracture locations. Okay?

24 Q. What's shown on Exhibit M-4.

25 A. Okay. So the first thing I said I wanted to

1 do is run the model and see even if it's feasible that
2 we could even come close to a history match, just
3 putting the Grayburg in with a -- I've actually got a
4 weak Goat Seep Aquifer attached here as well, and see
5 if I could just fit things.

6 I actually got a model that could fit
7 the oil, the gas and sort of the pressures. Okay?
8 The problem with this model was, it was very low
9 versus the historical cumulative water production that
10 you see here on the right.

11 And so, as a result, the conclusion was
12 that I had to have another source of energy coming
13 into the Grayburg itself. And so, you know, I had
14 to -- I didn't -- it had to come from somewhere.

15 Q. What's shown on this slide?

16 A. Okay. Keep in mind this is a semilog plot
17 to just kind of accentuate what's going on. So the
18 squares that are purple here, they show the historical
19 production. We actually only knew the cumulative
20 production, I forgot what date that was, from 1938 to
21 sometime -- I have to figure out what that was. But
22 that second point there is basically where we started
23 to get individual well rates on the wells and on the
24 field.

25 But what you do see in 1986, what I'm

1 showing here, is the rate we have from the match model
2 that shows the water rate that we're getting from the
3 Grayburg and the Goat Seep by itself, and that's about
4 3600 barrels a day. And that's about an 8400 barrel
5 of water per day shortfall versus what we had in terms
6 of historical production. And after that 1986, that
7 jump-up is from the waterflood.

8 Q. What's shown on Exhibit M-5.

9 A. Okay. So, you know, as I probably said, how
10 did we get the matched model? This is a very -- even
11 though we're just trying to do a field match and get
12 the water leaks, with this much production and having
13 a potential leak between the Grayburg and San Andres,
14 it's a very difficult model. I mean, I've done 350
15 models plus in the last 20 years, and this one might
16 be at the top of the list. So it was a really hard
17 history match.

18 There's a lot of moving parts. You have
19 to get the aquifer characterized properly. You have
20 to get this leak characterized properly. You've got
21 these hundred leaks between the two reservoirs. So it
22 was very challenging.

23 But we managed to finally get a leak --
24 excuse me, a good fit. And we fit field-wide
25 historical production and saltwater disposal volumes.

1 And we also fit historical pressures.

2 Q. What's shown Exhibit M-6?

3 A. Okay. So this is a field-wide match. You
4 can see oil-water-gas match, the water injection and
5 so forth. It's actually showing a forecast that's
6 well into the future, so you can kind of ignore that
7 for now. And this just shows some of the parameters
8 that we had in the match model.

9 The gas-oil ratio in that match model is
10 375. It's a little bit less than what came out of a
11 1990 working interest owners report, which was 423.
12 The B sub o that they had and they've been carrying
13 for the original oil was 1.2. And I'm guessing that
14 423 and that 1.2 was from very early data, and I don't
15 know how accurate it was. But because I have a
16 slightly lower GOR, I end up with slightly lower
17 B sub o, okay; a little less gas and solution, B sub o
18 a little less.

19 These are starting pressures we have for
20 the Grayburg and San Andres shown here. You can see
21 our match of 1986 pressures. San Andres is
22 essentially 1245. The Grayburg is somewhere -- and
23 there's a variable pressure everywhere in this
24 reservoir. It's not like it's one point. Okay?

25 You take a reservoir that's 17 miles

1 from north to south, it's not a box. It's anything
2 but a box. But yeah, the pressures range from like
3 300 to almost 600 pounds.

4 And I actually tried to create a
5 customized permeability field and kind of move,
6 essentially, the net to gross around between these
7 different areas so that I could better match the
8 pressures in these three respective leases and the
9 fluid flow between the leases as well.

10 And take it one step further, we match
11 the pressures in 2024 for the Grayburg and the
12 San Andres, as you're seeing here on these two
13 respective wells.

14 And one of the neatest things about this
15 model actually came out of Larry Lake's testimony. In
16 his testimony he said that currently the San Andres
17 Aquifer is building up between 4 and 10 psi per
18 million barrels of water injected. And, you know,
19 when I had this history match and put all this thing
20 together, I didn't have this information. I went back
21 and looked at my model and I was building up about 4
22 psi on average per billion barrels of water injected
23 currently.

24 So that gave me some confidence that, if
25 anything, the model's a little conservative, because

1 if it's 4 to 10 psi, the 10 is going to correspond to
2 areas in the San Andres that are tighter, where the
3 pressure is building up faster.

4 And then over here on the right, you can
5 see how complex this thing is. You've got water
6 that's come into the top of the formation here after
7 we've displaced water. In the middle of formation,
8 we've got some oil and water mix. And this is just
9 looking at it from the top view. And down here on the
10 bottom, of course, that's the AGU. And then you see a
11 2D representation.

12 Q. Dr. Buchwalter, just so it's clear, Dr. Lake
13 is one of Goodnight's experts, correct?

14 A. Yeah. I'm sorry.

15 Q. That's okay.

16 A. I'm sorry that he's not with us. I like
17 Larry Lake. He told me one time, he said -- you know,
18 I was asking, because we have a geostatistic package
19 in our software, and I asked him, I said, you know,
20 "Larry, all we use is Kriging when we're developing
21 the maps here, and you've got all this fancy
22 geostatistics. Can you explain, you know, how do you
23 use all this fancy stuff?"

24 You know what he told me? He just
25 smiled and said, "Jim, there's a lot less here than

1 meets the eye." They had some licenses there at the
2 time for the students. Go ahead.

3 Q. And what's shown on this slide, please?

4 A. Okay. Now, this slide is -- what is it
5 showing? It's showing my relative permeability
6 curves. Okay?

7 Now, the first thing I would say is
8 these are not relative permeability curves that
9 would -- they're indicative of the dual-porosity
10 system, which is what we have here. Okay?

11 These are relative permeability curves
12 that were required to come up with a history match of
13 a single-porosity system.

14 And I know Dr. Ampomah, yeah, you were
15 wondering about this yesterday, so I decided to put
16 some slides here and just kind of explain our workflow
17 and why we did what we did.

18 Okay. What is this?

19 Q. Oh, do you want me to...

20 A. Yeah, let me see. Here's some adjustments
21 that we made, and it's just in terms of how much
22 production we've had up here on the top. We produced
23 about 150 million barrels primary. That's about
24 16 percent recovery factor. The water-oil ratio at
25 that time was 1.

1 Currently, in water flooding, we're at
2 185 million barrels of cumulative production, and our
3 cumulative water-oil ratio is 10, and we're at about
4 20 percent recovery factor. If we run this forward to
5 2038, the recovery factor is about another 7 million
6 barrels.

7 And as far as the relative permeability
8 adjustments we made in the model, there's 30 percent
9 water saturation reported in a 1990 report. We're
10 using 35. The residual saturation that we're using is
11 slightly different. We're using 21 versus 25. It's a
12 little different. Of course, these parameters were
13 made so we could come up with a good history match.
14 And then the data that was in that 1990 report here is
15 shown on the bottom.

16 Okay. Next slide, please.

17 Q. What's shown on this slide, which is, "Dual
18 Porosity Modeling Experience."

19 A. Yeah, I mean, I don't want to brag, but when
20 I was at Texaco, I was supporting in Texaco, we had a
21 simulator that we used to represent fracture
22 simulation in the North Sea, and we were the first
23 company to actually incorporate anywhere in the world
24 the gravity contribution, which I'll talk about. We
25 had studies in different fracture reservoirs around

1 the world as well.

2 This is primarily for the -- this isn't
3 for the attorneys. This is for the reservoir
4 engineers. Next slide, please.

5 Okay. Now, we have a single-porosity
6 model, and I will concede that those relative
7 permeability curves in a perfect world are not the
8 right relative permeability curves. We have two sets
9 of relative permeability curves, don't we? We have a
10 relative permeability curve for the matrix and a
11 second one for the fractures.

12 And here's the problem with starting
13 with the dual porosity model. You double your number
14 of unknowns. You need to know the matrix block size,
15 and there's a gravity contribution, which I show over
16 here on the right, that you don't have in the
17 single-porosity model.

18 So, for example, if we've got oil in the
19 fractures and -- yeah, if we've got water in the
20 fractures and oil in the matrix, a 5-foot block and a
21 .1 psi per foot difference, what we have, essentially,
22 is we have a gravity contribution that's acting over
23 the box itself.

24 So, if I pretend this is my fracture and
25 I poke a hole in it, what happens? The water comes

1 out, right? Well, that's the same thing that I'm
2 showing here. Okay? And the other thing you have is
3 you have a duplicate set of different properties. You
4 have to characterize both the fracture and the matrix
5 porosity, the fracture and the matrix relative
6 permeability curves. There's something we call
7 relative capillary pressure that needs to be
8 characterized. And then permeability for both the
9 fractures and the matrix. Okay? So, there's a lot of
10 unknowns if you start with the dual-porosity approach.

11 So, what we use is a single-porosity
12 approach to figure out -- basically, to simplify this
13 and then switch it to dual porosity, if need be.

14 MR. RANKIN: Mr. Hearing Officer, I have not
15 seen these slides. This is all new information. I
16 don't even know what to say. I did have a chance to
17 depose this gentleman, but I have not seen any of
18 this before. And these are not exhibits, it's not
19 testimony.

20 This is supposed to be a summary. We're
21 now into 40 minutes with what was supposed to be a
22 summary of his testimony. This is all new, all new.

23 HEARING OFFICER HARWOOD: Ms. Hardy.

24 MR. RANKIN: I mean, you know, I have a
25 couple -- I mean, I have a lot of questions for him,

1 so I don't know how to proceed here, other than just
2 to raise it as an objection, because it's patently
3 unfair to have a 40-minute narrative of information
4 that wasn't provided to us.

5 The intent from the prehearing order was
6 to provide us with the direct testimony so that we
7 could then evaluate the input, you know, the
8 assumptions, the inputs, the parameters of all -- and
9 the conclusions of all these witnesses. And now
10 we're getting something different and new the morning
11 of the hearing, at a time when we were supposed to be
12 getting a summary only of the testimony that was
13 provided in writing.

14 HEARING OFFICER HARWOOD: I'm not seeing --
15 the document we're looking at, I'm not seeing it in
16 Subsection M of the exhibits. Is it somewhere else?

17 MS. HARDY: Mr. Examiner, I'm happy to
18 respond.

19 So these -- some of these slides are
20 background slides that have been provided. They're
21 demonstrative exhibits. They are not new. I mean,
22 the slides are new, but the information is from the
23 exhibits that we've included; they're more detailed.

24 And we've provided them to address
25 Dr. Ampomah's questions, largely, that have come up

1 during the hearing, because it seemed that this was
2 information that he wanted.

3 HEARING OFFICER HARWOOD: It's not really a
4 question of whether they're new or not. It's a
5 question of whether or not they've been provided to
6 Mr. Rankin so that he's not being sandbagged with new
7 information that wasn't provided. Have these been
8 provided to Mr. Rankin or the other parties?

9 MS. HARDY: These are demonstrative exhibits
10 to explain Dr. Buchwalter's testimony.

11 HEARING OFFICER HARWOOD: Okay.

12 MS. HARDY: Most of them have been provided.
13 The ones that are not marked as exhibits have not.
14 But I will note that Mr. Rankin deposed
15 Dr. Buchwalter for many hours and obtained the basis
16 for his opinions.

17 HEARING OFFICER HARWOOD: I still don't
18 think it's fair to present demonstrative exhibits
19 that have not been shared with the other parties.

20 MR. RANKIN: I guess if I -- if I had a -- I
21 mean, you know, obviously, as Dr. Buchwalter
22 testified, this is one of the more complex models
23 he's ever put together. Okay?

24 And if I at least had a chance to review
25 and understand how the information now he's saying

1 he's relying -- I mean, obviously this is information
2 he thinks is really important. Okay? And as a lay
3 attorney, who is supported by his experts, you know,
4 I did my best to evaluate and understand what he
5 thought was important during the deposition.

6 But if I had understood, you know, at
7 least, you know, this morning, what maybe he thought
8 was really important, I would at least not been taken
9 totally flat-footed by this.

10 But I don't know, you know, how to
11 proceed. Because I would like to be able to review
12 these slides and have at least an understanding of
13 the import of them relative to his updated model now,
14 because he has, my understanding, substantially
15 updated significant portions of the model in his
16 rebuttal. And that's fine. We pointed out lots of
17 issues and problems with it during the deposition,
18 and he's adjusted it.

19 But I would like to have the opportunity
20 to actually review these slides before I have to
21 undertake a cross-examination.

22 MR. MOANDER: And, Mr. Hearing Officer, I
23 just took a look through the deposition and rebuttal,
24 just for, like, this slide. And I'm not making any
25 accusations here, but I'm not seeing gravity physics

1 show up in that rebuttal, which seems to be a term of
2 art, as far as I'm hearing today.

3 Perhaps, and I'm a fan of this, an offer
4 of proof of some form that this has been disclosed
5 would quell any dispute here so we can keep moving.

6 HEARING OFFICER HARWOOD: Well, I mean, my
7 concern is unfairness. And, you know, it seems to me
8 that it's -- demonstrative exhibits or not, if
9 they've not been provided to the other parties, I
10 don't think it's fair to be questioning the witness
11 about demonstrative exhibits that have not been
12 provided to the other parties.

13 So, the only solution I can think of,
14 unless there -- how many of these are there?

15 MS. HARDY: There are only a couple -- there
16 are only a few. Most of our discussion focuses on
17 actual exhibits. These were provided as, really,
18 sort of background today based on the questions of
19 the Commission of other witnesses.

20 HEARING OFFICER HARWOOD: So, Mr. Rankin,
21 how much -- when she says "only a few," we'll assume
22 it's less than half a dozen. How much time do you
23 think you would need to review them before you'd be
24 prepared for cross-examination?

25 MR. RANKIN: Well, I mean, I think that

1 there's a few questions I could ask, I think, that
2 would -- I mean, let me put it this way. I would
3 like to have, you know, I don't know, a couple hours
4 to sit down with my experts and just, like, evaluate
5 what he's saying in these slides, because I just --
6 you know, I'm a layperson.

7 Maybe one of the reservoir engineers
8 could say, "Okay. I could get through this fast and
9 understand what he's doing." But I need to
10 understand a little bit before I can engage in
11 meaningful cross-examination exactly how this relates
12 to what he said in his initial testimony and what
13 he's saying now in his rebuttal, written testimony.
14 I just need a little bit of time.

15 HEARING OFFICER HARWOOD: Well, and that
16 wastes the Commission's time. I mean, that's the
17 problem. You know, that's the problem with surprise
18 stuff.

19 I don't know how much of this was
20 covered in the witness' deposition, how much of the
21 information is actually new versus how much is, you
22 know, just a demonstrative aid to stuff that has
23 already been covered with the witness.

24 But that's a risk that you bear when you
25 present demonstrative exhibits that haven't been

1 shared with the opposing counsel.

2 Mr. Rubin.

3 MR. RUBIN: Mr. Harwood, I do echo the
4 sentiments, and I do think it is patently unfair to
5 include demonstrative exhibits that have not been
6 disclosed. Pictures are worth a thousand words. To
7 the extent that the substance of these demonstrative
8 exhibits were part of what has been disclosed in
9 depositions, that's fine.

10 But I would strongly recommend to the
11 Commission that any exhibits that have not been
12 previously disclosed, even if they're, quote,
13 unquote, demonstrative, should not be presented
14 today.

15 MS. HARDY: And that's fine. I mean, I'm
16 happy to proceed to the slides that are exhibits. I
17 think that these are matters that will be asked about
18 by Dr. Ampomah and probably Mr. Rankin during the
19 questioning of Dr. Buchwalter. So we were trying to
20 head some of that off. But that's fine. We can go
21 ahead with the slides that are exhibits.

22 HEARING OFFICER HARWOOD: Well, you know, I
23 think -- and maybe I can suggest that on a break, you
24 share these demonstrative exhibits with Mr. Rankin.
25 If he chooses then to use them in cross-examination

1 then the fairness problem is solved.

2 MS. HARDY: Sure. That's absolutely fine.

3 HEARING OFFICER HARWOOD: But for now,
4 they're not -- don't be showing the witness
5 demonstrative exhibits that haven't been provided to
6 the parties.

7 MS. HARDY: Understood.

8 BY MS. HARDY:

9 Q. Okay. Can you describe what's shown on this
10 slide, which is Exhibit M-7?

11 A. Okay. If you look at the model, essentially
12 we have -- in order to get this thing to fit, you have
13 to have, essentially, a small -- it doesn't seem
14 small, it's 1.5 billion barrels, the Penrose,
15 Grayburg, Goat Seep Aquifer, that's the fit that we
16 established in order to come up with the history
17 match. And the San Andres, by comparison, is 157
18 billion barrels.

19 So basically, 99 percent of this aquifer
20 contribution is really -- potentially that we're going
21 to get is coming from the San Andres.

22 Now, if I make the -- attach an aquifer,
23 as I'll show you, to the Penrose, Grayburg, Goat Seep,
24 and make it larger, then I lose the history match of
25 all the wells on the western side of the structure.

1 Essentially, this is what we call edge
2 water drive on the right side here. You can see these
3 colored lines are depth lines, and you can see how the
4 water is moving up and following those depth lines.
5 And that's essentially what we call edge water drive.

6 And then on the left here, you can kind
7 of see the initial ternary diagram for this bottom of
8 the Grayburg, and then you can see it in 1986.

9 Q. And what's shown on Exhibit M-9.

10 A. Okay. This shows -- what you're seeing on
11 this exhibit here, on the far right-hand side, you can
12 see the reservoir that we have itself for the
13 Grayburg, Penrose, and it's cut off a little bit of
14 the Goat Seep, Grayburg Aquifer, but it's the top view
15 of the reservoir.

16 And this gray area out to the west
17 represents the aquifer that we've added to this model.
18 And what we do is, we go into the aquifer, we step the
19 cells off -- out by a factor of 2, so we get the
20 physics properly represented.

21 And then on the edge here in the
22 forecast, one of the forecasts, is we added 11
23 spillover wells to say, well, what if in the future
24 when we run these forecasts, what happens if we put
25 220,000 barrels of water per day, of water disposal

1 well out here on the edge, how would that affect the
2 San Andres Aquifer and then the leak up into the
3 Grayburg and so forth?

4 Q. And what's shown on Exhibit M-10?

5 A. Okay. This basically shows you what's going
6 to happen in the future. And I wish I could show you
7 why, a fig. picture of it, but I won't be able to.
8 But I'll describe it, nonetheless.

9 So over here on the left-hand side, we
10 show the saltwater disposal rates, and we can see it
11 jumping up to 350,000 barrels a day, and that's the
12 case where we had the new saltwater disposal wells.
13 So we've got two curves that jump up to that point,
14 and that's the blue curve, and then the red curve.

15 The blue curve corresponds to a case
16 where, in the future, we take the history match model
17 from 2025 forward and we turn on these 220,000 barrels
18 a day disposal wells. Okay.

19 And then the -- if we take the -- let's
20 see. The red curve has got the new saltwater disposal
21 wells, with no spillover, the blue curve has got the
22 spillover, and then we've got these dash curves. The
23 dash curve that's green has got the existing saltwater
24 disposal wells in the future with no spillover. That
25 shows what the rates will be in the future. And the

1 orange dash curve shows what will happen with the
2 existing wells with the spillover.

3 Now, you would think that if you crank
4 up and add these new saltwater disposal wells, we've
5 drastically increased the water that's going into the
6 San Andres. Okay? So you would think that all these
7 cases would produce different results as far as the
8 water influx in the Grayburg, but over here on the
9 right, we can see how much water is going into the
10 Grayburg. In all these curves, it doesn't matter
11 which case you run, they all go up to about 50-plus
12 thousand barrels a day.

13 Intuitively, it doesn't make sense,
14 right? So we have a higher injection rate. In the
15 future, we should see a higher leak and higher
16 disposal rate into the Grayburg. And let me
17 explain -- I had a figure, but I can't show it. But
18 let me explain why this happens.

19 What happens, it's really cool, it's one
20 of the coolest things about this whole study, is when
21 you inject that water, that aquifer goes up
22 30-something miles, and what happens is, you're
23 injecting water so fast, that within the next three
24 years, under the -- under the San Andres part that's
25 underneath the Grayburg, it's building up about 2700

1 pounds. And, essentially, at that point, you can't
2 inject any more water because if you did, you'd frac
3 the rock. I gave it a 3,000 pound maximum injection
4 pressure.

5 So from that point forward, if you look
6 at the model in 2038 -- 2028 versus 2035, the pressure
7 in the San Andres under the Grayburg is essentially
8 the same. And what's happening is the water now is
9 pseudo-steady state. It's either moving up at 50,000
10 barrels a day, or it's actually moving out into the
11 aquifer itself.

12 So essentially what's happening is we're
13 injecting water at such a high rate that we very
14 quickly reach pseudo-steady state underneath the
15 Grayburg and we're at 2700 pounds, and from that point
16 forward -- it's a huge aquifer. I mean, it's got the
17 capacity to take a tremendous amount of water, 159
18 billion barrels. And if we say, hey, we can build
19 this up to 3,000 pounds, that's great.

20 So technically, from an intuitive
21 standpoint, you think you can get all that water in,
22 but you can't because it takes a long time for that
23 water actually to move from where it is in 2028 to
24 move out that 33 miles. Until that water moves, and
25 they have water movement, basically what creates that

1 pressure wave.

2 Now, the other thing you'll notice that
3 this saltwater, in the future, what happens is the
4 leak rate increases about 50,000 barrels a day into
5 the Grayburg and very quickly within the next few
6 years.

7 Can I get back to the last slide?
8 There's one other point I wanted to -- oh, that's
9 okay. Go to the next slide.

10 Q. M-11?

11 A. Yeah. You weren't supposed to show that.
12 Sorry.

13 Q. I'll skip through it.

14 A. If anybody saw that, it was a really good
15 slide.

16 Okay. Anyhow, let's talk conceptually
17 about what's happened up to today. Well, up to today,
18 what's happened is we ejected 573 million barrels of
19 water, saltwater disposal. But at the same time,
20 about 77 percent of that water's been used to create
21 our waterflood in the Grayburg. So, really only a
22 little more than 20 percent of the saltwater injection
23 water has net been injected into the San Andres. So
24 really we haven't seen a lot of water coming in
25 through these leaks up to now, partly due to this.

1 Now, in the future what's going to
2 happen is that the pressure is going to build up in
3 the San Andres and the difference in pressure between
4 the San Andres and the Grayburg is going to become
5 greater. At the same time, we're not going to have
6 the benefit of that water-supply well. So, what's
7 going to happen in the future is we don't have the
8 water-supply well production to offset that injection,
9 and at the same time, we're building up this pressure
10 difference between the San Andres and the Grayburg.
11 The net result is you're going to have a rapid
12 increase in the water that's moving into our Grayburg
13 Reservoir.

14 Next exhibit, please. Don't show that,
15 please. Don't show that either.

16 Q. What about Exhibit M-12, please?

17 A. And they were all just demonstrative things
18 to really just show what I just said. But
19 nonetheless, you just have to trust me.

20 So what we did after the hearing, there
21 was a lot of concern that, hey, maybe there is an
22 aquifer in the Grayburg somehow and we have a seal
23 between the Grayburg and San Andres. But the first
24 thing we did is, I had a slight mistake in the model,
25 I wanted to add a couple of saltwater disposal wells

1 that you see here, so I made a pressure correction in
2 the model and adjusted the match. And I think you'll
3 see it on the next slide.

4 Q. And what is shown on Exhibit M-13?

5 A. Okay. This just shows the new match. It's
6 basically the same match I showed you on a previous
7 slide. So we've added the saltwater disposal wells.
8 We've adjusted starting pressure. We come up with a
9 good match as far as the pressure on 2024. And over
10 on the right here, you can see the match on the oil,
11 water, gas and so forth. So it's a good match.

12 These changes were not big changes in
13 the model, but they did improve it slightly.

14 Q. What's shown on this, which is marked here
15 as M-14?

16 A. So first thing I said is, well, let's put an
17 aquifer on the Grayburg. Let's seal off the
18 San Andres and see what happens. And this is the
19 latest model that's got these couple additional wells
20 put in there as well for saltwater disposal.

21 And you see we've got an aquifer going
22 out basically 33 miles into the San Andres -- excuse
23 me, in the Grayburg.

24 Q. And what about this slide?

25 And I want to note, it's my

1 understanding there may be just a discrepancy in the
2 exhibit numbers with what was filed. So this is M-15
3 on this presentation, but I believe it's M-16 in your
4 filed exhibits. Because I think our cover page was
5 marked as an exhibit in the filing. So just wanted to
6 make sure that's clear.

7 MS. HARDY: So this is M-14? Okay.

8 In the filed exhibits, but it's the same
9 document.

10 A. So all I tried to do here is, let's put an
11 aquifer on the Grayburg and see what happens and see
12 if it's feasible.

13 If you look at these curves, hey, we're
14 fitting the oil, we're fitting the gas, we're fitting
15 the water. Everything's good, right? So at least on
16 a field-wide basis it looks okay.

17 This aquifer, once again, goes up about
18 33 miles. This aquifer is actually much smaller than
19 the aquifer I needed for the San Andres because now
20 the aquifer -- you've got many, many wells on the
21 downdip side of the Grayburg, and so you've got all
22 these wells are soaking in water instead of just these
23 few little leaks or these hundred or so leaks that we
24 have.

25 So as a result we have a much smaller

1 aquifer to match the water production because we're
2 just trying to fit the production. This isn't really
3 at this point a history match. It's just a what-if.

4 Q. And what's shown on this slide, which is
5 marked here as M-16? But I believe in your filed
6 rebuttal it's M-15.

7 A. So what you see here on the left, in the
8 bottom, is I've got a number of wells on the left-hand
9 side in yellow. And all those wells that are in
10 yellow, I call that a group. And so I add up the
11 production for the group and I compare that to
12 historical water production on a field-wide basis.
13 And in this plot on the left side, on the bottom, you
14 can see now, because we've got water not just hitting
15 these hundred or so wells where we have these leaks
16 that are small to large, depending on which well we
17 selected, we've got all these wells on the west side
18 of the reservoir where the water is hitting due to
19 edge water drive. Okay?

20 As a result, we're making far more
21 water. So even though we're matching the field
22 production, we're making far more water, and, of
23 course, if we just look at San Andres by itself, what
24 happens in the -- even though it's a huge aquifer, it
25 still builds up pressure to 22, 21 psi on 11/8/24

1 because you're still injecting that water, it takes
2 time to move out. And from a physics standpoint, it
3 just hasn't had enough time to move out before it
4 builds up pressure, so you have those two problems.

5 Q. And what's shown on M-17, which is M-16 in
6 your filed rebuttal?

7 A. Okay. So this is showing another match
8 where we said, well, let's have the Grayburg in the
9 San Andres, let's create what we call -- I'll call it
10 a combined aquifer.

11 So we've got water coming from the
12 bottom, water coming from the Grayburg, is there some
13 combination there that would make sense? And, once
14 again, it's the newest model. And I sent the aquifer
15 the same distance in both models. I adjusted that
16 distance until we came up with the history match.

17 Q. What's shown on M-18, which is M-17 in your
18 filed rebuttal?

19 A. Well, this shows the Grayburg Aquifer in
20 blue here. And the gray area would have been the
21 extent of the San Andres Aquifer. As you can see,
22 it's a much smaller aquifer, but once again, the
23 aquifer is going out in both the Grayburg and the
24 San Andres in the same distance.

25 Q. And what's shown on M-19 here, which is M-18

1 in your filed rebuttal?

2 A. Okay. So once again we've got a good fit of
3 the production on the field-wide basis, everything
4 looks reasonable. But it -- I'm sorry, I'm getting
5 ahead of myself.

6 Q. And what about M-20, which is a M-19 in your
7 filed rebuttal?

8 A. I mean, it's got the same problem, right?
9 We've got edge water drive hitting all these wells on
10 the deeper part of the Grayburg, on the west side.
11 We're never going to get a fit, and so it's just not
12 going to work.

13 Q. And, Dr. Buchwalter, can you please
14 summarize your conclusions.

15 A. Okay. So we have 87 years of historical
16 production pressures. As I've said earlier, if you
17 have a model with this much data, you can establish
18 the relationship between the average pressure -- the
19 average pressure -- you can use all these pressures to
20 establish the initial volumes of oil, water, gas you
21 have in these reservoirs. You can also come up with
22 good estimation what this leak is. And I think these
23 forecasts are, you know, quite reasonable with the
24 data we've got.

25 The original oil in place is about 900

1 million barrels in both reservoirs, the Penrose,
2 Grayburg and then the San Andres ROZ.

3 I didn't mention that, but the ROZ is in
4 here as well, sits right below the Grayburg. It's in
5 the top. We have three equal layers in the
6 San Andres. I think I got 500 -- maybe it's 500
7 millidarcies permeability in there as well.

8 As far as future forecasts, it almost
9 doesn't matter whether they drill the saltwater
10 disposal wells or not; either way, very quickly in the
11 next few years, we're going to have a leak of about
12 50,000 barrels a day. And unfortunately for them,
13 their saltwater disposal rate is going to tank.

14 And then we did some alternative matches
15 that, you know, just didn't work putting an aquifer
16 into the Grayburg.

17 And the one thing I'm going to leave
18 with you to kind of keep in mind is that, you know,
19 per Larry Lake's testimony -- I guess that was a
20 Freudian slip when I said he was working for us. But,
21 you know, he said in his testimony, he said the
22 aquifer is increasing 4 to 10 psi per million barrels
23 injected. And, you know, we're confirming the 4 in
24 our model after the fact.

25 And let me just leave you with a couple

1 comments and just my impression of how you should take
2 all these slides and just think of what we've done.

3 I mean, as I said earlier, what the
4 simulator does is take all the pieces together and
5 look at it as a puzzle. And, you know, a lot of
6 times, I think when you look at all the pieces --
7 they're all important; I mean, I'm not denying that.
8 You need to put all these pieces in as best you can to
9 get the best answer possible.

10 But, you know, I would say if you're
11 looking at this, if you look at all the little pieces,
12 it's a lot like trying to look at the Superdome and
13 it's the lights are out and you turn on a flashlight,
14 you look in one place, you see a seat, another place,
15 you see the field. The nice thing about the simulator
16 is it looks at the model from 50,000 -- big picture,
17 50,000 feet. And then you can see how all those
18 little pieces may impact what's really going on this
19 reservoir, and you look through pieces.

20 You know, for example, there's got to be
21 water coming up from the bottom. It's got to be a
22 substantial amount of water. And there's no way you
23 can put it in the Grayburg Aquifer unless you can
24 extend it down thousands of feet.

25 And, you know, the model is not perfect.

1 I mean, I could work on this model for the next two
2 years. But is it good enough to match the initial
3 volumes in the reservoir and to match the production
4 changes of time and the pressures? It does a really
5 good job. So I think for the purposes of determining
6 this leak between the San Andres and the Grayburg, I
7 think it's a really good model, and for doing
8 forecasts at least on a field-wide basis.

9 If you ask me, "Do you have a perfect
10 match on this well or that?" I don't. You know, it's
11 pretty good, at least in groups of wells and so,
12 forth, but it's not perfect, and it wasn't designed
13 for doing that. So that's just about all I've got to
14 say.

15 Q. Dr. Buchwalter, is the takeaway from this,
16 based on your model, that fluid is migrating from the
17 San Andres into the Grayburg?

18 A. Yeah, I mean, I think it really is. I mean,
19 I've seen it in testimony, there's some wells that
20 were completed down into the San Andres and they're
21 probably making some water. Okay? I don't deny that.

22 But I would say you can identify the 50
23 wells that have the highest water-oil ratio in 1986
24 and see how many of those wells were actually
25 completed down in the San Andres. And if it turns out

1 that those are the -- every well, the top 50 that are
2 making high water-oil ratios, if those are all
3 completed in the San Andres, then, you know,
4 Goodnight's got a good case. If not, then, you know,
5 that water's coming up through a fracture network.

6 Q. Dr. Buchwalter, is it your opinion to a
7 reasonable degree of scientific probability, based on
8 your modeling, the water is migrating from the
9 San Andres into the Grayburg?

10 A. You know, I don't see how it could not be,
11 to be honest.

12 Q. And, Dr. Buchwalter, a large part of the
13 discussion in this hearing has focused on detailed
14 information regarding the top picks of the formation
15 and interpretations and logs and petrophysical data.

16 Would these different interpretations
17 change your match model and forecast results?

18 A. You know, actually, I don't think it's going
19 to change it too much. I mean, you can change the
20 picks here and there. It's got to change a lot. You
21 got to put a large aquifer on the bottom of the
22 Grayburg somehow. So unless that's -- you can put an
23 aquifer going down, you know, a thousand feet and then
24 put the San Andres on top of it, you might have an
25 argument. But I don't see how you could otherwise.

1 Q. And my last question, Dr. Buchwalter. As
2 you've explained, you've integrated all the parts of
3 the puzzle into your model. And has Goodnight
4 prepared any model to support their argument that this
5 water influx is not occurring?

6 A. It's a really good question. I wish I could
7 answer it. I don't -- I don't know why they haven't.
8 I can't explain why they wouldn't.

9 But yeah, if you don't have a -- you
10 know, a lot of things are interpretation. What I do
11 is I just take the data and you give me ranges and I
12 get the fit. You give me bad data, I'm going to give
13 you bad answers. Right?

14 But yeah, there's a lot more details we
15 can put in this model. I can see that. But for the
16 answer it was designed to -- for what it was designed
17 to answer, I think it's very adequate.

18 MS. HARDY: Thank you. Those are all my
19 questions.

20 HEARING OFFICER HARWOOD: All right. Let's
21 take our mid-morning break and come back at ten
22 minutes.

23 MR. RANKIN: Mr. Hearing Officer. I cannot
24 agree to proceed with the cross until I have a chance
25 to review the additional slides that I didn't see.

1 And we just went through more than an
2 hour of a summation of testimony, especially his
3 rebuttal was six pages, that was it. And there was a
4 lot of stuff here.

5 I mean, he said, you know, point blank
6 that -- we skipped through one or two slides, he
7 said, "Those slides were just to show what I just
8 said." Okay? I was taking notes fiercely to
9 understand what he was saying.

10 I need a little bit of time to confer
11 with my experts, to understand what he said today,
12 how it relates to what was in his testimony, what we
13 understood was in his testimony previously, how it
14 relates to what was in his deposition. I cannot
15 agree to go forward without having the opportunity to
16 see those slides and just to confer with my experts
17 to understand how I need to adjust my
18 cross-examination. I cannot agree to it.

19 HEARING OFFICER HARWOOD: How much time do
20 you need?

21 MR. RANKIN: I would like -- I mean, so
22 we're at 20 minutes to 11:00. I mean, frankly, I
23 need to -- I mean, I just need to sit down in a
24 conference room with these guys and figure it out.

25 So I would like -- I mean, I would

1 request that we come back at 1 o'clock and then allow
2 me to proceed with the cross-examination of
3 Dr. Buchwalter.

4 HEARING OFFICER HARWOOD: I think that's
5 fair.

6 MS. HARDY: May I raise one issue? And it's
7 just that Dr. Buchwalter didn't testify about the
8 slides that we didn't show. So I guess I'm sharing
9 them and then there will be cross on them, even
10 though he didn't testify about them?

11 MR. RANKIN: Understood, Dana. If you would
12 exclude the slides that you didn't show, 100 percent
13 agree. The slides that you didn't show, you can take
14 those out, but I would like to see the slides that --
15 everything that you did show, except for the ones
16 that -- you know, it looked like there were four or
17 so towards the end that you didn't show.

18 But I would like to have, otherwise, the
19 complete slideshow so that I can have an opportunity
20 to evaluate what was presented. The hour plus that
21 he gave as a summary that I can't discern what was in
22 his written testimony or not, and I need to
23 understand -- I just need a little bit of time.

24 CHAIR ROZATOS: Mr. Hearing Officer, I
25 actually do have a question for Mr. Rankin.

1 You said you wanted to see the whole
2 slide show, and I understand your thought process
3 behind it, but just so we understand, at least my
4 question, how is the whole slide show going to help
5 you with what was presented to the Commission? Just
6 so I can understand.

7 MR. RANKIN: Yeah, I mean, what I'd like to
8 do is I'd like to drive that slideshow and I'd like
9 to walk through part of my cross to investigate with
10 Dr. Buchwalter what was on -- what he said with
11 respect to the slides. A lot of those were
12 already -- many of them were already in his -- if you
13 just want to send me the slides that were not in the
14 slideshow -- I mean, that we're not exhibits that
15 were in the slide, that's fine. But she'd have to
16 edit it.

17 I'm just suggesting that she send what
18 was presented, excluding the ones that we skipped
19 over after I raised my injection. That way I can
20 just sequentially walk through on a cross basis,
21 like, what he just presented to the Commission.

22 CHAIR ROZATOS: It's not that I'm not -- I
23 don't think you should have it. I'm just asking, if
24 we didn't hear those slides, how does that help the
25 case?

1 MR. RANKIN: No, no, I'm sorry. I do not
2 want the slides that we didn't -- that he didn't talk
3 to. I don't want those slides.

4 CHAIR ROZATOS: Okay. Got it.

5 I apologize Mr. Examiner. It's your
6 call.

7 HEARING OFFICER HARWOOD: No apologies
8 necessary. I would have gone further and said he
9 gets all the slides, just so that -- you know, I
10 mean --

11 CHAIR ROZATOS: Mr. Harwood, if you could
12 also bring the microphone just a little further down.
13 Everybody may not have heard you. But I leave that
14 all to you.

15 MR. RANKIN: I guess, not having seen them,
16 to your point, Mr. Harwood, I don't know what he
17 spoke to that may have been in the slides, so I don't
18 know.

19 I mean, I shouldn't prejudice myself,
20 but if it's something that he spoke to that wasn't
21 presented, then I would like to see that slide. How
22 about that?

23 MS. HARDY: I'm happy to send all of the
24 slides.

25 HEARING OFFICER HARWOOD: Yeah, I don't want

1 to open a door, but there were several times when the
2 witness said, "I wish I could present this," or "say
3 this," or "show this."

4 And in the interest of fairness to your
5 opponent, I'm thinking maybe he should see all of
6 those slides. And if he wants to open that door with
7 slides that haven't been presented, well, there you
8 go.

9 MS. HARDY: I will send them right now.

10 MR. RANKIN: And, Ms. Hardy, maybe if you
11 could just let me know which ones were presented and
12 which ones weren't, that would be helpful as well. I
13 appreciate that.

14 MS. HARDY: Okay. I think I could do that.

15 CHAIR ROZATOS: So, Mr. Hearing Examiner, if
16 I'm hearing it correctly, we're just going to go to
17 break until 1 o'clock, correct?

18 HEARING OFFICER HARWOOD: I don't see any
19 other alternative.

20 CHAIR ROZATOS: Perfect. Thank you all.
21 See you at 1:00.

22 (Recess held from 10:42 a.m. to
23 1:08 p.m.)

24 CHAIR ROZATOS: Good afternoon everybody.
25 We're back. It's a little past 1:00. Apologies for

1 the delay.

2 Can you please mute yourselves if you're
3 on the platform.

4 Just wanted to notify everybody that the
5 legal team for Goodnight did request for an extension
6 of some time. They needed another half hour. So we
7 will be reconvening at 1:30. So for everybody on the
8 platform, we will be reconvening at 1:30. Thank you
9 for your patience.

10 (Recess held from 1:08 a.m. to
11 1:30 p.m.)

12 CHAIR ROZATOS: So we're back on the record.
13 We are on our continuation of the case that we were
14 on this morning between Goodnight and Empire.

15 And out in the audience and on the
16 platform, if you could please turn off your volumes
17 on your electronic devices and mute yourselves, we
18 would appreciate it.

19 We'll transfer it over to Mr. Harwood,
20 who is our hearing examiner.

21 So, go ahead, Mr. Harwood.

22 And here in the audience, someone has a
23 phone or something on. You need to mute it, please.

24 THE HEARING OFFICER: Mr. Rankin, are you
25 prepared for cross-examination of this witness at

1 this time?

2 MR. RANKIN: Mr. Hearing Officer, no, I'm
3 not. And I initiated an effort to confer with Empire
4 counsel and other counsel. I won't be prepared
5 today, but I will be prepared in the morning.

6 And I'm asking that instead of having
7 Mr. Buchwalter stand for cross, that we have, if
8 they're available -- I understand at least one of
9 Empire's witnesses is only available today, and
10 that's Dr. Trentham. So in order to accommodate his
11 schedule and my ability to integrate the information
12 I received today from Dr. Buchwalter, that we defer
13 his examination till tomorrow morning and that we
14 instead take on Empire's other, hopefully, three
15 witnesses this afternoon so that we can then pick up
16 with Dr. Buchwalter in the morning.

17 We're going to have several of our
18 experts go back and work on integrating what we heard
19 from today so that I can further integrate that into
20 my cross for tomorrow. I think that would be -- my
21 sense is that would be the best use of my time and
22 your time as well, because I think it would make my
23 cross much more efficient. And I think it would save
24 everybody time. And that would allow for any
25 prejudice to be resolved between today and tomorrow.

1 THE HEARING OFFICER: Have you conferred
2 with Ms. Hardy on that?

3 MR. RANKIN: I initiated with doing so, but
4 didn't complete it. So I've asked her if that would
5 work for her, for Empire and their witnesses, and I
6 haven't had a chance to complete that effort with
7 her.

8 HEARING OFFICER HARWOOD: Ms. Hardy.

9 MS. HARDY: Mr. Examiner, that does not work
10 for Empire's witnesses. Dr. Buchwalter is planning
11 to travel home tomorrow. He's here to testify. This
12 information was not new. It was more explanation of
13 what Dr. Buchwalter already had in his testimony.

14 Goodnight had a two-hour break to review
15 four slides that were just supplemental slides that
16 were explanatory. So they already have more
17 information now than they would have had if they
18 would have just proceeded with the cross earlier.

19 And so we object. We don't know whether
20 our other witnesses are available right now. The
21 plan was for Dr. Buchwalter to proceed this
22 afternoon, and so that's what we are prepared to
23 do.

24 THE HEARING OFFICER: I'm going to have to
25 defer to the expertise on the Commission to evaluate

1 this, because I'm not qualified to really understand,
2 you know, the depth of the technical issues that were
3 involved in the demonstrative exhibits, whether it
4 warrants what Mr. Rankin is requesting or doesn't
5 warrant it.

6 So, I have to turn it back on -- I'm not
7 trying to pass the buck, Mr. Rozatos, but, you know,
8 it's a technical question more than a legal one.

9 CHAIR ROZATOS: Mr. Rubin, you had your
10 microphone on first, so I'll let you start with what
11 you had to say.

12 MR. RUBIN: Is it feasible that
13 Mr. Buchwalter can appear virtually tomorrow?

14 MS. HARDY: No, I don't think so. He's one
15 of our primary witnesses and I think it's important
16 for him to be here in person and for the Commission
17 to hear from him in person.

18 MR. RUBIN: Because it is hard for us to
19 sort out which one of you is correct as to how new
20 this information is, having not heard it all and seen
21 it all.

22 MS. HARDY: It's not new. I think it's just
23 additional explanation that Dr. Buchwalter would have
24 given verbally, but now Goodnight has the benefit of
25 having depictions of it as well. So I think they're

1 actually better off than they would have been without
2 the information.

3 So, you know, their experts can address
4 it when they testify. But at this point I think it
5 is best to proceed with the cross of Dr. Buchwalter.

6 CHAIR ROZATOS: Before you continue, hold
7 on. I understand. I think this is basically the
8 concern that we were having earlier, right, that the
9 Commission was having. Because we're getting this
10 type of information and this is what's coming over to
11 the Commission as well. And I think it is a concern
12 for the Commission also. I don't have the Ph.D. I
13 know I'm not a -- anything. I don't have a Ph.D.
14 Dr. Ampomah lives and breathes this and he has the
15 concern as well.

16 We heard from you, Ms. Hardy. Thank
17 you.

18 Mr. Rankin, we heard from you. And I
19 know you have more to say. I saw your microphone go
20 on.

21 Mr. Moander, you were ready to say
22 something?

23 MR. MOANDER: So I'm going to renew my
24 suggestion that I think it would clarify the --

25 CHAIR ROZATOS: Wait up, Mr. Moander.

1 If we can make sure that you keep
2 yourselves muted on the platform. It's becoming a
3 problem, so please keep yourselves muted.

4 Thank you, Mr. Moander. Go ahead.

5 MR. MOANDER: OCD would renew its suggestion
6 that an offer of proof of disclosure of the materials
7 should resolve some of this in order to clarify what
8 was disclosed and what wasn't, which would lend
9 credence to potentially either side as to their
10 positions.

11 I did take a look. I did not do a
12 detailed look. I'm not seeing it. I could certainly
13 be wrong. But an offer of proof from Empire that
14 this material in some way, shape or form was
15 disclosed should, like I said, resolve this. So
16 that's a renewed suggestion.

17 CHAIR ROZATOS: I'm going to go through
18 everybody and then I'll come back to you, Mr. Rankin.

19 Mr. Beck.

20 MR. BECK: Well, I, like I think a
21 significant number of people in the room, do not have
22 the technical expertise to speak to the new material.
23 I think no one disputes that there are at least four
24 new slides that were disclosed and that
25 Mr. Buchwalter testified about.

1 Mr. Rankin is leaps and bounds smarter
2 than I am in this material. And, you know, as an
3 advocate, representing his client, has said that it's
4 unfair and it prejudices is him, it prejudices his
5 client. It's not the first time we've seen new
6 material coming in late. I hope it will be the last.
7 But I don't know if that's too optimistic.

8 I think that asking for a few hours to
9 digest the material tonight and come back tomorrow is
10 incredible. It's certainly an olive branch that I
11 don't think necessarily he should extend, but that
12 he's done so, I certainly think that request is
13 infinitely reasonable.

14 And I think everyone agrees that -- it's
15 certainly looking to me like Empire will not even
16 finish with all of its witnesses by tomorrow
17 afternoon. And so I don't think that putting
18 Mr. Buchwalter back in the mix to appear some other
19 time, whether it's tomorrow, whether it's later when
20 we reconvene, is going to upset the pace that we're
21 at right now.

22 CHAIR ROZATOS: Okay. Thank you.

23 Mr. Parrot.

24 MR. SUAZO: Hi, Commissioners.

25 CHAIR ROZATOS: Oh, I apologize, Mr. Suazo.

1 You're back. My apologies.

2 MR. SUAZO: No problem. I had OCD hearings
3 this morning, so I'm back and was able to tune in for
4 the last couple of hours.

5 And I've sent Ms. Hardy's PowerPoint to
6 Pilot, but obviously everybody's busy, and I have not
7 heard back from their technical folks. So we also
8 would like some additional time to review.

9 And I concur with Mr. Beck that, you
10 know, this is going to go on for some time. And I
11 think we just need to make sure that everybody has
12 the chance to really examine all the information that
13 the Commission is considering and also have a fair
14 chance to ask the questions that we would like to
15 have answered as a result of that information. So I
16 support Mr. Beck and Mr. Rankin's position.

17 CHAIR ROZATOS: Thank you, Mr. Suazo.

18 I see you, Mr. Hearing Officer. Before
19 you continue, I have two questions, but I want to see
20 what you have to say first, and then we go from
21 there.

22 THE HEARING OFFICER: Okay. Maybe we're
23 reading each other's minds.

24 I guess what I would like to hear is
25 from Dr. Buchwalter himself whether or not you could

1 change your travel plans and be here tomorrow.

2 THE WITNESS: I'd rather not, but if I have
3 to, I have to.

4 CHAIR ROZATOS: So that was kind of along
5 the lines -- and I apologize, Ms. Hardy, I was kind
6 of conferring with Dr. Ampomah as you were answering
7 about the doctor being on the platform tomorrow
8 instead of potentially being here. And I didn't hear
9 what the answer was. I apologize.

10 MS. HARDY: I said that we -- I don't think
11 that -- it's our preference to have him here in
12 person because I think his testimony is really
13 critical. And he's supposed to be traveling
14 tomorrow, so being on the platform tomorrow doesn't
15 solve that.

16 CHAIR ROZATOS: Okay. That was the answer
17 that I missed. I apologize. Give me one second.

18 Mr. Rankin, my question to you. Which
19 slides are the four extra slides? My apologies.
20 Because the Commission didn't see certain slides
21 either, right? Empire skipped through those. I
22 realize that this is information that you were
23 working on and that Goodnight is definitely
24 concerned.

25 Please explain to us, as well, the

1 slides that we didn't see, how is it pertinent? And
2 I apologize. As I said, I'm a layperson, so I'm
3 trying to figure it out myself.

4 MR. RANKIN: Part of the problem, Chair, is
5 I'm not going to be able to fully articulate this
6 because I'm still integrating it. I mean, however
7 long it was, it was a fire hose. Okay? And so the
8 reason I'm telling you that I can't go forward is
9 because I'm not in a position to articulate -- to
10 explain to you how to integrate what I learned today
11 and what I knew before.

12 My point is that we have six pages of
13 double-spaced testimony that explains, you know, 18,
14 19, 20 exhibits that are his final model and all the
15 different things he did in his final model. The six
16 pages of written testimony is woefully insufficient
17 to even explain what he has here.

18 The problem I have is that, you know,
19 what I had laid out was to explore what was missing
20 in his testimony in these slides. Okay? Now I'm
21 hearing things, over an hour of summary, that was
22 new, not in written testimony and couldn't easily be
23 discernible from the slides.

24 I think perhaps maybe some of our
25 experts could intuit some of that perhaps based on

1 the slides because they're intimately familiar with
2 the data. But I have not myself integrated that.
3 That's my problem. I'm the one who's charged with
4 cross-examining him, and I'm not in a position to
5 integrate what I learned this morning with what was
6 in the slides today and what little bit was in the
7 six-page rebuttal testing.

8 CHAIR ROZATOS: And I understand the
9 frustration. I apologize. I'm not trying to come
10 across to anybody -- and I'm not necessarily pointing
11 a finger. We have to understand as well.

12 Go ahead, Mr. Hearing Officer.

13 THE HEARING OFFICER: I'm just thinking if
14 Dr. Buchwalter can be here tomorrow and if he can be
15 prepared tomorrow, that seems like a reasonable
16 solution. That would appear to accommodate
17 Ms. Hardy's interest in having Dr. Buchwalter here in
18 person and would give you the time you need,
19 Mr. Rankin, to complete your preparation for cross.
20 Just don't come tomorrow and say, "I need more time."

21 CHAIR ROZATOS: So before you even answer
22 that, Mr. Rankin, here's my thing. This Commission
23 has heard individuals off of the platform before. I
24 realize it's the best to have someone in person, but
25 we also have to take into account that people travel

1 and people come from out of state.

2 And, Ms. Hardy, I believe this question
3 is to you and to your team, and for the doctor, as
4 well, but you're the lawyer we're talking to. Could
5 we not just continue this witness for another time?
6 He could be on the platform. Mr. Rankin will be able
7 to gather all of the information, questions that he
8 has. And we don't have to necessarily have the
9 doctor here in person. We could have him on the
10 platform.

11 Of course, you all have to agree to
12 this. This is just a suggestion that I have. And I
13 think it would allow Goodnight the opportunity to be
14 able to get the information that they need, to get
15 their experts' time to be able to review the
16 differences that are between the written and the
17 PowerPoint. But it also gives your witness the
18 opportunity to be able to explain what he has to say,
19 but just not in person.

20 MS. HARDY: Mr. Chair, I would need to
21 consult with my client, but I think that we would
22 rather proceed with Dr. Buchwalter tomorrow, if he
23 can change his travel plans.

24 CHAIR ROZATOS: That would be perfect with
25 us, but I'm just trying to offer options.

1 MS. HARDY: Yes, I understand.

2 CHAIR ROZATOS: Because both sides have
3 pertinent points, but we're trying to accommodate as
4 well. So, 15 more minutes?

5 MS. HARDY: Fifteen would do it. I mean, if
6 we're going to proceed this way, then we need to make
7 sure our other witnesses are available, because we
8 had not planned on that.

9 CHAIR ROZATOS: Okay. Let's reconvene at
10 2:05, that gives us the 15 minutes, and then we can
11 discuss again. Thank you.

12 (Recess held from 1:47 to 2:05 p.m.)

13 CHAIR ROZATOS: It's 2:05. We're back on
14 the record.

15 Ms. Hardy, we'll start off with you. We
16 posed a couple of options, so could you let us know
17 what the decision was.

18 MS. HARDY: Yes. Thank you, Mr. Chair. We
19 are prepared to proceed with Dr. Trentham as our
20 witness next.

21 CHAIR ROZATOS: Okay. And our other doctor
22 will be here tomorrow?

23 MS. HARDY: Dr. Buchwalter will be here as
24 tomorrow. And after Dr. Trentham, we can proceed
25 with Mr. Melzer and Mr. McShane, if we get that far.

1 CHAIR ROZATOS: Okay. I love your optimism.
2 That's great.

3 Mr. Hearing Officer, we transfer it back
4 to you.

5 THE HEARING OFFICER: Okay, great. So it's
6 Robert Trentham?

7 MS. HARDY: Yes, that's correct. And
8 Mr. Padilla is presenting Dr. Trentham.

9 CHAIR ROZATOS: And the doctor is on the
10 platform, correct? Okay. So we'll get him to be on
11 the Zoom. Thank you.

12 THE HEARING OFFICER: Okay, great. Doctor,
13 if you'll please raise your right hand.

14 ROBERT CRAIG TRENTHAM,
15 having first been duly sworn, testified as follows:

16 DIRECT EXAMINATION

17 BY MR. PADILLA:

18 Q. Dr. Trentham, please say your name for the
19 record.

20 A. It's Robert Craig Trentham.

21 Q. I'm sorry, I think I called you
22 Dr. Trentham.

23 A. Well, that's okay.

24 Q. Give the Commission, Dr. Trentham, a little
25 bit about your educational background.

1 A. Okay. I have a bachelor's and master's in
2 geology from the City College of New York, and a
3 Doctorate in Geological Sciences from the University
4 of Texas in El Paso.

5 Q. What have you done in terms of preparation
6 for this hearing and the self-affirmed statement that
7 you've signed?

8 A. Well, obviously, I've written the statement.
9 I've reviewed many of the materials provided to me by
10 Empire. I've had discussions with Steve Melzer and
11 with Bob Lindsay, both of whom I've known for decades
12 and have worked with also for decades.

13 Q. Give the Commission an overview, briefly, of
14 what you prepared.

15 A. My expertise, I guess, to bring to the table
16 on this project is an understanding of residual oil
17 zones. And I've been -- like many geologists, I've
18 worked in exploration production for over 20 years
19 before I came to the university.

20 It's always been frustrating that there
21 are these zones that have oil shows, have shows,
22 calculated as potentially productive, and yet they
23 turn out to be dry holes because they make mostly all
24 water.

25 And in the last 20 years or so, along

1 with Bob Lindsay and Steve Melzer and others, we've
2 been coming to realize that there are these intervals
3 that have residual oil but are not productive in the
4 classical sense of primary or waterflood production.

5 Q. Let me stop you there, Dr. Trentham. Your
6 resume or curriculum vitae states all of the
7 qualifications that you have, especially with respect
8 to ROZ developments in the Permian Basin, correct?

9 A. Yes, sir, that's correct.

10 MR. PADILLA: We tender Dr. Trentham as an
11 expert with regard to ROZ in the testimony in this
12 case.

13 HEARING OFFICER HARWOOD: Any objection from
14 Goodnight?

15 MR. RANKIN: No objection.

16 HEARING OFFICER HARWOOD: OCD?

17 MR. MOANDER: No objection.

18 MR. BECK: No objection.

19 HEARING OFFICER HARWOOD: And that was Rice.

20 And from Pilot?

21 MR. SUAZO: No objection from Pilot.

22 THE HEARING OFFICER: Dr. Trentham will be
23 so recognized.

24 BY MR. PADILLA:

25 Q. Dr. Trentham, you prepared a self-affirmed

1 statement regarding a little bit of what you said with
2 regard to your expertise in ROZ developments in
3 geology. You have prepared what are Exhibits D-1
4 through D-22. Well, attached to your self-affirmed
5 statement are Exhibits D-1 through D-22, correct?

6 A. Yes.

7 Q. And you also have six tables. They're
8 labeled D-1 through D-6, correct?

9 A. Yes.

10 Q. Dr. Trentham, to your knowledge, are the
11 contents of your tables that are attached to your
12 exhibits, true and correct, to the best of your
13 knowledge.

14 A. That's correct, sir.

15 MR. PADILLA: Mr. Chairman, we tender
16 Dr. Trentham's self-affirmed statement and the
17 exhibits attached to it, specifically D-1 through
18 D-22 and Tables D-1 through D-6 into evidence.

19 HEARING OFFICER HARWOOD: Any objection from
20 Goodnight?

21 MR. RANKIN: No objection.

22 HEARING OFFICER HARWOOD: OCD?

23 MR. MOANDER: No objection.

24 HEARING OFFICER HARWOOD: Rice?

25 MR. BECK: No objection.

1 HEARING OFFICER HARWOOD: Pilot?

2 MR. SUAZO: No objection from Pilot.

3 THE HEARING OFFICER: They'll be admitted.

4 (Admitted: Empire New Mexico
5 Exhibits D-1 through D-22 and
6 Tables D-1 through D-6.)

7 BY MR. PADILLA:

8 Q. Dr. Trentham, we've prepared a few slides
9 for you to summarize your testimony as shown by the
10 self-affirmed statement that has been introduced into
11 evidence. Let me try to share those slides.

12 HEARING OFFICER HARWOOD: Before we go
13 there, these have been shared with -- we're not going
14 down the same rabbit hole we were this morning, are
15 we? These have been shared with Goodnight?

16 MR. PADILLA: Yes, they have. They've had
17 them for quite a while, matter of fact.

18 MR. RANKIN: I mean, assuming that they're
19 just right out of his exhibits, that's fine. But if
20 it's something different that I haven't seen -- I
21 haven't seen slides for today, but if they're right
22 out of his exhibits, that's fine. He hasn't shared
23 what slides he's going to present, so I don't know.

24 HEARING OFFICER HARWOOD: I'm just trying to
25 avoid another train wreck. All right.

1 MR. PADILLA: I don't think I'm going to
2 have a train wreck for you, Mr. Harwood.

3 CHAIR ROZATOS: Are we having issues
4 sharing?

5 MS. HARDY: We are. But I think Mr. Padilla
6 can e-mail me the slides and I can share them.
7 Because it seems that he's having a problem with this
8 sharing.

9 CHAIR ROZATOS: I'm going to just make this
10 suggestion, Ms. Hardy. They should send you all the
11 slides. So then we don't have the --

12 MS. HARDY: Understood.

13 CHAIR ROZATOS: From here on out, send all
14 the slides to Ms. Hardy so she can have them ready,
15 please.

16 MS. HARDY: We will do that.

17 CHAIR ROZATOS: Thank you.

18 And, Doctor, thank you for your
19 patience. We apologize.

20 THE WITNESS: No problem. He's probably
21 better at it than I am.

22 BY MR. PADILLA:

23 Q. Dr. Trentham, I finally got help on this
24 thing, and I'm glad for that. Let's look at the first
25 slide, which is Exhibit D-2, and that comes from your

1 testimony before, correct?

2 A. That's correct. They used -- the same
3 exhibit numbers are on the original documents.

4 Q. Tell us what's contained in this slide.

5 A. Okay. This is a slide that shows or places
6 the EMSU-B, EMSU, the AGU fields along the Artesia
7 trend, which is one of the number of trends that we
8 have identified as having had this meteor-derived
9 flushing, where the original oil columns were much
10 thicker than they are today, and the lower portions of
11 the oil columns have been essentially swept by what we
12 refer to as Mother Nature's Water Flood.

13 This particular base map here is from
14 Alton Brown, who was working independently on ROZs,
15 trying to figure out ROZs when he was at Arco in the
16 late '90s. And what he was doing is he took this data
17 from unitization agreements and other information, and
18 noticed the tilted oil water contact on the base in
19 these fields and that each one had a different flow
20 direction. And so he was the first one to kind of
21 point out that even today, there's still this flow
22 that is moving through these trends and beneath these
23 fields.

24 Q. You have some dark arrows there in black.
25 What do those represent?

1 A. Those are the arrows -- that's the direction
2 and the number associated with the arrow, the amount
3 of tilt in feet per mile on the base of the water-oil
4 contact in those fields. And this is directly from
5 Alton Brown's presentation that he made. He made a
6 couple; one in 1999 and another one in 2001.

7 Q. You've also identified the Wasson Field
8 there with a red arrow.

9 A. Correct.

10 Q. Why did you do that?

11 A. Because it's probably the largest of the
12 fields where we have documentation over probably 15
13 miles of these tilted oil water contacts from the
14 Wasson Field and on up along the trend along the
15 eastern edge of the Northwest Shelf. And then the
16 other fields, of course, are places where he's
17 documented.

18 And you can see by the direction of the
19 arrows that there obviously is more than one trend or
20 direction of flow, and each one of those is associated
21 with a different trend.

22 Q. In terms of the Artesia trend, what else do
23 you find in there that is significant?

24 A. The Artesia trend, part of it extends across
25 the southern edge of the Northwest Shelf, and so

1 there's data from Vacuum Field. And we also have ROZ
2 information down to the south in Texas beyond the
3 limit of this map.

4 Q. Do you have anything else on this slide?

5 A. No.

6 Q. Dr. Trentham, we've seen this with
7 Dr. Lindsay, this next slide.

8 A. Yes.

9 Q. Give us your version of this slide as
10 appropriate or pertinent to this hearing.

11 A. Okay. Well, the lower cross-section is a
12 representation of the cross-section that hangs in most
13 geologists' offices. In the Permian Basin, it's the
14 east-west cross-section of the basin that was done in
15 the 1950s by the people who preceded us.

16 Then what Bob Lindsay did was he kind of
17 reconstructed what it had to have looked like before
18 the late-stage tectonics, which cut off the hydraulic
19 head to the west. He reestablished that it would be
20 easy to have this hydraulic head flushing from as far
21 west as the San Andres Mountains between Alamogordo
22 and Las Cruces, and that this water, these waters,
23 would be flushing down through the San Andres,
24 especially, but other intervals as well, and so that
25 we have enough horsepower or hydraulic head for this

1 flushing to occur. And this flushing, then, is
2 responsible for removing the movable oil from the
3 residual oil zone intervals. And you can see the
4 direction of flow that he's indicating with his arrows
5 in there.

6 Q. If we look at the top of the top depiction,
7 we see the Central Basin Platform. Does that
8 correspond to the bottom depiction of the Rio Grande
9 River?

10 A. Yes, it does.

11 Q. Okay.

12 A. Yes, it does.

13 Q. And where would you find ROZ in the Central
14 Basin Platform?

15 A. Well, we find them on both the east side and
16 the west side of the Central Basin Platform, extending
17 from, say, Hobbs on the north, on the northwest side,
18 all the way down to north of Fort Stockton. On the
19 east side of the platform, we see them from the
20 Seminole Field, north of Seminole, all the way down to
21 Upton County and Crockett County on the south in the
22 McCamey Field.

23 Q. Is ROZ generally found in a conventional oil
24 development?

25 A. Well, let's see. Yes, that's true. We find

1 them under many existing fields. And a little further
2 on in my testimony, I'll talk about the different
3 kinds of ROZs. But yes, we find them associated with
4 Grayburg, San Andres, Clear Fork, Tubb or Drinkard
5 fields on the Northwest Shelf on the Central Basin
6 Platform, and also in a couple places on the Eastern
7 Shelf.

8 Q. Is that generally where you've had primary
9 production in an upper zone?

10 A. Yes. The one example which I'll talk about
11 a little bit later is the Tall Cotton Field where
12 there is no upper arc, there is no main pay.

13 Q. Okay. Can we move on to the next slide.

14 A. Okay. So this is the slide that Steve
15 Melzer put together, actually, probably 15 years ago
16 now. And this is after many, you know, days, hours,
17 months of discussion about these different trends.
18 And so this shows where we see the different trends
19 across the basin. And you can see they extend as far
20 west at this point as the Guadalupe and the Sacramento
21 mountains, and they extend across the basin.

22 So the trend on the north is the
23 Slaughter Levelland trend, which extends then across
24 the northern part of the Midland Basin, over to the
25 Eastern Shelf. The lower trend of the -- kind of the

1 darker color, that's the Artesia trend, which then
2 comes down to the -- down the west side of the
3 platform and then down across and out towards the
4 Ozona Platform. Then kind of the fatter arrows
5 include the trend where the Wasson Field is located,
6 and then the other set of yellow arrows on the east
7 side of the platform indicates where we see the flow
8 paths on the east side of the platform.

9 We also have a couple of other flow
10 paths. There's a Roswell trend that's kind of the
11 smaller arrows in there, where there's just a limited
12 amount of production and just smaller ROZs. And then
13 there's another one across the Midland Basin, where we
14 know there are thick intervals that have residual oil
15 type values in the San Andres, but the San Andres is
16 not productive there, but it just hasn't been explored
17 as yet. As I've said to Steve many times, "We just
18 can't do everything."

19 Q. Dr. Trentham, it's fair to say that you're
20 going to find ROZ throughout these pathways?

21 A. Yes. Not continually, but certainly, yes.
22 Along those pathways you'll find fields with
23 brownfield ROZs beneath them, and you'll see areas
24 where there are ROZs without an associated existing
25 productive field.

1 Q. Let's move on to the next slide. What does
2 this Exhibit D-4 show?

3 A. Okay. This is the three types of different
4 ROZs. And this was, again, put together by Steve
5 Melzer. The first one would be where you have the oil
6 migrate into the traps and then at a later date, you
7 tilt the basin and allow the oil to migrate out past
8 the spill points of the different traps. That's a
9 Type 1. That's not common in the Permian Basin.

10 The Type 2, that's where the oil is
11 migrating into a trap and we've seen a failure of the
12 seal, and oil is migrated out past the trap. And we
13 have that as a Type 2-type ROZ. There are a limited
14 number of fields in the Permian Basin where Type 2 is
15 present.

16 Type 3 is the one that's associated with
17 our Mother Nature's Waterflood. In this case what
18 happens is that the area to the west has been tilted
19 up, and as a result of the uplift to the west, we see
20 these meteoric-derived flushing fluids coming down
21 from the area -- the watershed, essentially, from as
22 far west as the Rio Grande, across the San Andres
23 Mountains and across the Sacramentos and Guadalupe
24 and into the basin and flushing out the lower portion
25 of the ROZs -- the lower portion of the original oil

1 column and creating an ROZ.

2 Q. Dr. Trentham, is Type 3 the type of ROZ that
3 you would find underlying the EMSU and the AGU and the
4 EMSU-B?

5 A. Yes, it is.

6 Q. And that would be in the San Andres
7 Formation?

8 A. That is correct.

9 This is just a little zeroing in on this
10 to better understand the relationships between the
11 ROZs and where they're found. So in the upper one
12 there, the lower portion of the oil column has been
13 flushed by Mother Nature's Waterflood beneath an
14 existing field. And the field itself, it retains the
15 oil and you do not see it flushed out completely as
16 you see in the -- flushed out -- moveable oil flushed
17 out completely as you do see in the ROZs.

18 So where we have ROZs beneath an
19 existing field, we call those brownfields. And in
20 areas where, for one reason or another, either a lack
21 of trap or more hydraulic head, the entire column of
22 oil has been flushed except for some little areas
23 where there's lower permeability and porosity, where
24 higher oil saturation is retained, where all of the
25 column has been removed. And the example of that is

1 the Tall Cotton Field in Gaines County. And that's a
2 greenfield.

3 Q. In the lower depiction, the dynamic system,
4 as you've labeled it, do you see, when you drill
5 through it, any oil?

6 A. Yes. And this has been the conundrum that
7 we, as an exploration production geologists, have had
8 for decades, that you do see the types of shows. You
9 see drilling breaks. You see maybe oil on the pits.
10 You see gas and oil in samples. You might even see a
11 calculation on the logs of productive well
12 saturations. And so, yes, you can see all of those.

13 However, when you attempt to complete
14 those wells, they're doomed to failure because you're
15 looking at residual. Basically, the residual in those
16 fields, those greenfields, is similar to the residual
17 to a waterflood you see in a well-established and
18 well-run waterflood, so you'd be -- your oil is, at
19 this point, not movable except through the use of CO2.

20 Q. So you need CO2 flood in order to get the oil
21 out?

22 A. Yes, sir, that's correct.

23 Q. Okay. Let's move on to the next one. Okay.
24 Here we have a slide, Exhibit D-6, and this is a Tall
25 Cotton slide that you talked about earlier. Tell us

1 about the Tall Cotton.

2 A. Okay. Tall Cotton is in kind of west
3 central Gaines County. To the east is the Seminole
4 Field and the town of Seminole. Between Seminole and
5 Tall Cotton is the west Seminole Field.

6 And Tall Cotton was actually keyed off
7 of two wells that had been previously drilled in the
8 area. The one being the Anschutz Keating Well, to the
9 northwest. That was actually a well that was drilled
10 looking at a Clear Fork anomaly on seismic. They
11 cored that well. They had good mud logs. And the mud
12 logs and the electric logs and all the information
13 they had, as the geologist who had that well told me,
14 he said, "It's a no-brainer."

15 They set casing. They completed in the
16 interval where there was oil saturation in the core
17 and in the mud logs. And over about a three-month
18 time frame, they made eight barrels of oil and 3600
19 barrels of water and eventually plugged the well.
20 That is kind of what we believe to be a typical
21 response of an ROZ to an attempted completion.

22 So that's an area -- so in this area, we
23 know there's ROZ potential. The Reed & Stevens
24 Charlene Well actually made a few thousand barrels of
25 oil, but it was not an economic discovery. And it was

1 also eventually plugged.

2 At a later date, Kinder Morgan came in
3 and with the information they had on the Reed &
4 Stevens, they borrowed the core -- actually, I had the
5 core from the Anschutz Keating. They borrowed the
6 core from me and they had the mud logs, and so they
7 evaluated this area and determined it was a good place
8 to initiate a greenfield ROZ flood.

9 And in 2014, they initiated a CO2 flood.
10 It took about six months, but they eventually started
11 to make oil and they got up to 2,000 barrels a day or
12 more in production with ROZ only.

13 Q. So would you say that the Tall Cotton was a
14 successful play?

15 A. Oh, it's an excellent successful site, yes.

16 Q. And there had been no primary production or
17 waterflood in that field?

18 A. There had been lighter production from the
19 Reed & Stevens Charlene Well, but that's it.

20 Q. Okay. Let's move on to the next slide.
21 What's shown on this Exhibit D-9?

22 A. Okay. This is information from a
23 presentation made by Hess on the Seminole Field. This
24 is the Seminole Field. The city of Seminole is right
25 at the very southeastern end of the field. And in the

1 1980s, they were drilling deeper because they also had
2 Clear Fork production, and they noticed that there was
3 all shows in the interval below the main pay in the
4 San Andres.

5 And so management, with foresight,
6 determined that they needed to get more information
7 about this interval. They started to take moderate
8 sweeps of logs through the interval, and they took
9 cores, and the cores they took ranged from
10 conventional cores to sponge cores to pressure cores.

11 And what they determined was that there
12 was a range of saturations that they saw between the
13 conventional cores and the sponge cores and the
14 pressure cores. And that these saturations, assuming
15 that the better estimations of the actual oil in place
16 and the saturations were from the pressure cores, that
17 these were indicating that this was a potential target
18 for CO2 enhanced oil recovery.

19 Then in the late 19 -- or middle 1990s,
20 they actually started their first -- what they called
21 their ROZ Phase 1, which was they mixed injecting CO2
22 into the main pay, which was already under CO2 flood,
23 and the ROZ, and they saw a response.

24 And then they decided that they weren't
25 quite sure how much was coming from the ROZ, so they

1 did ROZ Phase 2. And in there they did an ROZ-only CO2
2 flood. And then they demonstrated to their confidence
3 that ROZ was floodable in this area. And they have
4 since gone in through a series of stages to complete
5 ROZ production throughout the field.

6 Q. On the right side of this Exhibit D-9, what
7 is that?

8 A. That was a pattern where you'd see where the
9 producers and the injectors were located for the ROZ
10 flood in Phase 2.

11 Q. This was a Brownfield development, right?

12 A. That's correct. This is a Brownfield
13 development.

14 Q. How far away is the Seminole Field from
15 EMSU, more or less?

16 A. Probably about 45 miles. But it's on the
17 other side of the Central Basin Platform, so
18 essentially you have the same -- the same reservoirs
19 are present on both sides of the platform.

20 Q. Okay. Do you have anything else on -- well,
21 okay. Let's move on to D-10.

22 A. All right. This is a chart that was put
23 together by Steve Melzer. And so the upper numbers or
24 the upper curves are actually the number of wells, so
25 just kind of ignore those, other than to see that they

1 did an infill drilling project in the mid-1980s, like
2 a lot of other companies.

3 But what they were seeing was that they
4 were seeing a decrease in the production. They were
5 on the decline curve. So the kind of decline curve
6 that you would normally expect, that's that kind of
7 light blue line there.

8 Then, though, they had started -- as I
9 mentioned before, they had started a CO2 flood in the
10 main pay in the mid-1980s. So the red curve, as you
11 can see, rapidly increasing, you know, in production,
12 that's the response of the main pay CO2 flood.

13 And then in 1996, with the first
14 introduction of the ROZ flood, then you see that
15 there's that uptick in production off that other
16 curve, kind of a little bit darker blue curve over
17 there. And then you can see where Phase 1 was, where
18 Phase 2 was, and then where they started to do the
19 more in-filling to the remainder of the field.

20 You can see that it's a mix of the
21 production from the main pay RO -- main pay CO2 flood,
22 and then you can see how the line extending to the
23 right is the additional production they have gotten
24 from the residual oil zone.

25 Q. What's the graph at the top, the very top

1 one?

2 A. That's just the producing well count.

3 Q. So, what conclusion do you draw from this
4 graph?

5 A. The conclusion that you draw from this graph
6 is not only is the CO2 enhanced low recovery project in
7 the main pay successful, but the CO2 enhanced low
8 recovery project in the ROZ is also successful.

9 Q. Now we have Table D-1. What do you show
10 here?

11 A. Okay. What I did was just put together as
12 an example of how thick ROZs can be, the relationship
13 of field main pay thicknesses and ROZ thicknesses that
14 I am confident in. And that would be the Platang, the
15 Seminole, Vacuum, Wasson, GLSAU, Goldsmith-Landreth
16 San Andres Unit, Seminole East and McCamey.

17 And you can see that the ROZ thickness
18 will vary. It's not a uniform thickness. But
19 Platang, Tall Cotton, neither one of those have an
20 associated main pay. So their entire floodable
21 interval is the ROZ.

22 At EMSU-B, the reason I've said zero is
23 that in the San Andres, there is no main pay, or just
24 a few wells that made a few barrels. So the EMSU-B
25 San Andres ROZ thickness is potentially as thick as

1 370 feet. And that's based off the work that Bob
2 Lindsay did in the mid-1990s when he worked for
3 Chevron and was working this area where he identified
4 stain in the San Andres as deep as 370 feet below the
5 top of San Andres. And those are in documents that I
6 know he's already submitted.

7 Q. That would be in the upper San Andres,
8 correct?

9 A. That is correct, yes.

10 Q. And the Tall Cotton is on the third line
11 here -- or second line, I should say. That's 400 feet
12 of pay?

13 A. That is correct. Let me modify that just
14 slightly. That's the deepest oil saturation that they
15 saw in the cores. And I've seen the cores for Tall
16 Cotton, so I'm familiar with that.

17 Q. In terms of EMSU, at the very top, what kind
18 of oil saturation would you expect to see there?

19 A. I've seen two of the cores, the 679 and the
20 Number 4 Bell, and in there I've seen -- the cores
21 start up in the Grayburg, but they have the upper
22 San Andres, the interval above the Lovington Sand, and
23 the TD -- one of them anyway, TDs below the Lovington
24 Sand. And there is oil saturation identified in core
25 throughout that interval. So, you know, I have

1 confidence in at least that much of it. We haven't
2 seen core beneath that, so we're hoping to get that at
3 some point.

4 Q. And going back to the EMSU, where you show
5 zero main pay, you're talking only about the
6 San Andres?

7 A. That's correct.

8 Q. Now, if you were to develop ROZ in the Lower
9 Grayburg, what kind of thickness would you expect?

10 A. Well, that is a question that I can't
11 answer. I am aware from my discussions with Bob
12 Lindsay that there is a flanking or edge ROZ to the
13 west side of the EMSU, kind of down off the structure
14 to the west where there is an ROZ in the Grayburg.
15 There is no ROZ in the Grayburg across the top of the
16 structure, as is my understanding.

17 There is actually one field, it's the
18 George Allen Field, which is in northwestern Gaines
19 County on the Northwest Shelf, where a company has
20 gone in and, in using CO2 EOR on the flank of the
21 structure not immediately beneath the main pay, but
22 just off the flank, similar to what we believe is
23 going on here at EMSU.

24 Q. It is fair to say that you would find a ROZ
25 above the San Andres and a ROZ below the top of the

1 San Andres?

2 MR. RANKIN: Objection, Mr. Hearing Officer.
3 Dr. Trentham did not offer rebuttal testimony.
4 Mr. Padilla is eliciting rebuttal testimony in the
5 summary of Dr. Trentham's direct testimony.

6 HEARING OFFICER HARWOOD: I'm not sure I
7 understand the objection, frankly. It's technical.
8 It's over my head.

9 MR. RANKIN: Well, Mr. Hearing Officer, we
10 had a prehearing order in which we were following the
11 disclosure of witnesses. Dr. Trentham was disclosed
12 as a witness for direct testimony. He was not
13 included as a rebuttal witness.

14 Mr. Padilla is now eliciting testimony
15 that goes beyond the scope of his direct testimony,
16 his rebuttal. Okay? He's introducing a new concept
17 that Dr. Trentham did not address in his direct
18 testimony about whether the EMSU has more than one
19 ROZ in it. That was not addressed in his direct
20 testimony.

21 HEARING OFFICER HARWOOD: Mr. Padilla.

22 MR. PADILLA: We've had -- we've gone
23 through this Table D-1. What's shown there is that
24 you have brownfield and greenfield ROZ developments.
25 The EMSU in the San Andres has zero main pay. All

1 the others after the third line have pay probably in
2 the Grayburg. I haven't asked that question.

3 And I'm just simply asking -- it's not
4 rebuttal. I'm just simply asking if you would expect
5 to have or could find ROZ above the San Andres below
6 the San Andres.

7 HEARING OFFICER HARWOOD: Well, that sounds
8 like an opinion that you're seeking from this
9 witness. Is that an opinion that was disclosed as
10 part of his testimony?

11 MR. PADILLA: Well, it's inherent in all the
12 discussion between the Grayburg and the San Andres.
13 I don't know -- everything -- there's been ample
14 discovery in this case, above and below the
15 San Andres.

16 This morning, for example,
17 Dr. Buchwalter talked about the Grayburg and the
18 San Andres and how water penetrated above and through
19 from the San Andres to the Grayburg. I mean, it's
20 inherent in all of the discussion.

21 I'm not asking for a rebuttal, and I
22 don't know what I would be rebutting.

23 MR. RANKIN: Mr. Hearing Officer, what's
24 happening here is that Empire is shifting its
25 position. They recognize that there's a potential

1 issue about a composite sequence boundary that
2 divides the San Andres from the Grayburg.

3 Dr. Trentham has not addressed this
4 issue. In his testimony, he simply took from all of
5 his papers and presentations and put a summary
6 together giving an overview of the -- not even the
7 EMSU, but of the Permian Basin and his experience and
8 understanding of ROZs and how they came about.

9 He has not reviewed any -- other than
10 the two cores, he has not reviewed any data or
11 information related to the EMSU. He did not address
12 his direct testimony -- and that's all he submitted,
13 that's all he was disclosed to submit on his direct
14 testimony.

15 Mr. Padilla is now eliciting, based on
16 the evidence that was presented here, now today,
17 additional testimony that is not part of his direct
18 testimony. The purpose of this summary is --

19 HEARING OFFICER HARWOOD: Some other Empire
20 witnesses have covered this territory.

21 MR. RANKIN: Absolutely. And so --

22 HEARING OFFICER HARWOOD: I'm going to
23 sustain the objection. I'll find it's cumulative.

24 MR. PADILLA: Mr. Harwood, I don't know
25 where I go. You've sustained the objection that I

1 can't inquire into whether or not there's a ROZ in
2 the Grayburg?

3 HEARING OFFICER HARWOOD: Stick to what has
4 been disclosed to Goodnight in terms of what this
5 witness is expected to testify to.

6 MR. PADILLA: Okay. We'll move on. That's
7 the end of the show. So we pass Dr. Trentham for
8 cross.

9 CROSS-EXAMINATION

10 BY MR. RANKIN:

11 Q. Dr. Trentham, how are you today?

12 A. I'm good, sir. Is this Adam? I can't tell.

13 Q. This is me, Adam. Sorry that you're not
14 here in person. And I would love to have gotten to
15 meet you. Someday I hope that we cross paths in
16 New York and we can have a drink at McSorley's Old Ale
17 House, but another day.

18 A. Yeah, I go back with McSorley's before
19 women were allowed in.

20 Q. Yeah, yeah. I guess it's a little
21 different, although not too much, I think.

22 Dr. Trentham, what did Empire retain you
23 to testify about in this case?

24 A. Residual oil zones and the potential for the
25 presence at EMSU-B and the EMSU and AGU.

1 Q. And more broadly than that, didn't they ask
2 you to give a general overview of ROZs in the Permian
3 Basin?

4 A. Yes, they did.

5 Q. Okay. But you've not been asked to evaluate
6 whether the purported ROZ in the San Andres at the
7 EMSU is recoverable?

8 A. No. They asked me if I believe there was a
9 potential for a ROZ there, which there is.

10 Q. And you haven't been asked to opine on what
11 the recovery factors might be?

12 A. No, I have not.

13 Q. Or whether the purported ROZ in the
14 San Andres is economically recoverable?

15 A. I have not made an evaluation of that,
16 although I probably believe it is.

17 Q. But that wasn't -- you weren't asked to
18 provide that opinion, were you?

19 A. No.

20 Q. And you haven't been provided any data or
21 documents or evidence that would allow you to make an
22 opinion or conclusion on that in this case, have you?

23 A. On what?

24 Q. On whether the potential ROZ in the
25 San Andres is economically recoverable.

1 A. From what I have seen, I believe it is.

2 Q. Let me ask this question again. Have you
3 been provided any documents, any economic information
4 or evidence from Empire on what the cost would be to
5 develop this proposed project?

6 A. No, no economics.

7 Q. You're not offering any opinions about
8 petrophysics?

9 A. I have opinions, but I haven't been asked
10 for them.

11 Q. And they weren't included in your direct
12 testimony, were they?

13 A. Well, that's what I mean, yeah.

14 Q. And you did not review any of the underlying
15 unitization documents, the evidence, exhibits, or
16 testimony that were submitted to the Commission here
17 in New Mexico at the time the EMSU was formed, were
18 you -- did you?

19 A. I've seen the unitization agreement, and
20 that's all.

21 Q. And you haven't reviewed the transcript that
22 was prepared -- the transcript of the hearing
23 resulting from that statutory hearing on the EMSU,
24 have you?

25 A. No.

1 Q. At the time you prepared your direct
2 testimony, you didn't review any of the well files or
3 production data separate from any of the witnesses'
4 testimony or exhibits that you reviewed in this case?

5 A. I've looked at the core and the logs, but
6 other than that, I just have secondhand information
7 from Bob Lindsay.

8 Q. And during the course of this hearing this
9 week, have you observed or listened to any of the
10 expert testimony in this case?

11 A. Bob Lindsay's.

12 Q. But you didn't participate in or listen to
13 any of the other experts who gave testimony or
14 opinions in this hearing this week?

15 A. That's correct.

16 Q. And I think I understood you to say this,
17 but the information that you depict in Table D-1 --
18 I'll see if I can pull it up real quick.

19 The information that you depict in Table
20 D-1 is entirely based on information you obtained from
21 Dr. Lindsay?

22 A. The only information on that table that I've
23 gotten from Dr. Lindsay is about the EMSU. All the
24 other is my information.

25 Q. Got it. Thanks for that clarification.

1 At the time you prepared your direct
2 testimony, you were not aware of any ROZs thicker than
3 the intervals you provide on Table D-1, correct?

4 A. That's correct. These are the ones I'm
5 confident of. Let's put it that way.

6 Q. Okay. Let me ask you again. Are you aware
7 of any ROZs out there that have been documented to
8 have thicker intervals than what you've presented on
9 this table?

10 A. I'm not -- I don't have any information to
11 tell me that there's any ones that are thicker. I
12 have anecdotal information that tells me there may be
13 two. But nothing I could testify to.

14 Q. And at the time you prepared your direct
15 testimony, you were unaware of the volumes of water
16 that were produced from the six EMSU saltwater --
17 water-supply wells, correct?

18 A. I had kind of peripheral knowledge about
19 them.

20 Q. But you weren't aware of what the volumes
21 were, correct?

22 A. That's correct.

23 Q. And you did not investigate, prior to
24 preparing your direct testimony, what zone in the
25 San Andres those water-supply wells were producing

1 from?

2 A. I was just told that they were deeper in the
3 San Andres than the ROZ.

4 Q. Okay. And you're also not aware of the
5 approximately 20 additional water-supply wells that
6 have withdrawn water from the San Andres in the area
7 offsetting the EMSU?

8 A. No, I'm not.

9 Q. At the time of your direct testimony in this
10 case, you were also unaware that there was a produced
11 water disposal occurring in the San Andres within the
12 exterior boundaries of the EMSU since the 1960s?

13 A. Again, only just anecdotal information.

14 Q. At the time of your direct testimony, you
15 were unaware that Empire was also disposing of
16 produced water into the same San Andres disposal zone
17 within the EMSU; is that correct?

18 A. That's correct.

19 MR. RANKIN: No further questions.

20 THE HEARING OFFICER: Mr. Moander, do you
21 have cross-examination?

22 MR. MOANDER: Briefly, Mr. Hearing Officer.
23 May I proceed?

24 HEARING OFFICER HARWOOD: Please proceed.
25

CROSS-EXAMINATION

BY MR. MOANDER:

Q. Good afternoon again. It's nice to see you. And always you can see where I'm at there, Doctor. Appreciate your time.

Just a few questions. I wanted to confirm, you didn't submit any rebuttal testimony for the cases before the Commission, correct?

A. Correct.

Q. Now, let's step back in time briefly. Do you recall being deposed on November 5th, 2024, in these matters?

A. Yes.

Q. And do you recall when I inquired of you whether you had an opinion on the migration of injection fluids from the EMSU San Andres Formation to the Hobbs Channel and the Capitan Reef? What you stated was you didn't have, and I quote, "No, at this point, I would make -- I have no -- nothing. I would say no."

Do you recall that statement?

A. Yes, I remember.

Q. And would it be fair to say that what you were trying to say in the deposition is that you didn't have an opinion to provide at that point on the

1 query posed to you?

2 A. Yeah. The way my mind works is I had to
3 create a three-dimensional picture in my head before,
4 and so I just kind of stuttered through that. That's
5 why I was hesitant.

6 Q. I've known several folks like that, Doctor.
7 I appreciate it.

8 Later on in that deposition, you then
9 opined, when inquiry was made by Goodnight counsel
10 Rankin, that the EMSU San Andres hydrologically was
11 separate from the Capitan Reef. Do you have any
12 reason to dispute that statement?

13 A. The Capitan and the San Andres are not in
14 communication. That's true.

15 Q. And then do you recall that you were
16 asked -- well, I inquired about the authorities upon
17 which you relied for that. Do you recall testifying
18 that your opinion was based on observation and
19 discussion?

20 A. Yes.

21 MR. MOANDER: Thank you. I'll pass the
22 witness.

23 HEARING OFFICER HARWOOD: Okay. Mr. Beck,
24 questions for Dr. Trentham?

25 MR. BECK: I don't have any questions.

1 Thank you.

2 HEARING OFFICER HARWOOD: Mr. Suazo?

3 MR. SUAZO: No questions from Pilot.

4 HEARING OFFICER HARWOOD: Commission?

5 CHAIR ROZATOS: I don't have any questions.

6 EXAMINATION BY THE COMMISSION

7 BY COMMISSIONER AMPOMAH:

8 Q. Bob, this is William?

9 A. Hey, William. How you doing?

10 Q. I'm good. Nice meeting you. I do have just
11 some few questions for you.

12 A. Sure.

13 Q. So I'm looking at your direct statement, and
14 on Page 3 of that, the last but one paragraph, you
15 talk about the results of the above studies and others
16 shows the identification of the ROZ is not necessarily
17 difficult or expensive. Can you quantify what you
18 mean by "not expensive"?

19 A. Well, first of all, my opinion is, if you
20 don't develop the ROZ, that's real expensive.

21 A lot of the -- our early work,
22 especially, of trying to determine what exactly a ROZ
23 looked like was done off mud logs, core reports,
24 anecdotal information from people that came up and
25 said, "Oh, yeah, I had one of those and here it is."

1 So developing the potential for an ROZ
2 in any area can be relatively inexpensive. It's data
3 mining. Then, of course, what I would recommend
4 always, and I recommended it to Empire as well as
5 anybody else, would be full sweeps of logs, whole
6 core, you know, good quality mud logging, you know,
7 the basic tools that you would use to evaluate the
8 potential for any prospect.

9 DSTs don't work in ROZs because of their
10 very nature, because of the saturations, they're so
11 low. DSTs usually recover all water. One of the
12 things historically about DSTs has been that because
13 of the waterflooding by Mother Nature and this
14 meteoric-derived water which brings in oxygen, the
15 water chemistry in an ROZ is, almost everywhere I've
16 seen it and have data for it, different than the water
17 chemistry in the main pay.

18 And so if you have DST information, I
19 did a large study on the west side of the platform
20 centered around the Monohans area from Kermit down to
21 the south, DSTs, historically, almost every single one
22 of them that encountered a DST recovered sulfur water.
23 And in the cores we also see native sulfur.

24 And so, you know, evidence like that,
25 it's cumulative evidence. We see sulfur in the cores.

1 We see sulfur water on DSTs. We see mud log shows.
2 We see calculations of oil saturations that if you're
3 not using the right m's and n's and Rw's you're going
4 to be wrong. You know, all those things together,
5 they're relatively inexpensive, relative to a failure.

6 Q. Bob, so you made mention of a recommendation
7 and you described that to the Commission. Now, my
8 question to you is, based on your discussions with
9 Empire, do you believe they've done enough analysis to
10 solidify the argument about the existence of, let's
11 say, potential recoverable ROZ in the San Andres?

12 A. From what I've seen, and this is basically
13 off the two cores, the 679 and the Number 4, what I've
14 seen in those wells and in some of the logs that I've
15 seen, looked at with Dr. Lindsay, and my understanding
16 of what it takes to have an ROZ, I believe that they
17 are -- their money is well spent doing a further
18 evaluation.

19 We don't know where the base of the ROZ
20 is at this point. The one core that penetrated below
21 the Lovington Sand had oil saturations to the very
22 bottom of the core. So I don't know if they've seen
23 the bottom of the ROZ; it could extend all the way
24 down to the base of the G-8, for all I know, another
25 200 feet. I just don't know.

1 More work needs to be done in the form
2 of gathering more data, core analysis and good logs,
3 maybe even FMIs, those kind of things. But yes, there
4 is an ROZ there, and now we have to quantify how good
5 it is, how thick it is.

6 Q. You know, I do like the FMI. Can you
7 confirm to the Commission that certainly the FMI will
8 also help us to know if there are any existing
9 fractures?

10 A. Yes, yes. And the other reason I like an
11 FMI is that you match it to the core. And then in
12 other wells, if you want to save a little bit of
13 money, take two or three cores, and then as you
14 further develop, you do more FMIs. But have FMIs in
15 the wells where you've got core, match your FMI to the
16 core, and then go forward with FMIs.

17 Q. Thank you. Bob, so back to your direct
18 testimony on Page 3. The last paragraph, on Line 2,
19 you said: The waterflood-swept intervals still have
20 20 to 40 percent residual oil in the pore space.

21 Bob, this one, are you referring to the
22 flooded area or it also applies to the exterior area
23 of the flooded area?

24 A. I would restrict that to the waterflood
25 area. I'm not sure what would be outside the

1 waterflood area.

2 Q. So, Bob, do you have an example of where we
3 have an effective waterflood where the residual oil
4 saturation goes to like 40 percent?

5 A. All right. The Platang Field, those are --
6 that's up in Yoakum County. It's northwest of Wasson
7 and west of -- and just east of the Texas/New Mexico
8 state line.

9 That area, there are saturated -- higher
10 oil saturations at the top of the San Andres pay, and
11 the top of the San Andres pay there is actually in the
12 Lower San Andres, beneath the Brushy Canyon bypass
13 surface or the Pi marker.

14 Okay. So in the upper portion there,
15 you have what I refer to as shingles of thin, mostly
16 tidal flat or subtidal rocks that have higher oil
17 saturations. And you can call them heavy ROZs, if you
18 want. They're not going to produce oil by themselves
19 in any large amount, but they have higher oil
20 saturations than 40 percent. And that's in the kind
21 of greenfield area like where Platang is located.

22 Q. Bob, so on that same page, you talk about on
23 average an additional recovery of 10 to 20 percent of
24 the original oil in place in a field is possible using
25 CO2. Can you tell the Commission if you have any

1 reference for this?

2 A. This is based on the types of recoveries you
3 get in a main pay ROZ relative to the waterfloods and
4 the -- the waterflood and the primary production in
5 the main pays. It's just a kind of -- I guess a
6 shorthand that people like Steve Melzer and Bob
7 Lindsay and I use. We know that in main pays you can
8 get that kind of recovery factor in a San Andres
9 field, and there is no reason to believe that with
10 similar oil saturations in the ROZ, too, residual for
11 an effective waterflood, that you wouldn't expect to
12 see similar kind of recovery factors of the oil in
13 place.

14 Q. Bob, on Page 4 of your direct testimony, the
15 first section, the last sentence: The movable oil was
16 swept by a natural waterflood, leaving behind the
17 ROZs, hence the name.

18 Bob, my question to you is that, do you
19 have any experience -- or, let's say, within the
20 Permian Basin, some of these fields that you talked
21 about, has there been any of these fields that has
22 undergone high volume of water injection and then you
23 still be able to recover the ROZs?

24 A. I am not aware of any. I've just not
25 studied any.

1 Q. So will this area that we are talking about
2 be the first one?

3 A. Yes. I'm just not aware of any. So, yes,
4 this would be the first one.

5 Q. Okay. So, Bob, during the direct, you
6 talked about Kinder Morgan. On your Exhibit D-6, you
7 were talking about the Tall Cotton Field and you said
8 that there was a field attempt at first, but Kinder
9 Morgan came back and then started the CO2 injection.

10 So I want to know, do you know how long
11 it took before Kinder Morgan was able to see oil
12 coming out, let's say, from the CO2 injection?

13 A. Six months.

14 Q. Did they produce a substantial amount of
15 water prior to that?

16 A. Oh, yes, yes.

17 Q. Okay. So, Bob, I'll go back to Page 4, the
18 last but one paragraph. You talk about a percentage
19 of the oil is forced from the pores and the CO2 is
20 trapped, becoming incidentally sequestered.

21 Let me go to the top. You say that the
22 process also changed the surface tension of the oil
23 and its attraction to the rock. So you're talking
24 about wettability there.

25 Now, the earlier question that I asked,

1 the EMSU, the San Andres has undergone significant
2 amount of water injection. There is a possibility
3 that the wettability might have changed and also
4 introduce water chemistry which is different from the
5 one, let's say, in the San Andres.

6 Do you believe that the potential
7 changes in the wettability might also impact how much
8 residual oil we do have in place as of today?

9 A. Okay. When changing the amount of oil that
10 we have in place, I think it would have produced some
11 of that oil if it was available, so I'm not sure if
12 the change in the water chemistry has changed the
13 wettability. I've not thought about it, I haven't
14 studied it, but that's off the top of my head. If
15 that were the case, I would imagine that you would
16 have started to produce some oil out of the interval
17 for the water-supply wells.

18 Q. Then let's talk about the water-supply wells
19 that has been within the area that we are talking
20 about, you know significant amount of water that has
21 been produced from the San Andres. And like you're
22 saying, I mean, if there's potential changes in the
23 wettability, there is a possibility that some of this
24 residual oil will become mobile.

25 So do you believe that if there is some

1 kind of oil there, at least we should have seen some
2 production through the water wells?

3 A. Oh, I'm not sure about how much water has
4 been produced. Or, you know, the thing is that if
5 you're producing water and injecting it into your
6 wells, you may very well just slap yourselves on the
7 back and say, "No, we're producing more oil."

8 Did they ever test the water that they
9 were -- their makeup water? Did they ever run it
10 through a barrel to see if any -- if there was a slick
11 of oil in it? I don't know if they ever produced any
12 oil or not.

13 I know that at Yates Field, back in the
14 1990s, the methodology that Marathon was using was to
15 produce as much oil as they possibly could. And they
16 were producing 50,000 barrels of water a day to try to
17 draw down the water and make more oil.

18 Well, they were selling that water or
19 giving that water to Burlington Resources for use in
20 their McCamey flood, their McCamey Field flood, and
21 Burlington was seeing an increase in their water -- in
22 their oil production. And they also noticed that in
23 their large volume tanks, their settling tanks,
24 basically, where they were storing the water until
25 they were using it for injection, they were seeing

1 oil. And they were seeing 500 barrels of oil coming
2 out of 50,000 barrels of produced water from Yates
3 Field that Burlington -- McCamey said, "Well that's
4 our oil now."

5 So yes, there are examples of where, you
6 know, produced water, unless properly treated, may
7 have enough oil in it that we don't recognize.

8 Q. Bob, so is it your testimony that as of
9 today, the bottom of the ROZ is not known in the EMSU?

10 A. That's correct. I have some inferences.
11 Bob Lindsay says that he's seeing oil in the core as
12 deep as minus 700 feet in the San Andres, but that
13 was -- that's kind of anecdotal information.

14 We just see -- we've seen those two
15 cores, the 679 and the 4, and in there, we don't see
16 the bottom of the ROZ because the core stopped in the
17 ROZ.

18 Q. So as of today, you can confirm that, at
19 least, there is an ROZ in the Upper San Andres?

20 A. Oh, absolutely.

21 Q. But not extensively in the Lower San Andres?

22 A. Don't know.

23 COMMISSIONER AMPOMAH: Thank you, Bob.
24 Thank you so much.

25 THE WITNESS: Thank you. Thank you,

1 William.

2 HEARING OFFICER HARWOOD: Commissioner
3 Lamkin, questions?

4 EXAMINATION

5 BY COMMISSIONER LAMKIN:

6 Q. Good afternoon, Dr. Trentham. I think I
7 just have one clarifying question for you.

8 So there's been discussion about how
9 Mother Nature's Waterflood has potentially changed the
10 wettability of the reservoir. Is that something that
11 would only happen with volumes on the order of what
12 Mother Nature's Waterflood would have produced, or
13 could that potentially be something that's an effect
14 of injection from SWDs?

15 A. I've never studied the wettability changes
16 as far as, you know, produced water or injected water
17 goes. But the wettability probably -- you know, has
18 the potential to change, but I'm just really not sure.
19 There's -- well, I'm just not sure.

20 COMMISSIONER LAMKIN: Thank you.

21 CHAIR ROZATOS: Mr. Hearing Officer, forgive
22 me. We forgot to ask Pilot if they had any
23 questions.

24 HEARING OFFICER HARWOOD: Oh, we did.

25 I'm sorry, Pilot. It was inadvertent

1 oversight. Pilot.

2 MR. SUAZO: No problem. No questions from
3 Pilot.

4 HEARING OFFICER HARWOOD: Okay. And we did
5 ask you, Mr. Beck?

6 MR. BECK: Yes.

7 HEARING OFFICER HARWOOD: Thanks for that
8 reminder.

9 Mr. Padilla, then, do you have much
10 redirect? It's 3:20, I want to take an afternoon
11 break. But if you don't have very much, we'll just
12 continue until you're done.

13 MR. PADILLA: I don't think I have too much
14 redirect, if any. But I'd like to confer with my
15 clients.

16 HEARING OFFICER HARWOOD: Sure.

17 CHAIR ROZATOS: Was that a request for a
18 break, Mr. Padilla?

19 MR. PADILLA: Yes, it is. Thank you.

20 CHAIR ROZATOS: I apologize. I think we
21 were all left kind of hanging with that one.

22 Mr. Hearing Officer, I think that was a
23 request for a break.

24 THE HEARING OFFICER: Okay. Well, do we
25 excuse this witness or are you coming back for

1 redirect?

2 MR. PADILLA: No, we don't excuse him yet.
3 I'll let you know.

4 HEARING OFFICER HARWOOD: Great. Fifteen
5 minutes?

6 CHAIR ROZATOS: So can we do a 15-minute
7 break, Mr. Harwood.

8 HEARING OFFICER HARWOOD: Let's do that.

9 CHAIR ROZATOS: Okay. We will be back at
10 3:35.

11 (Recess held from 3:21 to 3:35 p.m.)

12 HEARING OFFICER HARWOOD: Okay. I see
13 Dr. Trentham there. And are you ready to proceed,
14 Mr. Padilla?

15 MR. PADILLA: Mr. Harwood, we don't have any
16 redirect.

17 HEARING OFFICER HARWOOD: Okay.

18 MR. PADILLA: The witness may be released.

19 THE HEARING OFFICER: Thank you. You
20 anticipated my next question.

21 Okay. Dr. Trentham, thank you. And you
22 may not be aware of it, but you hold the record so
23 far as the shortest witness of all.

24 THE WITNESS: I don't know if that's good or
25 bad.

1 HEARING OFFICER HARWOOD: It's very good.
2 Thank you for your time.

3 THE WITNESS: Okay. Thank you. Thank you
4 for your attention.

5 THE HEARING OFFICER: All right. Let's see.
6 I show Steve Melzer is next on my list. Is that who
7 you're calling?

8 MR. PADILLA: We'll call Steve Melzer at
9 this time, Mr. Harwood.

10 LORD STEPHEN MELZER,
11 having first been duly sworn, testified as follows:

12 DIRECT EXAMINATION

13 BY MR. PADILLA:

14 Q. Mr. Melzer, please state your full name.

15 A. Lord Stephen Melzer.

16 Q. And you're a petroleum engineer?

17 A. I'm actually a geological engineer.

18 Q. Okay. Can you tell the Commission what a
19 geological engineer is.

20 A. When I'm with engineers, I'm a geologist,
21 and when I'm with geologists, I'm an engineer. I try
22 to ride the middle. It's an interesting discipline.
23 Not many of us around.

24 Q. And for what purpose have you been retained
25 for this hearing?

1 A. They wanted to look at the ROZ, its
2 producibility, its analogs and the like.

3 Q. Mr. Melzer, I've seen your resume or
4 curriculum vitae, and it's impressive. Can you give
5 us a little bit of flavor of what your experience is
6 with regard to ROZs.

7 A. Okay. I actually kicked off an assignment
8 that the University of Texas Board of Regents put me
9 in in the University of Texas Permian Basin back in
10 1994 to create an organization that looked at CO2
11 flooding in the future. CO2 flooding in West Texas is
12 a way to kind of avoid a quicker decline in the
13 reservoirs in West Texas.

14 I hired a fellow from Exxon that just
15 retired. He just came on to be my mentor in CO2
16 flooding. We created several short courses together
17 with the majors, like Exxon, Mobile, Texaco and the
18 like, and I got to learn from all of them and their
19 experiences.

20 They were thinking of moving from West
21 Texas investments to offshore investments and selling
22 the properties in West Texas, which many of them did,
23 and they needed so much --

24 Q. Mr. Melzer, I'm not sure if everyone hears
25 you. You might pull that a little closer.

1 A. And so we had to educate the smaller
2 companies about CO2 flooding. And then we created a
3 proposal in 1992, I think it was, to submit a research
4 proposal to do work on the residual oil zones that the
5 majors were developing and reporting in our
6 conferences.

7 And so we ended up creating a
8 conference. We just conducted our 30th. We call it
9 the "CO2 Flooding," and did that last December.

10 Q. Does that Co2 Flooding involve ROZs?

11 A. It does. And I'll show in some of my
12 testimony where it's been done. And it's being done
13 internationally.

14 By the way, I made the mention that I
15 left that post four years after creating it and went
16 to consulting on the subject of CO2 and CO2 EOR. And
17 in that role, I've been around the world basically at
18 several places evaluating whether they have ROZ
19 potential and CO2 potential in many fields around the
20 world.

21 Q. In those around the world fields that you've
22 been to, do you find the same type of geology for ROZ?

23 A. The geology is varied dramatically. Almost
24 every field is a different animal to itself. And what
25 I've found over the years is that there are at least

1 three types of ROZs, and let me -- we'll define that
2 here in a minute.

3 But you can vertically flood, Mother
4 Nature can vertically flood a field and leave a
5 residual oil zone below it. Or you can laterally
6 flood it, which is the case in the Permian Basin. Or
7 you can actually have tectonic movement that alters
8 the water-oil contact and then have that kind of a CO2
9 ROZ flood.

10 And so the one that dominates
11 everybody's attention is these laterally flooded zones
12 that we have in West Texas.

13 Q. Do you find ROZs in what you would call an
14 aquifer?

15 A. Well, I don't like the term "aquifer." I
16 tend to think of those as water that's used for human
17 purposes. Very seldom would that be the case in a
18 ROZ. It does produce only water, generally speaking,
19 except in the upper part. But the opportunity to use
20 that for official use is kind of limited because of
21 the high salinities involved in the ROZs.

22 So I know people use the word "aquifer"
23 because it makes only water, but I think it gives a
24 misrepresentation of the fact that it's an ROZ.

25 MR. PADILLA: Mr. Chairman, we tender

1 Mr. Melzer as an expert witness in geological
2 engineering.

3 HEARING OFFICER HARWOOD: Mr. Rankin, any
4 objection?

5 MR. RANKIN: No objection based on the
6 direct testimony that Mr. Melzer has provided on that
7 expertise.

8 HEARING OFFICER HARWOOD: Mr. Moander?

9 MR. MOANDER: No objection from OCD.

10 HEARING OFFICER HARWOOD: Mr. Beck?

11 MR. BECK: No objection.

12 HEARING OFFICER HARWOOD: Mr. Suazo.

13 MR. SUAZO: Pilot has no objection.

14 HEARING OFFICER HARWOOD: He will be so
15 recognized.

16 BY MR. PADILLA:

17 Q. Mr. Melzer, you prepared a self-affirmed
18 statement with a number of exhibits on it, correct?

19 A. Yes. Those are my statements.

20 Q. Now, attached to your self-affirmed
21 statement are Exhibits C-1 through C-17, correct?

22 A. Correct.

23 Q. Mr. Melzer, are the contents of your
24 self-affirmed statement true and correct to the best
25 of your knowledge, as well as the exhibits you

1 attached to it?

2 A. Yes, they are.

3 MR. PADILLA: Mr. Chairman, we offer the
4 self-affirmed statement together with the exhibits
5 C-1 through C-17 into evidence.

6 HEARING OFFICER HARWOOD: Any objection from
7 Goodnight?

8 MR. RANKIN: No objection.

9 HEARING OFFICER HARWOOD: OCD?

10 MR. MOANDER: No objection from OCD,
11 Mr. Hearing Officer.

12 HEARING OFFICER HARWOOD: Rice?

13 MR. BECK: No objection.

14 HEARING OFFICER HARWOOD: Pilot?

15 MR. SUAZO: Pilot has no objection.

16 HEARING OFFICER HARWOOD: Self-affirmed
17 statement on Exhibit C-1 through 17 will be admitted.

18 (Admitted: Empire New Mexico
19 Exhibits C-1 through C-17.)

20 BY MR. PADILLA:

21 Q. Mr. Melzer, we have a series of slides to
22 summarize your testimony, so we'll start off with the
23 first one. And tell us what is in there, what it did.

24 A. I think this was introduced perhaps by
25 Dr. Lindsay, but this comes from an author, 1999,

1 Alton Brown. It's a highly idealized water and oil
2 profile set of saturations in the Seminole Field. And
3 I might add that this particular field was where the
4 term "ROZ" started. And Hess, at the time, realized
5 that the shows of oil continued down well over 300
6 feet below their oil-water contact.

7 And so they did a pretty careful
8 analysis, as you've heard, with core, both
9 conventional, one or two sponge cores and one pressure
10 core, which they have reported on at our conference in
11 past years.

12 And I want to note, particularly this
13 top zone is the main pay zone, much like the case in
14 the EMSU or in the Grayburg. And what you see is a
15 transition of oil and water saturations where the
16 water saturation is increasing through an interval
17 that's usually about 35 to 50 feet in most fields.
18 And then it goes into a constant oil and water
19 saturation for some distance. And then it transitions
20 off at the bottom again to zero. And so that would be
21 the base of the ROZ where the oil saturation gets very
22 close to zero.

23 Q. Mr. Melzer, would you say the main pay zone
24 here in the Seminole, is that the Grayburg zone?

25 A. The green?

1 Q. Yes.

2 A. Analog would probably be a very good one for
3 the EMSU from Seminole here.

4 Q. And the residual oil zone, is that
5 San Andres?

6 A. Well, in this case, this is all San Andres
7 from top to bottom, top of the main pay to the base of
8 the oil saturation.

9 Q. Okay. So, effectively, the ROZ is at the
10 bottom of the pay zone?

11 A. Actually, there's a lot --

12 Q. Below -- below the main pay zone.

13 A. Yeah, the ROZ is below what I like to call
14 the producing oil-water contact. Because the company
15 that develops the main pay will generally want to stop
16 before they make much oil -- much water, excuse me,
17 and that would be somewhere in the neighborhood of 80
18 to 85 to 90 percent oil. And then that's the
19 producing oil-water contact. The actual static
20 water-oil contact would be where you make no more oil,
21 which is just a few feet below that.

22 Q. Now, I've heard you and other technological
23 witnesses that we have talk about the transition zone.
24 Can you explain to me what a transition zone is? I'm
25 sure it's the difference between the main pay zone and

1 the residual oil zone, but you call it "transition
2 zone." What is that?

3 A. Well, it's a smearing of oil and water
4 saturations. There's hardly ever a step change in
5 that oil and water saturations, and it transitions
6 over an interval that's 20 to 50 feet, roughly
7 speaking. And it depends on the properties of the
8 rock as to how thick that will be.

9 And I might add, too, that the reason
10 that ROZ technology has come about is because of
11 fields like this, like Seminole. Where most fields
12 will have an oil zone that's only 10 to 50 feet, and
13 the transition zone is what they saw below the
14 producing oil-water contact, and so they never saw a
15 thickness like this.

16 This is, you know, over 100 feet of
17 constant -- roughly constant oil saturation, so we had
18 to come up with a different name. And Hess saw that
19 first; Shell at Wasson Field saw it next. And that's
20 kind of where it all started.

21 Q. Mr. Melzer, explain to the Commission what
22 that scale at the bottom on water saturation, how that
23 plays into your --

24 A. I think this has been covered in the
25 previous testimony. But oil saturation and water

1 saturation are related in that the combination of the
2 two add up to 1 in situ. Now, there's some gas
3 saturation that can enter the picture, but we're
4 talking about oil zones here in particular.

5 Q. This slide defines a residual oil zone.
6 Explain to the Commission -- first of all, I want you
7 to explain, you have, in parentheses, "(POWC)." What
8 does that mean?

9 A. Producing oil-water contact.

10 Q. And how does that play into a ROZ?

11 A. Okay. You'll notice, first of all, that I
12 don't use numbers here, except in the case of the
13 water saturation. And that's arbitrary, too, because
14 the operator may decide he's willing to put up with
15 20 or 30 percent water. But usually, it's closer to
16 85 percent or 90 percent where he says, "I'm not
17 drilling deeper." And then we call it the producing
18 oil-water contact.

19 It's usually defined in the unitization
20 agreement; oftentimes, very arguably, between the
21 owners of the field. And so that's right in the
22 middle of the transition zone, where they've cut off
23 the producing water-oil contact and defined it there.

24 And then what happens is that in normal
25 fields, that just buries down to zero, say a few feet,

1 tens of feet below the producing oil-water contact,
2 and they call that a transition zone.

3 However, where you have a deep field, a
4 deep interval of shows, like they do at Seminole and
5 San Andres formations, in general, that'll be 50
6 feet -- maybe 30 to 50 feet interval of transition
7 where you get a varying and declining oil saturation.
8 Below that, it'll stay constant for a while if the
9 zone of oil shows it's thick enough.

10 Q. Is an ROZ typically below the producing
11 oil-water contact?

12 A. In most definitions, yes. And so the main
13 pay is above it. And then the ROZ starts below that.
14 Some people will still define a transition zone at the
15 top of the ROZ. I like to do that myself.

16 Q. Does your definition define a greenfield
17 ROZ?

18 A. It can. If there is no producing water-oil
19 contact, it means there was no main pay. And so you
20 have a transition at the top of the ROZ and a
21 transition at the base of it.

22 Q. Okay. This is marked Exhibit C-3, and what
23 is this?

24 A. This is part of what Dr. Bob Trentham likes
25 to call the -- his terminology, yeah, his cookbook, he

1 calls it. And what it is, is things to look for if
2 you think you might have an ROZ.

3 And we take this concept to various
4 folks and try to determine whether they have one. It
5 is broad, like I think was mentioned in the early
6 testimony. And not all of these pieces of evidence
7 will be present, and some of them will give you a
8 false reading.

9 But generally speaking, it is sort of
10 like the job that lawyers and hearing examiners have.
11 You piece a lot of information together to try to
12 figure out what the right answer is, and that is what
13 we use here, and make a judgment as to whether the ROZ
14 is present or not.

15 Q. Does this cookbook apply to the San Andres
16 ROZ --

17 A. Oh, yes.

18 Q. -- underlying --

19 A. Well, the ROZs in the San Andres will have
20 most of these attributes.

21 Q. Have you applied this cookbook recipe to the
22 San Andres underlying the EMSU?

23 A. Yes, I sure did, and it passes in my
24 judgment as to being an ROZ through a thick interval.

25 We don't have a lot of core data, as you

1 know, and we have been talking about it. So we just
2 know that it is present for some thickness to where
3 the core ended, but we do not know how deep it goes.

4 Q. So you can't tell below the core whether
5 there is ROZ?

6 A. Well, I'm not a skeptic of petrophysics,
7 because I use it a lot. But by itself it is not
8 enough to say that it is going to tell you where the
9 ROZ is.

10 In other words, there are so many
11 factors, as you have heard, that play into that, m and
12 n and water saturation. And the water saturation can
13 vary on these laterally swept Mother Nature
14 Waterfloods. So it is a very good diagnostic, but not
15 a perfect one.

16 So, yes, I don't know where the bottom
17 is, frankly.

18 Q. In terms of the depths above the core in the
19 679 well and the RR Bell Number 4 well, do these
20 factors play a prominent role in deciding whether or
21 not there is a ROZ?

22 A. They do play a factor, yes.

23 Q. And what was your conclusion?

24 A. That enough of them were present that it's,
25 I guess I'm am trying to pick my right word,

1 conclusively a ROZ.

2 Q. In the San Andres?

3 A. Yes. Well, I was also asked to show where
4 ROZs are present, and this is just the Permian Basin
5 examples. We've got a number of them around the
6 world. And what happened as a result of the
7 recognition of the residual oil zones, in general, is
8 that companies started to say, "Wait a minute. I need
9 to be flooding, CO2 flooding, below the producing
10 oil-water contact."

11 And so most of them, at least all of
12 them here, that saw those shows below the producing
13 oil-water contacts, said, "I guess I can deepen the
14 wells and inject into the ROZ," the upper ROZ, in many
15 cases.

16 And so as you see, there's 24 that we've
17 identified. It's very hard to find the literature to
18 back this up, but I feel very confident that that's
19 exactly what -- that they knew what they were doing.
20 And sometimes they commingled them with the main pay
21 because they were already flooding the main pay zone
22 above, and most of them are that way.

23 And then you see the 5 and 6 line there,
24 the Tall Cotton phase, we talked about that earlier.
25 And what that is -- and once we determine, as the next

1 slide will show, the fairways of sweep, Mother
2 Nature's sweep of the oil, this is a greenfield.

3 And we define a greenfield as a flood --
4 an area of oil shows that doesn't have a main pay. In
5 other words, when many of them drilled into the ROZ
6 and were frustrated that they got very little oil show
7 at all and made only water. And as you get deeper
8 into the ROZ, it's really rare that you see any oil
9 show or not in the produced fluid.

10 So we'll talk a little bit about the
11 Tall Cotton project in a minute. And that is what we
12 call a "greenfield ROZ"; whereas, the others are
13 brownfield ROZs.

14 Q. Mr. Melzer, I noticed that Numbers 7, 8, 9
15 10 and 12 are in Lea County, New Mexico.

16 A. Yes, they are.

17 Q. Are they in the area of where the EMSU is?

18 A. Yeah. They're not far. Probably the
19 closest one is Hobbs, if I remember my geography
20 right. And a thing to note on some of those, maybe
21 all of them, is that they have commingled the ROZ and
22 the main pay zone. In other words, that they decided
23 from the get-go they would produce them both
24 simultaneously, not just try to separate the main pay
25 from the ROZ.

1 And that's become a trend of late that
2 folks, they know they're going to make oil with CO2 or
3 an EOR process in general, enhanced oil recovery
4 process, and so they will design the project to
5 include part of the ROZ, if not all of it.

6 Q. And the ROZ is -- well, explain to us how
7 all of these, except the bottom, are San Andres
8 production. Right?

9 A. I think all but one. There's a flood in the
10 Horseshoe Atoll area. Let's see what number that is.
11 It's got to be in here. Let's see. Anyway, it's a
12 Pennsylvanian. There it is, Salt Creek. And that's
13 over in the eastern part of the Permian Basin. And
14 they had a ROZ underneath that Pennsylvanian Reef.

15 Q. And that's the one that's producing out of
16 the Canyon Reef?

17 A. It is.

18 Q. This exhibit, C5, this slide, what does that
19 tell us?

20 A. Okay. I updated this in early January of
21 last year. And these are published numbers on the
22 original oil in place and the main pay. Many of them
23 have -- the ROZ floods have added oil-in-place numbers
24 for the ROZ. But what I thought I'd do was
25 demonstrate some recoveries that they've had. And

1 some of this analysis is difficult, but I've had some
2 help from Hess, especially, who owns Seminole, on
3 doing this.

4 And you can see, these are large fields
5 in general because the capital expenses are pretty
6 high on putting in a CO2 flood. And then the primary
7 recovery in Seminole was only about 11 percent of the
8 main pay, and they decided to go to waterflood pretty
9 quickly. And we attribute 338 million barrels to the
10 waterflood recovery there. So now we're up to --
11 well, 30 percent from the waterflood, so we're up to
12 41 percent. And that was all main pay zone. So we
13 produced 41 percent of the oil in place in the primary
14 and secondary recovery phase.

15 Then they decided to go into CO2
16 recovery. And you can see how successful they were
17 there. They got 28 percent; that's a really good
18 number. It's actually up to 30 now in the recovery
19 from the -- enhanced oil recovery in the main pay
20 zone. And they added the ROZ later in the life of
21 that.

22 So part of that recovery from CO2 is now
23 in the ROZ, from the ROZ, and you can see that's 68
24 million barrels, so not insignificant. I've got a
25 graph of this later.

1 And then the total recovery to date is
2 70 percent of the original oil in place. So it's a
3 big number. And that's an impressive credit to Hess,
4 which is now owned by Oxy, I might add, the field is.

5 Q. So, essentially, out of the ROZ, as I
6 understand this compilation, is that it's 68 million
7 additional barrels of oil?

8 A. Yeah, just from below the producing
9 water-oil contact.

10 Q. Now you show us the next slide, Exhibit C-7.

11 A. This is the Denver Unit. This is part of
12 the Wasson Field that you've heard about already. And
13 you can see the main pay zone oil in place there is
14 about twice what it was at Seminole. They've
15 recovered about 38 percent of the oil in place from
16 the main pay to date. That would include primary,
17 secondary and CO2.

18 And so the recovery of CO2 by itself is
19 351. Let me back up. 851 is not including the CO2.
20 The 351 adds to the CO2, and so they're up to, you can
21 see, over 50 percent.

22 And they also instituted in -- I guess
23 later, about 2005 or 2006, they started flooding the
24 ROZ portion with CO2. And it's a little different,
25 more difficult analysis to figure out what's coming

1 from them, from the ROZ. But it's got to be greater
2 than 50 million barrels. I just used a conservative
3 number there.

4 So their total recovery to date is about
5 54 percent of the total oil in place, original oil in
6 place.

7 Q. So, Mr. Melzer, how does an operator go
8 about looking for ROZ and developing ROZ as they did
9 in the Denver Unit? I mean, what type of strategy or
10 exploration technique do they use to find the ROZ?

11 A. Well, in the case of Seminole, let me answer
12 that one, it's a real easy answer, because what they
13 did is they were drilling deeper to look at the Clear
14 Fork Formation. And what tipped them off was, they
15 said, "Oh, we're getting shows through the whole
16 interval."

17 And so in 1985, they said, "Oh, we
18 better deepen our unit." And so they petitioned the
19 Railroad Commission and the mineral interest owners to
20 deepen their unit from the producing oil-water contact
21 down through the San Andres. And fortunately, they
22 did that because now they could flood the entire ROZ.

23 So same thing sort of went on at Wasson
24 with the different operators and the different units
25 there. And they saw, going through the Clear Fork

1 again, that they had very thick zones of oil
2 saturation. And I think fortunately there, they had
3 decided to unitize down through the entire section of
4 the San Andres. And so they instituted CO2 flooding
5 into the ROZ. I think early on, they called it
6 transition zone. It only went 150 feet into the ROZ
7 there. And you can see what they recovered at the
8 Denver Unit.

9 Since that time, two or three of the
10 other units in the Wasson Field have done the same
11 thing. So there's probably well over 150 million
12 barrels that have been produced from the ROZ in the
13 Wasson Field today.

14 Q. So the Denver Unit is an actual unit,
15 correct?

16 A. Inside the Wasson Field, yes.

17 Q. And it covers all of the San Andres?

18 A. Yeah. The unit goes down to the base of the
19 San Andres, as far as I know. I don't know if that's
20 true for Tall Cotton -- I mean, for Bennett Ranch and
21 the other units there. But Shell did try to get the
22 full unit to the bottom of the San Andres.

23 Q. What does Exhibit C-8 show.

24 A. Well, I apologize for the complexity of this
25 graph, but it says a lot of things. Number one is

1 that the Denver Unit production, again, in the Wasson
2 Field shows the production from January of '70, where
3 the Railroad Commission -- well, the digital data
4 started. And you can see the peak of the waterflood
5 there in the '70s, and then the decline.

6 And the waterflood was starting to
7 mature out. And if you project that waterflood
8 decline down to zero, or near zero, you'd see that the
9 field would have been abandoned on January 12 or 14,
10 2014, as that shows.

11 And so they decided that they wanted to
12 continue the field to recover more oil, of course.
13 And so extending in the red is the contribution now
14 from the CO2 flood. You can see it almost flattened
15 the production decline out to zero for a while. And
16 then it started to decline again and they said, "Oh,
17 let's go after the ROZ."

18 And you can see the first bump on that
19 was '97, that's when they instituted their first phase
20 of the ROZ development, and then did another addition.
21 And then they continued to do additions, very small
22 areas, inside the Denver Unit.

23 And what I tried to do was look at the
24 difference between the decline from the main pay zone
25 ROZ that starts about '95, and the total production to

1 give you that purple or blue curve -- and what color
2 is it? Well, purple I guess. The bottom one anyway.
3 And you can see that the ROZ is contributing something
4 just around 9- to 10,000 barrels a day from the right
5 scale there. And so it continues to hold the
6 production pretty flat at the Denver Unit.

7 Q. Mr. Melzer, you pointed out a very
8 interesting thing here on this graph when we were
9 going over it. And in the purple line, towards the
10 right of the graph, there's a sharp decline there.
11 Can you explain what that is?

12 A. Oh, out there in 2020?

13 Q. Yes.

14 A. I think we'll all remember that year. That
15 was COVID and price drop associated with that. And
16 they ceased injection and production, I think, for a
17 few months right there.

18 Q. Anything further on this slide?

19 A. Oh, I think you see a little bump up there
20 in '23. And I think they're adding some more zones.
21 I haven't confirmed that with Occidental. That's the
22 operator. I'm pretty sure they're adding more zones
23 to keep the production pretty flat.

24 Q. We've seen this thing before in different
25 form, but tell us what you have here.

1 A. Well, this came about in 2002, I think it
2 was, when I was reviewing a lot of New Mexico
3 literature; I think some by the New Mexico Tech folks
4 and mining organization there in Socorro. And I
5 noticed that the oil fields in the San Andres were
6 aligning in a certain pattern. And not know --
7 knowing enough about the history, the paleogeography
8 of the Permian Basin, I said wow, these things are
9 lining up nicely.

10 And it turns out -- we call them
11 "fairways." And Dr. Bob Lindsay talked about this,
12 where there was an uplift in New Mexico associated
13 with the Laramide and then the basin in-range tectonic
14 events, and the water -- the San Andres is outcropped.

15 If you drive from, say, Roswell to
16 Plains, and aren't asleep, you see these sinkholes off
17 to the left, about halfway up, and that's where that
18 water comes in, at least in one of the fairways there,
19 the Roswell Fairway and then the Slaughter Fairway.

20 And so it went through the uplifted
21 sections of the San Andres. And what we define as the
22 fields that are indicated in the various colors there,
23 San Andres blue, is it swept out about half of the oil
24 that was entrapped prior to those uplifts.

25 And so we would decide then that there's

1 sweep going on in all the San Andres zones there, and
2 we decided well, gee, there's areas that didn't have a
3 bump on top of the ROZ, on the field, and that's what
4 we looked for for 70 years in the Permian Basin, bumps
5 on top of the ROZ. And so you define those as
6 greenfields, where there was no primary production.
7 Brownfields, you know, the production was there and
8 they deepened into the ROZ.

9 So I've named off a few fields. And I
10 should point out that EMSU and the whole complex
11 there, Monument Field area, is in that Artesia
12 Fairway.

13 Q. What does Exhibit C-10 show?

14 A. Okay. This is the Tall Cotton, the example
15 of the greenfield. And I like to show this because
16 there were people coming out of the woodwork saying,
17 "What are you doing out there?" because there was no
18 primary production.

19 And Kinder Morgan said, "Well, we
20 believe in greenfield ROZs," and so they drilled the
21 wells. You can see there's 40 wells in less than a
22 section area, by the way. This is about 580 acres
23 now, a little less than that before the Phase 2
24 program.

25 And so it took them a few months to see

1 any oil because you started to have to have the CO2
2 interact with the oil that was residual oil, and sure
3 enough, it did. And then they got pretty excited, as
4 you can see there in mid second decade of the 2000s,
5 and added more wells and infill drilled mostly, but
6 added a few wells on the periphery to create a peak of
7 production of about 3,000 barrels per day.

8 And we added this little insert here
9 because it's made now over five million barrels of
10 oil.

11 Q. And that's a greenfield?

12 A. Those are greenfield ROZ in less than a
13 section of land.

14 Q. Would that be pretty easy to overlook if you
15 didn't study it for --

16 A. Well, you can say it was overlooked for 70
17 or 80 years.

18 Q. You show oil saturation in these exhibits,
19 C-11, C-12, and then you have a C-13 which shows a
20 map?

21 A. Yeah.

22 Q. Tell us about the RR Bell core and what you
23 saw there.

24 A. Well, interestingly enough, you have a main
25 pay zone in the Grayburg there, in the left one, the

1 RR Bell 4. And you notice that at the base of the
2 Grayburg on the top of the San Andres, you can see
3 pretty much similar in terms of oil saturations. And
4 these are from conventional core again, so they're
5 running about 15, say, on average, say, 15 percent oil
6 saturation.

7 And I completely agree with what Drs.
8 Lindsay and Trentham have said about conventional core
9 being the lowest possible value for the in situ core
10 saturation, the in situ saturation. And so we
11 commonly will double that. That's a little less than
12 what Dr. Lindsay was talking about. But very
13 typically in the San Andres Formation, typical
14 lithologies in the San Andres Formation, something
15 like a double of the conventional core saturation will
16 be representative of what it is in situ. So Seminole
17 helped us with those numbers with their pressure core.

18 So anyway, that's the interpretation I
19 put on the data you've seen already. And that's
20 clearly a definition of a ROZ in my mind.

21 And then over in the middle, Exhibit
22 C-12, you see the EMSU. And I think these numbers are
23 very consistent with the scatter that you always see
24 in the lithologies within the San Andres, and even
25 worse in the Grayburg.

1 So I think it's hard -- in my mind, it's
2 hard to argue that we don't have some ROZ down to sea
3 level of minus 700. And that's my interpretation.

4 And the base of the oil saturation, if
5 you go by the interpretations on the logs, would look
6 like maybe 4300 feet. So if I had to guess where the
7 base was, I'd say it's minus 700, from this graph. We
8 need more data, but that's at least from the data we
9 have.

10 And then you all are familiar with the
11 graph on the right.

12 Q. What's this, C-16?

13 A. I want to take a minute to say that the
14 world has changed in the oil and gas business. It
15 doesn't take a rocket scientist to say that
16 horizontals are dominating our world. And that's
17 because they contact more reservoir.

18 And so one of the beauties of this area
19 in the Monument area is that you have fractures. And
20 a lot of those fields over in West Texas don't have
21 the fracture network that you've got because of the
22 intense folding that went on in the Monument area.

23 And so what I did, with a little help
24 from the folks at Empire, was look at a new flooding
25 technique. And it turns out that a company in Texas

1 is doing exactly this and they're flooding from bottom
2 to top. And you can do this with horizontals in the
3 bottom, try to contact as much of that oil near the
4 base of the ROZ, and allow the buoyancy of CO2 to float
5 that oil up; basically interact with the oil and
6 create a front.

7 The problem, typically, has been these
8 baffles. And we talked a little bit about baffles
9 already. But the beauty is, we've got these fractures
10 because of the intense folding. And I do very
11 strongly believe we'll be able to vertically flood all
12 the way up, maybe even into the Grayburg.

13 We're going to have to re-pressure the
14 Grayburg here because you need miscibility. And that
15 term means that the oil and CO2 mix and create a new
16 material that is more mobile than the very typically
17 lower gravity ROZ oil. But we've proven that that
18 works in the other fields that we've CO2 flooded.

19 And this would be a wonderful new
20 concept, which is going to take some capital to do, of
21 course. But I think we'll be able to watch the folks
22 over in Texas when they raise their money to do their
23 project. So that'll be an analog for us there.

24 Q. Mr. Melzer, just so that I understand this
25 exhibit, you have an injector on the right and it's a

1 horizontal, and it disperses CO2 and it floats up to
2 the top, and you have a producing well at the top?

3 A. Correct. It could be done with verticals,
4 too, in the main pay, which would save a lot of money,
5 perhaps. Both concepts are real, in my mind.

6 Q. This is the last exhibit you have, C-17.
7 What do you try to tell us here?

8 A. In the study we did back in the 2008 to '15
9 time frames, this is research work that we did with
10 the RPSEA Research Partnerships during our Energy for
11 America. And we were working with UTPB. And Bob
12 Trentham and I were kind of the leaders on that
13 project.

14 We asked a company called ARI, Advanced
15 Resources International, to help us with assessing
16 what the total oil-in-place numbers might be in the
17 ROZ in the greenfields only. These are areas that
18 didn't have fields over the top, you know, those areas
19 that were empty, if you will, in the fairways. And
20 they looked at five counties. I wish we had done
21 Lea County. I think they may have done that since
22 this time.

23 But you can see the total areas and
24 acreage and total oil-in-place numbers they came up
25 with. I'll highlight that fifth column over there,

1 which is 150 million barrels -- 150 billion barrels,
2 excuse me, of oil in place in the greenfields in those
3 five counties.

4 And they divided into higher quality and
5 lower quality. That would be based upon the facies;
6 not so much on the oil saturation but on the facies of
7 the rock. And you can see even with a small
8 15 percent oil recovery factor, 16 billion barrels of
9 produced oil in those five counties in the ROZ.

10 And at the time, RPSEA was very
11 interested in how much CO2 you would store with a
12 typical utilization rate of 16 mcf per barrel of oil.
13 I won't go into that. It's another whole subject to
14 itself. But there's a lot of CO2 you'll store when
15 you're making that oil.

16 Q. So when you're talking about 15 percent oil
17 recovery factor, is that a conservative figure that
18 you inserted here?

19 A. Say that again. I'm sorry.

20 Q. The 15 percent oil recovery factor, which is
21 the column second from the right, how did you arrive
22 at 15 percent?

23 A. I wanted to be ultra conservative because
24 that is a typical number we get from a main pay that's
25 been waterflooded. And so we'll get 15 percent of the

1 original oil in place.

2 But when it's been naturally
3 waterflooded, we've already lost the waterflood
4 barrels, so the oil-in-place number is going to be a
5 different number than the original oil in place,
6 because now we're at apples and oranges.

7 This is really complicated and I'm going
8 to lose everybody. But 15 percent, if it was a main
9 pay zone, is a very conservative number. We think
10 we'll double that with an ROZ recovery factor because
11 of the fact that it's been waterflooded.

12 Q. But these are greenfield ROZs that you're --

13 A. Correct. Only the greenfields.

14 Q. Okay.

15 A. Yes.

16 Q. What conclusions do you draw from all of
17 your exhibits that we've --

18 A. Well, first of all, I was tasked to say
19 whether it's an ROZ in San Andres in the EMSU.
20 Clearly it is, in my mind. And then is it amenable to
21 water -- or CO2 flooding, and I think it is. And I
22 think that it may even allow -- because of the
23 vertical fractures, it may even allow a more novel
24 approach to get even more oil than you would expect
25 from, say, this table.

1 And so what I would think is that more
2 data is required. I mean, unfortunately, that's the
3 world we live in. We never have enough data when we
4 need it. But I think all the symbols -- signals are
5 pointing to a successful ROZ project in the San Andres
6 in the EMSU.

7 MR. PADILLA: That's all I have,
8 Mr. Chairman, Mr. Harwood. I pass the witness for a
9 cross.

10 THE HEARING OFFICER: Thank you.

11 Mr. Rankin.

12 MR. RANKIN: Thanks, Mr. Hearing Officer. I
13 do have cross.

14 CROSS-EXAMINATION

15 BY MR. RANKIN:

16 Q. Good afternoon, Mr. Melzer. How are you
17 today?

18 A. Good.

19 Q. Good. I understand you were retained by
20 Empire to provide an overview of residual zones in the
21 Permian Basin; is that correct?

22 A. That is correct.

23 Q. And based on your experience having worked
24 with them over the years in the Permian Basin?

25 A. Yes sir.

1 Q. Okay. Now, as part of your direct testimony
2 that you filed back in August of 2024, do you recall
3 that you were requested to provide all the documents
4 that you had referenced or relied on in preparing your
5 analysis and coming to your conclusions?

6 A. Once requested, yes.

7 Q. Is your understanding that the prehearing
8 order required all experts to provide all the
9 documents that they referenced or relied on in coming
10 to their conclusions?

11 A. I think I did that. Much of it was in a
12 form, a website. Yes, sir.

13 Q. All right. So I'm going to just bring to
14 the -- once I get onto this sharing page here. When
15 we received your expert report, your testimony back in
16 August 2024, Empire's counsel provided us with a
17 document that identified for each expert who provided
18 direct testimony the documents that those experts
19 reviewed or relied on.

20 This is part of the record, so I'm not
21 going to admit it as an exhibit. But I will just
22 scroll down here to the entries where you have
23 identified the -- where it identifies where you have
24 provided two documents that you had referenced or
25 relied on in support of your testimony.

1 Now, obviously those numbers don't mean
2 anything to you, so I'm going to pull them up so you
3 can see them. Okay?

4 But there are two documents, and the
5 first one is 30 years of ROZ studies dated February
6 2023. It's a six-page document that is a sort of
7 overview of different types of CO2 EOR projects and ROZ
8 projects.

9 Do you recognize this document?

10 A. Yes, sir, I do.

11 Q. Is that one of the documents you provided?

12 A. Yes.

13 Q. Okay. And then the second document is this
14 final report. You may have actually even been
15 referring to it in your testimony. But it's a
16 231-page report that addresses an overview or case
17 studies of ROZ CO2 flood in and around the Permian; is
18 that right?

19 A. Correct. Yes.

20 Q. But neither of those two reports address the
21 EMSU unit, correct?

22 A. That's correct.

23 Q. So, as to the EMSU, you get a -- I think I
24 see in your testimony you did review two cores
25 specific to the EMSU, correct?

1 A. Core reports.

2 Q. Core reports?

3 A. Yes.

4 Q. And that was the 679 and the RR Bell
5 Number 4, correct?

6 A. That's correct.

7 Q. Is there any other data or information
8 specific to the EMSU that you reviewed in preparation
9 for your direct testimony that you submitted in
10 August?

11 A. '24?

12 Q. Mm-hmm.

13 A. I have to think about that, but I'm sure I
14 read some testimony that was presented, yes. But that
15 would have been afterwards, so no.

16 Q. No. Okay. So the time you prepared your
17 testimony in August 2024, only the data specific to
18 the EMSU were those two cores -- core reports, right?

19 A. Correct.

20 Q. And you were not asked to evaluate whether
21 the purported ROZ in the San Andres or even the
22 Grayburg is recoverable in this case?

23 A. I was asked to look at the ROZ as the
24 potential for CO2 flooding, yes.

25 Q. Okay. Let me ask the question again. Were

1 you asked to evaluate specifically whether the
2 purported ROZ in the Grayburg or San Andres is
3 technically recoverable?

4 A. Not exactly. Not explicitly.

5 Q. Okay. Let me ask -- I think it's a yes or
6 no question. Were you asked to opine on whether the
7 ROZ in either the Grayburg or San Andres is
8 technically recoverable?

9 A. I'm thinking about the conversations.

10 Q. Is it in your direct testimony?

11 A. No, it's not in my direct testimony.

12 Q. Okay. And you wouldn't be able to do that
13 by just looking at two core reports, would you?

14 A. It would be difficult to do, yes, sir.

15 Q. And along the same lines, you wouldn't be
16 able to determine, based on the two core reports, what
17 the recovery factors might be in the EMSU?

18 A. That's correct.

19 Q. And you wouldn't be able to determine, based
20 on those core reports or anything else you reviewed
21 with respect to the EMSU, whether the ROZ, purported
22 ROZ in the San Andres or Grayburg is economically
23 recoverable, would you?

24 A. No, sir.

25 Q. So you're not offering any opinions on

1 whether the purported ROZ in the San Andres or
2 Grayburg is economically recoverable, are you?

3 A. Only by analog with the two fields.

4 Q. Have you established any basis that those
5 fields are analogous?

6 A. Some ways, yes, sir.

7 Q. Okay. What data have you reviewed to
8 confirm that, and where it is in your testimony?

9 A. It is the oil saturations from the core.

10 Q. Okay. Now, have you looked at the API, the
11 gravity, viscosity, any other elements or components
12 of the oil that was in the San Andres in the EMSU?

13 A. No, because you can't sample residual oil.

14 Q. So you're telling me that it's not possible
15 to -- is it not possible to determine whether ROZ is
16 economically recoverable from the San Andres at this
17 point?

18 A. Only by analog.

19 Q. Okay. So your contention is that just based
20 on the oil saturations in the core that you can draw a
21 comparison and confirm that or make an opinion that
22 the EMSU ROZ, the purported ROZ, is analogous to all
23 the other ROZs that you discussed today in your
24 testimony?

25 A. Say that again.

1 Q. So is your opinion that just by looking at
2 the oil saturations in those two core reports for the
3 EMSU that you can opine that the EMSU is analogous to
4 every other field in ROZ development that you
5 discussed in your testimony today?

6 A. Well, not in every field, but the analog to
7 the Seminole is pretty good.

8 Q. Based on the oil saturations?

9 A. Yeah. And the saturation levels, yes.

10 Q. So that's the sole basis for your opinion,
11 that they're analogous?

12 A. Proximity and rock types also.

13 Q. Okay. You gave us a lot of different
14 examples of ROZ plays. Are you aware of any
15 commercial or pilot ROZ developments on the west side
16 of the Central Basin Platform and south of the
17 San Simon Channel?

18 A. I'm not. Well, you mind if I caveat that?

19 Q. Sure.

20 A. I think the commingled north and south Hobbs
21 fields do include the ROZ.

22 Q. Are they south of the San Simon Channel?

23 A. I'm thinking geography here. It's really
24 close. I think they are north of the San Simon.

25 Q. You're familiar with the tilt, the oil-water

1 contact tilt study that Mr. Brown did that
2 Dr. Trentham referenced in his testimony?

3 A. Yes.

4 Q. Now, I can bring it up if you'd like, but as
5 I understand, that study documented oil-water contact
6 tilts, which is an indication of a Mother Nature's
7 Waterflood event occurring?

8 A. That's correct.

9 Q. Now, I didn't see any oil-water contact
10 tilts indicating anything in the EMSU. Is that right?

11 A. That's correct.

12 Q. Were you aware at the time you prepared your
13 August 2024 testimony that there were six water-supply
14 wells in the EMSU that were completed in the
15 San Andres in the EMSU?

16 A. No, I was not.

17 Q. And are you aware of the approximately 20
18 additional water-supply wells that have been and were
19 withdrawing water from the San Andres in the area
20 immediately offsetting the EMSU?

21 A. Water-supply wells?

22 Q. Yeah.

23 A. No, sir.

24 Q. At the time that you prepared testimony in
25 August 2024, were you aware that there was produced

1 water disposal occurring in the San Andres in the EMSU
2 since the 1960s?

3 A. I was not. I might have expected that there
4 would be.

5 Q. Yeah. They have to put the water somewhere,
6 right?

7 Were you aware at the time you provided
8 your testimony that Empire was also disposing of
9 produced water into the same San Andres zone within
10 the EMSU?

11 A. Yes.

12 Q. You were aware of that?

13 A. Repeat it. Better repeat it.

14 Q. Sure. Were you aware at the time of your
15 testimony in August 2024 that Empire was also
16 disposing of produced water into the same San Andres
17 zone within the EMSU?

18 A. No, I was not. Sorry.

19 Q. Now, I think I'm anticipating your answer,
20 but just to be clear. Because ROZs have low oil
21 saturation and high water saturations, when you try to
22 produce them, they generally will produce high volumes
23 of water, by definition, correct?

24 A. By definition.

25 Q. Yeah. And that's the experience at Tall

1 Cotton, correct?

2 A. That is correct.

3 Q. Okay. Let's see. Now, I think we kind of
4 addressed this already, so I'm not going to ask that
5 one?

6 Are you aware, Mr. Melzer, of any
7 commercial or pilot ROZs currently under development
8 or that have been producing that are thicker than 400
9 feet?

10 A. Almost of the same mindset that Bob Trentham
11 is, anecdotally, I can say that. But I can't prove
12 it.

13 Q. Okay. So you're not, as you sit here, aware
14 of any that are thicker than that today?

15 A. No. That's a fair statement.

16 Q. Okay. You referenced in one of your
17 exhibits the Seminole San Andres Unit, the SSAU. That
18 particular unit, as I think I understood from your
19 testimony, that it was developed in conjunction with
20 the main pay zone, is that right, or subsequent to a
21 main pay zone?

22 A. Yes, it was. All the extensions were into
23 the ROZ from existing wells. And then they drilled
24 some dedicated injection wells, but that's it.

25 Q. And in the Denver Unit that you referenced,

1 is that also the case, that they developed that ROZ
2 either in conjunction with or subsequent to the
3 development of the main pay zone?

4 A. Correct.

5 Q. On the Tall Cotton, were you involved in
6 that project?

7 A. Depends on the definition there. They
8 called me down to talk about ROZs, and it wasn't too
9 long after that they started buying leases. So I
10 guess you could call me involved, but I wasn't buying
11 any leases, no.

12 Q. Okay. Let me ask this. Were you consulting
13 for the company at the time they were developing that
14 project?

15 A. Actually, it was more of a trade. They
16 support our Co2 Conference really well. If they asked
17 me to do something, I usually did it. So I went down
18 and briefed them.

19 Q. Okay. So in other words, were you there
20 with them from the inception of that project?

21 A. I was watching it from the inception. "With
22 them" is probably too specific.

23 Q. So did you consult with them at the time
24 they were initiating that project?

25 A. Pretty close to the time they initiated it.

1 A little bit before that.

2 Q. What did you do when you consulted with them
3 on that project? I guess "them," just to be clear,
4 who was the initiator of the project, the operator?

5 A. It was Kinder Morgan.

6 Q. Kinder Morgan. Okay. Did you consult with
7 Kinder Morgan on how to develop this ROZ?

8 A. Oh, they asked for my advice. I don't think
9 they took it all.

10 Q. Got it, got it. Now, you know, that case,
11 did you participate with Kinder Morgan or assist with
12 them in any way? I mean, what was your role when
13 they -- I think they went to hearing before the Texas
14 Railroad Commission, correct?

15 A. They went to?

16 Q. Hearing before the Texas Railroad
17 Commission. Were you involved with that hearing at
18 all?

19 A. I did not participate.

20 Q. Okay. So you say you tracked that project,
21 you've been watching it. Have you tracked it from
22 inception to the current?

23 A. Correct.

24 Q. You have. And you've been tracking the
25 production from that project?

1 A. Yes, sir.

2 Q. And you're aware that Kinder Morgan has
3 divested it?

4 A. Yes.

5 Q. Okay. I just want to talk a little bit more
6 about that project, since you have some familiarity
7 with it. You allude to it and you give us some
8 background, limited background on it, but you don't go
9 into any detail. Correct?

10 A. Correct.

11 Q. On the Tall Cotton project, Dr. Trentham did
12 give us a little bit of -- let me find where that is.
13 One second. I guess, let me just ask this question.

14 The Tall Cotton project, it was a
15 one-section project, right?

16 A. Correct.

17 Q. That was it, just one section, right?

18 A. Well, they had leased a whole nine sections
19 and developed the one on the east.

20 Q. So the first phase -- it was a two-phase
21 project, I think I gathered from your slides. Right?
22 It was a two-phase project?

23 A. Correct.

24 Q. But both phases were entirely within the one
25 section, correct?

1 A. That is correct.

2 Q. Okay. Do you recall what the well spacing
3 was for the first phase?

4 A. I think it was 80.

5 Q. Eighty-acres spacing?

6 A. It was 80 acres.

7 Q. Are you confident of that?

8 A. Sixty to eighty, for sure. And then they --
9 the infill was tighter because it was infill wells.

10 Q. Now, this is a greenfield, though, correct,
11 the Tall Cotton?

12 A. Correct. Yeah. Yes, sir.

13 Q. So there wouldn't be -- so the initial well
14 spacing -- is that the 80-acre pattern, you mean?

15 A. That's correct.

16 Q. Okay. So how many wells in a pattern?

17 A. I think there were 16 in that original.

18 Q. Sixteen total in the --

19 A. Doesn't fit, does it?

20 Q. I think you're almost right. Would it
21 surprise you if it were 20 producers?

22 A. I think there was 18, if I remember
23 correctly.

24 Q. Okay.

25 A. So it may have been less than 80. So 60

1 acres.

2 Q. But you've been tracking that project from
3 the inception. Are you familiar with how that project
4 has produced over time?

5 A. I am.

6 Q. And did you hear Dr. Trentham's description
7 of it as an excellent ROZ project?

8 A. It made a lot of oil, yes, sir.
9 Economically, I won't -- well, if you ask me, I'll not
10 comment.

11 Q. Do you have information on the economics?
12 You can answer that as a yes or no. Do you have
13 information on the economics?

14 A. No, not from them.

15 Q. You have information on the economics.
16 Where did you get that information from?

17 A. Back of the envelope. I know what a well
18 costs, I know about what it takes to operate those
19 vertical wells. My weakness is on the cost, on the
20 front-end cost.

21 Q. Okay. So if someone wanted to, they could
22 go to the Texas Railroad Commission and they could
23 look up and see what the costs were proposed by --
24 what Kinder Morgan thought the costs would be to
25 undertake that first phase of that project?

1 A. I don't think that data is available.

2 Q. Okay. So you're unfamiliar with what the
3 cost is, the actual cost that was incurred by Kinder
4 Morgan to undertake that project?

5 A. I think that's the same question. I think
6 the weakness I had is in the capital cost.

7 Q. Do you know how many injecting wells the
8 Phase 1 project employed?

9 A. I think there were 28 and almost as many as
10 the producing wells. So 18, plus or minus 4.

11 Q. Do you know whether they employed a water
12 curtain to help contain the CO2 injection?

13 A. That was why I was hesitating. They do have
14 a water curtain, so there were more injectors since --
15 there were water and CO2 injectors.

16 Q. Were they using the water produced from the
17 ROZ to manage the water curtain, do you know?

18 A. I can only speculate.

19 Q. Okay. So you're not sure how they managed
20 the produced water from the ROZ development?

21 A. I know they had a deep injection well, so --

22 Q. It was not the same zone? You know it was a
23 deep injection well? You understand it was not the
24 same zone as the ROZ?

25 A. Yes.

1 Q. Was the Tall Cotton operated as a continuous
2 CO2 injection or a water-alternating gas injection?

3 A. Initially, it was constant, and then they
4 did a WAG afterwards.

5 Q. Do you know why they switched?

6 A. It's typical. We call them papered floods
7 nowadays. We try to go as long as we can to the point
8 where we're making too much CO2, and then we start to
9 WAG. And usually in the WAG cycles, the water cycles
10 go longer over time.

11 Q. Okay. Are you aware what the volumes of
12 water production were from that ROZ?

13 A. Reported numbers weren't accurate. They
14 typically aren't. And sometimes not even reported in
15 the Railroad Commission.

16 Q. Okay. So are you saying that because you
17 believe that the reported volumes are not accurate?
18 You don't know what the actual production volumes
19 were?

20 A. I can only estimate them. Sorry. It would
21 have been high water cut.

22 Q. What's your estimation of the water
23 production volumes?

24 A. Oh, probably seven or eight times the well
25 volumes.

1 Q. Okay.

2 A. It varies over time.

3 Q. Let's see. My eyesight is gone these days.
4 I can't see anything anymore. Sorry. One second.

5 Do you know what the -- so the Phase 1
6 was a smaller pattern within the one section pilot
7 project area. What was the Phase 2 portion of the
8 project?

9 A. I think the acreage involved in the CO2 was
10 480 acres initially and 540 after Phase 2.

11 Q. So it increased approximately 60 acres to
12 Phase 2; is that your understanding?

13 A. I think that's --

14 Q. Something along those lines?

15 A. -- the case.

16 Q. Well, and was the Phase 2 different
17 orientations or different collections of patterns?

18 A. Infill drilling, basically trying to
19 decrease the time from injection to producing wells,
20 transit time of the CO2.

21 Q. Did they down-space to do that?

22 A. They did.

23 Q. Do you know what the down-spacing was?

24 A. I think it was to 40 acres.

25 Q. Per pattern?

1 A. Yes.

2 Q. What were the patterns they were using?

3 A. A modified line drive. You can call that
4 five spot, too, if you're clever about it.

5 Q. So five wells per pattern, and your
6 recollection is they started at 80 acres. So what's
7 the per-well spacing on that to start on Phase 1?

8 A. I haven't done my geometry that detailed.
9 But it went from 60 or 80 acres initially to 40 acres
10 in the infill drilling program.

11 Q. So almost down to 10 acres basing?

12 A. Between injector producer, yeah.

13 Q. So something on the order of between 15 and
14 20 acre spacing per producer injector down to 10, 15
15 acre per producer injector?

16 A. Sounds about right, yeah.

17 Q. Do you think that spacing is appropriate for
18 a greenfield ROZ?

19 A. No, I don't.

20 Q. In what way?

21 A. I think what they did was they -- they could
22 have stayed with their larger spacing and just been
23 more patient.

24 Q. But you think the original spacing at 15 to
25 20 acres per injector producer was appropriate for

1 that ROZ?

2 A. I do.

3 Q. I guess I'll just go ahead and share this
4 other exhibit. I'll put this into the record, Kinder
5 Morgan. I'm going to ask this to be marked as
6 Goodnight Cross Exhibit Number 5. It's the press
7 release that was issued by Kinder Morgan back on July
8 17th, 2024. I pulled this down from the website.
9 It's got a lot of material that's extraneous. It is
10 complete.

11 But I was just going to scroll down,
12 Mr. Melzer, and point you to the language where Kinder
13 Morgan in this press release addresses the status of
14 their CO2 projects. And they indicate that -- or they
15 state that during the quarter that they're reporting
16 on, "Kinder Morgan CO2 optimized its asset portfolio
17 through two transactions in the Permian Basin for a
18 net outlay of approximately \$40 million. The segment
19 divested its interest in the Katz Unit, the Goldsmith
20 Landreth, San Andres Unit, Tall Cotton Field and
21 Reinecke Unit, along with certain shallow interests in
22 Diamond M Field and acquired AVAD Energy Partners'
23 interests in the North McElroy Unit and a leasehold
24 interest in an undeveloped leasehold directly adjacent
25 to the SACROC."

1 It goes on to say, the last portion I've
2 highlighted here, "The impact of these two
3 transactions is to replace fields with high production
4 decline rates and limited CO2 flood opportunities with
5 fields that have attractive potential CO2 flood
6 projects."

7 Had you seen this press release before
8 Mr. Melzer?

9 A. I did skim it, yes.

10 Q. Okay. So your understanding is, based on
11 that press release, that Kinder Morgan was divesting
12 the Tall Cotton Field because it was subject to --
13 going through a high decline rate, with limited CO2?

14 A. That's what it says.

15 MR. PADILLA: Objection. This is
16 speculation.

17 MR. RANKIN: I'm asking what his
18 understanding is. He was involved with the project.
19 I was just asking what his understanding is.

20 MR. PADILLA: The question was pure
21 speculative, asking for speculation.

22 HEARING OFFICER HARWOOD: Well, I've heard
23 the answer. No, I'll allow it. It's overruled.

24 BY MR. RANKIN:

25 Q. You can answer the question now.

1 A. Yeah. Let's repeat it, so I can get it
2 right.

3 Q. Well, I'm asking you -- I guess, I don't
4 know, we have the court reporter. I don't want to
5 mess up my question again, since it was overruled. I
6 don't know if we can have it read back.

7 Because I think I was trying to ask you
8 if your understand was that Kinder -- what your
9 understanding was, based on this press release, why
10 Kinder Morgan divested its asset at the Tall Cotton.

11 A. That's a complicated answer. My feeling is
12 they had something in mind to invest in, and it looked
13 better than this.

14 Q. Okay. Fair enough.

15 MR. RANKIN: May I move the admission of
16 this exhibit into the record?

17 HEARING OFFICER HARWOOD: Any objection from
18 Empire?

19 MR. PADILLA: Yes, I'm going to object that
20 it's hearsay. We don't know where this -- whether
21 this information on a press release is accurate or
22 not. It's not from a government source or anything.
23 It's from Kinder Morgan, and it tells us nothing in
24 terms of the issues involved in this case.

25 Now, if Mr. Rankin is trying to show

1 profitability or market analysis or market value, I
2 don't know, that's not at issue here.

3 HEARING OFFICER HARWOOD: Mr. Rankin, what's
4 the purpose for this, beyond what you've already
5 elicited from the witness? Why does it advance the
6 Commission's decision-making in this case, other than
7 what you've elicited?

8 MR. RANKIN: I think that based on what I've
9 elicited, I don't need the admission of the evidence,
10 Mr. Hearing Officer.

11 HEARING OFFICER HARWOOD: Okay. So you're
12 withdrawing?

13 MR. RANKIN: Withdraw it as an exhibit.

14 HEARING OFFICER HARWOOD: All right. Great.
15 Solves one problem.

16 Before you go on, Mr. Rankin, I note
17 that it's 4:56 p.m., so give us a forecast of how
18 much more you have. Not to pressure you, but at some
19 point soon we need to make a decision about
20 adjourning for the day and continuing this.

21 MR. RANKIN: Mr. Melzer, are you planning to
22 travel tomorrow?

23 THE WITNESS: I'm here through the day
24 tomorrow.

25 MR. RANKIN: Okay. I don't want to rush

1 myself. I didn't interrupt Mr. Padilla's hour-long
2 summary of Mr. Melzer's testimony. I probably have,
3 I don't know, 20 to 30 minutes of additional cross.
4 So I could pick it up in the morning, at the most.

5 HEARING OFFICER HARWOOD: Mr. Chairman,
6 Members of the Commission, does that sound like a
7 good plan?

8 CHAIR ROZATOS: Sounds like a good stopping
9 point, yes.

10 HEARING OFFICER HARWOOD: All right.
11 Mr. Rubin, I thought maybe you said there's something
12 you wanted to cover before we adjourn for the day?

13 MR. RUBIN: Thank you, Mr. Harwood. I did
14 send an e-mail to counsel for all the parties, so I'm
15 covered.

16 HEARING OFFICER HARWOOD: Okay. Great. All
17 right. Well, thank you all.

18 MR. RANKIN: Can I raise a housekeeping
19 question? I haven't had a chance to confer with
20 counsel on it. But one question I have is whether or
21 not we can have any indication of when we might
22 reconvene for this hearing.

23 I don't know if the Commission has been
24 able to confer amongst themselves or have any dates
25 that they may offer or date ranges that we may be

1 thinking about ourselves. So even if it's a range,
2 so that our experts who have lots of different
3 projects, and ourselves as well, can think about what
4 may be on the horizon.

5 CHAIR ROZATOS: We've been so absorbed in
6 this case, we have not talked. So we'll get you
7 something tomorrow.

8 MR. RANKIN: Okay. Understood.

9 HEARING OFFICER HARWOOD: Okay. Thank you
10 all, thank all of today's witnesses. And last, but
11 certainly not least, thank you, Madam Court Reporter,
12 for all your help today.

13 We'll be off the record in this matter.
14 We'll reconvene tomorrow morning promptly at 9:00.

15 (Proceedings adjourned at 4:58 p.m.)
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AFFIRMATION OF COMPLETION OF TRANSCRIPT

I, Kelli Gallegos, DO HEREBY AFFIRM that on February 27, 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. March 18, 2025



Kelli Gallegos

VERITEXT LEGAL SOLUTIONS

500 Fourth Street, NW- Suite 105

Albuquerque, New Mexico 87102

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1	105 889:18	15th 709:24	742:9,14
1 704:18 706:7 706:8,14,15,19 708:15 719:12 720:17,17 721:5,6 733:6 741:25 743:21 769:1 772:17 789:3,5,8,17,18 790:5,6 798:9 803:21 805:17 806:9 809:23 815:17,20 816:3 837:21 838:5,17,19 842:2 879:8 881:5 882:7	10:42 772:22 11 752:22 756:10 849:7 857:19 11/8/24 760:25 110 704:18 11:00 768:22 12 757:16 847:15 853:9 857:19 858:22 1220 703:6 705:4 12400 704:14 1245 732:15 738:22 13 733:6 758:4 857:19 14 758:15 759:7 853:9 15 759:2 760:6 785:4,10 793:12 796:15 832:6 858:5,5 861:8 862:8,16 862:20,22,25 863:8 882:13 882:14,24	16 741:24 759:3 760:5 761:5 859:12 862:8,12 877:17 17 706:19 707:11 728:17 738:25 761:5 761:17 837:21 838:5,17,19 861:6 17th 883:8 18 761:17,25 782:13 877:22 879:10 889:15 185 742:2 19 761:25 762:6 782:14 803:19 1938 727:14 731:9 736:20 1950s 794:15 1960s 817:12 872:2 1980s 803:1 805:1,10 1985 851:17	1990s 803:19 807:2 828:14 1992 835:3 1994 834:10 1996 805:13 1999 793:6 838:25 1:00 772:21,25 1:08 772:23 773:10 1:30 773:7,8,11 1:47 785:12 1st 703:5
1,000 731:15 1.2 738:14 1.2. 738:13 1.5 751:14 10 715:3 728:17 731:4 739:17 740:1,1 742:3 753:4 763:22 804:21 824:23 841:12 847:15 856:13 882:11,14			2 2 730:20 752:19 791:25 798:10,13,14 804:1,10 805:18 823:18 856:23 881:7 881:10,12,16 2,000 802:11 20 706:8 720:17 721:6 733:19 737:15 742:4 756:22 762:6 768:22 782:14 787:18

787:25 817:5 823:20 824:23 841:6 842:15 871:17 877:21 882:14,25 887:3 200 822:25 2000s 857:4 2001 793:6 2002 855:1 2005 850:23 2006 850:23 2008 861:8 2014 802:9 853:10 2020 854:12 2023 866:6 2024 739:11 758:9 818:11 865:2,16 867:17 871:13 871:25 872:15 883:8 2025 703:11 731:9 753:17 889:4,15 2028 755:6,23 2035 755:6 2038 742:5 755:6 2068 704:4 21 706:7 720:17 721:5 742:11 760:25	22 706:14 760:25 789:4,5 789:18 790:5 220,000 752:25 753:17 23 854:20 2307 704:7 231 866:16 23614 707:11 23775 707:12 24 846:16 867:11 24,000 731:8 24018 707:12 24020 707:12 24025 707:13 24123 707:11 25 742:11 2523 704:10 25245 705:10 27 703:11 889:4 2700 754:25 755:15 28 849:17 879:9 281 704:13 28943 889:16 2:05 785:10,12 785:13 2d 740:11 3 3 708:15 731:24 798:16 799:2 820:14	823:18 843:22 3,000 755:3,19 857:7 30 733:19 742:8 754:22 842:15 843:6 849:11,18 866:5 887:3 300 704:14 739:3 839:5 30th 835:8 33 755:24 758:22 759:18 338 849:9 345,000 731:5 35 742:10 839:17 350 737:14 350,000 753:11 351 850:19,20 3600 737:4 801:18 370 807:1,4 375 738:10 38 850:15 3:20 831:10 3:21 832:11 3:35 832:10,11 4 4 735:24 739:17,21 740:1 763:22 763:23 798:2 807:20 822:13 825:14 826:17	829:15 845:19 858:1 867:5 879:10 40 734:20 744:21 745:3 823:20 824:4 824:20 856:21 881:24 882:9 883:18 400 807:11 873:8 41 849:12,13 423 738:11,14 4300 859:6 45 804:16 480 881:10 4:56 886:17 4:58 888:15 5 5 737:8 743:20 846:23 883:6 50 734:20 754:11 765:22 766:1 839:17 841:6,12 843:5 843:6 850:21 851:2 50,000 755:9 756:4 763:12 764:16,17 828:16 829:2 500 705:14 763:6,6 829:1 889:18
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525 734:15 54 851:5 540 881:10 570 734:15 573 756:18 580 856:22 5th 818:11	70s 853:5 718 706:6 721 706:8 77 756:20 78216 704:14 786 706:10 790 706:15	87504-2307 704:8 87505 705:4,15 889 706:20	abnormally 733:5 above 807:22 808:25 810:5 810:14,18 820:15 843:13 845:18 846:22 absolutely 717:22 751:2 811:21 829:20 absorbed 888:5 accentuate 736:17 accommodate 774:10 783:16 785:3 account 783:25 accumulation 723:6 accurate 738:15 880:13 880:17 885:21 accusations 747:25 achieve 725:3 acquired 883:22 acre 877:14 882:14,15 acreage 861:24 881:9 acres 856:22 877:5,6 878:1 881:10,11,24 882:6,9,9,11,25
6	8	9	
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		a	
		a.m. 707:1 772:22 773:10 abandoned 853:9 ability 774:11 889:11 able 711:22 712:1 717:4 747:11 753:7 780:3 782:5 784:6,14,15,18 825:23 826:11 860:11,21 868:12,16,19 887:24	
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act 708:15 acting 707:6,6 743:22 actions 709:12 actual 711:10 748:17 803:15 840:19 852:14 879:3 880:18 actually 723:1 723:21 726:10 726:16 728:15 730:22 731:18 735:19 736:3,6 736:19 738:5 739:4,15 742:23 747:20 749:21 755:10 755:23 759:18 765:24 766:18 769:25 777:1 796:15 801:6,9 801:24 802:4 803:20 804:24 808:17 824:11 833:17 834:7 836:7 840:11 849:18 866:14 874:15 adam 704:19 812:12,13 add 754:4 757:25 760:10 839:3 841:9 842:2 850:4	added 752:17 752:22 758:7 848:23 849:20 857:5,6,8 adding 854:20 854:22 addition 853:20 additional 758:19 767:25 776:23 780:8 805:23 811:17 817:5 824:23 850:7 871:18 887:3 additions 853:21 address 745:24 777:3 809:17 811:11 866:20 addressed 809:19 811:3 873:4 addresses 866:16 883:13 adds 850:20 adequate 767:17 adjacent 883:24 adjourn 887:12 adjourned 888:15 adjourning 886:20	adjudication 708:16 709:11 adjust 724:2 725:1 768:17 adjusted 747:18 758:2,8 761:15 adjustments 741:20 742:8 admission 885:15 886:9 admit 865:21 admitted 706:7 706:14,18 720:18 721:2,4 790:3,4 838:17 838:18 advance 886:5 advanced 861:14 advice 875:8 advocate 779:3 affect 753:1 affirm 720:11 889:3,7,12 affirmation 889:1 affirmed 787:6 788:25 789:4 789:16 790:10 837:17,20,24 838:4,16 afternoon 772:24 774:15 775:22 779:17	818:3 830:6 831:10 864:16 afternoon's 708:1 ago 796:15 agrankin 704:20 agree 714:15 767:24 768:15 768:18 769:13 784:11 858:7 agreed 714:16 715:10 agreement 814:19 842:20 agreements 792:17 agrees 779:14 agu 729:12 740:10 792:6 799:3 812:25 ahead 730:18 741:2 750:21 762:5 773:21 778:4 783:12 883:3 aid 749:22 ain't 728:19 alamogordo 794:21 albuquerque 705:10 889:18 ale 812:16 aligning 855:6
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[allen - apologies]

<p>allen 808:18</p> <p>allow 713:1 769:1 774:24 784:13 798:7 813:21 860:4 863:22,23 884:23</p> <p>allowed 812:19</p> <p>allude 876:7</p> <p>alternating 880:2</p> <p>alternative 763:14 772:19</p> <p>alters 836:7</p> <p>alton 792:14 793:5 839:1</p> <p>amenable 863:20</p> <p>america 861:11</p> <p>amount 727:13 755:17 764:22 793:2 797:12 824:19 826:14 827:2,9,20</p> <p>ample 810:13</p> <p>ampomah 703:21 706:12 708:19,21 710:2,18,19,20 713:25 715:18 715:20 717:19 741:14 750:18 777:14 781:6 820:7 829:23</p>	<p>ampomah's 745:25</p> <p>analog 840:2 860:23 869:3 869:18 870:6</p> <p>analogous 869:5,22 870:3 870:11</p> <p>analogs 834:2</p> <p>analysis 822:9 823:2 839:8 849:1 850:25 865:5 886:1</p> <p>andres 728:11 729:24 730:4 731:2,7,15 732:11,14 737:13 738:20 738:21 739:12 739:16 740:2 751:17,21 753:2 754:6,24 755:7 756:23 757:3,4,10,23 758:18,22 759:19 760:23 761:9,21,24 763:2,6 765:6 765:17,20,25 766:3,9,24 794:21,23 796:4 797:15 797:15 798:22 799:6 803:4 806:16,23,25</p>	<p>807:4,5,7,22 808:6,25 809:1 809:25 810:5,6 810:12,15,18 810:19 811:2 813:6,14,25 816:25 817:3,6 817:11,16 818:16 819:10 819:13 822:11 824:10,11,12 825:8 827:1,5 827:21 829:12 829:19,21 840:5,6 843:5 844:15,19,22 846:2 848:7 851:21 852:4 852:17,19,22 855:5,14,21,23 856:1 858:2,13 858:14,24 863:19 864:5 867:21 868:2,7 868:22 869:1 869:12,16 871:15,19 872:1,9,16 873:17 883:20</p> <p>anecdotal 816:12 817:13 820:24 829:13</p> <p>anecdotally 873:11</p>	<p>animal 835:24</p> <p>anomaly 801:10</p> <p>anschutz 801:8 802:5</p> <p>answer 708:11 732:3 764:9 767:7,16,17 781:9,16 783:21 808:11 844:12 851:11 851:12 872:19 878:12 884:23 884:25 885:11</p> <p>answered 780:15</p> <p>answering 781:6</p> <p>answers 767:13</p> <p>anticipated 832:20</p> <p>anticipating 872:19</p> <p>antonio 704:14</p> <p>anybody 756:14 783:10 821:5</p> <p>anymore 881:4</p> <p>anyway 807:23 848:11 854:2 858:18</p> <p>api 869:10</p> <p>apologies 714:18 721:16 722:21 771:7</p>
---	--	---	---

[apologies - attached]

772:25 780:1 781:19 apologize 717:14 720:2 771:5 779:25 781:5,9,17 782:2 783:9 791:19 831:20 852:24 appear 776:13 779:18 783:16 appearing 706:9 apples 863:6 applied 844:21 applies 823:22 apply 844:15 appreciate 707:21 710:13 772:13 773:18 818:5 819:7 approach 728:1 744:10 744:12 863:24 approaching 715:11 appropriate 714:21 794:10 882:17,25 approved 708:21,23,24 710:7 approximately 817:5 871:17 881:11 883:18	aquifer 731:15 731:16,17,18 733:25,25 734:7,11 735:15 736:4 737:19 739:17 751:15,19,22 752:14,17,18 753:2 754:21 755:11,16 757:22 758:17 758:21 759:11 759:17,18,19 759:20 760:1 760:24 761:10 761:14,19,21 761:22,23 763:15,22 764:23 766:21 766:23 836:14 836:15,22 arbitrary 842:13 arc 796:12 arco 792:15 area 719:8 733:15 734:14 734:19 735:2 752:16 761:20 798:18,21 801:8,22,22 802:7 804:3 807:3 817:6 821:2,20 823:22,22,23	823:25 824:1,9 824:21 826:1 827:19 847:4 847:17 848:10 856:11,22 859:18,19,22 871:19 881:7 areas 739:7 740:2 797:23 799:20,22 853:22 856:2 861:17,18,23 arguably 842:20 argue 859:2 argument 766:25 767:4 822:10 ari 861:14 arrive 862:21 arrow 793:2,8 arrows 792:24 793:1,19 795:4 797:4,6,11 art 748:2 artesia 792:6 793:22,24 797:1 856:11 articulate 782:5,9 asked 715:4 740:19 750:17 775:4 810:2 813:5,8,10,17 814:9 819:16	826:25 846:3 861:14 867:20 867:23 868:1,6 874:16 875:8 asking 740:18 770:23 774:6 779:8 810:3,4 810:21 884:17 884:19,21 885:3 asleep 732:19 732:20 855:16 assessing 861:15 asset 883:16 885:10 assignment 834:7 assist 875:11 associated 793:2,20 796:3 797:24 798:16 806:20 854:15 855:12 assume 748:21 assuming 735:22 790:18 803:14 assumptions 745:8 assure 714:1 atoll 848:10 attach 751:22 attached 733:25 734:11
---	--	--	---

[attached - basically]

736:4 789:4,11 789:17 837:20 838:1 attachment 719:12 attempt 800:13 826:8 attempted 801:21 attention 717:14 732:20 833:4 836:11 attorney 747:3 attorneys 714:2 743:3 attraction 826:23 attractive 884:5 attribute 849:9 attributes 844:20 audience 721:23 722:16 773:15,22 august 865:2 865:16 867:10 867:17 871:13 871:25 872:15 author 838:25 authorities 819:16 avad 883:22 available 774:8 774:9 775:20	785:7 827:11 879:1 ave 704:14 705:14 average 722:25 733:15 739:22 762:18,19 824:23 858:5 avoid 790:25 834:12 aware 808:11 816:2,6,20 817:4 825:24 826:3 832:22 870:14 871:12 871:17,25 872:7,12,14 873:6,13 876:2 880:11 aye 708:22 710:4 ayes 710:5 b b 738:12,17,17 792:6 799:4 806:22,24 812:25 bachelor's 787:1 back 707:22,23 707:25 708:10 709:7 711:15 715:16 731:9 739:20 756:7 767:21 769:1	772:25 773:12 774:18 776:6 778:18 779:9 779:18 780:1,3 780:7 785:13 786:3 808:4 812:18 818:10 823:17 826:9 826:17 828:7 828:13 831:25 832:9 834:9 846:18 850:19 861:8 865:2,15 878:17 883:7 885:6 background 745:20 748:18 786:25 876:8,8 bad 767:12,13 832:25 baffles 860:8,8 bailey 709:21 baker 705:9 bar 713:17 barrel 737:4 828:10 862:12 barrels 737:4 739:18,22 741:23 742:2,6 751:14,18 752:25 753:11 753:17 754:12 755:10,18 756:4,18 763:1 763:12,22	801:18,19,24 802:11 806:24 828:16 829:1,2 849:9,24 850:7 851:2 852:12 854:4 857:7,9 862:1,1,8 863:4 base 792:13,18 793:3 822:19 822:24 839:21 840:7 843:21 852:18 858:1 859:4,7 860:4 based 709:18 719:15 748:18 765:16 766:7 782:25 807:1 811:15 815:20 819:18 822:8 825:2 837:5 862:5 864:23 868:16,19 869:19 870:8 884:10 885:9 886:8 basic 821:7 basically 722:3 722:5 724:4 729:16,22 735:21 736:22 744:12 751:19 753:5 755:25 758:6,22 777:7 800:15 822:12
---	--	--	--

[basically - boundary]

828:24 835:17 860:5 881:18 basin 788:8 794:13,14 795:7,14,16 796:5,19,21,24 797:13 798:7,9 798:14,24 804:17 811:7 813:3 825:20 834:9 836:6 846:4 848:13 855:8,13 856:4 864:21,24 870:16 883:17 basing 882:11 basis 727:20 729:22 746:15 759:16 760:12 762:3 765:8 770:20 869:4 870:10 bat 712:6 baylen 703:20 bear 749:24 beatty 705:14 707:18 beauties 859:18 beautiful 718:4 beauty 860:9 beck 705:11 714:17,18,19 714:20 717:24 717:25 719:24 778:19,20	780:9,16 788:18 789:25 819:23,25 831:5,6 837:10 837:11 838:13 becoming 778:2 826:20 believe 707:15 708:7 716:6 717:1,6 759:3 760:5 784:2 801:20 808:22 813:8,16 814:1 822:9,16 825:9 827:6,25 856:20 860:11 880:17 bell 807:20 845:19 857:22 858:1 867:4 beneath 792:22 797:23 799:13 799:18 808:2 808:21 824:12 benefit 757:6 776:24 bennett 852:20 best 747:4 764:8,9 774:21 777:5 783:24 789:12 837:24 889:10 better 715:4 716:16 739:7 777:1 791:21	799:10 803:15 851:18 872:13 885:13 beyond 794:2 809:15 886:4 big 724:18 728:16,19,25 734:7 758:12 764:16 850:3 billion 739:22 751:14,18 755:18 862:1,8 birkhead 709:22 bit 711:5,13 712:4 714:6 716:16 717:8 738:10 749:10 749:14 752:13 768:10 769:23 783:6 786:25 789:1 796:11 805:16 823:12 834:5 847:10 860:8 875:1 876:5,12 bite 727:24,24 black 792:24 blank 768:5 block 743:14 743:20 blue 731:14 753:14,15,21 761:20 805:7 805:16 854:1	855:23 board 834:8 bob 787:11 788:1 794:16 807:1 808:11 815:7,11 820:8 822:6 823:17 823:21 824:2 824:22 825:6 825:14,18 826:5,17 829:8 829:11,23 843:24 855:11 861:11 873:10 boilerplate 709:9 borrowed 802:4,5 bottom 734:6,9 735:15 740:10 742:15 752:7 760:8,13 761:12 764:21 766:21 795:8 822:22,23 829:9,16 839:20 840:7 840:10 841:22 845:16 848:7 852:22 854:2 860:1,3 boundaries 817:12 boundary 811:1
---	---	---	---

[bounds - careful]

bounds 779:1 box 704:4,7,10 705:10 722:5,6 722:8 739:1,2 743:23 boxes 734:14 brag 742:19 brainer 801:14 branch 779:10 break 713:1 750:23 767:21 772:17 775:14 831:11,18,23 832:7 breaks 800:9 breathes 777:14 briefed 874:18 briefly 787:13 817:22 818:10 bring 708:10 771:12 787:15 865:13 871:4 bringing 716:8 brings 821:14 broad 844:5 broadly 813:1 broggi 704:20 brought 708:6 brown 792:14 839:1 871:1 brown's 793:5 brownfield 797:23 804:11 804:12 809:24	847:13 brownfields 799:19 856:7 brushy 824:12 buchwalter 706:5 718:10 718:14,16,20 718:24 719:16 720:8 721:8,19 740:12 746:15 746:21 750:19 762:13 765:15 766:6,12 767:1 769:3,7 770:10 774:7,12,16 775:10,13,21 776:13,23 777:5 778:25 779:18 780:25 783:14,17 784:22 785:23 810:17 buchwalter's 720:15 746:10 buck 776:7 build 723:24 724:20 727:7 727:22 755:18 757:2 building 703:5 704:13 739:17 739:21 740:3 754:25 757:9 builds 727:7,10 760:25 761:4	built 726:8 732:17 bump 853:18 854:19 856:3 bumps 856:4 buoyancy 860:4 buries 842:25 burlington 828:19,21 829:3 business 859:14 busy 780:6 buying 874:9 874:10 bwenergylaw... 705:16 bwenertylaw.... 705:17 bypass 824:12	calculation 800:11 calculations 822:2 call 708:20 723:25 725:4 732:6 744:6 752:1,5 760:10 761:9,9 771:6 799:19 824:17 833:8 835:8 836:13 840:13 841:1 842:17 843:2,25 847:12 855:10 874:10 880:6 882:3 called 722:2,23 723:8 786:21 803:20 852:5 861:14 874:8 calling 833:7 calls 844:1 canyon 824:12 848:16 capacity 719:1 755:17 capillary 744:7 capital 849:5 860:20 879:6 capitan 818:17 819:11,13 career 713:13 careful 839:7
		c	
		c 704:1 705:1 706:19,19 837:21,21 838:5,5,17,19 838:19 843:22 850:10 852:23 856:13 857:19 857:19,19 858:22 859:12 861:6 c5 848:18 calculated 787:22	

[carrying - clarify]

carrying 738:12 case 707:11,11 707:12,12 711:10,10,12 712:2 717:4 721:20,22 723:23 725:6 728:10 753:12 753:15 754:11 766:4 770:25 773:13 788:12 798:17 810:14 812:23 813:22 815:4,10 817:10 827:15 836:6,17 839:13 840:6 842:12 851:11 866:16 867:22 874:1 875:10 881:15 885:24 886:6 888:6 cases 707:9 713:12 717:2 720:9 754:7 818:8 846:15 casing 801:15 catch 713:5 caveat 709:22 870:18 ceased 854:16 cell 729:17 cells 730:22 731:5 752:19	centered 821:20 central 795:7 795:13,16 796:5 801:3 804:17 870:16 centre 704:13 certain 724:11 781:20 855:6 883:21 certainly 778:12 779:10 779:12,15 797:21 823:7 888:11 certainty 723:2 724:12,14 730:9 certificate 706:20 chair 703:19 707:3,7,20 708:3,17,23 709:3,6,8,13 710:1,12,20 711:25 712:21 713:4,7 714:7 714:8,16,24 715:2,18 716:6 716:22,25 717:11,17,24 718:1,4 721:12 721:15 722:13 769:24 770:22 771:4,11	772:15,20,24 773:12 776:9 777:6,25 778:17 779:22 779:25 780:17 781:4,16 782:4 783:8,21 784:20,24 785:2,9,13,18 785:21 786:1,9 791:3,9,13,17 820:5 830:21 831:17,20 832:6,9 887:8 888:5 chairman 709:16 789:15 836:25 838:3 864:8 887:5 challenge 735:4 challenging 737:22 chance 744:16 746:24 767:24 775:6 780:12 780:14 887:19 change 716:14 722:7 766:17 766:19,19,20 781:1 784:23 827:12 830:18 841:4 changed 826:22 827:3 827:12 830:9	859:14 changes 758:12 758:12 765:4 827:7,22 830:15 changing 827:9 channel 818:17 870:17,22 characterizati... 710:24 711:2 715:23 716:1,2 characterize 744:4 characterized 737:19,20 744:8 charged 783:3 charlene 801:24 802:19 chart 804:22 chemistry 821:15,17 827:4,12 chevron 807:3 chino 703:5 chooses 750:25 chris 705:5 chris.moander 705:5 city 787:2 802:24 clarification 815:25 clarify 777:24 778:7
---	--	---	---

[clarifying - commission's]

clarifying 830:7 classical 788:4 clear 735:17 740:12 759:6 796:4 801:10 803:2 851:13 851:25 872:20 875:3 clearly 858:20 863:20 clever 882:4 client 712:20 713:9 714:23 716:24 724:7 726:6 779:3,5 784:21 client's 724:5 clients 831:15 close 728:24 736:2 839:22 870:24 874:25 closed 708:8,14 708:17 709:5,7 709:10 closer 735:14 834:25 842:15 closest 847:19 co2 800:19,20 802:9 803:18 803:21,22 804:1 805:9,12 805:21 806:6,7 808:20 824:25 826:9,12,19	834:10,11,15 835:2,9,10,16 835:16,19 836:8 846:9 848:2 849:6,15 849:22 850:17 850:18,19,20 850:24 852:4 853:14 857:1 860:4,15,18 861:1 862:11 862:14 863:21 866:7,17 867:24 874:16 879:12,15 880:2,8 881:9 881:20 883:14 883:16 884:4,5 884:13 coherent 714:4 collections 881:17 college 787:2 color 797:1 854:1 colored 752:3 colors 855:22 column 799:1 799:12,21,25 861:25 862:21 columns 792:9 792:11 combination 761:13 842:1	combined 761:10 come 708:10 711:15 713:18 717:14 725:24 728:23 732:2 734:8 735:16 736:2,14 740:6 741:12 742:13 745:25 751:16 758:8 762:21 767:21 769:1 778:18 779:9 783:9,20 784:1 841:10,18 comes 743:25 791:25 797:2 838:25 855:18 comfortable 709:3 714:2 coming 710:15 710:17 734:1,6 734:7 735:1 736:12 751:21 756:24 761:11 761:12 764:21 766:5 777:10 779:6 788:2 798:20 803:25 826:12 829:1 831:25 850:25 856:16 865:5,9 comment 878:10	comments 713:11 717:10 764:1 commercial 870:15 873:7 commingled 846:20 847:21 870:20 commission 703:3,18,23 706:12 707:7 708:8 709:4,17 709:19 710:9 710:14,16 711:18,21 716:8 717:15 719:6 748:19 750:11 770:5 770:21 775:25 776:16 777:9 777:11,12 780:13 781:20 783:22 786:24 787:13 814:16 818:8 820:4,6 822:7 823:7 824:25 833:18 841:21 842:6 851:19 853:3 875:14,17 878:22 880:15 887:6,23 889:5 commission's 749:16 886:6
---	--	--	---

[commissioner - considered]

commissioner 706:12,13 708:19,21,22 710:2,18,19,20 715:18,20 716:7 717:18 820:7 829:23 830:2,5,20 commissioners 720:15 779:24 common 798:9 commonly 858:11 communication 729:23 731:12 732:10 819:14 companies 805:2 835:2 846:8 company 705:8 719:4 742:23 808:19 840:14 859:25 861:14 874:13 compare 760:11 comparison 751:17 869:21 compilation 850:6 complete 769:19 775:4,6 783:19 800:13 804:4 883:10	completed 765:20,25 766:3 801:15 871:14 completely 715:12 799:15 799:17 858:7 completion 801:21 889:1 complex 725:9 740:5 746:22 856:10 complexity 852:24 complicated 714:13 863:7 885:11 components 869:11 composite 811:1 compositional 719:10 722:2 comprehend 712:12 computer 726:10 concede 743:6 concept 809:16 844:3 860:20 concepts 861:5 conceptually 756:16 concern 710:14 710:18,21	712:16 713:25 716:7,12,18 748:7 757:21 777:8,11,15 concerned 781:24 concerns 710:9 conclusion 736:11 806:3,5 813:22 845:23 conclusions 745:9 762:14 863:16 865:5 865:10 conclusively 846:1 concur 712:10 780:9 conducted 835:8 confer 712:19 713:8 716:23 768:10,16 774:3 831:14 887:19,24 conference 768:24 835:8 839:10 874:16 889:6 conferences 835:6 conferred 715:8 775:1 conferring 781:6	confess 713:18 confidence 726:24 739:24 804:2 808:1 confident 806:14 816:5 846:18 877:7 confirm 818:7 823:7 829:18 869:8,21 confirmed 854:21 confirming 763:23 confused 711:13 confuses 711:17 confusing 711:5 715:15 confusion 715:12 conjunction 873:19 874:2 conservation 703:3 705:2 707:7 889:5 conservative 739:25 851:2 862:17,23 863:9 consideration 714:5 considered 714:11
---	--	---	---

[considering - correct]

considering 780:13 consistent 858:23 consolidated 707:9 constant 839:18 841:17 841:17 843:8 880:3 constructed 731:5 735:22 consult 784:21 874:23 875:6 consultant 724:6 consulted 875:2 consulting 725:12 835:16 874:12 cont'd 705:1 contact 734:17 792:18 793:4 836:8 839:6 840:14,19,20 841:14 842:9 842:18,23 843:1,11,19 846:10 850:9 851:20 859:17 860:3 871:1,5 871:9 contacts 793:13 846:13	contain 879:12 contained 792:4 contends 709:21 contention 869:19 contents 789:11 837:23 context 715:7 continually 797:21 continuation 773:13 continue 777:6 780:19 784:5 831:12 853:12 continued 839:5 853:21 continues 854:5 continuing 707:8 886:20 continuous 880:1 contributing 854:3 contribution 742:24 743:15 743:22 751:20 853:13 conundrum 800:6 convened 709:4	conventional 795:23 803:10 803:13 839:9 858:4,8,15 conversation 712:15 conversations 868:9 cookbook 843:25 844:15 844:21 cool 754:19 coolest 754:20 core 801:16 802:4,5,6 807:24 808:2 815:5 820:23 821:6 822:20 822:22 823:2 823:11,15,16 829:11,16 839:8,10 844:25 845:3,4 845:18 857:22 858:4,8,9,15,17 867:1,2,18 868:13,16,20 869:9,20 870:2 cored 801:11 cores 803:9,9 803:10,10,10 803:13,13,14 803:16 807:15 807:15,19,20 811:10 821:23	821:25 822:13 823:13 829:15 839:9 866:24 867:18 corey 704:15 correct 707:14 720:12 740:13 772:17 776:19 786:7,10 788:8 788:9 789:5,8 789:12,14 792:1,2 793:9 799:8 800:22 804:12 807:8,9 807:13 808:7 815:15 816:3,4 816:17,21,22 817:17,18 818:8,9 829:10 837:18,21,22 837:24 852:15 861:3 863:13 864:21,22 866:19,21,22 866:25 867:5,6 867:19 868:18 871:8,11 872:23 873:1,2 874:4 875:14 875:23 876:9 876:10,16,23 876:25 877:1 877:10,12,15 889:9
--	--	--	--

<p>corrected 726:20</p> <p>correction 758:1</p> <p>correctly 727:8 772:16 877:23</p> <p>correlation 735:11,12</p> <p>correspond 740:1 795:8</p> <p>corresponds 753:15</p> <p>cost 814:4 878:19,20 879:3,3,6</p> <p>costs 878:18,23 878:24</p> <p>cotton 796:11 800:1,25 801:1 801:2,5,6 802:13 806:19 807:10,16 826:7 846:24 847:11 852:20 856:14 873:1 874:5 876:11 876:14 877:11 880:1 883:20 884:12 885:10</p> <p>counsel 703:23 750:1 774:4,4 819:9 865:16 887:14,20</p> <p>count 806:2</p>	<p>counties 861:20 862:3,9</p> <p>county 795:21 795:21 800:1 801:3 808:19 824:6 847:15 861:21</p> <p>couple 726:13 726:13 727:21 744:25 748:15 749:3 757:25 758:19 763:25 780:4 785:16 793:6 796:6 797:9</p> <p>course 724:25 740:10 742:12 760:23 784:11 793:16 815:8 821:3 853:12 860:21</p> <p>courses 834:16</p> <p>court 885:4 888:11</p> <p>cover 759:4 887:12</p> <p>covered 749:20 749:23 811:20 841:24 887:15</p> <p>covers 852:17</p> <p>covid 854:15</p> <p>craig 706:9 786:14,20</p> <p>crank 754:3</p>	<p>create 729:10 739:4 756:20 761:9 819:3 834:10 857:6 860:6,15</p> <p>created 722:2 730:7 834:16 835:2</p> <p>creates 755:25</p> <p>creating 799:1 835:7,15</p> <p>credence 778:9</p> <p>credit 850:3</p> <p>creek 848:12</p> <p>critical 781:13</p> <p>crockett 795:21</p> <p>cross 706:10,11 706:17 747:21 748:24 749:11 750:25 767:24 768:18 769:2,9 770:9,20 773:25 774:7 774:20,23 775:18 777:5 783:4,19 794:11,12,14 812:8,9,15 817:21 818:1 864:9,13,14 883:6 887:3</p> <p>cruces 794:22</p> <p>cumulative 732:24 735:6,7 736:9,19 742:2</p>	<p>742:3 811:23 821:25</p> <p>current 875:22</p> <p>currently 739:16,23 742:1 873:7</p> <p>curriculum 788:6 834:4</p> <p>curtain 879:12 879:14,17</p> <p>curve 743:10 753:14,14,15 753:20,21,23 754:1 805:5,5 805:10,16,16 854:1</p> <p>curves 741:6,8 741:11 743:7,8 743:9 744:6 753:13,22 754:10 759:13 804:24</p> <p>customized 729:15 730:5,8 739:5</p> <p>cut 752:13 794:18 842:22 880:21</p> <p>cwehmeyer 704:15</p> <p>cycles 880:9,9</p>
			d
			<p>d 706:1,14,14 706:15,15 789:3,4,5,5,8,8</p>

[d - denver]

789:17,18,18 789:18 790:5,5 790:6,6 791:25 798:2 800:24 802:21 804:6 804:21 806:9 809:23 815:17 815:20 816:3 826:6 dana 704:5 769:11 daniel 703:24 darcy's 723:9 dark 792:24 812:16 darker 797:1 805:16 darrell 725:20 725:20,24,25 726:1,9 dash 753:22,23 754:1 data 710:17,17 723:23 724:13 724:14,19 725:14,17 726:3,5,6,20 727:6 732:6,7 738:14 742:14 762:17,24 766:15 767:11 767:12 783:2 792:16 794:1 811:10 813:20 815:3 821:2,16	823:2 844:25 853:3 858:19 859:8,8 864:2 864:3 867:7,17 869:7 879:1 date 736:20 798:6 802:2 850:1,16 851:4 887:25 dated 866:5 dates 887:24 davis 725:25 day 710:23 727:17 737:4,5 752:25 753:11 753:18 754:12 755:10 756:4 763:12 802:11 812:17 828:16 854:4 857:7 886:20,23 887:12 days 710:22 711:23 796:16 881:3 decade 857:4 decades 787:11 787:12 800:8 december 835:9 decide 842:14 855:25 decided 741:15 803:24 847:22 849:8,15 852:3	853:11 856:2 deciding 845:20 decision 713:23 714:12 785:17 886:6,19 decline 805:5,5 834:12 853:5,8 853:15,16,24 854:10 884:4 884:13 declining 843:7 decrease 805:4 881:19 dedicated 873:24 deems 709:23 deep 807:4 829:12 843:3,4 845:3 879:21 879:23 deepen 846:13 851:18,20 deepened 856:8 deeper 735:13 735:13,16 762:10 803:1 817:2 842:17 847:7 851:13 deepest 734:24 735:9 807:14 defending 713:17 defer 774:12 775:25	define 836:1 843:14,16 847:3 855:21 856:5 defined 842:19 842:23 defines 842:5 definitely 712:1 712:13,13 781:23 definition 843:16 858:20 872:23,24 874:7 definitions 843:12 degree 766:7 delay 773:1 deliberations 709:18 demonstrate 848:25 demonstrated 804:2 demonstrative 745:21 746:9 746:18 748:8 748:11 749:22 749:25 750:5,7 750:13,24 751:5 757:17 776:3 denver 850:11 851:9 852:8,14 853:1,22 854:6
---	--	--	--

<p>873:25</p> <p>deny 709:19</p> <p>765:21</p> <p>denying 764:7</p> <p>depending</p> <p>724:17 760:16</p> <p>depends 841:7</p> <p>874:7</p> <p>depict 815:17</p> <p>815:19</p> <p>depiction 795:6</p> <p>795:8 800:3</p> <p>depictions</p> <p>776:25</p> <p>depose 744:17</p> <p>deposed 746:14</p> <p>818:11</p> <p>deposition</p> <p>747:5,17,23</p> <p>749:20 768:14</p> <p>818:24 819:8</p> <p>depositions</p> <p>750:9</p> <p>dept 705:3</p> <p>depth 735:9</p> <p>752:3,4 776:2</p> <p>depths 845:18</p> <p>derived 792:8</p> <p>798:20 821:14</p> <p>describe 751:9</p> <p>753:8</p> <p>described</p> <p>822:7</p> <p>description</p> <p>878:6</p>	<p>design 848:4</p> <p>designed</p> <p>765:12 767:16</p> <p>767:16</p> <p>desire 713:19</p> <p>detail 729:5</p> <p>876:9</p> <p>detailed 730:22</p> <p>745:23 766:13</p> <p>778:12 882:8</p> <p>details 721:21</p> <p>729:5 767:14</p> <p>determine</p> <p>820:22 844:4</p> <p>846:25 868:16</p> <p>868:19 869:15</p> <p>determined</p> <p>802:7 803:6,11</p> <p>determining</p> <p>765:5</p> <p>develop 808:8</p> <p>814:5 820:20</p> <p>823:14 875:7</p> <p>developed</p> <p>873:19 874:1</p> <p>876:19</p> <p>developing</p> <p>740:20 821:1</p> <p>835:5 851:8</p> <p>874:13</p> <p>development</p> <p>795:24 804:11</p> <p>804:13 853:20</p> <p>870:4 873:7</p> <p>874:3 879:20</p>	<p>developments</p> <p>788:8 789:2</p> <p>809:24 870:15</p> <p>develops</p> <p>840:15</p> <p>devices 773:17</p> <p>dhardy 704:5</p> <p>diagnostic</p> <p>845:14</p> <p>diagram 752:7</p> <p>diamond</p> <p>883:22</p> <p>difference</p> <p>743:21 757:3</p> <p>757:10 840:25</p> <p>853:24</p> <p>differences</p> <p>784:16</p> <p>different 723:1</p> <p>723:20 727:11</p> <p>727:15 729:1</p> <p>729:16 730:7</p> <p>731:1 739:7</p> <p>742:11,12,25</p> <p>744:3 745:10</p> <p>754:7 766:16</p> <p>782:15 790:20</p> <p>792:19 793:21</p> <p>796:2,17,18</p> <p>798:3,8 812:21</p> <p>821:16 827:4</p> <p>835:24 841:18</p> <p>850:24 851:24</p> <p>851:24 854:24</p> <p>863:5 866:7</p>	<p>870:13 881:16</p> <p>881:17 888:2</p> <p>difficult 712:11</p> <p>737:14 820:17</p> <p>849:1 850:25</p> <p>868:14</p> <p>digest 779:9</p> <p>digital 853:3</p> <p>dimensional</p> <p>819:3</p> <p>direct 706:6,10</p> <p>706:17 718:18</p> <p>719:13 720:8</p> <p>720:15 745:6</p> <p>786:16 809:5</p> <p>809:12,15,17</p> <p>809:19 811:12</p> <p>811:13,17</p> <p>814:11 815:1</p> <p>816:1,14,24</p> <p>817:9,14</p> <p>820:13 823:17</p> <p>825:14 826:5</p> <p>833:12 837:6</p> <p>865:1,18 867:9</p> <p>868:10,11</p> <p>direction</p> <p>792:20 793:1</p> <p>793:18,20</p> <p>795:4</p> <p>directly 793:4</p> <p>883:24</p> <p>director 707:6</p> <p>discern 769:21</p>
---	---	---	---

discernible 782:23 discipline 833:22 disclosed 748:4 750:6,8,12 778:8,15,24 809:11 810:9 811:13 812:4 disclosure 778:6 809:11 disconnected 712:4 discovery 801:25 810:14 discrepancy 759:1 discuss 708:10 708:16 785:11 discussed 709:10 869:23 870:5 discussion 708:1 748:16 766:13 796:17 810:12,20 819:19 830:8 discussions 787:10 808:11 822:8 disperses 861:1 displaced 740:7 displayed 733:14	disposal 725:18 726:21 731:21 737:25 752:25 753:10,12,18 753:20,24 754:4,16 756:19 757:25 758:7,20 763:10,13 817:11,16 872:1 disposing 817:15 872:8 872:16 disposition 889:14 dispute 748:5 819:12 disputes 778:23 disrespect 717:15 distance 761:15 761:16,24 839:19 divested 876:3 883:19 885:10 divesting 884:11 divided 862:4 divides 811:2 division 705:2 doctor 712:11 716:14 721:13 722:14,21,23 781:7 784:3,9	785:21 786:9 786:12 791:18 818:4 819:6 doctorate 787:3 document 745:15 759:9 865:17 866:6,9 866:13 documentation 793:12 documented 793:17 816:7 871:5 documents 732:12 792:3 807:5 813:21 814:3,15 865:3 865:9,18,24 866:4,11 doing 730:18 749:9 765:7,13 775:3 792:16 820:9 822:17 846:19 849:3 856:17 860:1 dominates 836:10 dominating 859:16 don 705:14 doomed 800:14 door 772:1,6 double 743:13 782:13 858:11	858:15 863:10 downdip 759:21 dozen 748:22 dr 703:21 709:22 713:25 718:10,14,20 719:16 720:8 720:15 721:8 721:19 740:12 740:12 741:14 745:25 746:10 746:15,21 750:18,19 762:13 765:15 766:6,12 767:1 769:3,7 770:10 774:10,12,16 775:10,13,21 776:23 777:5 777:14 780:25 781:6 783:14 783:17 784:22 785:19,23,24 786:8,18,22,24 788:5,10,22,25 789:10,16 790:8 791:23 794:6,7 797:19 799:2 809:3,5 809:11,17 810:17 811:3 812:7,11,22 815:21,23 819:24 822:15
--	--	--	---

830:6 832:13 832:21 838:25 843:24 855:11 858:12 871:2 876:11 878:6 dramatically 835:23 drastically 754:5 draw 806:3,5 828:17 863:16 869:20 drill 729:22 763:9 800:4 drilled 801:7,9 847:5 856:20 857:5 873:23 drilling 800:9 803:1 805:1 842:17 851:13 881:18 882:10 drinkard 796:4 drive 703:6 705:4 732:9 734:2 735:15 752:2,5 760:19 762:9 770:8 855:15 882:3 drop 854:15 dropped 732:14 drs 858:7 dry 787:23 dst 821:18,22	dsts 821:9,11 821:12,21 822:1 dual 741:9 742:17 743:13 744:10,13 due 756:25 760:18 duly 718:17 786:15 833:11 duplicate 744:3 dynamic 800:3 e e 704:1,1 705:1 705:1 706:1,7 706:7,7 720:17 720:17,17 721:5,5,5 791:6 887:14 earlier 711:8 726:4 732:8 762:16 764:3 775:18 777:8 800:25 826:25 846:24 early 738:14 820:21 844:5 848:20 852:5 easily 782:22 east 794:14 795:15,19 797:6,8 801:3 806:16 824:7 876:19	eastern 793:15 796:6,25 848:13 easy 794:20 851:12 857:14 eat 727:23,24 eating 727:23 echo 750:3 echoing 714:8 economic 801:25 814:3 economically 813:14,25 868:22 869:2 869:16 878:9 economics 814:6 878:11 878:13,15 edge 728:21 734:2 752:1,5 752:21 753:1 760:19 762:9 793:15,25 808:12 edit 770:16 educate 835:1 education 719:12 educational 786:25 effect 709:25 830:13 effective 824:3 825:11	effectively 840:9 efficient 774:23 effort 774:3 775:6 eight 801:18 880:24 eighty 877:5,8 either 755:9 757:15 763:10 778:9 781:21 799:20 868:7 874:2 ejected 756:18 el 787:4 electric 801:12 electronic 773:17 elements 869:11 elephant 727:23,24 elicited 886:5,7 886:9 eliciting 809:4 809:14 811:15 empire 704:2 706:7,14,19 707:10 712:18 713:6,7 714:23 715:9 716:23 718:8 721:4 725:16 773:14 774:3 775:5 778:13 779:15
--	---	---	---

[empire - everything's]

781:21 787:10 790:4 810:24 811:19 812:22 814:4 817:15 821:4 822:9 838:18 859:24 864:20 872:8 872:15 885:18 empire's 711:7 774:9,14 775:10 865:16 employed 718:25 719:2 879:8,11 889:12 empty 861:19 emsu 728:19,20 729:12 792:6,6 799:3,4 804:15 806:22,24 807:17 808:4 808:13,23 809:18,25 811:7,11 812:25,25 813:7 814:17 814:23 815:23 816:16 817:7 817:12,17 818:16 819:10 827:1 829:9 839:14 840:3 844:22 847:17 856:10 858:22 863:19 864:6	866:21,23,25 867:8,18 868:17,21 869:12,22 870:3,3 871:10 871:14,15,20 872:1,10,17 encountered 821:22 ended 835:7 845:3 energy 705:3 736:12 861:10 883:22 engage 749:10 engineer 726:18 833:16 833:17,19,21 engineering 719:17 723:20 837:2 engineers 743:4 749:7 833:20 enhanced 803:18 806:6,7 848:3 849:19 enmrd.nm.gov 705:5,6 enter 708:14 842:3 entertain 709:19 entire 799:21 806:20 851:22	852:3 entirely 815:20 876:24 entitled 709:23 entity 714:18 entrapped 855:24 entries 865:22 envelope 878:17 eor 808:20 835:16 848:3 866:7 equal 723:6 763:5 equals 722:4 equation 723:8 ernest 704:11 especially 712:5 768:2 788:7 794:24 820:22 849:2 esq 703:24 essentially 724:20 730:5 731:14 738:22 739:6 743:21 751:11,13 752:1,5 755:1 755:7,12 792:11 798:21 804:18 850:5 establish 728:6 728:8 762:17 762:20	established 729:3 751:16 800:17 869:4 estimate 880:20 estimation 762:22 880:22 estimations 803:15 evaluate 745:7 747:4 749:4 769:20 775:25 813:5 821:7 867:20 868:1 evaluated 802:7 evaluating 835:18 evaluation 813:15 822:18 event 871:7 events 855:14 eventually 801:19 802:1 802:10 everybody 707:3,15 712:9 715:5 771:13 772:24 773:4,7 774:24 778:18 780:11 863:8 everybody's 780:6 836:11 everything's 759:15
--	---	---	--

[evidence - explain]

evidence 715:17 734:11 789:18 790:11 811:16 813:21 814:4,15 821:24,25 838:5 844:6 886:9 evidentiary 707:8 exactly 749:11 820:22 846:19 860:1 868:4 examination 706:6,10,10,11 706:12,17,17 718:18 747:21 748:24 749:11 750:25 768:18 769:2 773:25 774:13 786:16 812:9 817:21 818:1 820:6 830:4 833:12 864:14 examine 780:12 examiner 707:18 718:9 720:14 745:17 771:5 772:15 773:20 775:9 examiners 844:10	examining 783:4 example 724:12 729:15 743:18 764:20 796:10 799:25 806:12 810:16 824:2 856:14 examples 829:5 846:5 870:14 excel 735:9 excellent 707:20 709:13 717:11 718:1 802:15 878:7 except 728:20 769:15 799:22 800:19 836:19 842:12 848:7 excited 857:3 exclude 769:12 excluding 770:18 excuse 708:9 735:7 737:24 758:22 831:25 832:2 840:16 862:2 exhibit 730:20 731:24 735:24 737:8 738:2 751:10 752:9 752:11 753:4 757:14,16 758:4 759:2,5	791:25 792:3 798:2 800:24 802:21 804:6 826:6 838:17 843:22 848:18 850:10 852:23 856:13 858:21 860:25 861:6 865:21 883:4,6 885:16 886:13 exhibits 706:7 706:14,18 720:9,16 721:5 744:18 745:16 745:21,23 746:9,13,18 748:8,11,17 749:25 750:5,8 750:11,16,21 750:24 751:5 759:4,8 770:14 776:3 782:14 789:3,5,12,17 790:5,19,22 814:15 815:4 837:18,21,25 838:4,19 857:18 863:17 873:17 existence 822:10 existing 753:23 754:2 796:1 797:24 799:14 799:19 823:8	873:23 expect 805:6 807:18 808:9 810:4 825:11 863:24 expected 812:5 872:3 expenses 849:5 expensive 820:17,18,20 experience 719:12 742:18 811:7 825:19 834:5 864:23 872:25 experiences 834:19 expert 719:16 721:13 788:11 815:10 837:1 865:15,17 expertise 719:8 775:25 778:22 787:15 789:2 837:7 experts 740:13 747:3 749:4 768:11,16 774:18 777:3 782:25 784:15 815:13 865:8 865:18 888:2 explain 740:22 741:16 746:10 754:17,18
--	--	---	---

[explain - field]

767:8 781:25 782:10,17 784:18 840:24 841:21 842:6,7 848:6 854:11 explained 723:13 727:2 767:2 explains 782:13 explanation 775:12 776:23 explanatory 775:16 explicitly 868:4 exploration 787:18 800:7 851:10 explore 782:19 explored 797:16 express 710:10 exs 706:7,14,19 extend 731:18 764:24 779:11 796:19,21 822:23 extending 795:16 805:22 853:13 extends 793:24 796:23 extension 773:5 extensions 873:22	extensively 829:21 extent 717:3 750:7 761:21 exterior 817:12 823:22 extra 781:19 extraneous 883:9 extraordinarily 714:3 extremely 734:19 exxon 834:14 834:17 eye 741:1 eyesight 881:3	fair 746:18 748:10 769:5 780:13 797:19 808:24 818:23 873:15 885:14 fairness 751:1 772:4 fairway 855:19 855:19 856:12 fairways 847:1 855:11,18 861:19 fall 732:19,19 false 844:8 familiar 783:1 807:16 859:10 870:25 878:3 familiarity 876:6 fan 748:3 fancy 740:21 740:23 fane 704:6 far 742:7 748:2 752:11 754:7 758:9 760:20 760:22 763:8 785:25 794:20 796:19 798:22 804:14 830:16 832:23 847:18 852:19 fast 749:8 754:23	faster 735:16 740:3 fatter 797:4 fault 724:25 favor 710:3 fe 703:7 704:4 704:7,10,19 705:4,15 feasible 736:1 759:12 776:12 february 703:11 866:5 889:4 feedback 722:18 feel 711:20 846:18 feeling 885:11 feet 731:15 733:17 734:15 764:17,24 766:23 793:3 807:1,4,11 822:25 829:12 839:6,17 840:21 841:6 841:12,16 842:25 843:1,6 843:6 852:6 859:6 873:9 feldewert 704:21 fellow 834:14 field 727:20 728:7,8 729:15
	f		
	f 704:15 facies 862:5,6 facilitated 716:15 fact 763:24 790:17 836:24 863:11 factor 741:24 742:4,5 752:19 825:8 845:22 862:8,17,20 863:10 factors 813:11 825:12 845:11 845:20 868:17 failure 798:11 800:14 822:5		

[field - flattened]

729:22,25	835:19,21	find 709:2	826:8 833:11
736:24 737:11	839:17 841:11	722:15 793:23	838:23 841:19
737:24 738:3	841:11 842:25	795:13,15,25	842:6,11
739:5 759:16	849:4 855:5,22	796:3 797:20	853:18,19
760:12,21	856:9 859:20	797:22 799:3	863:18 866:5
762:3 764:15	860:18 861:18	808:24 810:5	876:20 877:3
765:8 793:7,14	869:3,5 870:21	811:23 835:22	878:25
794:1 795:20	884:3,5	836:13 846:17	fit 709:23 724:2
795:22 796:11	fiercely 768:8	851:10 876:12	725:3,16,17
797:5,25	fifteen 785:5	fine 712:21	726:23 727:8
799:14,14,19	832:4	716:4 717:19	727:18 728:4
800:1 801:4,5	fifth 861:25	747:16 750:9	730:8 736:5,6
802:17,23,24	fig 753:7	750:15,20	737:24,24
802:25 804:5	figure 722:7	751:2 770:15	738:1 751:12
804:14 805:19	723:1 725:21	790:19,22	751:15 760:2
806:13 808:17	729:7,19,21	finger 783:11	762:2,11
808:18 824:5	736:21 744:12	finish 779:16	767:12 877:19
824:24 825:9	754:17 768:24	finished 709:6	fits 729:16
826:7,8 828:13	782:3 792:15	fire 782:7	fitting 759:14
828:20 829:3	844:12 850:25	firm 704:9	759:14,14
835:24 836:4	862:17	first 712:25	five 731:6
839:2,3 841:19	figured 732:22	715:9 718:17	734:18 857:9
842:21 843:3	file 709:23	722:4 723:5	861:20 862:3,9
850:4,12	filed 714:15	724:23 726:1	882:4,5
852:10,13,16	759:2,4,8	726:12 727:18	flank 808:20,22
853:2,9,12	760:5 761:6,18	728:6 732:5	flanking
856:3,11 870:4	762:1,7 865:2	734:5 735:25	808:12
870:6 883:20	files 815:2	741:7 742:22	flashlight
883:22 884:12	filing 759:5	757:23 758:16	764:13
fields 792:6,19	filling 805:19	776:10 779:5	flat 747:9
792:23 793:4	final 709:12	780:20 786:15	824:16 854:6
793:12,16	782:14,15	791:24 792:20	854:23
796:1,5 797:22	866:14 889:14	798:5 803:20	flattened
798:14 800:16	finally 737:23	805:13 820:19	853:14
825:20,21	791:23	825:15 826:2,4	

[flavor - frankly]

flavor 834:5 float 860:4 floats 861:1 flood 712:3 792:12 800:20 802:8,9 803:22 804:2,10 805:9 805:12,14,21 828:20,20 836:3,4,6,9 847:3 848:9 849:6 851:22 853:14 860:11 866:17 884:4,5 floodable 804:3 806:20 flooded 823:22 823:23 836:11 860:18 flooding 742:1 834:11,11,16 835:2,9,10 846:9,9,21 850:23 852:4 859:24 860:1 863:21 867:24 floods 848:23 880:6 floor 703:5 flow 723:8,25 739:9 792:19 792:21 793:20 795:4 797:7,9 fluid 722:6 723:25 724:14	739:9 765:16 847:9 fluids 724:22 729:1 798:20 818:16 flushed 799:13 799:15,16,16 799:22 flushing 792:9 794:20,23 795:1,1 798:20 798:24 fmi 823:6,7,11 823:15 fmis 823:3,14 823:14,16 focus 716:3 focused 766:13 focuses 748:16 folding 859:22 860:10 folks 780:7 819:6 844:4 848:2 855:3 859:24 860:21 follow 711:19 712:12 following 717:7 752:4 809:10 follows 718:17 786:15 833:11 foot 743:20,21 footed 747:9 forced 826:19	forecast 738:5 752:22 766:17 886:17 forecasts 725:4 752:22,24 762:23 763:8 765:8 foregoing 889:9 foresight 803:5 forgive 830:21 forgot 736:20 830:22 fork 796:4 801:10 803:2 851:14,25 form 748:4 778:14 823:1 854:25 865:12 formation 740:6,7 766:14 799:7 818:16 851:14 858:13 858:14 formations 843:5 formed 814:17 fort 795:18 forth 724:1 725:5,22 728:16 729:12 738:5 753:3 758:11 765:12 889:8	fortunately 726:25 851:21 852:2 forward 742:4 753:17 755:5 755:16 768:15 782:8 823:16 found 795:23 799:11 835:25 four 711:23 714:20 725:8 725:14 769:16 775:15 778:23 781:19 835:15 fourth 710:23 889:18 frac 755:2 fractional 723:8 fracture 730:6 735:23 742:21 742:25 743:24 744:4,5 766:5 859:21 fractures 743:11,19,20 744:9 823:9 859:19 860:9 863:23 frame 801:18 frames 861:9 francis 703:6 705:4 frankly 768:22 809:7 845:17
---	--	---	--

freudian 763:20 front 860:6 878:20 frustrated 847:6 frustrating 787:20 frustration 783:9 full 718:22 821:5 833:14 852:22 fully 711:22 782:5 further 730:2 739:10 771:8 771:12 774:19 796:1 817:19 822:17 823:14 854:18 889:7 889:12 future 725:5 738:6 752:23 753:6,16,24,25 754:15 756:3 757:1,7 763:8 834:11	gamesmanship 714:10 gas 727:14 728:8 731:10 732:9 736:7 738:4,9,17 758:11 759:14 762:20 800:10 842:2 859:14 880:2 gaspar 705:14 gather 784:7 gathered 876:21 gathering 823:2 gee 856:2 gem 719:2 gemini 719:2,3 719:3 general 813:2 843:5 846:7 848:3 849:5 generally 713:17 795:23 796:8 836:18 840:15 844:9 872:22 gentleman 744:17 geography 847:19 870:23 geological 711:2 787:3 833:17,19	837:1 geologist 801:13 833:20 geologist's 724:25 geologists 787:17 794:13 800:7 833:21 geology 710:24 723:21 724:17 724:18 730:23 787:2 789:3 835:22,23 geometry 882:8 george 808:18 geostatistic 740:18 geostatistics 740:22 gerasimos 703:19 gerry 707:5 getting 737:2 745:10,12 762:4 777:9 851:15 give 711:25 714:9 726:2 767:11,12,12 781:17 783:18 786:24 787:13 794:9 813:2 834:4 844:7 854:1 876:7,12 886:17	given 723:24 725:2 730:24 730:25 732:7,7 776:24 gives 784:17 785:10 836:23 giving 710:16 811:6 828:19 glad 791:24 glsau 806:15 go 708:8,9,17 710:25 711:14 715:4,9 716:17 716:17 717:18 721:8,9 723:8 730:18 741:2 750:20 752:18 754:11 756:9 768:15 772:8 772:16 773:21 774:18 777:19 778:4,17 780:10,20 782:8 783:12 790:12 811:25 812:18 823:16 826:17,21 847:23 849:8 849:15 851:7 853:17 859:5 862:13 876:8 878:22 880:7 880:10 883:3 886:16
g			
g 822:24 gaines 800:1 801:3 808:18 gallegos 889:3 889:17			

[goat - great]

<p>goat 736:4 737:3 751:15 751:23 752:14 goes 754:21 759:17 809:15 824:4 830:17 839:18 845:3 852:18 884:1 going 709:13 710:24 711:4 711:14,20 716:10 725:7 727:12 729:8 731:8,13 732:3 732:16,19,23 735:15 736:17 740:1 751:20 753:5 754:5,9 757:1,2,4,5,7 757:11 758:21 761:23 762:11 762:12 763:11 763:13,17 764:18 766:18 766:23 767:12 770:4 772:16 774:17 775:24 777:23 778:17 779:20 780:10 782:5 785:6 790:13,23 791:1,9 797:20 808:4,23 811:22 822:3 824:18 845:8</p>	<p>848:2 851:25 854:9 856:1 860:13,20 863:4,7 865:13 865:21 866:2 873:4 883:5,11 884:13 885:19 goldsmith 806:15 883:19 good 707:3,17 711:19 712:15 715:3,4 717:18 717:19,20 718:12,13,20 718:21 723:2 723:11 724:17 726:25 727:17 727:18 728:21 729:25 737:24 742:13 756:14 758:9,11 759:15 762:2 762:22 765:2,5 765:7,11 766:4 767:6 772:24 801:11 802:7 812:12 818:3 820:10 821:6 823:2,4 830:6 832:24 833:1 840:2 845:14 849:17 864:16 864:18,19 870:7 887:7,8</p>	<p>goodnight 704:17 707:10 709:20,22 710:11 712:22 720:20 732:3 767:3 773:5,14 775:14 776:24 781:23 784:13 788:14 789:20 790:15 812:4 819:9 838:7 883:6 goodnight's 717:9 740:13 766:4 gor 738:16 gotten 805:23 812:14 815:23 government 885:22 grande 795:8 798:22 graph 805:25 806:4,5 849:25 852:25 854:8 854:10 859:7 859:11 gravity 742:24 743:15,22 747:25 860:17 869:11 gray 711:24 752:16 761:20 grayburg 728:11 729:24</p>	<p>730:4 731:1,6 731:12,13,17 732:11 734:1,8 734:12 736:3 736:13 737:3 737:13 738:20 738:22 739:11 751:15,23 752:8,13,14 753:3 754:8,10 754:16,25 755:7,15 756:5 756:21 757:4 757:10,12,22 757:23 758:17 758:23 759:11 759:21 761:8 761:12,19,23 762:10 763:2,4 763:16 764:23 765:6,17 766:9 766:22 796:4 807:21 808:9 808:14,15 810:2,12,17,19 811:2 812:2 839:14,24 857:25 858:2 858:25 860:12 860:14 867:22 868:2,7,22 869:2 great 725:12 726:11 755:19 786:2,5,12</p>
--	---	---	--

[great - harwood]

832:4 886:14 887:16 greater 757:5 851:1 green 753:23 839:25 greenfield 800:2 802:8 809:24 824:21 843:16 847:2,3 847:12 856:15 856:20 857:11 857:12 863:12 877:10 882:18 greenfields 800:16 856:6 861:17 862:2 863:13 grid 731:19,20 731:22 gross 739:6 group 729:12 760:10,11 groups 728:16 729:10,11,14 765:11 guadalupe 704:18 796:20 guadalupes 798:23 guess 717:3 728:24 733:9 746:20 763:19 769:8 771:15 780:24 787:15	812:20 825:5 845:25 846:13 850:22 854:2 859:6 874:10 875:3 876:13 883:3 885:3 guessing 738:13 guys 768:24 h half 725:19 748:22 773:6 855:23 halfway 855:17 hall 703:5 hand 718:15 733:13 734:18 752:11 753:9 760:8 786:13 hanging 831:21 hangs 794:12 hanson 705:9 happen 753:6 754:1 757:2,7 830:11 happened 756:17,18 846:6 happening 755:8,12 810:24 happens 713:22 743:25 752:24 754:18 754:19,22	756:3 758:18 759:11 760:24 798:18 842:24 happy 745:17 750:16 771:23 hard 714:3 737:16 776:18 846:17 859:1,2 hardy 704:5 706:6 715:2 718:7,9,19 719:15 720:6,7 720:14 721:3,7 721:12,14,17 721:18 744:23 745:17 746:9 746:12 748:15 750:15 751:2,7 751:8 759:7 767:18 769:6 771:23 772:9 772:10,14 775:2,8,9 776:14,22 777:16 781:5 781:10 784:2 784:20 785:1,5 785:15,18,23 786:7 791:5,10 791:12,14,16 hardy's 780:5 783:17 hart 704:18 harwood 703:16 707:23	707:24 718:5,6 718:11,13 719:18,21,23 719:25 720:4 720:19,22,24 721:1 744:23 745:14 746:3 746:11,17 748:6,20 749:15 750:3 750:22 751:3 767:20 768:19 769:4 771:7,11 771:16,25 772:18 773:19 773:21 775:8 788:13,16,19 789:19,22,24 790:1,12,24 791:2 809:6,21 810:7 811:19 811:22,24 812:3 817:24 819:23 820:2,4 830:2,24 831:4 831:7,16 832:4 832:7,8,12,15 832:17 833:1,9 837:3,8,10,12 837:14 838:6,9 838:12,14,16 864:8 884:22 885:17 886:3 886:11,14 887:5,10,13,16
--	---	--	--

[harwood - history]

888:9 he'll 720:4 head 750:20 794:19,20,25 799:21 809:8 819:3 827:14 hear 710:5 712:1,14,25 713:25 770:24 776:17 780:24 781:8 878:6 heard 703:15 711:3 712:6 714:1 716:22 717:21 723:17 771:13 774:18 776:20 777:16 777:18 780:7 783:23 839:8 840:22 845:11 850:12 884:22 hearing 703:1 703:16 707:4,9 707:17,24 708:8 718:5,6 718:11,13 719:18,21,23 719:25 720:4 720:14,19,22 720:24 721:1 744:14,23 745:11,14 746:1,3,11,17 747:22 748:2,6 748:20 749:15	750:22 751:3 757:20 766:13 767:20,23 768:19 769:4 769:24 771:7 771:25 772:15 772:16,18 773:20,24 774:2 775:1,8 775:24 780:18 780:22 782:21 783:12,13 786:3,5,12 787:6 788:13 788:16,19,22 789:19,22,24 790:1,3,12,24 794:10 809:2,6 809:9,21 810:7 810:23 811:19 811:22 812:3 814:22,23 815:8,14 817:20,22,24 819:23 820:2,4 830:2,21,24 831:4,7,16,22 831:24 832:4,8 832:12,17,19 833:1,5,25 837:3,8,10,12 837:14 838:6,9 838:11,12,14 838:16 844:10 864:10,12	875:13,16,17 884:22 885:17 886:3,10,11,14 887:5,10,16,22 888:9 889:4 hearings 713:13 780:2 hears 834:24 hearsay 885:20 heavy 824:17 held 772:22 773:10 785:12 832:11 help 717:8 770:4,24 791:23 823:8 849:2 859:23 861:15 879:12 888:12 helped 858:17 helpful 715:6 772:12 hesitant 819:5 hesitating 879:13 hess 802:23 839:4 841:18 849:2 850:3 hey 755:18 757:21 759:13 820:9 hi 779:24 high 728:17 733:5,6 734:19 734:25 755:13	766:2 825:22 836:21 849:6 872:21,22 880:21 884:3 884:13 higher 754:14 754:15,15 799:24 824:9 824:16,19 862:4 highest 765:23 highlight 861:25 highlighted 733:4 735:20 884:2 highlights 721:9 highly 839:1 highway 704:13 hinkle 704:3 hinklelawfir... 704:5 hired 834:14 historical 724:2 736:9,18 737:6 737:25 738:1 760:12 762:15 historically 821:12,21 history 724:3,8 725:10 727:6 728:24 731:19 734:17 736:2
--	---	--	---

[history - indication]

737:17 739:19 741:12 742:13 751:16,24 753:16 760:3 761:16 855:7 hits 734:5 hitting 760:14 760:18 762:9 hmm 867:12 hobbs 795:17 818:17 847:19 870:20 hold 777:6 832:22 854:5 hole 743:25 790:14 holes 787:23 holland 704:18 hollandhart.c... 704:20,21,22 home 775:11 honest 724:16 725:10 766:11 honestly 725:6 732:1 hope 708:25 779:6 812:15 hopefully 724:13 774:14 hoping 808:2 horizon 888:4 horizontal 861:1 horizontals 859:16 860:2	horsepower 794:25 horseshoe 848:10 hose 782:7 hour 768:2 769:20 773:6 775:14 782:21 887:1 hours 746:15 749:3 779:8 780:4 796:16 house 812:17 housekeeping 887:18 huge 755:16 760:24 huh 733:9 human 836:16 hundred 737:21 759:23 760:15 hydraulic 794:18,20,25 799:21 hydrologically 819:10	793:7 807:3,24 846:17 865:17 865:23 identifies 865:23 identify 765:22 ignore 738:6 804:25 imagine 827:15 immediately 808:21 871:20 immersed 715:13 impact 764:18 827:7 884:2 import 747:13 important 724:9 726:17 732:21 747:2,5 747:8 764:7 776:15 impression 714:10 764:1 impressive 834:4 850:3 improve 758:13 inadvertent 830:25 inception 874:20,21 875:22 878:3 incidentally 826:20	include 750:5 797:5 848:5 850:16 870:21 included 745:23 809:13 814:11 including 850:19 inconsistent 734:22 incorporate 742:23 increase 757:12 828:21 increased 754:5 881:11 increases 756:4 increasing 763:22 805:11 839:16 incredible 779:10 incurred 879:3 independently 792:14 indicate 883:14 indicated 855:22 indicates 797:7 indicating 795:4 803:17 871:10 indication 871:6 887:21
	i		
	ibc 704:13 idea 732:16 idealized 839:1 identification 820:16 identified 730:3 792:8		

[indicative - interval]

indicative 741:9	811:11 814:3 815:6,17,19,20	770:19 818:16 825:22 826:9	783:2
individual 730:9 735:8 736:23	815:22,24 816:10,12 817:13 820:24	826:12 827:2 828:25 830:14 854:16 873:24	integrating 774:18 782:6
individuals 783:23	821:18 829:13 844:11 867:7	879:12,21,23 880:2,2 881:19	intend 717:6
inexpensive 821:2 822:5	878:11,13,15 878:16 885:21	injector 860:25 882:12,14,15 882:25	intense 859:22 860:10
inferences 829:10	inherent 810:11,20	injectors 804:9 879:14,15	intent 745:5
infill 729:21 805:1 857:5 877:9,9 881:18 882:10	initial 749:12 752:7 762:20 765:2 877:13	input 711:16 714:22 745:7	interact 857:2 860:5
infinitely 779:13	initially 880:3 881:10 882:9	inputs 745:8	interest 738:11 772:4 783:17 851:19 883:19 883:24 889:14
influx 754:8 767:5	initiate 802:8	inquire 812:1	interested 862:11
information 710:15 712:3 712:11 722:3 723:13 739:20 744:15 745:3 745:22 746:2,7 746:25 747:1 749:21 766:14 774:11 775:12 775:17 776:20 777:2,10 780:12,15 781:22 784:7 784:14 792:17 794:2 801:12 802:3,22 803:6	initiated 774:3 775:3 802:9 874:25	inquired 818:14 819:16	interesting 833:22 854:8
	initiating 874:24	inquiry 819:9	interestingly 857:24
	initiator 875:4	insert 857:8	interests 883:21,23
	inject 754:21 755:2 846:14	inserted 862:18	international 861:15
	injected 739:18 739:22 756:23 763:23 830:16	inside 852:16 853:22	internationally 835:13
	injecting 754:23 755:13 761:1 803:21 828:5 879:7	insignificant 849:24	interpretation 767:10 858:18 859:3
	injection 738:4 754:14 755:3 756:22 757:8	instituted 850:22 852:4 853:19	interpretations 766:15,16 859:5
		insufficient 782:16	interrupt 721:13 887:1
		integrate 724:7 774:11,19 782:10 783:5	interval 801:16 803:3,7,8
		integrated 731:8 767:2	

[interval - know]

806:21 807:22 807:25 827:16 839:16 841:6 843:4,6 844:24 851:16 intervals 731:1 788:2 794:24 795:3 797:14 816:3,8 823:19 intimately 783:1 intricacies 726:7 introduce 827:4 introduced 790:10 838:24 introducing 809:16 introduction 805:14 intuit 782:25 intuitive 755:20 intuitively 754:13 invest 885:12 investigate 770:9 816:23 investments 834:21,21 involve 835:10 involved 714:11 776:3 836:21 874:5	874:10 875:17 881:9 884:18 885:24 issue 713:16 769:6 811:1,4 886:2 issued 883:7 issues 710:10 747:17 776:2 791:3 885:24 it'll 843:8 j jackpot 726:19 james 705:16 706:5 707:18 718:16,24 january 848:20 853:2,9 jbroggi 704:21 jesse 705:6 jessek.tremaine 705:6 jim 718:10 725:24 726:14 740:25 job 765:5 844:10 jparrot 705:17 judgment 844:13,24 julia 704:20 july 883:7 jump 737:7 753:13	jumping 753:11 justice 725:10 k k 705:6 katz 883:19 keating 801:8 802:5 keep 722:20 733:24 736:16 748:5 763:18 778:1,3 854:23 kelli 889:3,17 kermi 821:20 keyed 801:6 kick 707:24 kicked 834:7 kind 712:11 727:2 732:5 736:17 738:6 739:5 741:16 752:6 763:18 781:4,5 792:20 794:16 796:25 797:4,10 801:2 801:20 804:25 805:5,6,16 807:17 808:9 808:13 816:18 819:4 823:3 824:20 825:5,8 825:12 828:1 829:13 831:21 834:12 836:8 836:20 841:20	861:12 873:3 kinder 802:2 826:6,8,11 856:19 875:5,6 875:7,11 876:2 878:24 879:3 883:4,7,12,16 884:11 885:8 885:10,23 kinds 796:3 knew 736:19 782:11 846:19 know 710:17 710:21,22 711:3,5,9 712:9,24 715:21 716:5 721:22,25 724:5,12,14 725:8,15,17,22 726:4,5 727:16 728:2 729:8 730:17 732:1,2 733:6,19 734:20 735:1 736:13 737:9 738:15 739:18 740:17,19,22 740:24 741:14 743:14 744:16 744:24 745:1,7 746:21 747:3,6 747:7,10,10 748:7 749:3,3 749:6,17,19,22
--	--	---	--

[know - levelland]

750:22 762:23 763:15,18,21 763:23 764:5 764:10,20,25 765:10 766:3,4 766:10,18,23 767:7,10 768:5 769:16 771:9 771:16,18 772:11 775:19 776:2,7 777:3 777:13,19 779:2,7 780:10 782:13,18 785:16 790:23 796:16 797:14 801:23 805:11 807:6,25 810:13,22 811:24 821:6,6 821:24 822:4 822:19,22,24 822:25 823:6,8 825:7 826:10 826:10 827:20 828:4,11,13 829:6,22 830:16,17 832:3,24 836:22 841:16 845:1,2,3,16 848:2 852:19 852:19 855:6 856:7 861:18 875:10 878:17	878:18 879:7 879:11,17,21 879:22 880:5 880:18 881:5 881:23 885:4,6 885:20 886:2 887:3,23 knowing 855:7 knowledge 789:10,13 816:18 837:25 known 787:11 819:6 829:9 kriging 740:20 I I 704:11 lab 724:15 labeled 789:8 800:4 lack 799:20 laid 782:19 lake 740:12,17 lake's 739:15 763:19 lamkin 703:20 706:13 708:22 830:3,5,20 land 857:13 landreth 806:15 883:20 language 883:12 laptops 722:17 laramide 855:13	large 760:16 766:12,21 821:19 824:19 828:23 849:4 largely 745:25 larger 751:24 882:22 largest 793:11 larry 739:15 740:17,20 763:19 las 794:22 late 779:6 792:16 794:18 803:19 848:1 laterally 836:5 836:11 845:13 latest 758:19 law 704:9 723:9 lawyer 784:4 lawyers 844:10 lay 747:2 layers 731:3,4 731:6 763:5 layperson 749:6 782:2 lea 847:15 861:21 leaders 861:12 leak 728:10 730:5,8 737:13 737:20,23 753:2 754:15 756:4 762:22	763:11 765:6 leaks 730:3,7 735:21 737:12 737:21 756:25 759:23,23 760:15 leaps 779:1 learn 834:18 learned 782:10 783:5 leased 876:18 leasehold 883:23,24 leases 728:23 729:2 739:8,9 874:9,11 leave 763:17,25 771:13 836:4 leaving 825:16 lee 706:5 718:16,24 left 733:18 734:2,3,18 752:6 753:9 760:7,8,13 831:21 835:15 855:17 857:25 legal 773:5 776:8 889:17 lend 778:8 letter 714:20 level 729:5 859:3 levelland 796:23
---	---	--	---

[levels - lot]

levels 870:9 licenses 741:1 life 849:20 light 805:7 lighter 802:18 lights 764:13 likes 843:24 limit 794:3 limitations 716:11 limited 797:11 798:13 836:20 876:8 884:4,13 lindsay 787:11 788:1 794:7,16 807:2 808:12 815:7,21,23 822:15 825:7 829:11 838:25 855:11 858:8 858:12 lindsay's 815:11 line 705:8 805:7,22 807:10,11 810:1 823:18 824:8 846:23 854:9 882:3 lines 752:3,3,4 781:5 868:15 881:14 lining 855:9 list 737:16 833:6	listen 711:4,10 815:12 listened 711:11 715:22 815:9 listening 710:23 literally 726:19 728:4,22 literature 846:17 855:3 lithologies 858:14,24 litigation 713:24 little 711:5,13 712:4 714:6 715:7 716:16 717:8 727:11 738:10,17,18 739:25 742:12 749:10,14 752:13 756:22 759:23 764:11 764:18 768:10 769:23 771:12 772:25 783:6 786:24 789:1 796:1,11 799:9 799:22 805:16 812:20 823:12 834:5,25 847:6 847:10 850:24 854:19 856:23 857:8 858:11 859:23 860:8	875:1 876:5,12 live 864:3 lives 777:14 llc 705:8,13 llp 704:3,6 located 797:5 804:9 824:21 locations 735:23 log 822:1 logging 821:6 logs 766:15 800:11 801:11 801:12,12,17 802:6 803:8 815:5 820:23 821:5 822:14 823:2 859:5 long 709:1 755:22 782:7 826:10 874:9 880:7 887:1 longer 880:10 look 725:24 726:2,2 729:4 729:5 732:6,23 732:24 733:8,9 733:12,18 734:13 735:9 747:23 751:11 755:5 759:13 760:23 764:5,6 764:11,12,14 764:19 778:11 778:12 791:24	795:6 834:1 844:1 851:13 853:23 859:5 859:24 867:23 878:23 looked 726:12 739:21 769:16 794:17 815:5 820:23 822:15 834:10 856:4 861:20 869:10 885:12 looking 721:19 731:20 740:9 745:15 764:11 779:15 800:15 801:10 820:13 851:8 868:13 870:1 looks 723:22 759:16 762:4 764:16 lord 706:16 833:10,15 lose 751:24 863:8 lost 863:3 lot 713:13 724:15,16 733:6 737:18 740:25 744:9 744:25 756:24 757:21 764:5 764:12 766:20 767:10,14
--	---	---	---

[lot - match]

768:4 770:11 805:2 820:21 840:11 844:11 844:25 845:7 852:25 855:2 859:20 861:4 862:14 870:13 878:8 883:9 lots 747:16 888:2 lottery 728:3 love 786:1 812:14 lovington 807:22,23 822:21 low 733:20 734:21 736:8 806:6,7 821:11 872:20 lower 738:16 738:16 792:10 794:11 796:25 798:24,25 799:12,23 800:3 808:8 824:12 829:21 860:17 862:5 lowest 858:9	735:24 737:8 738:2 745:16 751:10 752:9 753:4 756:10 757:16 758:4 758:15 759:2,3 759:7 760:5,6 761:5,5,17,17 761:25,25 762:6,6 845:11 883:22 madam 888:11 made 741:21 742:8,13 758:1 793:5,5 801:18 801:24 802:23 806:24 813:15 819:9 822:6 835:14 847:7 857:9 878:8 mail 791:6 887:14 main 796:12 803:3,22 805:10,12,21 805:21 806:7 806:13,20,23 808:5,21 809:25 821:17 825:3,5,7 839:13,23 840:7,12,15,25 843:12,19 846:20,21 847:4,22,24	848:22 849:8 849:12,19 850:13,16 853:24 857:24 861:4 862:24 863:8 873:20 873:21 874:3 majors 834:17 835:5 make 709:3 713:19 714:4 722:14,15,19 751:22,24 754:13 759:6 761:13 774:22 778:1 780:11 785:6 787:23 791:9 802:11 813:21 818:19 828:17 840:16 840:20 844:13 848:2 869:21 886:19 makers 713:23 makes 713:20 836:23 makeup 828:9 making 747:24 760:20,22 765:21 766:2 862:15 880:8 886:6 man 725:12 manage 879:17	managed 737:23 879:19 management 803:5 map 733:14 735:7 792:13 794:3 857:20 maps 724:7 740:21 marathon 828:14 march 709:24 889:15 marked 720:16 730:19 746:13 758:14 759:5 760:5 843:22 883:5 marker 824:13 market 886:1,1 master's 787:1 match 725:11 726:11,11,12 728:7,15,18,20 728:21,24 729:13 730:1 731:19 734:17 736:2 737:1,11 737:17 738:3,4 738:8,9,21 739:7,10,19 741:12 742:13 751:17,24 753:16 758:2,5 758:6,9,10,11
m			
m 705:11 706:8 706:8,8 720:17 720:17,17 721:6,6,6 730:20 731:24			

[match - middle]

760:1,3 761:7 761:16 765:2,3 765:10 766:17 823:11,15 matched 728:10 737:10 matches 763:14 matching 728:9 760:21 material 778:14,22 779:2,6,9 860:16 883:9 materials 778:6 787:9 matrix 743:10 743:14,20 744:4,5,9 matt 714:20 matter 712:15 715:21 727:6 754:10 763:9 790:17 888:13 889:13,15 matters 708:2 709:10 750:17 818:12 matthew 705:11 mature 853:7 maximum 755:3 mbeck 705:11 mccamey 795:22 806:16	828:20,20 829:3 mcelroy 883:23 mcf 862:12 mcshane 785:25 mcsorley's 812:16,18 mean 711:4 725:9,12 737:14 742:19 744:24,25 745:21 746:21 747:1 748:6,25 749:2,16 750:15 755:16 762:8 764:3,7 765:1,18,18 766:19 768:5 768:21,22,23 768:25 770:7 770:14 771:10 771:19 782:6 785:5 790:18 810:19 814:13 820:18 827:22 842:8 851:9 852:20 864:2 866:1 875:12 877:14 meaningful 749:11 means 719:3 843:19 860:15	measure 722:6 measured 724:15 measurements 722:10 meet 812:15 meeting 820:10 meetings 708:15 meets 741:1 melzer 706:16 785:25 787:10 788:1 796:15 798:5 804:23 825:6 833:6,8 833:10,14,15 834:3,24 837:1 837:6,17,23 838:21 839:23 841:21 847:14 851:7 854:7 860:24 864:16 873:6 883:12 884:8 886:21 melzer's 887:2 member 703:20 703:21 members 703:18 709:16 710:4 887:6 mention 763:3 822:6 835:14 mentioned 716:15 805:9 844:5	mentor 834:15 mess 885:5 messages 717:13 meteor 792:8 meteoric 798:20 821:14 methodology 828:14 mexico 703:2,7 704:2,4,7,10,19 705:2,4,10,15 706:7,14,19 707:10 721:4 790:4 814:17 824:7 838:18 847:15 855:2,3 855:12 889:4 889:18 mfeldewert 704:22 michael 704:21 microphone 771:12 776:10 777:19 microphones 722:16 mid 767:21 805:1,10 807:2 857:4 middle 730:23 740:7 803:19 833:22 842:22 858:21
---	---	---	--

[midland - morgan]

midland 796:24 797:13	885:12	713:10 714:9	761:14 762:17
midstream 704:17 707:10	minds 780:23	717:2,12,13,22	763:24 764:16
migrate 798:6	mindset 873:10	719:22 720:23	764:25 765:1,7
798:7	mineral 851:19	747:22 777:21	765:16 766:17
migrated	minerals 705:3	777:23,25	767:3,4,15
798:12	mining 732:6	778:4,5 788:17	782:14,15
migrating	821:3 855:4	789:23 817:20	model's 739:25
765:16 766:8	minus 723:6	817:22 818:2	modeling
798:11	829:12 859:3,7	819:21 837:8,9	742:18 766:8
migration	879:10	838:10	models 727:11
818:15	minute 745:3	mobile 827:24	727:17 737:15
miguel 705:15	832:6 836:2	834:17 860:16	746:22 761:15
mile 793:3	846:8 847:11	model 722:2,4	moderate 803:7
miles 728:17,17	859:13	723:15,19,25	modified 882:3
734:9 738:25	minutes 715:3	724:12,23	modify 807:13
754:22 755:24	744:21 767:22	725:3,8,9,10,16	money 729:8
758:22 759:18	768:22 785:4	725:21,22,23	822:17 823:13
793:13 804:16	785:10 832:5	726:2,8,11,22	860:22 861:4
millidarcies	887:3	726:25 727:5,7	monohans
763:7	miscibility	727:7,10,14,16	821:20
million 739:18	860:14	727:22 728:1,8	month 801:17
741:23 742:2,5	misrepresent...	728:15,17	months 796:17
756:18 763:1	836:24	729:17 730:21	802:10 826:13
763:22 849:9	missed 721:15	730:22 731:4	854:17 856:25
849:24 850:6	727:3 781:17	732:2,17	monument
851:2 852:11	missing 782:19	735:22 736:1,6	856:11 859:19
857:9 862:1	mistake 757:24	736:8 737:1,10	859:22
883:18	mix 740:8	737:14 738:8,9	morgan 802:2
mind 733:24	779:18 805:20	739:15,21	826:6,9,11
736:16 763:18	860:15	742:8 743:6,13	856:19 875:5,6
819:2 858:20	mixed 721:23	743:17 747:13	875:7,11 876:2
859:1 861:5	733:1 803:21	747:15 751:11	878:24 879:4
863:20 870:18	mm 867:12	752:17 753:16	883:5,7,13,16
	moander 705:5	755:6 757:24	884:11 885:10
	706:11 713:5	758:2,13,19	885:23

[morning - new]

morning 707:3 707:17,19 718:12,13,20 718:21 745:10 747:7 767:21 773:14 774:5 774:13,16 780:3 783:5 790:14 810:16 887:4 888:14 mother 792:12 798:17 799:13 821:13 830:9 830:12 836:3 845:13 847:1 871:6 motion 708:5 708:14,17,24 709:11,19,20 709:25 710:1,6 710:7 mountains 794:21 796:21 798:23 movable 795:2 800:19 825:15 move 710:1 724:22 729:1 739:5 755:23 755:24 761:2,3 796:13 798:1 800:23 802:20 804:21 812:6 885:15	moveable 799:16 movement 755:25 836:7 moves 755:24 moving 737:18 748:5 752:4 755:9,10 757:12 792:22 834:20 msuazo 705:16 mud 801:11,11 801:17 802:6 820:23 821:6 822:1 mullins 705:9 mute 720:3 773:2,17,23 muted 722:20 778:2,3 n n 704:1 705:1 706:1 845:12 n's 822:3 name 718:22 718:24 726:1 786:18 825:17 833:14 841:18 named 856:9 names 714:20 narrative 745:3 native 821:23 natural 705:3 825:16	naturally 863:2 nature 713:23 821:10,13 836:4 845:13 nature's 792:12 798:17 799:13 830:9,12 847:2 871:6 near 853:8 860:3 neatest 739:14 necessarily 716:13 779:11 783:10 784:8 820:16 necessary 771:8 need 709:9 710:6 716:23 728:4 729:25 743:14 744:13 748:23 749:9 749:14 764:8 768:10,17,20 768:23,23 769:22,23 773:23 780:11 783:18,20 784:14,20 785:6 800:20 846:8 859:8 860:14 864:4 886:9,19 needed 708:7 759:19 773:6	803:6 834:23 needs 744:7 823:1 neighborhood 840:17 neither 806:19 866:20 889:12 net 739:6 756:23 757:11 883:18 network 766:5 859:21 never 727:11 762:11 830:15 841:14 864:3 new 703:2,7 704:2,4,7,10,19 705:2,4,10,15 706:7,14,19 707:10 721:4 744:15,22,22 745:10,21,22 746:4,6 749:21 753:12,20 754:4 758:5 775:12 776:19 776:22 778:22 778:24 779:5 782:22 787:2 790:4 809:16 812:16 814:17 824:7 838:18 847:15 855:2,3 855:12 859:24 860:15,19
---	---	---	---

[new - officer]

<p>889:4,18 newest 761:14 nice 764:15 818:3 820:10 nicely 855:9 night 708:5 nine 876:18 nm 705:3 normal 842:24 normally 805:6 north 704:13 704:18 739:1 742:22 795:17 795:18,20 796:22 870:20 870:24 883:23 northern 796:24 northwest 793:15,25 795:17 796:5 801:9 808:19 824:6 northwestern 808:18 note 746:14 758:25 839:12 847:20 886:16 notes 768:8 notice 756:2 842:11 858:1 noticed 792:18 803:2 828:22 847:14 855:5</p>	<p>notify 773:4 novel 863:23 november 818:11 nowadays 880:7 nrt 722:4 number 707:11 707:13 743:13 760:8 778:21 792:7 793:2 798:14 804:24 807:20 822:13 837:18 845:19 846:5 848:10 849:18 850:3 851:3 852:25 862:24 863:4,5 863:9 867:5 883:6 numbers 707:11,12 728:3 759:2 792:3 804:23 842:12 847:14 848:21,23 858:17,22 861:16,24 866:1 880:13 nw 889:18</p>	<p>oath 720:11 object 775:19 885:19 objection 708:6 713:10 714:22 715:1 719:19 719:20,22,24 720:3,19,21,23 720:25 745:2 788:13,15,17 788:18,21 789:19,21,23 789:25 790:2 809:2,7 811:23 811:25 837:4,5 837:9,11,13 838:6,8,10,13 838:15 884:15 885:17 observation 819:18 observed 815:9 obtained 746:15 815:20 obviously 734:5 746:21 747:1 780:6 787:8 793:19 866:1 occidental 854:21 occur 795:1 occurring 767:5 817:11 871:7 872:1</p>	<p>ocd 707:6 713:4,10 717:22 719:21 720:22 778:5 780:2 788:16 789:22 837:9 838:9,10 offer 748:3 778:6,13 784:25 809:3 838:3 887:25 offering 814:7 868:25 office 726:1 officer 703:16 707:24 718:5,6 718:11,13 719:18,21,23 719:25 720:4 720:19,22,24 721:1 744:14 744:23 745:14 746:3,11,17 747:22 748:6 748:20 749:15 750:22 751:3 767:20,23 768:19 769:4 769:24 771:7 771:25 772:18 773:24 774:2 775:1,8,24 780:18,22 783:12,13 786:3,5,12</p>
	<p>o</p>		
	<p>o 738:12,17,17 o'clock 769:1 772:17</p>		

[officer - okay]

788:13,16,19	828:3 829:20	822:21 823:20	869:9,12,13,20
788:22 789:19	830:24 844:17	824:3,10,16,18	870:2,8,25
789:22,24	851:15,17	824:19,24	871:5,9 872:20
790:1,3,12,24	853:16 854:12	825:10,12,15	878:8 889:4
809:2,6,9,21	854:19 875:8	826:11,19,22	okay 708:3
810:7,23	880:24	827:8,9,11,16	713:4 716:5,19
811:19,22	oil 703:3 705:2	827:24 828:1,7	716:20 717:11
812:3 817:20	707:7 723:2	828:11,12,15	717:24 721:11
817:22,24	727:13 728:8	828:17,22	721:15,21
819:23 820:2,4	732:24 733:5	829:1,1,4,7,11	722:22 723:3
830:2,21,24	733:20 734:17	835:4 836:5,8	723:16 724:3,6
831:4,7,16,22	734:19,21	839:1,5,6,15,18	724:10 730:21
831:24 832:4,8	735:7,8 736:7	839:21 840:4,8	731:25 732:19
832:12,17,19	738:4,9,13	840:14,16,18	732:20 733:8
833:1,5 837:3	740:8 741:24	840:19,20,20	733:12 735:23
837:8,10,12,14	742:3 743:18	841:1,3,5,12,14	735:25 736:7
838:6,9,11,12	743:20 758:10	841:17,25	736:16 737:9
838:14,16	759:14 762:20	842:4,5,9,18,23	738:3,17,24
864:10,12	762:25 765:23	843:1,7,9,11,18	740:15 741:4,6
884:22 885:17	766:2 787:16	846:7,10,13	741:10,18
886:3,10,11,14	787:21 788:3	847:2,4,6,8	742:16 743:5
887:5,10,16	792:9,11,18	848:2,3,22,23	744:2,9 746:11
888:9	793:3,13 795:2	849:13,19	746:23 747:2
offices 794:13	795:3,23	850:2,7,9,13,15	749:8 751:9,11
official 836:20	797:14 798:5,7	851:5,5,20	752:10 753:5
offset 757:8	798:10,12,25	852:1 853:12	753:18 754:6
offsetting 817:7	799:12,15,16	855:5,23 857:1	756:9,16 758:5
871:20	799:22,24	857:2,2,10,18	759:7,16
offshore 834:21	800:5,9,10,18	858:3,5 859:4	760:19 761:7
oftentimes	800:20 801:16	859:14 860:3,5	762:2,15
842:20	801:18,25	860:5,15,17	765:21 768:8
oh 727:4	802:11 803:15	861:16,24	771:4 772:14
741:19 756:8	803:18 805:24	862:2,6,8,9,12	779:22 780:22
779:25 802:15	807:14,18,24	862:15,16,20	781:16 782:7
820:25 826:16	812:24 822:2	863:1,4,5,24	782:20 785:9

785:21 786:1,5 786:10,12,23 787:1 792:5 794:11 795:11 796:13,14 798:3 800:23 800:23 801:2 802:20,22 804:20,21 806:11 809:16 812:6 813:5 816:6 817:4 819:23 824:14 826:5,17 827:9 831:4,24 832:9 832:12,17,21 833:3,18 834:7 840:9 842:11 843:22 848:20 856:14 863:14 865:1 866:3,13 867:16,25 868:5,12 869:7 869:10,19 870:13 873:3 873:13,16 874:12,19 875:6,20 876:5 877:2,16,24 878:21 879:2 879:19 880:11 880:16 881:1 884:10 885:14 886:11,25 887:16 888:8,9	old 812:16 olive 779:10 once 722:11 728:11 729:3 732:25 759:17 761:13,22 762:2 846:25 865:6,14 ones 746:13 769:15 770:18 772:11,12 816:4,11 open 708:15 709:7 772:1,6 operate 878:18 operated 880:1 operating 705:8 operator 842:14 851:7 854:22 875:4 operators 851:24 opine 813:10 868:6 870:3 opined 819:9 opinion 766:6 810:8,9 813:18 813:22 818:15 818:25 819:18 820:19 869:21 870:1,10 opinions 746:16 814:7,9 815:14 868:25	opponent 772:5 opportunities 884:4 opportunity 747:19 768:15 769:19 784:13 784:18 836:19 opposing 750:1 opposition 710:6 optimal 713:15 optimism 786:1 optimistic 779:7 optimized 883:16 options 784:25 785:16 orange 754:1 oranges 863:6 order 716:15 717:4 726:12 727:18 745:5 751:12,16 774:10 778:7 800:20 809:10 830:11 865:8 882:13 organization 834:10 855:4 organized 714:4 orientations 881:17	original 723:2 738:13 762:25 792:3,9 798:25 824:24 848:22 850:2 851:5 863:1,5 877:17 882:24 originally 722:7 727:14 728:18 outcropped 855:14 outlay 883:18 outline 721:22 outlook.com 704:11 outside 823:25 overlook 857:14 overlooked 857:16 overruled 884:23 885:5 oversight 831:1 overview 721:20 787:13 811:6 813:2 864:20 866:7 866:16 own 714:18 owned 850:4 owners 738:11 842:21 851:19 owns 849:2
---	---	--	--

[oxy - pay]

oxy 850:4 oxygen 821:14 ozona 797:4	page 706:2 759:4 783:7 820:14 823:18 824:22 825:14 826:17 865:14 866:6,16 pages 768:3 782:12,16 paleogeograp... 855:7 papered 880:6 papers 811:5 paperwork 712:8 paragraph 820:14 823:18 826:18 parameters 724:2 725:2 727:15 738:7 742:12 745:8 parentheses 842:7 parrot 705:16 707:17,18,21 714:25 715:1 718:2,3 720:1 720:1,2,25 779:23 part 731:16 733:21 734:23 734:24 735:14 750:8 754:24 762:10 766:12 770:9 782:4	793:24 796:24 810:10 811:17 836:19 843:24 848:5,13 849:22 850:11 865:1,20 participate 815:12 875:11 875:19 particular 792:13 839:3 842:4 873:18 particularly 839:12 parties 707:14 708:6 710:10 712:14 713:14 714:11 715:8 746:8,19 748:9 748:12 751:6 887:14 889:13 partly 756:25 partner 719:3 partners 883:22 partnerships 861:10 parts 737:18 767:2 party 717:3 paso 787:4 pass 776:7 812:7 819:21 864:8	passes 710:6 844:23 past 772:25 798:7,12 839:11 patently 745:2 750:4 paths 797:8,10 812:15 pathways 797:20,22 patience 773:9 791:19 patient 882:23 pattern 804:8 855:6 877:14 877:16 881:6 881:25 882:5 patterns 881:17 882:2 pay 732:20 796:12 803:3 803:22 805:10 805:12,21,21 806:7,13,20,23 807:12 808:5 808:21 809:25 810:1 821:17 824:10,11 825:3 839:13 839:23 840:7 840:10,12,15 840:25 843:13 843:19 846:20 846:21 847:4
--	--	---	---

[pay - pilot]

847:22,24 848:22 849:8 849:12,19 850:13,16 853:24 857:25 861:4 862:24 863:9 873:20 873:21 874:3 pays 825:5,7 pc 704:12 705:14 peak 853:4 857:6 pecos 703:5 pedro 704:14 peifer 705:9 peiferlaw.com 705:11 pending 708:16 penetrated 810:18 822:20 pennsylvanian 848:12,14 penrose 730:25 731:6,11 751:14,23 752:13 763:1 people 721:23 778:21 783:25 784:1 794:15 820:24 825:6 836:22 843:14 856:16 percent 741:24 742:4,8 751:19	756:20,22 769:12 823:20 824:4,20,23 840:18 842:15 842:16,16 849:7,11,12,13 849:17 850:2 850:15,21 851:5 858:5 862:8,16,20,22 862:25 863:8 percentage 826:18 perfect 726:22 743:7 764:25 765:9,12 772:20 784:24 845:15 perforation 735:10 peripheral 816:18 periphery 857:6 permeabilities 727:16 permeability 730:5 739:5 741:5,8,11 742:7 743:7,8 743:9,10 744:6 744:8 763:7 799:23 permian 705:8 788:8 794:13	798:9,14 811:7 813:2 825:20 834:9 836:6 846:4 848:13 855:8 856:4 864:21,24 866:17 883:17 person 776:16 776:17 781:12 783:18,24 784:9,19 812:14 personal 713:19 perspective 717:10 pertinent 782:1 785:3 794:10 petitioned 851:18 petroleum 833:16 petrophysical 766:15 petrophysics 814:8 845:6 ph.d. 722:1 723:12 777:12 777:13 phase 803:21 804:1,10 805:17,18 846:24 849:14 853:19 856:23 876:20,20,22	877:3 878:25 879:8 881:5,7 881:10,12,16 882:7 phases 876:24 phone 773:23 physics 724:22 732:17 747:25 752:20 761:2 pi 824:13 pick 774:15 845:25 887:4 picks 766:14,20 picture 753:7 764:16 819:3 842:3 pictures 750:6 piece 844:11 pieces 722:3 723:13,18,20 764:4,6,8,11,18 764:19 844:6 pile 726:5 pilot 705:13 707:16,19 714:25 719:25 719:25 720:1 720:24 780:6 788:20,21 790:1,2 820:3 830:22,25 831:1,3 837:13 838:14,15 870:15 873:7 881:6
--	---	---	---

[pits - powc]

pits 800:9	796:6 797:3,4	760:3 768:5	posed 785:16
place 723:2,19	797:7,8 804:17	771:16 777:4	819:1
723:21,24	804:19 821:19	782:12 792:21	position 780:16
762:25 764:14	870:16	796:20 800:19	782:9 783:4
764:14 802:7	play 802:14	808:3 818:19	810:25
803:15 824:24	842:10 845:11	818:25 822:20	positions
825:13 827:8	845:20,22	856:10 869:17	778:10
827:10 848:22	plays 841:23	880:7 883:12	possibility
848:23 849:13	870:14	886:19 887:9	827:2,23
850:2,13,15	please 708:12	pointed 747:16	possible 714:4
851:5,6 861:16	708:20 710:19	854:7	715:25 716:4
861:24 862:2	715:5 718:14	pointer 733:9	764:9 824:24
863:1,4,5	718:22 722:19	pointing	858:9 869:14
places 792:5	722:21 730:20	783:10 864:5	869:15
793:16 796:6	741:3 742:16	points 723:1	possibly 828:15
835:18	743:4 757:14	785:3 798:8	post 835:15
plains 855:16	757:15,16	poke 743:25	potential
plan 775:21	762:13 773:2	pore 823:20	737:13 801:23
887:7	773:16,23	pores 826:19	803:17 810:25
planned 785:8	778:3 781:25	porosity 729:15	812:24 813:9
planning	786:13,18	729:16 741:9	813:24 821:1,8
775:10 886:21	791:15 817:24	741:13 742:18	822:11 827:6
plans 781:1	833:14	743:5,13,17	827:22 830:18
784:23	plot 735:10	744:5,10,11,13	835:19,19
platang 806:14	736:16 760:13	799:23	867:24 884:5
806:19 824:5	plugged 801:19	portfolio	potentially
824:21	802:1	883:16	751:20 778:9
platform	plus 731:15	portion 798:24	781:8 787:22
707:16 722:13	737:15 754:11	798:25 799:12	806:25 830:9
722:19 773:3,8	769:20 879:10	824:14 850:24	830:13
773:16 778:2	point 715:9	881:7 884:1	pound 755:3
781:7,14	733:10,11	portions	pounds 739:3
783:23 784:6	736:22 738:24	747:15 792:10	755:1,15,19
784:10 786:10	753:13 755:1,5	pose 712:16	powc 842:7
795:7,14,16,19	755:15 756:8		

[powerpoint - proceed]

powerpoint 780:5 784:17	717:4 746:18 749:25 772:2 790:23 798:15	839:9 858:17 860:13 886:18	probability 766:7
pre 714:15	804:19 844:7	pressures 727:9,19 728:9	probably 707:24 711:9
preceded 794:15	844:14 845:2	728:16 736:7	711:16 712:24
preference 781:11	845:24 846:4	738:1,19,21	715:24 721:24
prehearing 717:7 745:5	presentation 717:2 759:3	739:2,8,11	734:20 737:9
809:10 865:7	793:5 802:23	762:16,19	750:18 765:21
prejudice 771:19 774:25	presentations 811:5	765:4	791:20 793:11
prejudices 779:4,4	presented 711:8,21	pretend 743:24	793:12 796:15
preliminary 708:2	750:13 769:20	pretty 765:11	804:16 810:1
preparation 783:19 787:5	770:5,18,21	839:7 849:5,8	813:16 830:17
867:8	771:21 772:7	854:6,22,23	840:2 847:18
prepared 748:24 767:4	772:11 811:16	857:3,14 858:3	852:11 874:22
773:25 774:4,5	816:8 867:14	870:7 874:25	880:24 887:2
775:22 783:15	presenting 786:8	previous 758:6	problem 721:17 736:8
785:19 787:14	press 883:6,13	841:25	743:12 749:17
788:25 789:3	884:7,11 885:9	previously 719:5 750:12	749:17 751:1
790:8 814:22	885:21	768:13 801:7	762:8 778:3
815:1 816:1,14	pressure 722:6	price 854:15	780:2 782:4,18
837:17 867:16	722:10,25	primarily 724:17 731:11	783:3 791:7,20
871:12,24	724:3,8,13	743:2	831:2 860:7
preparing 816:24 865:4	727:5 732:14	primary 741:23 776:15	886:15
presence 812:25	738:23 740:3	788:4 796:8	problems 747:17 761:4
present 707:14	744:7 755:4,6	802:16 825:4	proceed 716:10
707:15 715:17	756:1 757:2,3	849:6,13	716:13 717:23
	757:9 758:1,8	850:16 856:6	722:21 745:1
	758:9 760:25	856:18	747:11 750:16
	761:4 762:18	prior 732:25	767:24 769:2
	762:19 803:10	816:23 826:15	775:21 777:5
	803:14,16	855:24	784:22 785:6
			785:19,24
			817:23,24

[proceed - provided]

832:13 proceeded 775:18 proceedings 703:10 706:3 707:2 888:15 889:8,10 process 712:23 724:4 770:2 826:22 848:3,4 produce 734:19 734:21 754:7 824:18 826:14 827:16 828:15 836:18 847:23 872:22,22 produced 741:22 816:16 817:10,16 827:10,21 828:4,11 829:2 829:6 830:12 830:16 847:9 849:13 852:12 871:25 872:9 872:16 878:4 879:16,20 producer 882:12,14,15 882:25 producers 804:9 877:21 producibility 834:2	producible 862:9 producing 732:25 806:2 816:25 828:5,7 828:16 840:14 840:19 841:14 842:9,17,23 843:1,10,18 846:9,12 848:15 850:8 851:20 861:2 873:8 879:10 881:19 production 722:10,12,24 724:1,3,8,13 727:5,9,19 728:15 729:13 732:1 733:22 733:23 735:6 736:9,19,20 737:6,12,25 741:22 742:2 757:8 760:1,2 760:11,12,22 762:3,16 765:3 787:18 788:4 796:9 797:12 800:7 802:12 802:16,18 803:2 804:5 805:4,11,15,21 805:23 815:3 825:4 828:2,22	848:8 853:1,2 853:15,25 854:6,16,23 856:6,7,18 857:7 875:25 880:12,18,23 884:3 productive 787:22 788:3 797:16,25 800:11 proficient 721:24 profile 839:2 profitability 886:1 program 856:24 882:10 project 725:13 787:16 805:1 806:6,8 814:5 847:11 848:4 853:7 860:23 861:13 864:5 874:6,14,20,24 875:3,4,20,25 876:6,11,14,15 876:21,22 878:2,3,7,25 879:4,8 881:7 881:8 884:18 projects 866:7 866:8 883:14 884:6 888:3	prominent 845:20 promptly 888:14 proof 748:4 778:6,13 properly 737:19,20 752:20 829:6 properties 744:3 834:22 841:7 proposal 835:3 835:4 proposed 814:5 878:23 prospect 821:8 prove 873:11 proven 860:17 provide 721:20 724:7,8,9 745:6 813:18 816:3 818:25 864:20 865:3,8 provided 719:11 720:8 745:4,13,20,24 746:5,7,8,12 748:9,12,17 751:5 787:9 813:20 814:3 837:6 865:16 865:17,24 866:11 872:7
---	---	--	--

[proximity - rankin]

proximity 870:12 pseudo 755:9 755:14 psi 739:17,22 740:1 743:21 760:25 763:22 public 703:1 published 848:21 pull 815:18 834:25 866:2 pulled 883:8 pure 884:20 purple 736:18 854:1,2,9 purported 813:6,13 867:21 868:2 868:21 869:1 869:22 purpose 729:19 729:20 811:18 833:24 886:4 purposes 765:5 836:17 pursuant 708:14 put 709:9 713:11 716:17 723:15,19,23 724:11,19 725:8,14 726:14,20 728:23 735:6,7	735:8,21 739:19 741:15 746:23 749:2 752:24 758:16 758:20 759:10 764:8,23 766:21,22,24 767:15 796:15 798:4 804:22 806:11 811:5 816:5 834:8 842:14 858:19 872:5 883:4 putting 736:3 763:15 779:17 849:6 puzzle 723:18 723:22 764:5 767:3 pv 722:4	770:4 776:8 781:18 784:2 808:10 810:2 814:2 822:8 825:18 826:25 830:7 832:20 867:25 868:6 876:13 879:5 884:20,25 885:5 887:19 887:20 questioning 748:10 750:19 questions 744:25 745:25 748:18 749:1 767:19 780:14 780:19 784:7 817:19 818:6 819:24,25 820:3,5,11 830:3,23 831:2 quick 815:18 quicker 834:12 quickly 755:14 756:5 763:10 849:9 quite 713:5 762:23 790:17 803:25 quote 750:12 818:18	r r 704:1 705:1 rabbit 790:14 railroad 851:19 853:3 875:14 875:16 878:22 880:15 raise 718:14 745:2 769:6 786:13 860:22 887:18 raised 710:11 770:19 ranch 852:20 range 739:2 803:12 855:13 888:1 ranged 803:9 ranges 725:2 767:11 887:25 rankin 704:19 706:10,17 712:24 715:9 716:22,25 719:18,20 720:21 744:14 744:24 746:6,8 746:14,20 748:20,25 750:18,24 767:23 768:21 769:11,25 770:7 771:1,15 772:10 773:24 774:2 775:3
	q qualifications 719:15 788:7 qualified 719:16 776:1 quality 726:5 821:6 862:4,5 quantify 820:17 823:4 quarter 883:15 quell 748:5 query 819:1 question 715:16 746:4,5 767:1,6 769:25		

[rankin - recover]

776:4 777:18 778:18 779:1 781:18 782:4 783:19,22 784:6 788:15 789:21 790:18 809:2,9 810:23 811:21 812:10 817:19 819:10 837:3,5 838:8 864:11,12,15 884:17,24 885:15,25 886:3,8,13,16 886:21,25 887:18 888:8 rankin's 780:16 rapid 757:11 rapidly 805:11 rare 847:8 rate 737:1,2 754:14,16 755:13 756:4 763:13 862:12 884:13 rates 728:9,16 736:23 753:10 753:25 884:4 rather 781:2 784:22 ratio 732:24 733:20 735:7,8 738:9 741:24 742:3 765:23	ratios 733:5 734:20,21 766:2 reach 755:14 read 867:14 885:6 reading 780:23 844:8 ready 715:3 717:22,25 718:3 730:10 730:12 777:21 791:14 832:13 real 735:19 815:18 820:20 851:12 861:5 realities 713:14 realize 781:22 783:24 788:2 realized 839:4 really 711:21 715:21 723:22 730:14 732:21 734:14 737:16 746:3 747:2,8 748:17 751:20 754:19 756:14 756:21,24 757:18 760:2 764:18 765:4,7 765:18 767:6 776:1 780:12 781:12 830:18 847:8 849:17 863:7 870:23	874:16 reason 725:7 782:8 799:20 806:22 819:12 823:10 825:9 841:9 reasonable 730:9 762:4,23 766:7 779:13 783:15 reasons 713:18 rebuttal 709:21 714:14 720:9 720:16 747:16 747:23 748:1 749:13 760:6 761:6,18 762:1 762:7 768:3 783:7 809:3,4 809:13,16 810:4,21 818:7 rebuttals 711:11,11 712:5 rebutting 810:22 recall 818:11 818:14,21 819:15,17 865:2 877:2 received 774:12 865:15 recess 772:22 773:10 785:12 832:11	recipe 844:21 recognition 846:7 recognize 810:25 829:7 866:9 recognized 720:5 788:23 837:15 recollection 882:6 recommend 750:10 821:3 recommenda... 822:6 recommended 821:4 reconstructed 794:17 reconvene 779:20 785:9 887:22 888:14 reconvening 773:7,8 record 707:1 707:22 709:9 713:12 716:18 718:23 720:18 773:12 785:14 786:19 832:22 865:20 883:4 885:16 888:13 records 735:6 recover 821:11 825:23 853:12
--	--	---	---

[recoverable - research]

recoverable 813:7,14,25 822:11 867:22 868:3,8,23 869:2,16 recovered 821:22 850:15 852:7 recoveries 825:2 848:25 recovery 741:24 742:4,5 803:18 806:6,8 813:11 824:23 825:8,12 848:3 849:7,10,14,16 849:18,19,22 850:1,18 851:4 862:8,17,20 863:10 868:17 red 753:14,20 793:8 805:10 853:13 redirect 831:10 831:14 832:1 832:16 reed 801:23 802:3,19 reef 818:17 819:11 848:14 848:16 reestablished 794:19 refer 792:12 824:15	reference 825:1 referenced 865:4,9,24 871:2 873:16 873:25 referring 823:21 866:15 regard 788:11 789:2 834:6 regarding 709:11 710:10 766:14 789:1 regents 834:8 reinecke 883:21 related 811:11 842:1 889:13 relates 749:11 768:12,14 relationship 722:9,11 723:7 727:8 762:18 806:12 relationships 723:4 799:10 relative 727:15 741:5,8,11 742:7 743:6,8 743:9,10 744:5 744:7 747:13 822:5 825:3 relatively 821:2 822:5 release 883:7 883:13 884:7	884:11 885:9 885:21 released 832:18 relied 819:17 865:4,9,19,25 relying 747:1 remainder 805:19 remember 818:22 847:19 854:14 877:22 reminder 831:8 removed 799:25 removing 795:2 renew 777:23 778:5 renewed 709:20 778:16 repeat 872:13 872:13 885:1 replace 884:3 report 732:15 738:11 742:9 742:14 865:15 866:14,16 889:7 reported 742:9 839:10 880:13 880:14,17 reporter 885:4 888:11 reporting 835:5 883:15	reports 732:7,8 820:23 866:20 867:1,2,18 868:13,16,20 870:2 represent 724:22 730:6 742:21 792:25 representation 724:20 740:11 794:12 representative 858:16 represented 752:20 representing 707:19 779:3 represents 723:25 752:17 request 719:16 720:15 769:1 773:5 779:12 831:17,23 requested 865:3,6 requesting 776:4 required 741:12 864:2 865:8 requiring 717:14 research 835:3 861:9,10
---	---	---	---

[reservoir - role]

reservoir 719:9 719:17 721:24 722:10,25 723:18,20 724:1,3,6,21 726:18 732:9 732:23 733:15 733:16,21 734:3,4,8,14,16 734:24,24 735:13,14,17 738:24,25 743:3 749:7 752:12,15 757:13 760:18 764:19 765:3 830:10 859:17 reservoirs 737:21 742:25 762:21 763:1 804:18 834:13 residual 742:10 787:16 788:3 795:3 797:14 800:15,15,16 805:24 812:24 823:20 824:3 825:10 827:8 827:24 835:4 836:5 840:4 841:1 842:5 846:7 857:2 864:20 869:13 resolve 778:7 778:15	resolved 774:25 resources 705:3 828:19 861:15 respect 770:11 788:7 868:21 respective 731:3 739:8,13 respond 712:1 712:20 713:2 745:18 response 801:21 803:23 805:12 responsible 795:2 restrict 823:24 result 736:11 757:11 759:25 760:20 780:15 798:19 846:6 resulting 814:23 results 754:7 766:17 820:15 resume 788:6 834:3 retain 812:22 retained 799:24 833:24 864:19 retains 799:14 retired 834:15	review 711:7 746:24 747:11 747:20 748:23 767:25 775:14 780:8 784:15 814:14 815:2 866:24 reviewed 787:9 811:9,10 814:21 815:4 865:19 867:8 868:20 869:7 reviewing 855:2 rice 705:8 714:17,20 717:25 719:23 722:1 723:11 788:19 789:24 838:12 ride 833:22 right 708:25 710:5 711:10 712:5 714:19 718:4,6,11,14 728:12,13 729:4 731:10 733:2,3,13,14 734:2 736:10 740:4 743:8,16 744:1 752:2,11 754:9,14 758:10 759:15 762:8 763:4 767:13,20	772:9 775:20 777:8 779:21 781:21 786:13 790:19,21,25 802:24 804:6 804:11,22 805:23 822:3 824:5 833:5 842:21 844:12 845:25 847:20 848:8 854:4,10 854:17 859:11 860:25 862:21 865:13 866:18 867:18 871:10 872:6 873:20 876:15,17,21 877:20 882:16 885:2 886:14 887:10,17 rio 795:8 798:22 ripley 703:16 risk 749:24 river 795:9 ro 805:21 robert 706:9 786:6,14,20 rock 755:3 826:23 841:8 862:7 870:12 rocket 859:15 rocks 824:16 role 835:17 845:20 875:12
--	---	---	--

[roll - sacramento]

roll 708:20	839:4,21 840:9	708:3,17,23	825:17,23
room 709:2	840:13 841:10	709:3,6,13	834:6 835:10
768:24 778:21	842:10 843:10	710:1,12	836:1,13,21
roswell 797:10	843:13,15,17	711:25 712:21	844:19 846:4
855:15,19	843:20 844:2	713:4,7 714:7	847:13 856:20
rotate 731:20	844:13,16,24	714:16,24	863:12 869:23
roughly 841:6	845:5,9,21	715:2,18 716:6	872:20 873:7
841:17	846:1,14,14	716:22 717:1	874:8
roz 763:2,3	847:5,8,12,21	717:11,17,24	rpsea 861:10
788:8,11 789:2	847:25 848:5,6	718:1,4 721:12	862:10
794:1 795:13	848:14,23,24	721:15 722:13	rr 845:19
795:23 797:20	849:20,23,23	769:24 770:22	857:22 858:1
798:13 799:1,2	850:5,24 851:1	771:4,11	867:4
801:21,23	851:8,8,10,22	772:15,20,24	rubin 703:24
802:8,12	852:5,6,12	773:12 776:7,9	708:12,13,20
803:21,23,25	853:17,20,25	777:6,25	708:25 709:8
804:1,1,3,5,9	854:3 856:3,5	778:17 779:22	709:15,16
805:14 806:8	856:8 857:12	779:25 780:17	710:3,5,8,12
806:13,17,21	858:20 859:2	781:4,16 783:8	714:8 750:2,3
806:25 808:8	860:4,17	783:21 784:24	776:9,12,18
808:12,14,15	861:17 862:9	785:2,9,13,21	887:11,13
808:24,25	863:10,19	786:1,9 791:3	run 724:23
809:19,24	864:5 866:5,7	791:9,13,17	725:4 729:8
810:5 812:1	866:17 867:21	820:5 830:21	736:1 742:4
813:6,9,13,24	867:23 868:2,7	831:17,20	752:24 754:11
817:3 820:16	868:21,22	832:6,9 887:8	800:18 828:9
820:20,22	869:1,15,22,22	888:5	running 728:7
821:1,15	870:4,14,15,21	rozs 792:14,15	858:5
822:11,16,19	873:23 874:1	796:3 797:12	rush 886:25
822:23 823:4	875:7 878:7	797:23,24	rw's 822:3
825:3,10 829:9	879:17,20,24	798:4,25	s
829:16,17,19	880:12 882:18	799:11,17,18	s 703:6 704:1,5
834:1 835:18	883:1	806:12 811:8	705:1
835:22 836:9	rozatos 703:19	813:2 816:2,7	sacramento
836:18,24	707:3,5,20	821:9 824:17	796:20

[sacramentos - sea]

sacramentos 798:23 sacro 883:25 saint 703:6 salinities 836:21 salt 848:12 saltwater 725:18 726:21 731:21 737:25 753:10,12,20 753:23 754:4 756:3,19,22 757:25 758:7 758:20 763:9 763:13 816:16 sample 869:13 samples 800:10 san 704:14,14 728:11 729:24 730:4 731:2,7 731:15 732:11 732:14 737:13 738:20,21 739:12,16 740:2 751:17 751:21 753:2 754:6,24 755:7 756:23 757:3,4 757:10,23 758:18,22 759:19 760:23 761:9,21,24 763:2,6 765:6 765:17,20,25	766:3,9,24 794:21,23 796:4 797:15 797:15 798:22 799:6 803:4 806:16,23,25 807:4,5,7,22 808:6,25 809:1 809:25 810:5,6 810:12,15,18 810:19 811:2 813:6,14,25 816:25 817:3,6 817:11,16 818:16 819:10 819:13 822:11 824:10,11,12 825:8 827:1,5 827:21 829:12 829:19,21 840:5,6 843:5 844:15,19,22 846:2 848:7 851:21 852:4 852:17,19,22 855:5,14,21,23 856:1 858:2,13 858:14,24 863:19 864:5 867:21 868:2,7 868:22 869:1 869:12,16 870:17,22,24 871:15,19 872:1,9,16	873:17 883:20 sand 807:22,24 822:21 sandbagged 746:6 santa 703:7 704:4,7,10,19 705:4,15 santoyo 704:12 saturated 824:9 saturation 710:23 742:9 742:10 799:24 801:16 807:14 807:18,24 824:4 839:16 839:19,21 840:8 841:17 841:22,25 842:1,3,13 843:7 845:12 845:12 852:2 857:18 858:6 858:10,10,15 859:4 862:6 870:9 872:21 saturation 711:3 800:12 803:12,14,16 821:10 822:2 822:21 824:10 824:17,20 825:10 839:2 839:15 841:4,5	858:3 869:9,20 870:2,8 872:21 save 774:23 823:12 861:4 saw 756:14 777:19 803:12 803:23 807:15 841:13,14,18 841:19 846:12 851:25 857:23 saying 746:25 749:5,13 768:9 827:22 856:16 880:16 says 722:5 748:21 829:11 842:16 852:25 884:14 scale 841:22 854:5 scatter 858:23 schedule 774:11 schedules 713:24 sciences 787:3 scientific 766:7 scientist 859:15 scope 809:15 screen 721:10 screwed 726:14 scroll 865:22 883:11 sea 742:22 859:2
--	---	---	--

[seal - send]

seal 757:22 758:17 798:12 seat 764:14 second 708:19 710:2 711:25 722:14 728:14 734:13 736:22 743:11 781:17 807:11 857:4 862:21 866:13 876:13 881:4 secondary 849:14 850:17 secondhand 815:6 section 708:15 794:11,12,14 825:15 852:3 856:22 857:13 876:15,17,25 881:6 sections 855:21 876:18 see 711:1 712:14 723:21 727:3 730:14 731:10,10,13 732:11 734:1 734:18,25 735:1,10,17,18 735:20 736:1,4 736:10,25 738:4,20 740:5 740:10 741:20 752:2,3,7,8,12	753:10,20 754:9,15 758:1 758:3,10,18,21 759:11,11 760:7,14 761:21 764:14 764:15,17 765:24 766:10 766:25 767:15 767:25 768:16 769:14 770:1 771:21 772:5 772:18,21 780:18,19 781:20 782:1 793:18 795:3,7 795:19,25 796:18,19 797:7,23 798:19 799:15 799:16,17 800:4,8,9,9,10 800:10,12,17 804:8,25 805:11,14,17 805:20,22 806:17 807:18 815:18 818:3,4 821:23,25 822:1,1,2 825:12 826:11 828:10 829:14 829:15 832:12 833:5 839:14 846:16,23	847:8 848:10 848:11 849:4 849:16,23 850:13,21 852:7 853:4,8 853:14,18 854:3,19 855:16 856:21 856:25 857:4 858:2,22,23 861:23 862:7 866:3,24 871:9 873:3 878:23 881:3,4 seeing 731:16 731:21 733:3 733:22 734:10 739:12 745:14 745:15 747:25 752:10 778:12 805:3,4 828:21 828:25 829:1 829:11 seeking 810:8 seem 751:13 seemed 746:1 seems 748:1,7 783:15 791:7 seen 744:15,17 756:24 765:19 771:15 776:20 779:5 790:20 790:21 794:6 798:11 807:15 807:19,20	808:2 814:1,19 821:16 822:12 822:14,15,22 828:1 829:14 834:3 854:24 858:19 884:7 seep 736:4 737:3 751:15 751:23 752:14 segment 883:18 seismic 801:10 seldom 836:17 selected 760:17 self 787:6 788:25 789:4 789:16 790:10 837:17,20,24 838:4,16 selling 828:18 834:21 semilog 736:16 seminole 795:20,20 801:3,4,4,5 802:23,24,24 804:14 806:15 806:16 839:2 839:24 840:3 841:11 843:4 849:2,7 850:14 851:11 858:16 870:7 873:17 send 770:13,17 771:23 772:9 791:10,13
---	---	---	--

[send - significant]

887:14 sense 713:21 754:13 761:13 774:21 788:4 sent 761:14 780:5 sentence 825:15 sentiments 714:9 750:4 separate 815:3 819:11 847:24 sequence 713:18 717:7 811:1 sequencing 713:15 sequential 713:20 sequentially 770:20 sequestered 826:20 series 804:4 838:21 service 705:8 session 708:14 708:18 709:5,7 709:7,10 set 733:12 734:13 744:3 797:6 801:15 839:2 889:8 sets 743:8	settling 828:23 seven 880:24 several 725:11 772:1 774:17 819:6 834:16 835:18 shaheen 704:8 712:19 715:2 716:21 717:17 718:7 shallow 883:21 shanor 704:3 shape 778:14 share 713:12 750:24 790:11 791:6 883:3 shared 746:19 750:1 790:13 790:15,22 sharing 716:12 769:8 791:4,8 865:14 sharon 704:8 sharp 854:10 she'd 770:15 sheen 715:6 shelf 793:15,25 796:5,7,25 808:19 shell 841:19 852:21 shifting 810:24 shingles 824:15 short 834:16	shortest 832:23 shortfall 737:5 shorthand 825:6 889:8 show 730:3 736:18 743:15 748:1 751:23 753:6,10 754:17 756:11 757:14,15,18 768:7 769:8,12 769:13,15,17 770:2,4 772:3 798:2 806:9 808:4 812:7 833:6 835:11 846:3 847:1,6 847:9 850:10 852:23 856:13 856:15 857:18 885:25 showed 725:16 758:6 showing 737:1 738:5 741:5,5 744:2 751:4 761:7 shown 731:23 732:18 735:24 736:15 737:8 738:2,20 741:3 742:15,17 751:9 752:9 753:4 758:4,14 760:4 761:5,17	761:25 790:9 802:21 809:23 shows 733:14 734:10 737:2 738:7 752:10 753:5,25 754:1 758:5 761:19 787:21,21 792:5 796:18 800:8 803:3 820:16 822:1 839:5 843:4,9 846:12 847:4 851:15 853:2 853:10 857:19 side 733:4,13 734:3,4,18 751:25 752:2 752:11 753:9 759:21 760:9 760:13,17 762:10 778:9 795:15,16,17 795:19 797:2,7 797:8 804:6,17 808:13 821:19 870:15 sides 785:2 804:19 signals 864:4 signature 889:16 signed 787:7 significant 733:25 747:15
--	--	--	--

[significant - solves]

778:21 793:23 827:1,20 similar 800:16 808:22 825:10 825:12 858:3 similarly 734:25 simon 870:17 870:22,24 simple 723:5,22 simplify 744:12 simply 810:3,4 811:4 simulation 710:25 711:4 711:14,16,17 716:1,3 719:9 719:10,17 721:24 723:19 729:19,20 742:22 simulator 723:5,14 742:21 764:4 764:15 simultaneously 847:24 single 741:13 743:5,17 744:11 821:21 sinkholes 855:16 sir 788:9 789:14 800:22 812:12 864:25	865:12 866:10 868:14,24 869:6 871:23 876:1 877:12 878:8 sit 749:4 768:23 873:13 site 710:23 711:2 715:25 716:2 802:15 sits 763:4 situ 842:2 858:9,10,16 six 725:8,15 726:14,16 768:3 782:12 782:15 783:7 789:7 802:10 816:16 826:13 866:6 871:13 sixteen 877:18 sixty 877:8 size 743:14 skeptic 845:6 skim 884:9 skip 756:13 skipped 768:6 770:18 781:21 slap 828:6 slaughter 796:23 855:19 sleeping 735:5 slick 828:10 slide 721:19 730:10 731:23	732:18,20 736:15 741:3,4 742:16,17 743:4 747:24 751:10 756:7,9 756:15 758:3,7 758:24 760:4 770:2,4,15 771:21 791:25 792:4,5 794:4 794:7,9 796:13 796:14 798:1 800:24,25 802:20 842:5 847:1 848:18 850:10 854:18 slides 721:10 741:16 744:15 745:19,20,22 747:12,20 749:5 750:16 750:21 764:2 767:25 768:6,7 768:16 769:8 769:12,13,14 770:11,13,24 771:2,3,9,17,24 772:6,7 775:15 775:15 778:24 781:19,19,20 782:1,20,23 783:1,6 790:8 790:11,21,23 791:6,11,14 838:21 876:21	slideshow 769:19 770:8 770:14 slight 757:24 slightly 727:15 738:16,16 742:11 758:13 807:14 slip 763:20 small 733:23 751:13,14 760:16 853:21 862:7 smaller 759:18 759:25 761:22 797:11,12 835:1 881:6 smarter 779:1 smearing 841:3 smiled 740:25 soaking 759:22 socorro 855:4 software 740:19 sole 870:10 solidify 822:10 solution 732:9 738:17 748:13 783:16 solutions 705:13 889:17 solve 781:15 solved 751:1 solves 886:15
--	---	--	--

[someday - stenographic]

someday 812:15 somewhat 710:11 soon 886:19 sorry 714:17 717:13 721:12 721:15 725:25 730:16 740:14 740:16 756:12 762:4 771:1 786:21 812:13 830:25 862:19 872:18 880:20 881:4 sort 736:7 748:18 776:19 844:9 851:23 866:6 sound 887:6 sounds 711:9 810:7 882:16 887:8 source 736:12 885:22 south 705:4 739:1 794:2 795:21 821:21 870:16,20,22 southeastern 802:25 southern 793:25 space 823:20 881:21	spaced 782:13 spacing 877:2,5 877:14 881:23 882:7,14,17,22 882:24 speak 778:22 speakers 722:17 speaking 714:2 714:23 836:18 841:7 844:9 specific 866:25 867:8,17 874:22 specifically 789:17 868:1 speculate 879:18 speculation 884:16,21 speculative 884:21 spencer 704:6 spencerfane.c... 704:8 spend 729:7 spent 725:8,14 726:9 822:17 spill 798:8 spillover 752:23 753:21 753:22,24 754:2 spoke 771:17 771:20	sponge 803:10 803:13 839:9 spot 882:4 square 733:19 squares 733:4 733:13 736:18 ssau 873:17 sshaheen 704:8 st 704:18 705:4 stage 794:18 stages 804:4 stain 807:4 stand 774:7 standard 709:8 standpoint 755:21 761:2 start 712:18 729:4 744:10 776:10 785:15 807:21 838:22 880:8 882:7 started 707:4 710:22 712:5 719:4 730:23 736:22 802:10 803:7,20 805:8 805:9,18 826:9 827:16 839:4 841:20 846:8 850:23 853:4 853:16 857:1 874:9 882:6 starting 738:19 743:12 758:8 853:6	starts 724:5 843:13 853:25 startups 731:8 state 703:2 708:7 715:19 718:22 755:9 755:14 784:1 824:8 833:14 883:15 stated 708:6 709:11 713:7 717:2,17,19 818:18 statement 717:8 787:6,8 789:1,5,16 790:10 818:21 819:12 820:13 837:18,21,24 838:4,17 873:15 statements 837:19 states 788:6 static 840:19 status 883:13 statutory 814:23 stay 709:1 843:8 stayed 882:22 ste 704:14,18 steady 755:9,14 stenographic 889:8
---	---	--	--

step 728:6,14 730:2 739:10 752:18 818:10 841:4 stephen 706:16 833:10,15 steve 787:10 788:1 796:14 797:17 798:4 804:23 825:6 833:6,8 stevens 801:23 802:4,19 stick 812:3 stockton 795:18 stop 788:5 840:15 stopped 829:16 stopping 887:8 store 862:11,14 storing 828:24 story 713:20 717:2,9 straight 707:25 straightforward 714:14 strategy 851:9 street 889:18 strike 709:20 strong 734:11 strongly 750:10 860:11 structure 711:20 730:24	731:1,2 735:1 751:25 808:13 808:16,21 structured 711:6 students 741:2 studied 825:25 827:14 830:15 studies 726:6 742:25 820:15 866:5,17 study 729:20 729:20 754:20 821:19 857:15 861:8 871:1,5 stuff 713:18 740:23 749:18 749:22 768:4 stuttered 819:4 suazo 705:15 707:16 779:24 779:25 780:2 780:17 788:21 790:2 820:2,3 831:2 837:12 837:13 838:15 sub 738:12,17 738:17 subject 835:16 862:13 884:12 submit 811:13 818:7 835:3 submitted 712:9,10 807:6 811:12 814:16	867:9 subsection 745:16 subsequent 873:20 874:2 substance 750:7 substantial 764:22 826:14 substantially 747:14 subtidal 824:16 successful 802:14,15 806:7,8 849:16 864:5 suggest 715:24 735:5 750:23 suggested 715:9 suggesting 770:17 suggestion 777:24 778:5 778:16 784:12 791:10 suggests 732:9 suite 889:18 sulfur 821:22 821:23,25 822:1 summarize 762:14 790:9 838:22	summary 719:11 744:20 744:22 745:12 769:21 782:21 809:5 811:5,18 887:2 summation 768:2 superdome 764:12 supplemental 775:15 supply 726:17 726:20 757:6,8 816:17,25 817:5 827:17 827:18 871:13 871:18,21 support 767:4 780:16 865:25 874:16 supported 747:3 supporting 742:20 supposed 744:20,21 745:11 756:11 781:13 sure 722:14,15 722:19 751:2 759:6 778:1 780:11 785:7 803:25 809:6 820:12 823:25
--	--	---	--

827:11 828:3 830:18,19 831:16 834:24 840:25 844:23 854:22 857:2 867:13 870:19 872:14 877:8 879:19 surface 824:13 826:22 surprise 749:17 877:21 surprised 723:10 surprising 729:1 surreply 709:23 suspect 707:25 sustain 811:23 sustained 811:25 swd 705:13 swds 830:14 sweep 847:1,2 856:1 sweeps 803:8 821:5 swenergylaw... 704:15 swept 792:11 823:19 825:16 845:13 855:23 switch 744:13	switched 880:5 sworn 718:17 786:15 833:11 symbols 864:4 system 741:10 741:13 800:3 t t 704:8 table 787:15 806:9 809:23 815:17,19,22 816:3,9 863:25 tables 706:15 789:7,11,18 790:6 take 708:25 722:5,9 725:21 725:21 730:2 738:25 739:10 753:16,19 755:17 764:1,4 767:11,21 769:13 774:14 778:11 783:25 803:7 823:13 831:10 844:3 859:13,15 860:20 takeaway 765:15 taken 709:12 747:8 889:5 takes 755:22 761:1 822:16 878:18	talk 709:15 742:24 756:16 771:2 796:2,10 820:15 824:22 826:18 827:18 840:23 847:10 874:8 876:5 talked 800:25 810:17 825:20 826:6 846:24 855:11 860:8 888:6 talking 711:15 725:11 730:17 784:4 808:5 826:1,7,23 827:19 842:4 845:1 858:12 862:16 tall 796:11 800:1,24 801:1 801:2,5,6 802:13 806:19 807:10,15 826:7 846:24 847:11 852:20 856:14 872:25 874:5 876:11 876:14 877:11 880:1 883:20 884:12 885:10 tank 763:13 tanks 828:23 828:23	target 803:17 tasked 863:18 td 807:23 tds 807:23 team 773:5 784:3 tech 855:3 technical 776:2 776:8 778:22 780:7 809:7 technically 755:20 868:3,8 technique 851:10 859:25 technological 840:22 technology 841:10 tectonic 836:7 855:13 tectonics 794:18 tell 792:4 800:25 812:12 816:11 824:25 833:18 838:23 845:4,8 848:19 854:25 857:22 861:7 telling 782:8 869:14 tells 816:12 885:23 ten 728:3 767:21
--	--	--	---

[tend - thing]

tend 836:16	719:13 720:9	873:19 887:2	thanks 815:25
tender 721:13	720:12,16	testing 783:7	831:7 864:12
788:10 789:15	721:9 723:17	texaco 742:20	thick 731:15
836:25	739:15,16	742:20 834:17	734:15 797:14
tens 843:1	744:19,22	texas 704:14	806:12,25
tension 826:22	745:6,12	787:4 794:2	823:5 841:8
term 748:1	746:10 749:12	824:7 834:8,9	843:9 844:24
836:15 839:4	749:13 763:19	834:11,13,21	852:1
860:15	763:21 765:19	834:22 836:12	thicker 792:10
terminology	768:2,12,13	859:20,25	816:2,8,11
843:25	769:22 775:13	860:22 875:13	873:8,14
terms 730:22	781:12 782:13	875:16 878:22	thickness 731:3
730:22 732:16	782:16,20,22	thank 707:20	733:15,16
737:5 741:21	788:11 790:9	709:16 710:12	806:17,18,25
787:5 793:22	792:1 796:2	710:20 711:24	808:9 841:15
807:17 812:4	809:3,4,5,12,14	714:6,7,16,24	845:2
845:18 858:3	809:15,18,20	715:1,6 716:21	thicknesses
885:24	810:10 811:4	718:3 720:3,6	806:13,13
ternary 752:7	811:12,14,17	721:3,17	thin 824:15
territory	811:18 814:12	767:18 772:20	thing 710:16
811:20	814:16 815:2,4	773:8 777:16	711:6,23 715:4
test 828:8	815:10,13	778:4 779:22	723:12 724:9
testified 718:17	816:2,15,24	780:17 785:11	724:18 725:15
719:5 746:22	817:9,14 818:7	785:18 786:11	725:17 727:4
778:25 786:15	823:18 825:14	791:17,18	727:21 728:3
833:11	829:8 835:12	819:21 820:1	728:25 729:18
testify 725:22	837:6 838:22	823:17 829:23	732:5,13
725:23 769:7	841:25 844:6	829:24,25,25	735:25 739:19
769:10 775:11	865:1,15,18,25	830:20 831:19	740:5 741:7
777:4 812:5,23	866:15,24	832:19,21	744:1,2 751:12
816:13	867:9,14,17	833:2,3,3	756:2 757:24
testifying	868:10,11	864:10 887:13	758:16 763:17
819:17	869:8,24 870:5	887:17 888:9	764:15 783:22
testimony	871:2,13,24	888:10,11	791:24 828:4
709:21 711:2,8	872:8,15		847:20 851:23

[thing - times]

852:11 854:8 854:24 things 713:24 724:11,14,16 727:3,16,22 728:4,5 736:5 739:14 754:20 757:17 767:10 782:15,21 821:12 822:4 823:3 844:1 852:25 855:8 think 712:19 713:1,2,22 715:20 716:11 716:13,15,25 717:1,8 722:23 723:16,17 725:7 727:2 730:6,25 735:18 746:18 748:10,13,23 748:25 749:1 750:4,17,23 754:3,6 755:21 758:2 759:4 762:22 763:6 764:2,6 765:5 765:7,18 766:18 767:17 769:4 770:23 772:14 774:20 774:22,23 776:14,15,22 776:25 777:4,7	777:11,24 778:20,23 779:8,11,12,14 779:17 780:11 781:10,12 782:24 784:13 784:21 786:21 791:1,5 812:21 815:16 827:10 830:6 831:13 831:20,22 835:3 836:16 836:23 838:24 841:24 844:2,5 848:9 852:2,5 854:14,16,19 854:20 855:1,3 858:22 859:1 860:21 861:21 863:9,21,22 864:1,4 865:11 866:23 867:13 868:5 870:20 870:24 872:19 873:3,18 875:8 875:13 876:21 877:4,17,20,22 879:1,5,5,9 881:9,13,24 882:17,21,24 885:7 886:8 888:3 thinking 772:5 783:13 834:20 868:9 870:23	888:1 thinks 747:2 thinner 735:14 thinnest 733:21 734:23 third 723:7 729:18 807:10 810:1 thought 712:22 714:10 720:2 728:18,19 747:5,7 770:2 827:13 848:24 878:24 887:11 thoughts 712:15 713:2 715:19 thousand 750:6 754:12 766:23 801:24 thousands 728:4 764:24 three 710:5,22 722:3 723:12 728:23 731:6 739:8 754:23 763:5 774:14 798:3 801:17 819:3 823:13 836:1 852:9 tidal 824:16 tighter 740:2 877:9 till 774:13	tilt 793:3 798:7 870:25 871:1 tilted 792:18 793:13 798:18 tilts 871:6,10 time 713:8 716:23 724:23 727:25 729:8 740:17 741:2 741:25 745:11 748:22 749:14 749:16 755:22 756:19 757:5,9 761:2,3 765:4 768:10,19 769:23 773:6 774:1,21,22,24 779:5,19 780:8 780:10 783:18 783:20 784:5 784:15 801:18 814:17 815:1 816:1,14 817:9 817:14 818:5 818:10 833:2,9 839:4 852:9 861:9,22 862:10 867:16 871:12,24 872:7,14 874:13,23,25 878:4 880:10 881:2,19,20 times 714:1 764:6 772:1
---	---	---	---

797:17 880:24 tipped 851:14 today 710:24 711:14 720:11 723:17 729:9 748:2,18 750:14 756:17 756:17 768:11 774:5,9,12,19 774:25 782:10 783:6 790:21 792:10,21 811:16 812:11 827:8 829:9,18 852:13 864:17 869:23 870:5 873:14 888:12 today's 888:10 together 713:2 723:15,21,24 725:9 739:20 746:23 764:4 796:15 798:4 804:23 806:11 811:6 822:4 834:16 838:4 844:11 told 725:20 740:17,24 801:13 817:2 tomorrow 774:13,20,25 775:11 776:13 779:9,16,19 781:1,7,14,14	783:14,15,20 784:22 785:22 785:24 886:22 886:24 888:7 888:14 tonight 735:5 779:9 took 747:23 792:16 802:10 803:8,9 811:4 826:11 856:25 875:9 tools 821:7 top 730:24,25 731:2,11 733:12 734:16 737:16 740:6,9 741:22 752:14 763:5 766:1,14 766:24 795:6,6 805:25,25 807:5,17 808:15,25 824:10,11 826:21 827:14 839:13 840:7,7 843:15,20 856:3,5 858:2 860:2 861:2,2 861:18 topic 708:10 total 850:1 851:4,5 853:25 861:16,23,24 877:18	totally 714:15 747:9 towards 710:15 769:17 797:3 854:9 town 801:4 tracked 875:20 875:21 tracking 875:24 878:2 trade 874:15 train 790:25 791:2 training 719:12 transactions 883:17 884:3 transcript 703:10 706:3 706:20 707:2 814:21,22 889:1,10 transfer 707:23 709:14 773:19 786:3 transit 881:20 transition 839:15 840:23 840:24 841:1 841:13 842:22 843:2,6,14,20 843:21 852:6 transitions 839:19 841:5 trap 798:11,12 799:21	trapped 826:20 traps 798:6,8 travel 775:11 781:1 783:25 784:23 886:22 traveling 781:13 treated 829:6 tremaine 705:6 tremendous 755:17 trend 735:17 792:7 793:14 793:19,21,22 793:24 796:22 796:23,25 797:1,5,10 848:1 trends 792:7,22 796:17,18 trentham 706:9 774:10 785:19 785:24 786:6,8 786:14,18,20 786:22,24 788:5,10,22,25 789:10 790:8 791:23 794:6 797:19 799:2 809:3,11,17 811:3 812:7,11 812:22 819:24 830:6 832:13 832:21 843:24 858:8 861:12
--	---	---	---

[trentham - understood]

871:2 873:10 876:11 trentham's 789:16 809:5 878:6 tried 713:12 739:4 759:10 853:23 true 720:12 789:12 795:25 819:14 837:24 852:20 889:9 trust 757:19 try 713:19 728:6,15 729:6 729:13,18 730:8 732:6 790:11 828:16 833:21 844:4 844:11 847:24 852:21 860:3 861:7 872:21 880:7 trying 714:3 728:2 729:7 737:11 750:19 760:2 764:12 776:7 782:3 783:9 784:25 785:3 790:24 792:15 818:24 820:22 845:25 881:18 885:7 885:25	tubb 796:4 tune 780:3 turn 710:8 718:4 722:16 724:21 753:17 764:13 773:16 776:6 787:23 turned 726:21 turns 765:25 855:10 859:25 twice 850:14 twins 719:3 two 723:4 726:10 729:7 731:1,6 737:21 739:12 743:8 753:13 761:4 765:1 768:6 775:14 780:19 801:7 807:19 811:10 816:13 822:13 823:13 829:14 839:9 842:2 852:9 865:24 866:4 866:20,24 867:18 868:13 868:16 869:3 870:2 876:20 876:22 883:17 884:2 type 777:10 797:15 798:9 798:10,13,13 798:14,16	799:2,2 835:22 851:9 types 798:3 800:8 825:2 836:1 866:7 870:12 typical 801:20 858:13 862:12 862:24 880:6 typically 724:24 843:10 858:13 860:7 860:16 880:14 u ultimately 727:13 ultra 862:23 unaware 816:15 817:10 817:15 uncertainties 724:10 uncertainty 724:16 under 720:11 731:17 754:24 754:24 755:7 796:1 803:22 873:7 undergone 825:22 827:1 underground 724:21 underlying 799:3 814:14	844:18,22 underneath 731:12,14 754:25 755:14 848:14 understand 709:18 711:22 715:12,14 716:11 717:5 722:11,25 729:23 746:25 747:4 749:9,10 768:9,11,17 769:23 770:2,3 770:6 774:8 776:1 777:7 783:8,11 785:1 799:10 809:7 850:6 860:24 864:19 871:5 879:23 885:8 understanding 717:9 747:12 747:14 759:1 787:16 808:16 811:8 822:15 865:7 881:12 884:10,18,19 885:9 understands 726:7 understood 747:6 751:7 768:13 769:11 791:12 815:16
--	--	--	---

[understood - wait]

873:18 888:8 undertake 747:21 878:25 879:4 undeveloped 883:24 unfair 745:3 750:4 779:4 unfairness 748:7 unfamiliar 879:2 unfortunate 713:14 unfortunately 725:13 727:1 763:12 864:2 uniform 806:18 unit 806:16 850:11 851:9 851:18,20 852:8,14,14,18 852:22 853:1 853:22 854:6 866:21 873:17 873:18,25 883:19,20,21 883:23 unitization 792:17 814:15 814:19 842:19 unitize 852:3 units 851:24 852:10,21	university 722:1 723:11 723:11 787:3 787:19 834:8,9 unknowns 743:14 744:10 unquote 750:13 updated 747:13 747:15 848:20 uplift 798:19 855:12 uplifted 855:20 uplifts 855:24 upper 796:9,12 799:11 804:23 804:24 807:7 807:21 824:14 829:19 836:19 846:14 upset 779:20 upstairs 708:9 uptick 805:15 upton 795:21 use 722:9 723:12 725:3 740:20,23 744:11 750:25 762:19 774:21 800:19 821:7 825:7 828:19 836:19,20,22 842:12 844:13 845:7 851:10 used 714:19 722:22,23	742:21 756:20 792:2 836:16 851:2 using 725:25 742:10,10,11 808:20 822:3 824:24 828:14 828:25 879:16 882:2 usually 821:11 839:17 842:15 842:19 874:17 880:9 utilization 862:12 utpb 861:11	version 794:9 versus 736:9 737:5 742:11 749:21 755:6 vertical 863:23 878:19 vertically 836:3 836:4 860:11 verticals 861:3 video 889:5 view 731:9 740:9 752:14 virtually 706:9 776:13 viscosity 869:11 vitae 788:6 834:4 volume 703:12 733:19 825:22 828:23 volumes 725:18 728:9,12,13 729:4 737:25 762:20 765:3 773:16 816:15 816:20 830:11 872:22 880:11 880:17,18,23 880:25 vote 708:20
		v	
		v 703:12 vacuum 794:1 806:15 valid 710:11 value 858:9 886:1 values 797:15 variable 738:23 varied 835:23 varies 881:2 various 713:24 844:3 855:22 vary 806:18 845:13 varying 843:7 verbally 776:24 veritext 889:17	
			w
			wag 880:4,9,9 wait 777:25 846:8

[walk - way]

walk 770:9,20 want 712:1,19 713:11 714:9 716:17 717:4 730:17 741:19 742:19 758:25 770:13 771:2,3 771:25 780:19 823:12 824:18 826:10 831:10 839:12 840:15 842:6 859:13 876:5 885:4 886:25 wanted 712:16 735:25 746:2 756:8 757:25 759:5 770:1 773:4 818:6 834:1 853:11 862:23 878:21 887:12 wants 772:6 warrant 776:5 warrants 776:4 wasson 793:7 793:14 797:5 806:15 824:6 841:19 850:12 851:23 852:10 852:13,16 853:1 wastes 749:16 watch 860:21	watching 874:21 875:21 water 705:13 726:17,20 727:13 728:8 730:8 732:24 733:5,20,22,23 734:1,2,5,6,17 734:19,21,25 735:1,7,8,15 736:9 737:2,5 737:12 738:4,4 739:18,22 740:5,7,8 741:24 742:1,3 742:9 743:19 743:25 752:2,4 752:5,25,25 754:5,8,9,21,23 755:2,8,13,17 755:21,23,24 755:25 756:19 756:23,24 757:6,8,12 758:11 759:15 759:22 760:1 760:12,14,18 760:19,21,22 761:1,11,12 762:9,20 764:21,22 765:21,23 766:2,8 767:5 787:24 792:12 792:18 793:3	793:13 794:22 801:19 810:18 816:15,17,25 817:5,6,11,16 821:11,14,15 821:16,22 822:1 825:22 826:15 827:2,4 827:12,17,18 827:20 828:2,3 828:5,8,9,16,17 828:18,19,21 828:24 829:2,6 830:16,16 836:8,16,18,23 839:1,6,15,16 839:18 840:14 840:16,19,20 841:3,5,14,22 841:25 842:9 842:13,15,18 842:23 843:1 843:11,18 845:12,12 846:10,13 847:7 850:9 851:20 855:14 855:18 863:21 870:25 871:5,9 871:13,18,19 871:21 872:1,5 872:9,16,21,23 879:11,14,15 879:16,17,20 880:2,9,12,21	880:22 water's 756:20 766:5 waterflood 737:7 756:21 788:4 798:17 799:13 800:17 800:18 802:17 823:19,24 824:1,3 825:4 825:11,16 830:9,12 849:8 849:10,11 853:4,6,7 863:3 871:7 waterflooded 862:25 863:3 863:11 waterflooding 732:25 733:1 821:13 waterfloods 825:3 845:14 waters 794:22 watershed 798:21 wave 756:1 way 708:4 710:15,16 711:6 712:6,10 715:11 716:3 716:10,13,16 717:18 723:17 724:4 728:1 731:5,9 732:22
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[way - witness]

734:16 735:22 749:2 763:10 764:22 770:19 778:14 785:6 795:18,20 816:5 819:2 822:23 834:12 835:14 846:22 856:22 860:12 875:12 882:20 ways 869:6 we've 711:3 712:4,8,9 715:11,13,22 722:24 728:11 728:12 730:7 731:8 733:19 734:15,18 740:7,8 741:22 743:18,19 745:23,24 752:17 753:13 753:22 754:4 758:7,8,21 760:14,17 761:11 762:2,9 762:24 764:2 779:5 788:1 790:8 794:6 798:11 809:22 809:22 829:14 846:5,16 854:24 860:9 860:17,18 863:3,17 888:5	weak 736:4 weakness 878:19 879:6 website 865:12 883:8 week 726:10 815:9,14 weeks 725:8,15 726:13,13 wehmeyer 704:12,15 wells 724:21 725:11 726:14 726:16,17,17 726:21 728:20 728:20 729:6 729:11,11,12 729:14,22 730:7,9 731:4 731:21,25 732:25 733:5,6 733:20,20 734:2,4,18,20 735:2,3,8,10,13 735:16,20,21 736:23 739:13 751:25 752:23 753:12,18,21 753:24 754:2,4 757:25 758:7 758:19 759:20 759:22 760:8,9 760:15,17 762:9 763:10 765:11,19,23	765:24 800:14 801:7 804:24 806:24 816:17 816:25 817:5 822:14 823:12 823:15 827:17 827:18 828:2,6 846:14 856:21 856:21 857:5,6 871:14,18,21 873:23,24 877:9,16 878:19 879:7 879:10 881:19 882:5 wendell 703:5 went 711:16 723:10 725:15 739:20 768:1 835:15 851:23 852:6 855:20 859:22 874:17 875:13,15 882:9 west 731:18 734:4,10 752:16 760:17 762:10 794:14 794:19,21 795:16 796:20 797:2 798:18 798:19,22 801:2,5 808:13 808:14 821:19 824:7 834:11	834:13,20,22 836:12 859:20 870:15 western 751:25 wettability 826:24 827:3,7 827:13,23 830:10,15,17 wide 727:20 728:8,18 729:22 737:24 738:3 759:16 760:12 762:3 765:8 william 703:21 820:8,9 830:1 willing 842:14 win 728:2 winning 726:19 wish 710:10 753:6 767:6 772:2 861:20 withdraw 886:13 withdrawing 871:19 886:12 withdrawn 817:6 witness 713:14 717:7 718:8,10 718:12 722:22 748:10 749:20 749:23 751:4 772:2 773:25 781:2 784:5,17
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[witness - zone]

785:20 791:20 809:12,13 810:9 812:5 819:22 829:25 831:25 832:18 832:23,24 833:3 837:1 864:8 886:5,23 witnesses 706:4 711:15 715:10 745:9 748:19 774:9,15 775:5 775:10,20 776:15 779:16 785:7 809:11 811:20 815:3 840:23 888:10 woefully 782:16 women 812:19 wonderful 860:19 wondering 741:15 woodwork 856:16 word 836:22 845:25 words 733:21 750:6 845:10 847:5,22 874:19 work 723:16 728:5 762:12 763:15 765:1	774:18 775:5,9 807:1 820:21 821:9 823:1 835:4 861:9 worked 714:3 787:12,18 807:2 864:23 workflow 741:16 working 738:11 763:20 781:23 792:14 807:3 861:11 works 714:14 724:24 819:2 860:18 world 742:23 743:1,7 835:17 835:20,21 846:6 859:14 859:16 864:3 worse 858:25 worth 750:6 wow 855:8 wozniak 705:14 707:18 wreck 790:25 791:2 writing 709:24 745:13 written 749:13 769:22 782:16 782:22 784:16 787:8	wrong 778:13 822:4 x x 706:1 y yates 828:13 829:2 yeah 708:3 713:1 730:12 739:2 740:14 741:14,20 742:19 743:19 756:11 765:18 767:9,14 770:7 771:25 812:18 812:20,20 814:13 819:2 820:25 840:13 843:25 847:18 850:8 852:18 857:21 870:9 871:22 872:5 872:25 877:12 882:12,16 885:1 year 715:14 730:23 848:21 854:14 years 725:12 726:7 727:5 728:25 729:7 732:1 737:15 754:24 756:6 762:15 763:11	765:2 787:18 787:25 796:15 835:15,25 839:11 856:4 857:17 864:24 866:5 yellow 760:9,10 797:6 yesterday 708:1 741:15 yoakum 824:6 york 787:2 812:16 z zero 806:22 808:5 809:25 839:20,22 842:25 853:8,8 853:15 zeroing 799:9 zone 795:3 796:9 805:24 816:24 817:16 836:5 839:13 839:13,23,24 840:4,10,12,23 840:24,25 841:1,2,12,13 842:5,22 843:2 843:9,14 846:21 847:22 849:12,20 850:13 852:6 853:24 857:25 863:9 872:9,17
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[zone - zoom]

873:20,21

874:3 879:22

879:24

zones 787:17

787:21 812:24

835:4 836:11

842:4 846:7

852:1 854:20

854:22 856:1

864:20

zoom 786:11