

STATE OF NORTH DAKOTA
PUBLIC SERVICE COMMISSION

SCS Carbon Transport LLC
Midwest Carbon Express CO2 Pipeline
Project Siting Application

Case No.
PU-22-391

TRANSCRIPT OF FORMAL HEARING

May 30, 2024

Bismarck, North Dakota

APPEARANCES

Commissioners Randy Christmann, Sheri Haugen-Hoffart, and
Substitute Decisionmaker Timothy J. Dawson

BRET DUBLINSKE, PATRICK MAHLBERG, and TYLER GLUDT,
Fredrikson & Byron, PA, on behalf of Applicant SCS Carbon
Transport LLC

RANDALL J. BAKKE, Bakke Grinolds Wiederholt, on
behalf of Intervenor Burleigh County

BRIAN E. JORDE, Domina Law Group, on behalf of
Intervenors/Landowners

ZACHARY PELHAM, Special Assistant Attorney General
Advisory Counsel to the Public Service Commission

C O N T E N T S

INTERVENOR/LANDOWNER/BURLEIGH COUNTY WITNESSES

CHAD WACHTER

Direct Examination by MR. BAKKE	5
Cross Examination by MR. GLUDT	33
Cross Examination by MR. PELHAM	34
Cross Examination by MR. JORDE	38
Questions by COMMISSION	42
Redirect Examination by MR. BAKKE	56

JEFF STEINBRONN

Direct Examination by MR. BAKKE	60
Cross Examination by MR. MAHLBERG	88
Cross Examination by MR. PELHAM	103
Cross Examination by MR. JORDE	104
Questions by COMMISSION	105
Redirect Examination by MR. BAKKE	117

JOHN ABRAHAM

Direct Examination by MR. JORDE	124
---	-----

JASON HOWARD

Direct Examination by MR. JORDE	135
Cross Examination by MR. PELHAM	142
Cross Examination by MR. BAKKE	142
Questions by COMMISSION	146

VICTOR SCHOCK

Direct Examination by MR. JORDE	156
---	-----

1 ALJ HOGAN: All right. Good morning. My clock
2 shows it's 8:30 so we are going to get started.

3 Today is May 30th, 2024, at 8:30 a.m. and we are
4 reconvening in Public Service Commission Case No.
5 PU-22-391, which is a siting application for SCS Carbon
6 Transport LLC for the Midwest Carbon Express CO2
7 pipeline project. Our hearing today is being held in
8 the Pioneer Room in the State Capitol.

9 Before we get started with testimony, I'll just
10 ask if there's any other matters we need to address this
11 morning.

12 One thing, Mr. Jorde, I received an email last
13 night with the materials that Commissioner Christmann
14 had requested, and I think it was a link. Did you -- I
15 haven't opened the link, but is there certain materials
16 -- should we mark it as an exhibit, or how did you want
17 to handle that?

18 MR. JORDE: I think Roseanne, who I think is
19 there today, was going to upload that to the docket just
20 to make it official. So if that hasn't happened, that
21 will be happening.

22 ALJ HOGAN: Okay. And are we marking it as an
23 exhibit?

24 UNIDENTIFIED SPEAKER: Your Honor, that was
25 filed last night and it was marked.

1 ALJ HOGAN: Oh, okay.

2 UNIDENTIFIED SPEAKER: Exhibit 51, Your Honor.

3 ALJ HOGAN: Okay. Thank you.

4 MR. JORDE: So I guess I'd offer Exhibit 51 to
5 complete the record there.

6 ALJ HOGAN: Any objection from Summit to that
7 exhibit?

8 MR. GLUDT: No objection, Your Honor.

9 ALJ HOGAN: Mr. Pelham.

10 MR. PELHAM: No.

11 ALJ HOGAN: All right. Then Landowners
12 Exhibit 51 is received.

13 All right. First witness this morning.

14 MR. BAKKE: Good morning, Your Honor. We'll
15 call Mr. Chad Wachter.

16 ALJ HOGAN: Good morning, Mr. Wachter. First
17 thing I'll have you do is turn your microphone on.

18 CHAD WACHTER: Good morning.

19 ALJ HOGAN: I'll have you state your full name
20 for the record and spell your last name.

21 CHAD WACHTER: Chad Wachter, W-A-C-H-T-E-R.

22 ALJ HOGAN: And, Mr. Wachter, before you testify
23 this morning, I'm required by law to advise you on the
24 penalties for perjury in the state of North Dakota.

25 Perjury is a Class C felony, punishable by a

1 maximum fine of \$10,000, maximum five years'
2 imprisonment, or both.

3 Do you understand what perjury is?

4 CHAD WACHTER: I do.

5 ALJ HOGAN: And being advised of the potential
6 penalties for perjury, do you promise to tell the truth
7 in this case today?

8 CHAD WACHTER: I will.

9 ALJ HOGAN: All right. Thank you.

10 Go ahead, Mr. Bakke.

11 **CHAD WACHTER,**

12 being first duly sworn, was examined and testified as
13 follows:

14 DIRECT EXAMINATION

15 BY MR. BAKKE:

16 Q. Good morning, Mr. Wachter. You previously
17 testified in this matter when you were a named
18 intervenor party in the case; is that correct?

19 A. Yes.

20 Q. Okay. And as of March 8, 2024, you have no
21 longer been a party to the case; is that correct?

22 A. Correct.

23 Q. Okay. After the application of Summit was
24 denied on August 4, 2023, sometime thereafter did you
25 learn about the reroute being proposed by Summit around

1 Bismarck for their proposed pipeline?

2 A. Yes.

3 Q. Okay. And did you get a chance to take a look
4 at that?

5 A. Yes.

6 Q. And did you see that, at least from what Summit
7 filed with the Public Service Commission, they did not
8 show any change to the eastern route near Silver Ranch?
9 Is that your understanding?

10 A. Yes.

11 Q. Okay. And did Summit ever tell you that they
12 were going to change the location of the eastern route
13 any distance at all as part of their reroute?

14 A. They told me that they would not change the
15 eastern portion, that they couldn't.

16 Q. And did you speak with someone from Summit
17 directly in that regard?

18 A. Yes.

19 Q. Okay. And who did you speak with that provided
20 assurance that they were not moving the eastern proposed
21 route any distance at all from the original route?

22 A. Let's see here. Wade Boeshans.

23 Q. Okay. And when did Mr. Boeshans make that
24 representation to you, that the eastern route would not
25 change from the original route?

1 A. I wouldn't be able to give you an exact date
2 when that happened.

3 Q. Can you give us an approximation or can you tell
4 the circumstances? Was it a phone call?

5 A. Well, Wade and I have had numerous discussions
6 about the location of the pipeline. And I have
7 advocated very hard to try to convince him to move the
8 pipeline further east and, again, numerous discussions.
9 And every one of those discussions I was told that it's
10 not possible.

11 Q. Okay.

12 A. I can't -- you know, I don't remember every
13 date.

14 Q. Okay. That's fine.

15 And then I would draw your attention to Burleigh
16 County Exhibit 101. And that's in the black binder to
17 your left. If you just turn to Exhibit 101, there's a
18 map there that Burleigh County prepared based on GIS
19 data.

20 A. Yes.

21 Q. And you can see on there that Burleigh County,
22 using GIS data, based on some rudimentary information
23 provided by Summit, has shown the original pipeline
24 route by the red line and then they have plotted in the
25 reroute with the -- excuse me, they plotted in the

1 route -- the reroute in red and the original route is
2 shown in the green. Do you recognize that there?

3 A. Yes.

4 Q. Okay. And you can see in the location near
5 Silver Ranch directly to the east, that where the red
6 line is just north of I-94, under their reroute, they
7 are moving that further to the west towards Silver
8 Ranch. Do you see that there?

9 A. I do.

10 Q. And you can see that they then propose that that
11 reroute location go adjacent to the existing rest areas
12 on I-94. I assume you're familiar with that location?

13 A. I am.

14 Q. Okay. And then they route it further north from
15 there, which would still be west of where they had it
16 routed originally in green. Do you see that?

17 A. I do.

18 Q. Okay. And based on your testimony here today,
19 is it accurate to state that Mr. Boeshans nor anyone
20 else from Summit told you that under the reroute, in
21 fact, they're planning to move the Summit pipeline route
22 closer to your development at Silver Ranch?

23 A. That's correct. That would be true.

24 Q. Okay.

25 A. I did not hear that.

1 Q. Okay. In fact, they told you it was staying in
2 its original route?

3 A. Yes.

4 Q. Okay. So having seen now and heard that Summit,
5 in fact, intends to move the reroute closer to your
6 development and closer to Bismarck, what is your
7 reaction to that?

8 A. I guess I'm surprised. Maybe I shouldn't be. A
9 little upset about it. I don't think this -- I mean,
10 the situation is definitely not better because of that.
11 So, yeah, I'm not very happy about it.

12 Q. Okay. Do you think it will have a negative
13 impact on your development of lots and homes in Silver
14 Ranch?

15 A. Yes.

16 Q. Okay. In relation to where the Summit pipeline
17 is proposed to be routed to the east of your
18 development, how far away do you feel would be an
19 appropriate and safe location for the Summit pipeline to
20 be routed if you had some voice in that process?

21 A. 20 miles away.

22 Q. And why do you make that request and why do you
23 say that?

24 A. Based on what I saw happen in Mississippi.

25 Q. And you're talking about the Satartia,

1 Mississippi, event?

2 A. Correct.

3 Q. Okay. And then have you subsequently learned
4 that since you have been a party in this case there was
5 another CO2 pipeline leak in Louisiana? Were you aware
6 of that?

7 A. I heard that, yes.

8 Q. Okay. And does that add to your level of
9 concern?

10 A. It does.

11 Q. Okay. Well, let's turn to another topic. You
12 can set the map aside for now. You mentioned these
13 contacts that you've had with Summit. Have you had some
14 in-person meetings with representatives of Summit since
15 August 3, 2024 -- or 2023? I'm sorry.

16 A. I have.

17 Q. Okay. And was one of those meetings a meeting
18 where you were contacted by Ron Ness from the North
19 Dakota Petroleum Council?

20 A. Yes.

21 Q. Okay. And tell the commissioners about that.

22 A. I was contacted by Mr. Ron Ness. And he invited
23 me to come to his office, stated that he had negotiated
24 with Carbon Summit Solutions so we could take a look at
25 the dispersion modeling.

1 Q. Okay. And approximately when was this call from
2 Mr. Ness?

3 A. Well, I don't remember when the call was, but
4 the meeting took place on January 24th.

5 Q. Of 2024?

6 A. Yes. Sorry. Yes, January 24th, 2024, at
7 2:30 p.m.

8 Q. Okay. And where is the North Dakota Petroleum
9 Council located at?

10 A. It's in the Broadway Building.

11 Q. Downtown Bismarck?

12 A. Downtown Bismarck Broadway Building, yes.

13 Q. Okay. And so you went to that meeting. Who was
14 present at that meeting?

15 A. I believe it was Justin Kringstad, Brady Peyton
16 (phonetic), Wade Bo- -- I'm sorry, I always get your
17 name mixed up -- Wade Boeshans, Ron Ness, and myself.

18 Q. Who is Justin Kringstad?

19 A. I'm not sure. I didn't -- I don't know.

20 Q. Okay. And Mr. Ness, Ron Ness, you understand to
21 be the CEO or executive for the North Dakota Petroleum
22 Council?

23 A. Yes.

24 Q. And that is a not-for-profit organization for
25 the energy industry. Were you aware of that?

1 A. I am.

2 Q. Okay. And he's not -- to your knowledge,
3 Mr. Ness isn't employed by Summit; Mr. Powell told us
4 that earlier in these hearings. Is that your
5 understanding?

6 A. Say that again.

7 Q. Mr. Ness is not employed by Summit --

8 A. No. No, he's not.

9 Q. Okay. And tell the commissioners who you saw in
10 relation to a presentation on the dispersion modeling at
11 Mr. Ness's office?

12 MR. GLUDDT: Objection, Your Honor. We've been
13 down this path multiple times now. Mr. Bakke has a
14 pending motion before the Commission. Summit has not
15 yet responded but will. And Mr. Bakke's attempting to
16 litigate that motion by implying somehow there may be a
17 waiver because of the people present at this meeting.
18 And it's not appropriate to be litigating that motion
19 here today.

20 ALJ HOGAN: Didn't we address this yesterday? I
21 mean, I think we're talking about the same issue we were
22 talking about yesterday.

23 MR. BAKKE: I don't think so. And our motion
24 doesn't include discussion, at least at this point, in
25 relation to Summit showing this dispersion modeling

1 information to individuals, private citizens, that they
2 -- of their choosing in relation to the dispersion
3 model. That's a complete waiver of their claim that
4 it's confidential. They can't --

5 ALJ HOGAN: Doesn't that go to your motion,
6 though? I mean, we have a motion pending. I don't
7 understand why we're addressing it at this hearing when
8 we need to address that -- the Commission will need to
9 address that motion first.

10 MR. BAKKE: Well, I think the reason we're
11 asking it to be addressed now is there's a very clear
12 waiver. I mean, how can Summit selectively decide who
13 in the public, which private citizen gets to see the
14 plume model and who doesn't. And this is our
15 opportunity to question witnesses from -- private
16 citizens who have been shown this dispersion model and
17 -- at this time and avoid the potential of another
18 hearing date to address these issues in the event the
19 motion was granted.

20 But they're the ones that made the affirmative
21 choice, Summit, to show this to select private citizens.
22 And you can't have it both ways. I mean, if you're
23 showing it -- and at that point he's a party and at that
24 point I was still representing him.

25 ALJ HOGAN: Mr. Pelham, do you have a position

1 on this issue?

2 MR. PELHAM: First off, the Commission has
3 decided to grant a protective order for the information.

4 The second thing I would note is, just from a
5 procedural standpoint, Mr. Wachter testified this
6 meeting took place in January of 2024. Burleigh County
7 has been an intervenor since August of 2023. The order,
8 protective order, has been in place since August
9 of 2023. We received a motion for reconsideration from
10 Burleigh County the day before, on Memorial Day, of
11 these proceedings this week. Whether or not a waiver
12 has occurred or not is subject to a legal motion that
13 has been made.

14 Now is not the time to determine the issue. The
15 issue has been decided. And the Commission is now being
16 presented with a question that could have, probably
17 should have, been brought up before today and these
18 proceedings but was not. That isn't the Commission's
19 decision to not have brought these issues up, which were
20 known but were not brought up.

21 So I don't think it's appropriate to be
22 litigating the present motion for reconsideration. The
23 company hasn't responded. And I'll be honest, I haven't
24 had time to fully review the motion either.

25 So I think that that is something that the

1 Commission is going to have to take up, make a decision
2 on, and then proceed. But at present, as it stands
3 right now, there is a protective order that the
4 Commission has made a determination that the dispersion
5 modeling is confidential and protected under the North
6 Dakota procedures.

7 Thank you.

8 MR. BAKKE: And with all due respect, I think
9 this is a new legal issue for Your Honor to address in
10 these proceedings. This is Burleigh County's first
11 opportunity to question witnesses in this case. By the
12 time they got involved, as Mr. Pelham pointed out, in
13 August of 2023, all the hearings were done already.
14 We've had no opportunity to call witnesses until this
15 week.

16 And so presenting evidence at a hearing,
17 including through Mr. Powell, which I couldn't get
18 before he testified, there was no way for me to file a
19 motion prior to that and take the position that
20 Mr. Powell admits these were private citizens because I
21 had no opportunity to question him until this week. He
22 then admitted this was shown to two private citizens.
23 We now have Mr. Wachter here today to do that and to
24 confirm that. He's just done that.

25 So to suggest we should have filed a motion

1 before we had the evidence just doesn't make sense in
2 this case. And irrespective of the timing of it, this
3 is new information for the Court.

4 And if the Court feels it can't rule on it now,
5 I understand, but the fact of the matter is this is
6 really an evidentiary issue in terms of whether there's
7 been a waiver. It's a legal issue. And I think he
8 should be able to talk about that because they
9 voluntarily showed it to him and another private
10 citizen. So they put it out in the public
11 affirmatively.

12 ALJ HOGAN: Well, for the record, I did not
13 decide the motion for confidential or privileged status.
14 That was decided by the Commission. That order is in
15 place so we're not talking about those issues today.

16 There is a pending motion that was -- like
17 Mr. Pelham said, was just filed this week. The other
18 parties haven't responded. I think this whole line of
19 questioning falls under whether or not that motion is
20 granted. So I think the Commission needs to address
21 that motion first after it's been fully briefed before
22 we're going further on that line of questioning.

23 So as I indicated yesterday and I think the day
24 before, I am going to sustain the objection. We're not
25 going to go down that road during this hearing.

1 MR. BAKKE: Okay.

2 Q. (BY MR. BAKKE) Let me just ask you some
3 general questions, Mr. Wachter, about this meeting with
4 Summit at the North Dakota Petroleum Council. Were you
5 given any instruction that any of the information that
6 you learned about or that was discussed there was
7 somehow national security information?

8 A. Not national security, no.

9 Q. Okay. And did you receive any email or written
10 instruction saying that anything you discuss there or
11 learned there was confidential or Summit thought it was
12 confidential?

13 A. Yes. On the first page of the presentation it
14 said it was confidential.

15 Q. Okay. And when you were there, did anybody
16 instruct you from Summit that you can't talk to anybody
17 about this?

18 A. I don't recall there being statements to that
19 effect. I think it was maybe just implied because of
20 the --

21 Q. In relation to what you learned at that meeting,
22 did you have -- continue to have safety concerns after
23 being at that meeting in regards to the Summit pipeline?

24 A. I just want to be careful that, by answering
25 this question, I don't want to violate any order here.

1 It would depend on whether or not the information that I
2 saw was accurate.

3 Q. And in terms of information you learned about,
4 did you want that information to be tested and studied
5 and verified by an independent expert or individual who
6 had knowledge on the criteria used as part of that?

7 A. Yes.

8 Q. Okay. And did you express that at the meeting?

9 A. I expressed that many times with many
10 conversations with Summit.

11 Q. Okay. And is that still your request today,
12 that that information be vetted, the criteria tested and
13 addressed by an independent expert not affiliated with
14 Summit?

15 A. Yes.

16 Q. Okay. Let's turn to the next meeting with
17 Summit. Did you have another meeting with Summit
18 representatives?

19 A. Yeah. I've had various phone calls and -- and
20 some meetings in person, yes. I believe the next
21 meeting I had was on February 21st, I think.

22 Q. And how did that meeting come about? And that
23 would be 2024; correct?

24 A. Correct. Yep. I'm sorry. Yep, February 21st,
25 2024. Wade and I had agreed that we would get together

1 and just have a discussion about where things are at,
2 kind of get an update on some different things related
3 to the pipeline so...

4 Q. Okay. So was it Mr. Boeshans that contacted
5 you?

6 A. I don't remember if he contacted me or I
7 contacted him. I think he contacted me for that
8 particular meeting based -- probably based on a phone
9 call that we had had, a prior phone call that we had
10 had, so...

11 Q. And where was the meeting with Summit
12 representatives on February 21, 2024?

13 A. It was at the University of Mary, at the Harold
14 Hamm School of Engineering.

15 Q. And who was present at that meeting?

16 A. Bruce Rastetter, Wade Boeshans, and then was
17 greeted by Andrew Feist, Jerome Richter, and ran into
18 Scott Hennen in the entryway.

19 Q. And who did you understand Mr. Rastetter to be?

20 A. Well, I -- he's with Summit Ag, which I think is
21 -- I mean, this is their project through Summit Carbon
22 Solutions so... I've -- my understanding is he's the
23 top dog.

24 Q. Okay.

25 A. So...

1 Q. And also a major investor in the Summit
2 pipeline?

3 A. Yes.

4 Q. Is that your understanding? Okay. And tell the
5 commissioners what happened at that meeting.

6 A. You know, we had a meeting and we discussed
7 various aspects of the pipeline. Mr. Rastetter kind of
8 gave a little bit of a history about himself and a
9 little bit about the project from his point of view.
10 And we did discuss the dispersion modeling and --

11 THE WITNESS: You're just going to have to tell
12 me if I need to stop with my testimony from violating
13 your -- I'll do my best to stay in the parameters of --

14 ALJ HOGAN: Well, I would ask that you don't
15 talk about the specifics of any dispersion modeling. So
16 I think the fact that you mentioned you discussed it,
17 great, but let's not go into specifics about --

18 THE WITNESS: Okay.

19 ALJ HOGAN: -- what was discussed.

20 A. Okay. So I don't think that this would violate
21 it, but I -- I just reiterated that I thought the
22 worst-case scenario should reflect the incident in
23 Satartia, Mississippi. I expressed some frustration
24 over the delay being able to see the model, that it
25 would have saved some significant time, money, and

1 perhaps some legal resources, and that -- not really
2 going to talk about anything else with the meeting
3 because I think it's too intertwined with -- with the
4 protective order so...

5 Q. Without disclosing the content of the
6 discussion, did you discuss continuing concerns you had
7 with the dispersion model by Summit that you had seen?

8 A. Yes.

9 Q. Okay. And without getting into details, did you
10 talk to them about some specific details in the
11 dispersion model that you felt were either inappropriate
12 or criteria that had not been considered that you felt
13 should have been?

14 A. Yes.

15 Q. Okay. Okay. Did you also discuss the topic of
16 risk management and emergency response issues should
17 there be a leak in the Summit pipeline?

18 A. Yes.

19 Q. Okay. And what discussion did you have in that
20 regard in regards to risk management and emergency
21 response?

22 A. I had just stated that I felt that it was in the
23 best interest of the city of Bismarck, our community,
24 that this dispersion model should be shown to all first
25 responders, emergency management, public officials

1 within the city and the county, and that -- and that if
2 there was something that I could do to facilitate that
3 so that would happen, because I feel it's important that
4 we need to get information out so people can see it, so
5 they know what they're dealing with. That was -- that
6 was the extent of that.

7 Q. Okay. Did you reiterate your request that an
8 independent expert should look at the dispersion
9 modeling information?

10 A. I don't know if I brought it up really there. I
11 mean, I made the statement that, no, that this isn't my
12 background, I'm not an expert in this stuff, and it sure
13 would be nice to have somebody that is more qualified
14 than me to go to, to look at it and tell me whether --
15 whether it's accurate.

16 Q. Did you have discussions with the Summit
17 representatives in regards to how they had dealt with
18 the public and with landowners in relation to the Summit
19 pipeline and their attempts to secure easements from
20 landowners?

21 A. Yeah, we did actually talk about that. And I
22 think that, you know, the meeting was -- Summit pretty
23 much acknowledged at that meeting that in the beginning
24 they didn't hire the right people and that there were
25 some things that were being done that should not have

1 been done, and that when they discovered that, that they
2 took immediate action to correct those things so they
3 would not happen, such as threatening people with
4 eminent domain if they don't sign. You know, that was
5 -- because that happened to me.

6 So I think they've acknowledged that that was
7 not the right way to deal with those situations and --
8 and, you know, now they have a really good group of
9 people that are working for them, that's the
10 conversation, so those things are not happening.

11 Q. And you don't have any knowledge as to whether
12 they continue to threaten eminent domain with some
13 hold-out landowners or not; correct?

14 A. I only know what I've read in the paper about it
15 and -- but I have not spoken with anybody recently on
16 that so...

17 Q. Okay. And did you have a discussion with them
18 regarding what your practices are as a real estate
19 developer in dealing with adjacent landowners?

20 A. Well, I've -- I have had those conversations
21 with Summit. You know, I don't believe that happened at
22 that particular meeting, but I've -- you know, I've
23 explained to Summit that when we're going to do a zoning
24 change or develop an area, the first thing that we do is
25 we contact everybody that's going to be affected by it,

1 we try to have a meeting with all of them, we try to
2 explain to them everything they're -- you know, what's
3 going to happen. I try to find out what their concerns
4 are. I try to answer their concerns. If there's
5 something they're not happy about, I try to compromise
6 with them. And when I do that, I don't have to worry
7 about having 500 people show up at a planning and zoning
8 meeting, you know, fighting me on it because, you know,
9 those -- if you do those things, those things don't
10 happen.

11 And that was -- I was trying to maybe give a
12 little bit of advice that -- that I think that if Summit
13 would have -- would do more of those things, that maybe
14 this would be a little bit smoother for them so... And
15 I know they've gone out and tried to talk with people
16 one-on-one and I'm not trying to discredit any of that
17 but...

18 Q. Okay. And when you left the meeting, did you
19 have an impression one way or the other whether Summit
20 was going to follow up with you or recontact you?

21 A. Well, we never really set a date for -- well,
22 any other meetings. I just said that if I -- I told
23 them that if I can be of any assistance to make sure
24 that emergency information, you know, the dispersion
25 modeling, to make sure that it's getting to where it

1 needs to so people can see it so we can figure out how
2 we're going to train our first responders, how emergency
3 management -- so they can -- they know how to respond to
4 an incident, I just reiterated that it was important to
5 have those conversations and -- and that that
6 information be provided and -- but I think I had an
7 understanding that -- you know, that they wanted to do
8 that now and -- and they were going to do that. And if
9 they needed an introduction or something like that,
10 which, I mean, I'm sure they -- they don't need one from
11 me, but I was trying to be cordial in my communication
12 with them so...

13 Q. Okay. And since that meeting that you had on
14 February 21, 2024, have you had any further contacts
15 with Summit in terms of meetings?

16 A. I've had a few conversations with them but not
17 really any -- maybe, you know, one meeting and that was
18 it.

19 Q. Okay. And any significance on any of those
20 contacts, whether by phone or any subsequent meeting?

21 A. No, nothing really. Did you -- was there
22 something specific you wanted me to --

23 Q. No. I just wondered if there was anything
24 significant in any of those subsequent communications
25 that you thought would be helpful to the commissioners.

1 A. Well, we talked -- I did talk to Wade about his
2 testimony and he had -- he was being investigated by the
3 Morton County Sheriff's Department. And so he actually
4 sent me a copy of his testimony and -- and asked me if I
5 thought that he said anything that was untruthful. And
6 I read it. And I told -- I told him that as far as him
7 and I, I can't speak for the other people, but I -- I
8 didn't see anything that was untruthful related to me
9 and him.

10 I did have a concern with, you know, the
11 statement that -- and I don't recall exactly what was
12 said, but, to the fact that the pipeline wouldn't really
13 have any impact on the growth pattern, there was a
14 statement. And I'm not saying that Wade was being
15 untruthful with his statement there, but, you know,
16 maybe there was a misunderstanding.

17 But my position still is, is that this pipeline
18 will, where it's situated at to the east of the city of
19 Bismarck, is going to cause problems. It is in our
20 growth corridor and we are going to have some things
21 that we're not going to be able to do if it does go in
22 that location.

23 Q. Let's turn to one final topic and that is the
24 effect of having natural gas or oil pipelines on
25 development property. And setting aside CO2 pipelines

1 for purposes of the discussion because you haven't had
2 any developments and I assume you're not aware of any
3 developments in the Bismarck, Mandan or Burleigh County
4 area where there's ever been a CO2 pipeline installed or
5 proposed to be installed before the Summit pipeline;
6 correct?

7 A. That's right.

8 Q. Okay. So let's focus on your experience with
9 natural gas pipelines and/or oil pipelines near or in
10 developments. There was a witness called earlier this
11 week by the name of Jeff Olson, a gentleman from -- I
12 think he resides primarily in Wisconsin. Did you have
13 an opportunity to review Mr. Olson's written testimony
14 that he filed with the PSC?

15 A. I did.

16 Q. Okay. And he offered two primary opinions.
17 First, he said there's no pattern as to which lots are
18 developed first in housing subdivisions in Bismarck or
19 Burleigh County. Many of the encumbered lots are some
20 of the first to sell. And by "encumbered lots," he
21 indicated he meant natural gas or oil pipelines. Do you
22 agree with that testimony?

23 A. I don't agree with that testimony, no.

24 Q. Okay.

25 A. That's not been my experience.

1 Q. Okay. And then, second, he said there's no
2 market evidence in the Bismarck area that he uncovered
3 at least that suggested pipelines impact the market
4 value of residential properties when they're either on
5 the property or adjacent to the property. Do you agree
6 with that opinion by Mr. Olson?

7 A. No, I don't.

8 Q. Okay. Can you tell the commissioners what your
9 experience is in regards to what happens with
10 residential lots in a development that are encumbered
11 with natural gas or oil pipelines?

12 A. Typically, they are usually the last lots to
13 sell. Sometimes we have to discount them. Sometimes a
14 property owner that will have a house next to a vacant
15 lot that's got the pipeline cutting through the corner
16 of it will buy it just so they can have a bigger yard
17 but with no intentions of putting anything on that lot.

18 You know, if I look at Promontory Point, which
19 is one of our developments, the -- I can show you with
20 pictures.

21 Q. Yeah. And do you have in front of you what's
22 been marked as Burleigh County 136 which are photographs
23 showing some lots in Promontory Point 5 in northwest
24 Bismarck that are lots that you or your company own and
25 have --

1 A. Yes.

2 Q. -- for sale?

3 A. Yeah. So --

4 Q. Just one minute, Mr. Wachter, we've got to pass
5 that around and then I've got to offer that.

6 A. Sure.

7 Q. And just for the record, you provided these
8 photographs to me last night, is that correct, after
9 reading Mr. Olson's testimony?

10 A. Right. After I read the testimony, I thought it
11 would be good at least to send these pictures to you,
12 yes, that's correct.

13 Q. And these are all photographs, Burleigh County
14 136, of Promontory Point 5 in northwest Bismarck of lots
15 that you owned or own?

16 A. Yes, that's correct.

17 MR. BAKKE: Your Honor, we'll offer Burleigh
18 County Exhibit 136.

19 ALJ HOGAN: Any objection?

20 MR. GLUDT: No objection, Your Honor.

21 ALJ HOGAN: Mr. Pelham.

22 MR. PELHAM: No objection.

23 ALJ HOGAN: All right. Burleigh County 136 is
24 received.

25 Q. (BY MR. BAKKE) Okay. Can you please explain

1 to the commissioners, starting on the first page of
2 these photographs, there's two to a page, what these
3 photographs show?

4 A. These pictures were taken in Promontory Point
5 located in northwest Bismarck. I took these pictures
6 yesterday. The pictures that you're looking at show
7 vacant single-family lots that we have not been able to
8 sell that are still in inventory.

9 Q. And are they encumbered by some sort of
10 pipeline?

11 A. Yes.

12 Q. Is that what the yellow and blue poles
13 signifies, is that's a, what? A gas pipeline?

14 A. Yes.

15 Q. Okay. And when were these lots first available
16 for sale, roughly?

17 A. I would say it's been about five to seven years.

18 Q. And would I be correct in understanding that as
19 these are developed lots, meaning you have all the city
20 services available to the lot, curb, gutter, paved road,
21 sewer line, waterline, etcetera, that you would have to
22 continue to pay taxes and specials on those lots each
23 year --

24 A. We do.

25 Q. -- as an ongoing expense or --

1 A. Yeah. We -- we -- we have to pay taxes and
2 special assessments every year.

3 And what was the other part of the question?

4 Q. I think that was it.

5 A. Okay.

6 Q. I think you answered it.

7 So, you know, holding it for five to
8 seven years, what would you be talking about on a lot
9 like that in, you know, either the lots shown on the
10 first page paying in taxes and specials each year,
11 roughly?

12 A. Well, it costs us about a \$2,000 a year to hold
13 a lot, the one lot. So, you know, if there's -- we're
14 holding for five years and we've got four lots there,
15 our holding expenses are 40,000 bucks.

16 Q. Okay. And then in the location where the pole
17 is shown, there would have to be certain setbacks for
18 structures or anything that would -- you can't have
19 anything covering that location; correct?

20 A. That's right.

21 Q. Okay. So that's going to affect the size or the
22 footprint of the home and the configuration of the home
23 that can be built on the lot as well?

24 A. Yeah.

25 Q. Okay.

1 A. Yeah. So initially when you -- we -- yes, we
2 have it actually right on the plat showing the easement
3 so there's no misunderstanding when somebody pulls a
4 building permit, they know exactly where it's at and how
5 far they need to be away from it.

6 Q. And do you have other lots in other locations
7 other than Promontory Point 5 where you've experienced
8 the same thing, meaning that you are unable to sell or
9 there's a significant delay in selling lots that are
10 ready for sale and to be built on, but because they're
11 encumbered by a gas or oil pipeline, you're unable to
12 sell them?

13 A. There are no other projects that I have
14 developed. There are projects out there, but not ones
15 that I have developed. So I don't think I would be able
16 to be very -- provide very much value by commenting on
17 those.

18 Q. Have you observed other lots in town of other
19 developers other than yourself where you've seen the
20 same thing, where they have lots that appear to be
21 encumbered by a natural gas or oil pipeline that seemed
22 to continue to be vacant?

23 A. Yes. Even large electrical -- I know we're not
24 talking about electrical transmission lines, but even
25 those as well, have one running right through Pebble

1 Creek and people are scared to be by it and it's -- you
2 know, I don't know if that's relevant or not. I'm just
3 saying that even with those the public is scared so...

4 Q. Okay. That's all the questions I have for you,
5 Mr. Wachter. There may be others that do. Thank you.

6 ALJ HOGAN: Mr. Gludt, any questions?

7 MR. GLUDT: Yes, Your Honor, just briefly.

8 CROSS EXAMINATION

9 BY MR. GLUDT:

10 Q. Thank you for being here today, Mr. Wachter.

11 A. Thank you.

12 Q. Would you agree that to the extent where it's
13 possible or feasible for Summit, that Summit should be
14 doing its best to accommodate potential reroutes on
15 landowner properties if the landowner were to request
16 those?

17 A. Yeah.

18 Q. Would it surprise you to learn that this
19 adjustment that Mr. Bakke discussed with you to the east
20 of Bismarck was made pre -- before the Commission's
21 August 4th order and at the request of a landowner?

22 MR. BAKKE: Object for lack of foundation.
23 There's been no testimony or evidence on that.

24 ALJ HOGAN: I'll allow him to answer.

25 A. Repeat the question, please.

1 Q. (BY MR. GLUDT) Would it surprise you to learn
2 that the reroute that Mr. Bakke discussed with you to
3 the east of Bismarck was actually made before the
4 Commission's August 4, 2023, order and at the specific
5 request of a landowner?

6 MR. BAKKE: Same objections.

7 A. Yes.

8 ALJ HOGAN: I'll allow him to answer.

9 MR. GLUDT: I have no further questions.

10 ALJ HOGAN: Mr. Pelham, any questions?

11 MR. PELHAM: Yes.

12 CROSS EXAMINATION

13 BY MR. PELHAM:

14 Q. Good morning, Mr. Wachter. Thanks for being
15 here. Some questions for you on the Exhibit 136, the
16 last page. Looks like a line drawn through --

17 A. Yeah.

18 Q. That's the natural gas pipeline, representative
19 of it, at least; right? Not to scale.

20 A. I apologize it was not straighter.

21 Q. That's okay.

22 A. I did my best.

23 Q. I think we get the idea.

24 And I guess my question for you, sir, if you
25 know, I assume Wachter Development Inc. is your company;

1 right?

2 A. That's correct, yes.

3 Q. And as a developer of this property, at one time
4 all of the lots shown here would have at one time been
5 owned by Wachter Development Inc.; is that right?

6 A. Yes.

7 Q. And I'm just wondering then as to the lots that
8 are not developed, kind of like in the island between
9 Powder Ridge Drive and Clairmont Road and Valley Drive,
10 and I can't make out the other road there, but that
11 island there, do you see that there, sir?

12 A. Are you talking -- are you talking over here?

13 Q. No, I'm sorry, I'm not. And I'm not describing
14 it --

15 A. Here?

16 Q. Yeah, the -- and I'm describing it as an
17 island --

18 A. Oh.

19 Q. -- just because it's surrounded by roads and
20 streets.

21 A. Okay. I know what you're talking about. Yes.

22 Q. And primarily the areas that are not sold at
23 present. I'm just wondering if you are able to say
24 when, for example, the Bryce and Amber, looks like
25 "Fast" lot would have been sold in comparison to the

1 other lots?

2 A. I -- if there wasn't a pipeline going through
3 that area, those lots would be sold.

4 Q. And as far as other areas of Promontory
5 development, are there other lots that have not been
6 sold but do not -- or are not encumbered by a pipeline?

7 A. There's a couple other lots in Promontory Point
8 that are not in these pictures that have not been sold
9 that also have the pipeline on them, yes.

10 Q. Specifically as to these lots shown and depicted
11 on page 4 of Exhibit 136, I'm wondering if you've -- if
12 you or anyone with your company, sir, have been told by
13 potential buyers that the reason why they are not
14 purchasing is because of the restrictions related to the
15 encumbrance of the pipeline?

16 A. Yes, I have -- we have had people tell us that.

17 Q. And specifically, sir, if you recall, how many
18 people do you recall have told you that?

19 A. I would say five.

20 Q. And of those five, do you recall -- well, what
21 did they specifically tell you, if you can recall, sir?

22 A. Well, some of them were not able to get the
23 house to fit because of the setback from the pipeline.
24 Some just didn't want to be that close to a pipeline
25 like that. It was either they couldn't get something to

1 fit or they were scared of it and they didn't want to be
2 near it.

3 Q. Fair enough.

4 If you know, sir, do you know whether or not the
5 -- the asking price on these particular lots had been
6 lowered in comparison to the lots that were sold?

7 A. Well, we're marketing them at -- at the fair
8 market value, the same market value, as what we are --
9 all of our lots with the understanding that we realize
10 we're going to have to discount these lots if we have
11 somebody that is interested. We usually won't discount
12 until we get somebody engaged in a discussion.

13 Q. Fair enough.

14 So as part of the negotiation process just
15 generally across the Wachter Development, and I think
16 you described it as inventory so I'll use that word and
17 you can correct me if I'm using that incorrectly, but
18 the inventory, of the inventory that Wachter Development
19 has in Bismarck, how many times specifically has the
20 price been negotiated downward as a result of the
21 pipeline encumbering that property?

22 A. I believe that -- try to put it into really easy
23 terms. I would say 80 percent of every sale that we
24 have made that has a pipeline on that property, we've
25 had to take a lower price for the property in order to

1 get it sold.

2 Q. Thank you, sir. I don't have any other
3 questions for you.

4 ALJ HOGAN: Mr. Jorde, do you have any
5 questions?

6 MR. JORDE: Yes, Your Honor. Thank you. I do
7 have a few questions.

8 CROSS EXAMINATION

9 BY MR. JORDE:

10 Q. Mr. Wachter, I don't know if you can see me, but
11 as long as you can hear me, it will be okay.

12 Your first couple of line of questionings with
13 Mr. Bakke was -- you made the comment that Summit had
14 told you it wasn't possible -- I think your exact phrase
15 was "not possible" -- to move the pipeline. And was
16 that further east of Bismarck?

17 A. Yes.

18 Q. Okay. And did you -- I mean, did they present
19 any information like here's a federal regulation or
20 here's a state law to justify the phrasing "not
21 possible," or did you take that to be inconvenient or it
22 wasn't their preference to adjust the route further
23 east?

24 A. No. I think they said they had some
25 archaeological concerns to the east --

1 Q. Okay.

2 A. -- and --

3 Q. I'm sorry, go ahead.

4 A. And that was the primary reason for their
5 inability to go further east.

6 Q. But did they show you any data or evidence to
7 substantiate that?

8 A. Last year I saw a GIS map where you can turn on
9 layers, and I was able to see the areas, you know, of
10 these different sites and they would have to, you know,
11 zigzag -- they can get around them, but they just have
12 to zigzag to get around them.

13 Q. Okay.

14 A. And they don't --

15 Q. No, I'm sorry. And I appreciate that. And I
16 was just trying to understand the phrasing "not
17 possible" because that's a pretty big statement. But
18 from what they showed you, it can be done in certain
19 locations, but they didn't want to do that, at least
20 that's what I'm taking. Is that fair?

21 A. Well, yeah. I mean, they said it can't be done,
22 but the truth is it can be done.

23 Q. Right.

24 A. It's just a lot of work and a lot of zigzagging
25 around to be able to do it.

1 Q. Okay.

2 A. And you're probably not going to get a nice
3 straight line like what they're trying to get now.

4 Q. And did they happen to tell you how many right
5 angles, how many bends or curves they already have in
6 their over 350 North Dakota proposed miles?

7 A. No.

8 Q. And did they tell you that they had to be
9 located in Burleigh County for some reason, or given the
10 vast nature of North Dakota, did you have any
11 discussions with them about completely changing the
12 route and not even coming into Burleigh County?

13 A. No, I don't think I've had those discussions
14 with them.

15 Q. When you were at the -- I believe it was the
16 January 24th, 2024, meeting at the North Dakota
17 Petroleum Council office, I think you said you were
18 shown a presentation. I'm not going to get into the
19 content for all the objections and reasons stated, but I
20 want to clarify, was that presentation, sir, like a
21 PowerPoint on some type of a monitor or computer?

22 A. That's what it was, yes.

23 Q. Okay. And did they -- don't tell me what they
24 gave you, but did they also, in addition to the
25 PowerPoint, hand you any hard copy of a summary or notes

1 or reports or studies or anything like that?

2 A. No.

3 Q. Okay. So to be clear, the exclusive information
4 in terms of any type of visual presentation related to
5 any of this plume or dispersion or risk modeling was
6 this PowerPoint; is that correct?

7 A. Yes.

8 Q. You had said that in -- I think it was in your
9 February 21st, 2024, meeting where Mr. Rastetter was
10 present, I believe your phrasing was that Summit pretty
11 much acknowledged, in the beginning at least, it didn't
12 hire the right people and things were -- had been done
13 that shouldn't have been done. Was it your
14 understanding that the things that shouldn't have been
15 done that were included certain persons threatening
16 eminent domain if landowners didn't sign?

17 A. Yes.

18 Q. And after they acknowledged that those threats
19 had been made to pressure people into signing easements,
20 did Mr. Rastetter or anyone from Summit share with you
21 how many of the easements obtained after such threats
22 that Summit rescinded or canceled or tore up or gave
23 back to those landowners?

24 A. No.

25 MR. JORDE: I don't have anything further.

1 Thank you, sir.

2 ALJ HOGAN: Commissioner Christmann.

3 COMMISSIONER CHRISTMANN: Good morning. A few
4 questions to tie up my understanding of your testimony.

5 Were there any other developers or, you know,
6 Burleigh County citizens or Burleigh County government
7 representatives at that meeting at the Petroleum
8 Council?

9 THE WITNESS: No.

10 COMMISSIONER CHRISTMANN: And the University of
11 Mary, the same?

12 THE WITNESS: Correct.

13 COMMISSIONER CHRISTMANN: Okay. And then so I
14 understand --

15 THE WITNESS: Commissioner, just to clarify,
16 could you just repeat your question one more time? I
17 want to make sure I'm answering it correctly. I have a
18 second thought on that.

19 COMMISSIONER CHRISTMANN: So at either one of
20 those meetings. I was mainly thinking of the other
21 developers who had previously been here but also maybe
22 Burleigh County representatives or --

23 THE WITNESS: No.

24 COMMISSIONER CHRISTMANN: You mentioned some
25 people like Ron Ness.

1 THE WITNESS: Yeah. It was Ron Ness, myself,
2 and somebody who works for him, and then Wade and the
3 person who was presenting the information.

4 COMMISSIONER CHRISTMANN: Okay. Then on this
5 new exhibit this morning with these pictures --

6 THE WITNESS: Yes.

7 COMMISSIONER CHRISTMANN: -- sorry, I don't
8 drive around town very much so I don't know all these
9 streets and everything. I don't even know for sure
10 where Promontory Point is but --

11 THE WITNESS: Sure.

12 COMMISSIONER CHRISTMANN: The last page here, I
13 look at this map and I think I am seeing five encumbered
14 lots that are unsold; correct? Because that one is kind
15 of pie-shaped and it's partially encumbered.

16 THE WITNESS: There's four. That four that we
17 have that are unsold.

18 COMMISSIONER CHRISTMANN: Oh, I see that bottom
19 pie-shaped one is.

20 THE WITNESS: Yes. Sold, but they have elected
21 not to do anything with it. I think they just wanted --
22 yeah, I'm not, I guess --

23 COMMISSIONER CHRISTMANN: Okay, that --

24 THE WITNESS: Yeah, if you look at the house,
25 it's the same owner.

1 COMMISSIONER CHRISTMANN: Yeah, I see that now.

2 THE WITNESS: So they just bought it for a
3 larger backyard.

4 COMMISSIONER CHRISTMANN: Because I don't
5 understand the dimensions of Promontory Point, is this
6 one example of some of these encumbered unsold lots or
7 is this all of them in Promontory Point?

8 THE WITNESS: This is just one example.
9 There's --

10 COMMISSIONER CHRISTMANN: How many -- you can
11 have a series of these. How many, about, encumbered
12 lots are unsold?

13 THE WITNESS: I would say that there's probably
14 -- we have, to the best of my recollection, I would say
15 seven.

16 COMMISSIONER CHRISTMANN: Okay. And then about
17 how many encumbered lots are sold?

18 THE WITNESS: I would say seven or eight.

19 COMMISSIONER CHRISTMANN: Okay. Now I want to
20 ask about that development area --

21 THE WITNESS: Yeah.

22 COMMISSIONER CHRISTMANN: -- and the
23 unencumbered lots. About how many are sold and unsold?

24 THE WITNESS: Can I give it to you in
25 percentages or do you want actual numbers?

1 COMMISSIONER CHRISTMANN: If you can -- I know
2 you're not going to lie to me. Just an estimate about
3 of how many --

4 THE WITNESS: I'm just going --

5 COMMISSIONER CHRISTMANN: -- the numbers of
6 them.

7 THE WITNESS: I just don't know off the top of
8 my head how many lots we have there.

9 COMMISSIONER CHRISTMANN: Let's do percentages
10 then. So we've kind of determined that about half and
11 half of the encumbered.

12 THE WITNESS: Yeah.

13 COMMISSIONER CHRISTMANN: So what -- yeah,
14 percentages would be fine in the unencumbered.

15 THE WITNESS: Of Promontory Point, I would say
16 that we are, I don't know, 80 percent sold out.

17 COMMISSIONER CHRISTMANN: That gives me
18 perspective that it is making a difference --

19 THE WITNESS: Yeah, the only --

20 COMMISSIONER CHRISTMANN: -- in this
21 development.

22 THE WITNESS: Yeah, the only other lots that we
23 ever had a hard time selling other than pipeline lots
24 are corner lots. They also can be very challenging
25 because special assessments are more for corner lots

1 than -- we've done good up here with our corner lots.
2 We managed to get them sold.

3 COMMISSIONER CHRISTMANN: Then over in -- and
4 I'm pretty sure you covered this in your testimony last
5 year.

6 THE WITNESS: Sure.

7 COMMISSIONER CHRISTMANN: I just need to be
8 refreshed. Your development north of the interstate on
9 the east side of Bismarck --

10 THE WITNESS: Yeah, Silver Ranch.

11 COMMISSIONER CHRISTMANN: -- Silver Ranch.

12 THE WITNESS: Yeah.

13 COMMISSIONER CHRISTMANN: How close is the
14 eastern boundary of it to where this new proposal is for
15 the pipeline running just along the east side of section
16 24 and 13?

17 THE WITNESS: Looks like about two and a half
18 miles, depending on where you're measuring from.

19 COMMISSIONER CHRISTMANN: Because now I see that
20 from the interstate -- how far north do you go from the
21 interstate?

22 THE WITNESS: I'd say we're about a mile north
23 of the interstate.

24 COMMISSIONER CHRISTMANN: The north edge of it
25 is?

1 THE WITNESS: Yeah.

2 COMMISSIONER CHRISTMANN: Okay.

3 THE WITNESS: And just to be clear too, because
4 I don't want to mislead you, when I talk about a
5 development, I'm talking about the stuff that is in our
6 plan to develop it. You might not see it here today,
7 but it will be developed.

8 COMMISSIONER CHRISTMANN: So then you have plans
9 to develop, I'm thinking, about a half mile east of the
10 current city limit.

11 THE WITNESS: Yes. So we have plans to develop
12 up to 80th Street, all the way over to 80th Street. So
13 it's two sections on the north side of 43rd. To put
14 that in some perspective, it's right across the street
15 from the Burleigh County shop, if that helps.

16 COMMISSIONER CHRISTMANN: Okay. So you don't
17 own any of that land, that next two and a half miles up
18 to the pipeline, or do you own that and use it for other
19 purposes and development right now?

20 THE WITNESS: I don't own any land east of 80th
21 Street.

22 COMMISSIONER CHRISTMANN: Okay. So now I can
23 get to what I'm trying to understand about how this all
24 works and who gets impacted.

25 THE WITNESS: Sure.

1 COMMISSIONER CHRISTMANN: So when you get to the
2 next -- I don't know how big of tracts you usually
3 acquire, quarter section or section or something, that
4 you think you'd like to develop -- I use this example
5 because we work with abandoned coal mines. If there's
6 something that's been excavated out from under -- there
7 can be places where it's uninhabitable, you just can't
8 build there. If you're buying that land and there was a
9 few acres of that, I presume you would pay less for that
10 whole tract because part of it has to be left
11 undeveloped; correct?

12 THE WITNESS: That -- that's the way it's
13 supposed to work, but it doesn't -- it depends on the
14 seller, how difficult they are. That's the way I like
15 to negotiate it, the way that you just explained it, but
16 sometimes I've had to buy stuff that they just want the
17 same amount per acre regardless of -- you know,
18 regardless of if it's usable or not.

19 COMMISSIONER CHRISTMANN: And then you make your
20 decision whether you're paying X for most of the acreage
21 and discounted Y for a few acres, or just some overall
22 average for all of the acres, you have to figure out
23 whether you think you can turn a profit on the
24 development?

25 THE WITNESS: That's correct. Yes. Yeah.

1 COMMISSIONER CHRISTMANN: And so if you buy land
2 with, instead of the coal mine example, with the
3 pipeline example, presumably that landowner was
4 compensated, gets out of our domain but, hopefully, a
5 just compensation for that, so shouldn't the developer
6 then be able to acquire it for a price for which they
7 can develop it and knowing that some lots will probably
8 sell for less or not be saleable?

9 THE WITNESS: So if I -- I want to make sure I
10 understand the question. You're saying that when we're
11 negotiating to buy a piece of property, that we should
12 be able to negotiate a lower price for the pipeline
13 portion, for the area where the pipeline is at, and then
14 make adjustments on our sales price accordingly. So
15 basically, if you're going to bring down the purchase
16 price and you bring down our sales price, the net effect
17 would be the same.

18 I can tell you, like up in Promontory Point, we
19 didn't -- we didn't get any discount for any of the
20 portion where the pipeline was so that didn't -- it
21 didn't happen. That would be the way to do it, but it
22 doesn't happen that way in the real world usually, not
23 when it comes to development land.

24 COMMISSIONER CHRISTMANN: Okay. I don't have
25 any other questions. Thanks for being here,

1 Mr. Wachter.

2 THE WITNESS: Yeah, you bet. Thank you.

3 ALJ HOGAN: Commissioner Haugen-Hoffart.

4 THE WITNESS: Good questions.

5 COMMISSIONER HAUGEN-HOFFART: I'm going to
6 continue off of -- you mentioned that we might not see
7 but you have future plans of development.

8 THE WITNESS: Yeah.

9 COMMISSIONER HAUGEN-HOFFART: Can you explain
10 like the location of what your future plans are? And
11 I'm going to have you reference Exhibit 101.

12 THE WITNESS: Okay.

13 ALJ HOGAN: You can take it out of the binder if
14 that's easier.

15 THE WITNESS: Okay, Commissioner, what we have
16 planned for this area, Silver Ranch development, is we
17 are hoping some way in the next five years we're going
18 to get an interchange on 66 off of I-94, which is going
19 to help us with the commercial part of our development.
20 Most of the commercial that we're planning to do is
21 going to be from 43rd Avenue Northeast all the way down
22 to the interstate. And in that same area --

23 And, Commissioner, do you see on the map where
24 I'm talking about?

25 COMMISSIONER HAUGEN-HOFFART: Yep.

1 THE WITNESS: Right through the middle of that
2 area, Commissioner, Century Avenue is going to come
3 through at some point. And Century Avenue will come
4 right through the middle of that area and connect to
5 66 Street.

6 Then if you look in the northwest part of that
7 little area that we're talking about, you'll see there's
8 kind of a maroon outline and it's gray. That's where
9 we've done single family and a little bit of lower
10 density multi-family developments such as twin homes in
11 that area. And then as we move to the north, we've got
12 single family twin homes, lower density -- or medium
13 density multi-family.

14 And then as we continue up to the north, we just
15 donated ten acres to Bismarck Public Schools for a new
16 30-thousand-square-foot career academy and they're going
17 to start building that soon. And then directly across
18 the street to the east we just closed with the Diocese
19 of Bismarck. They acquired close to 25 acres. They're
20 going to build a Catholic campus up in northeast
21 Bismarck. We're really excited about that. To the
22 south of that area we're working with an assisted living
23 center.

24 And then as we go outside of that gray area and
25 we go up into the remainder of these different sections,

1 a lot of what we'll see is going to be single family and
2 multi-family development.

3 So the objective would be to get about 4,500
4 dwellings in the Silver Ranch development over the next
5 22 to 25 years. And that's figuring about 150 to 200 a
6 year. We're not hitting that now with interest rates
7 the way they are, but once we get back on track, I'm
8 confident that we'll hit those numbers.

9 COMMISSIONER HAUGEN-HOFFART: And all that, that
10 you described, is approximately two miles from the
11 proposed pipeline?

12 THE WITNESS: That is right. That's correct.
13 Yes.

14 COMMISSIONER HAUGEN-HOFFART: Okay. Thank you.
15 Any other development north or east?

16 THE WITNESS: So basically if you go from 52nd
17 Street all the way over to 80th, there's going to be
18 4,500 dwellings that will be in that area. We'll have
19 some mixed use. We need to get some other type of
20 commercial stuff kind of incorporated into the
21 development. So I just don't have that laid out yet.

22 COMMISSIONER HAUGEN-HOFFART: Okay.

23 THE WITNESS: Might have to move that around a
24 little bit. And commercial is actually driven by
25 rooftops. So we need to -- in order to get the

1 commercial, we have to have more rooftops. And we
2 really need that interchange at 66.

3 COMMISSIONER HAUGEN-HOFFART: Okay. Okay.
4 Thank you.

5 THE WITNESS: Yeah.

6 COMMISSIONER HAUGEN-HOFFART: There was
7 testimony as recent as yesterday that the reroute that
8 was submitted by Summit Carbon Solutions was influenced
9 by you as a Bismarck area intervenor. Would you agree
10 with that statement?

11 THE WITNESS: I would say that I don't think I
12 had any influence because the pipeline has not only not
13 moved on the east side, but now it's closer in one area.

14 As far as what happened -- I can give you my
15 opinion if you want to hear it. I believe that Summit
16 had no intentions of moving the pipeline to the east
17 because they had already gone through all the way to get
18 all those easements and they didn't want to have to do
19 it all over again. And on the north side they didn't
20 have all the easements they needed so it was very easy
21 for them to just move because they didn't have to get
22 what -- they didn't have to abandon, you know, the
23 easements because they didn't have them, you know. But
24 to have to go and get all those easements again on the
25 east side, what a hassle that would be.

1 COMMISSIONER HAUGEN-HOFFART: And costly.

2 THE WITNESS: And costly, yes.

3 COMMISSIONER HAUGEN-HOFFART: Okay. How would
4 you describe your relationship with Summit Carbon
5 Solutions?

6 THE WITNESS: I think it's good. I get along
7 with them. I have to -- I have to get along with people
8 that I don't disagree with. That's just the nature of
9 my business and that's just me and who I am. So I have
10 no issues with -- with these guys as far as getting
11 along with them.

12 I don't like -- I'm not against their project.
13 I want to be clear because I've had people say that I'm
14 against this project. I am for this project. I just
15 don't want it so close. I don't want that portion of
16 the pipeline to be so close to the city on the east
17 side. I don't think it's in our best interest as a
18 community for safety and growth.

19 You know, we might not have problems today, but
20 we are going to have problems, you know, 50 years down
21 the road. If you ever get time, look at the maps of
22 Bismarck from 50 years ago and look at how much growth
23 has happened and then you're going to realize that, oh,
24 my gosh, we're going to be where this pipeline is in no
25 time, much sooner than what we think. And it's not

1 going to be very easy to go under this pipeline and --
2 you know, so I -- I have concerns.

3 But Summit has been very respectful to me. I
4 will say at the beginning, no, they were not, but I'm on
5 good terms with them. I don't agree with them, but I'm
6 on good terms.

7 COMMISSIONER HAUGEN-HOFFART: What don't you
8 agree with?

9 THE WITNESS: Where the pipeline is going on the
10 east side.

11 COMMISSIONER HAUGEN-HOFFART: Okay. Okay.
12 There's been -- you referenced that you would like it
13 20 miles further out --

14 THE WITNESS: Right.

15 COMMISSIONER HAUGEN-HOFFART: -- than the
16 proposed -- we heard yesterday from someone 14 miles.

17 THE WITNESS: Yeah. I know, you're getting all
18 these numbers and you're like how do you -- how do you
19 back up what these numbers are; right? Well, I think
20 part of the problem is, is that we've got this study
21 that nobody can look at and so, because of that, you
22 can't get a definitive number. You have people that are
23 looking probably at what happened down in Mississippi
24 and looking at how far that plume traveled, and that's
25 probably where people are coming up with their -- with

1 their distance. That's how I came up with my distance.
2 I'm, like, okay, I heard that it traveled 8 to 12 miles.
3 Let's be -- we're 20 miles away, you know.

4 COMMISSIONER HAUGEN-HOFFART: Okay. Thank you
5 so much. I have no further questions.

6 ALJ HOGAN: Mr. Dawson, any questions?

7 SUBSTITUTE DECISIONMAKER DAWSON: No questions.

8 ALJ HOGAN: Any redirect, Mr. Bakke?

9 MR. BAKKE: Yes, Your Honor. But can I -- I
10 need to ask him confidentially about something in Silver
11 Ranch as to whether I can ask him about it because it
12 would go to Commissioner Haugen-Hoffart's question about
13 development in that area. So can I just very quickly?

14 ALJ HOGAN: Yes.

15 (Pause)

16 REDIRECT EXAMINATION

17 BY MR. BAKKE:

18 Q. A few follow-up questions, Mr. Wachter. First
19 of all, in relation to the questions you got from
20 Summit's attorney about supposedly some landowner making
21 a request to move the pipeline further west towards
22 Bismarck, has Summit ever told you that? Are you
23 hearing that for the first time today?

24 A. First time today.

25 Q. Okay. And, in fact, what Summit told you is

1 that the original route would not be moved from the
2 location that is shown on BC101, the map, meaning that
3 you're learning now that they're planning to move it
4 further to the west towards Bismarck; correct?

5 A. Yeah. What I was told, Mr. Bakke, is that the
6 pipeline on the east side of Bismarck would not be moved
7 and that it would only be moved on the north, and then I
8 come here and I learn that it actually did move, but it
9 moved closer to the city of Bismarck.

10 Q. Irrespective of -- if that occurred,
11 irrespective of whether it was on the original route or
12 the reroute, they never told you either way that they
13 were moving it to a location further to the west towards
14 Silver Ranch at any time?

15 A. No. I've never heard that.

16 Q. Okay. And the one other development that --
17 that I think is going to happen in Silver Ranch, but you
18 can tell the commissioners, are there plans in relation
19 to the Gaia House going in Silver Ranch?

20 A. Yeah, that's true. Yep. Gaia is -- just
21 acquired property in Silver Ranch and they're going to
22 build a hospice facility there, which I think is great
23 because we need that in Bismarck.

24 Q. Okay. And where will that be located?

25 A. That's going to be located north of Silver Ranch

1 elementary school about five blocks.

2 Q. Okay. And Silver Ranch Elementary School is
3 currently open and in operation?

4 A. Yep. Open and operation and about 400 students
5 there.

6 MR. BAKKE: That's all the questions I have.
7 Thank you.

8 ALJ HOGAN: Mr. Gludt, any other questions?

9 MR. GLUDT: No, Your Honor.

10 ALJ HOGAN: Mr. Pelham.

11 MR. PELHAM: No.

12 ALJ HOGAN: Mr. Jorde.

13 MR. JORDE: No, thank you.

14 ALJ HOGAN: Any other commissioner questions or
15 Mr. Dawson?

16 All right. Thank you, Mr. Wachter.

17 MR. JORDE: Your Honor, if I might, I know
18 Mr. Bakke has been busy with his witness; I've got
19 Mr. Howard virtually on here that won't be a long
20 witness. I'm wondering if Mr. Bakke wouldn't mind if I
21 get through Mr. Howard at this time.

22 MR. BAKKE: And I also have Mr. Steinbronn
23 waiting on the Zoom link right now and he's been waiting
24 a while. Maybe I can give you a call on break after
25 I've had a chance to talk to him, if we are taking a

1 break now.

2 ALJ HOGAN: Yeah, we can take our break. Let's
3 take a 15-minute break and the two of you can talk and
4 then when we come back you'll tell me who's next.

5 MR. BAKKE: Okay. And just to update you on the
6 status of the other witness who had the medical issue,
7 she will not be able to appear today for medical
8 reasons.

9 ALJ HOGAN: Okay.

10 MR. BAKKE: So I'm going to be communicating
11 with her about whether she could testify on Monday
12 sometime. She's trying to rearrange her work schedule.
13 I should know something more by tomorrow.

14 ALJ HOGAN: Okay. All right. We will reconvene
15 at 10:15.

16 (Recess)

17 ALJ HOGAN: All right. My clock shows 10:15 so
18 we're going to get started again. And next witness is
19 who?

20 MR. BAKKE: It's Jeff Steinbronn.

21 ALJ HOGAN: All right. And, Mr. Steinbronn, can
22 you hear me okay?

23 JEFF STEINBRONN: Yes, hear you loud and clear.

24 ALJ HOGAN: All right. I'll have you start by
25 stating your full name for the record and spelling your

1 last name.

2 JEFF STEINBRONN: Jeffery Paul Steinbronn,
3 S-T-E-I-N-B-R-O-N-N.

4 ALJ HOGAN: And, Mr. Steinbronn, before you
5 testify this morning, I'm required by law to advise you
6 on the penalties for perjury in the state of North
7 Dakota.

8 Perjury is a Class C felony, punishable by a
9 maximum fine of \$10,000, a maximum five years'
10 imprisonment, or both.

11 Do you understand what perjury is?

12 JEFF STEINBRONN: Yes.

13 ALJ HOGAN: And being advised of the potential
14 penalties for perjury, do you promise to tell the truth
15 in this case today?

16 JEFF STEINBRONN: I do.

17 ALJ HOGAN: All right. Thank you.

18 Go ahead, Mr. Bakke.

19 MR. BAKKE: Thank you, Your Honor.

20 **JEFF STEINBRONN,**

21 being first duly sworn, was examined and testified as
22 follows:

23 DIRECT EXAMINATION

24 BY MR. BAKKE:

25 Q. Mr. Steinbronn, could you tell the commissioners

1 where you're located at today?

2 A. I'm in Indianapolis, Indiana.

3 Q. Okay. And I want to talk a bit about your
4 background. Can you tell the commissioners about your
5 educational background?

6 A. Yes. I was the valedictorian in my high school
7 class in a little school there in northeast Iowa and
8 went on to Iowa State for a degree in chemistry. And
9 while I was at Iowa State, I joined the military on the
10 Nuclear Power Officer Program. And after graduating,
11 went to OCS, got my commission, and went through the
12 training pipeline in nuclear power and, from there, when
13 I got through my first submarine, I signed up to be an
14 instructor at Naval Nuclear Power School, which is in
15 Orlando. And while I was at Orlando, I also got my
16 master's in business administration.

17 Then from there went on to my second submarine
18 and then cross-decked over to my third submarine where
19 we did an engineered refueling overhaul, which was a
20 very large training event in and of itself where I was
21 the nuclear -- on the nuclear joint task group as well
22 as the non-nuclear joint task group. So anything that
23 was being tested on the submarine, it had to go through
24 me. And from the second submarine, then I went on to
25 the -- to work with the Reserves.

1 And then I went down to San Diego to work with
2 the Coral battle groups as well as being a navigation
3 assistant for all the submarines that came through San
4 Diego. And from there went here to Indianapolis as the
5 commanding officer of the Naval Marine Corps Reserve
6 Center in Indianapolis. Three days after I took over,
7 we sent our 104 Marines over to Iraq for Iraqi Freedom.

8 And also, after I retired, I went into teaching.
9 And one of the requirements for doing the dual credit is
10 to do master's program work in the subjects that you're
11 going to be teaching, which is both chemistry and
12 physics, as well as in the program there that I went
13 through, Troops to Teachers, as well as the Indianapolis
14 Teaching Fellows Program, and that was run by Marian
15 College then. It's now Marian University. And so I
16 have my master's in art of teaching there plus a bunch
17 of credits in a master's program, chemistry, as well as
18 physics.

19 Q. Okay. And how long total were you in the
20 military, in the Navy?

21 A. 22 years, 9 months, and 9 days.

22 Q. Okay. And can you tell us about your background
23 and experience with welds and weld joints and
24 connections on pipes?

25 A. When I was the damage control assistant in

1 my first submarine, we -- sometimes we had to put freeze
2 seals on. And that's when it's a live system and we had
3 to cut something out to get another submarine underway,
4 and then we had to restore from that. And during that
5 part -- portion of it, that's the first time I ever saw
6 a freeze seal where you're using liquid nitrogen to
7 freeze everything in the line. And that came up again
8 when I was in the shipyard with my third submarine, and
9 that freeze seals should not be used on carbon steel
10 because it's going to cause them to go through brittle
11 fracture transformation. And so you'd basically -- once
12 you put the freeze seal on, you're going to have to cut
13 upstream of it to be able to get rid of that piece of
14 the pipe and you have to do non-destructive testing to
15 figure out how far up the line you'd have to do that.

16 And so other job duties, we -- I got there, to
17 the third submarine, just as we were landing the new
18 core for a nuclear fuel overhaul, and that's where I was
19 the nuclear JTG from the ship as well as non-nuclear.
20 So all the piping systems, we had a bunch of mock-ups as
21 well as all the diagrams for those things. So it's --
22 in submarine qualification, you have to be able to trace
23 all the pipes throughout the submarine. And the
24 submarine itself is a pipe by itself. And so that lends
25 itself to, when you're doing the nuclear portion, you're

1 inside the reactor compartment. And inside the reactor
2 compartment, there's the other -- other high rad areas
3 that you have to avoid. So you have to know what's in
4 every pipe that you're going to be going past.

5 Q. Okay. Then can you tell the commissioners a
6 little bit about your background and experience in
7 chemistry and studying and with -- experience with CO2?

8 A. Well, as a Dow Chemical scholar for IOSD,
9 there's only one of those per year. I was also the
10 freshman chemistry performance award winner. There's
11 only one of those per year.

12 And going with the -- with the nuclear plants,
13 you have steam and you have water and you have subcooled
14 and superheated kind of things.

15 And then carbon dioxide, one of the first carbon
16 dioxide detectors went onto the nuclear submarines, and
17 that was before the one that went out, Mauna Loa
18 (phonetic), in 1956. So Nautilus was launched in 1954
19 to -- and on board there were CO2 scrubbers.

20 We also have something called CAMS -- that's a
21 central air monitoring system -- so that you maintain
22 all your levels low. It gives you alarms if you go high
23 in any of the 13 things that it was monitoring back in
24 the day. So the carbon dioxide levels, if you -- your
25 ship is pressurized when you're underway most of the

1 time so you can maintain your oxygen levels separate
2 from the carbon dioxide. So carbon dioxide levels, if
3 you -- if you have problems with your CO2 scrubbers,
4 you're going to have to ventilate more often, which
5 means come to periscope depth and circulate air from the
6 outside to get your carbon dioxide levels down. So
7 those limit -- 30-day limits, instantaneous limits, and
8 all that stuff, it's still governed by the CEC.

9 And so carbon dioxide, we also -- a friend of
10 mine was in charge of all of the salvaging of other
11 submarines and he just had done the 27-country Rim of
12 the Pacific salvage operations just before the Kursk
13 blew itself up in the North Sea. And we could have been
14 there in 17 hours and saved those guys, but the
15 Russians, yeah, once there's a problem, they start
16 lying. That's their immediate action. And so they were
17 trying to blame us for blowing that thing up. No. We
18 had all the tapes. And so we were offering to save
19 those guys that were stranded aft. And every one of
20 those guys died of carbon dioxide toxicity. And that
21 was avoidable.

22 Q. Okay. Let's talk about what you've done in
23 relation to this case. Have you reviewed certain
24 documents in relation to the proposed Summit pipeline in
25 North Dakota specifically and more specifically in

1 Burleigh County?

2 A. Yes. Yes, I have. And also done other
3 background information from places where they -- they
4 claimed victory, from Saudi Arabia, Qatar, and also from
5 China, working with these systems. But most of those
6 systems are either compressed gas or super -- it's dense
7 phase carbon dioxide.

8 So from the phase diagram -- I don't know if you
9 have a copy of that there -- there's five specific
10 places on the phase diagram. You have the solid, which
11 we know as dry ice. We have the gas phase, which most
12 people know about. You have a liquid phase and the
13 dense phase above that. As you pressurize it, it
14 changes its characteristics. That's a physical piece.
15 And then once you -- there's two places. Most people
16 know about the triple point where you can have solid,
17 liquid, and gas phases all present at the same time, but
18 then there's the critical point. The critical point is
19 a higher temperature, higher pressure, and that forces
20 the gas or the liquid into what's called a supercritical
21 fluid.

22 So in that supercritical fluid, if there's
23 impurities, it also changes the characteristics of the
24 fluid that's going to be flowing and it -- if you drop
25 the pressure below the critical pressure, depending on

1 temperature, you're going to turn it into a gas or
2 you're going to turn it into a liquid. Now that's a
3 process, it takes time, but as you turn the
4 supercritical fluid, the pressure drops below the
5 critical temperature, you're going to be flashing that
6 into steam. Well, the vapor phase of carbon dioxide.
7 So it's going to go to a gas. So the gas, depending on
8 the pressure, is the density change. So you have a
9 change in volume as you go to the gas. Even though it's
10 at the same temperature with a different pressure, it's
11 going to go to a larger volume.

12 So even in the supercritical fluid, as you raise
13 the pressure, you're going to change the density. So
14 the supercritical fluid is compressible. Liquid, not so
15 much. You can pump some more liquid in to raise the
16 pressure, but it's -- it's not compressible. You can
17 push it in so you have more in it, which, by Pascal's
18 Law, it's going to feel that pressure throughout the
19 fluid and into the walls without abatement. It's going
20 to be the same all the way across.

21 But when you get to the gas phase, that's where
22 things -- you're going to be at least two phases when
23 you drop pressure. If you drop temperature as well,
24 you're going to have three phases of matter, which is
25 the liquid, the gas, and the supercritical fluid.

1 Q. Okay. Let me stop you there and just -- if you
2 could just briefly describe the documents, not going
3 into any great detail, but the documents that you have
4 studied and considered in regards to offering opinions
5 in this case on the Summit pipeline?

6 A. Okay. Went back to the metallurgical book.
7 It's "Nature and Properties of Engineering Materials."
8 I have the map of the anticipated pipeline in Burleigh
9 County, North Dakota. That's the 51.46 miles. I also
10 looked at some things from the internet to check out
11 temperatures inside North Dakota. And I've also went to
12 some engineering sites, Kenexis, and that's where we're
13 looking at hazards of things both inside the pipeline
14 and outside the pipeline in carbon steel to -- as a
15 technical document, to verify the things that were in
16 the engineering materials book.

17 Also went to a -- the CDC, verifying what the
18 current levels for lethal dose of carbon dioxide and
19 effects thereof, depending on whether it's a five
20 minute, 30 days, and instantaneous immediate danger to a
21 human life. I've also looked at the Britannica on the
22 Lake Nyos disaster that was carbon dioxide from a
23 volcano that was dissolved underneath a lake and
24 released the carbon dioxide and the effects that
25 happened there, as well as the population review of

1 Bismarck, amongst other papers to make sure that the
2 phase diagram that I have is the most accurate so it
3 checks with four other sources.

4 Q. Okay. Then in relation to the map you
5 described, did the map you received show the location or
6 proposed location of the main valves for the Summit
7 pipeline --

8 A. Yes.

9 Q. -- in Burleigh County?

10 A. Yes.

11 Q. Okay. So based on review of that information,
12 have you formulated certain opinions in this case as to
13 the carbon steel pipeline and how CO2 in a supercritical
14 phase will be impacted by temperature and locations
15 specifically in Burleigh County?

16 A. I have.

17 Q. Okay. So first of all, how will the Summit CO2
18 pipeline when operating be affected by weather and
19 atmospheric conditions that are typically experienced in
20 Bismarck, North Dakota, in our area of the country?

21 A. The ambient temperature in the summertime will
22 not have too much of effect on it during the summer
23 because the temperature band that -- from their document
24 says they're going to maintain an operating box of 88 to
25 100 degrees Fahrenheit and 1,200 to 2,200 pounds per

1 square inch. So as they --

2 From the Chinese paper -- they've been doing
3 this for a while. They have -- when they put it in --
4 they're also doing it in kilometers. So 350 kilometers
5 is, roughly, 200 miles. So from the course of whatever
6 temperature they put in, whether it is a liquid starting
7 at 0 degrees or whether it's a super cool -- excuse me,
8 a supercritical fluid carbon dioxide starting off at 100
9 degrees, it's going to be down to ambient temperature
10 within 200 miles. That's without a pumping station. So
11 it's just full flow from the -- whatever pumping station
12 they started with. So it's going to be ambient
13 temperature.

14 Insulation has nothing to do with it because
15 insulation is also a conductor. It has an R-value
16 that's based on certain things, but it's -- it's
17 resistant to temperature change, but it can't stop the
18 heat from flowing out.

19 So in the wintertime -- we just had a low in
20 Dickinson, North Dakota, at a negative 70 windchill.
21 Windchill is a thing because the convection heat is
22 going to move out as if it was at that temperature. So
23 the outer shell of the pipeline would have experienced a
24 negative 70 even though it was only a minus
25 39 Fahrenheit and a 29 degree -- or a 29-miles-per-hour

1 wind. So it's convection heat transfer that's getting
2 it down to that windchill temperature.

3 For those people who don't believe windchill
4 temperature is a real thing, you just have to ask Morton
5 Thiokol about their O-rings on the Challenger on the
6 first -- or the 28th of January back in 1986. It's the
7 windchill that caused those things to be brittle.

8 It's the same idea inside here. Because as I've
9 learned more and more physics, everything's analogous to
10 something else. So the analysis here or the analogy
11 here is as soon as that outer shell, which is less than
12 a millimeter thick, as soon as it gets down to that
13 negative -- depends on the amount of carbon -- I don't
14 know what the percent carbon is, whether it's low
15 carbon, high carbon, medium carbon, what it is, but all
16 carbon steels exhibit this brittle fracture
17 transformation between 0 and a negative 20 degrees
18 Fahrenheit.

19 Q. And so --

20 (Simultaneous speaking)

21 A. Sorry.

22 Q. Let me stop you there and maybe if you can try
23 to shorten your answers. I know this is, from your
24 perspective, stuff you know inside out and backwards,
25 but maybe we can, at least for my sake, dumb it down a

1 little bit.

2 So my question is where will the carbon steel
3 pipeline from the Summit pipeline in Burleigh County be
4 exposed to the windchill and the extreme temperatures
5 because, of course, much of it is proposed to be buried
6 underground about four feet?

7 A. Yes. Everything that's aboveground is going to
8 be subject to the windchill. So the windchill, you're
9 normally going to have winds coming out of the northwest
10 and that's -- the windchill is what the surface
11 temperature of that pipe will be metallurgically.

12 What's inside, if you still have flow -- and as
13 far as I can tell from the map, the pumping station is
14 in South Dakota. So you're already going over 200 miles
15 before it gets to Burleigh County. So that will be at
16 ambient temperature when it gets there.

17 So when it gets to the -- goes -- rises up and
18 over through the valve and down, that whole U-shape
19 that's aboveground is going to be at cold temperatures.
20 You're going to make out -- the strongest piece is the
21 welds. Outside the welds, you have two bands that are
22 already susceptible to brittle fracture. That's where
23 your failure is going to be when the failure happens.
24 So if it is brand-new pipe cold rolled in the United
25 States, there's a different set than cold rolled over in

1 China. My son was a machinist and we know of those kind
2 of things here too. So we --

3 The other piece is it's only being buried to
4 48 inches. That is the construction requirement that's
5 based on tort law. Looking at other websites, we have a
6 freeze line -- the frost line goes down to 75 inches in
7 North Dakota as an average. So when it's above the
8 frost line, things that are cold can get colder. A lot
9 of people don't realize that if you throw ice in the
10 freezer, it's going to go down to that negative
11 30 degrees. You have to heat it up to the melting point
12 before that ground will thaw. So it's susceptible to
13 the cold weather. It's just going to take a little bit
14 longer for that cold air to pull the heat out of the
15 ground, but it will.

16 So the brittle fracture transformation will
17 still happen underground when the underground
18 temperature gets to negative 20. So at the frost line,
19 all of that is kind of insulation for the ground that's
20 not frosted.

21 So here in Indianapolis, that -- once you're
22 below the frost line by about three feet, you're still
23 going to be able to maintain about a 48 to 50-degree
24 Fahrenheit, but inside the frost line it can get as cold
25 as it is outside because it's going to be convection

1 over the top, it's going to conduct through the soil.
2 It's a little bit resistant depending on your soil,
3 whether it's clay or whatever it is, it's a different
4 heat transfer conductivity, but it's still going to
5 conduct heat. It is still going to get cold, especially
6 if you have a long cold snap at 48 inches, it could be
7 just as cold as it is on the surface.

8 Q. Okay. And what happens to that pipeline
9 underground if it gets as cold as the surface or very
10 cold, how does that impact --

11 A. It will transform itself into a brittle
12 material. So at minus 100 degrees, you could flick it
13 with your finger and it would snap because it losses --
14 it's a curve that's almost straight down. As you go
15 from normal temperatures of ambient, whether it's
16 70 degrees or 100 degrees, it will come all the way down
17 to less than one-third for most -- most carbon steels,
18 less than one-third in about a 25-degree temperature
19 drop from 0.

20 Q. Okay. So in your opinion, what depth would be a
21 safe location for this CO2 pipeline to be buried below
22 ground in North Dakota with our cold weather extremes?

23 A. Well, with your cold weather extremes, you're
24 still -- when the valves are above the surface -- but
25 you have to be able to do maintenance, I understand

1 that, but if -- you have to be well below 75 inches
2 because you have to be well below the frost line, I'd
3 say, by -- just judging from what we have in Indiana,
4 you'd have to be about four or five feet below the frost
5 line to keep it from going below 0. Because --

6 Q. How deep would that be?

7 A. Well, 75 plus the three feet'ish, that would be
8 a minimum of over a hundred -- we have 105 inches so
9 that's about 9 feet deep. But you still have the riser
10 coming out. So that piece is still going to be
11 susceptible to brittle fracture transformation.

12 And every winter almost -- from the winters that
13 I looked at in North Dakota there, you're going to have
14 temperatures that are below a negative 20. So it's
15 those cycles below that also transform more of the
16 metal, not just the surface piece. Because brittle
17 fracture is the rapid propagation of a flaw. You have
18 plenty of pressure inside the plate to burst it from the
19 inside once that brittle fracture propagates.

20 It propagates at the velocity of sound in the
21 metal. Velocity of sound in the metal of carbon steels
22 is somewhere around 5,700 meters per second, which is
23 about 18,000 feet per second and it's only two pi feet
24 around. And so, therefore, it's going to be about 333
25 microseconds to propagate a crack all the way around the

1 pipe. You don't have that kind of reflex.

2 Q. So the main line valves that are aboveground in
3 Burleigh County, are they at risk of this brittle
4 fracture given the supercritical CO2 in the pipeline?

5 A. Yes. Whether it's -- whether it's
6 supercritical, whether it's gas, whether it's liquid, at
7 that pressure, that will be enough. You already have
8 enough stress right there to whip it free once it's
9 (indiscernible).

10 Q. Can you hear us, Mr. Steinbronn?

11 A. Yes, I can.

12 Q. Okay. Okay. We had a little bit of a video
13 issue, it seemed like, on our end.

14 So what is the risk and can that risk be
15 mitigated at the main line valves for the Summit
16 pipeline that are aboveground in relation to this
17 brittle fracture risk?

18 A. If they're wide open, I don't see it. But if
19 they -- they'd actually have to be able to heat that
20 pipe. You'd have to have a large enough house there to
21 make sure that you keep it heated well above the brittle
22 fracture transformation point so it's --

23 Q. And what happens if there is brittle fracture of
24 one of those main line valves?

25 A. Brittle fracture of the main line valve will

1 release all unisolated supercritical carbon dioxide in
2 the form of gas.

3 Q. Okay.

4 A. Because the atmosphere outside of it is at one
5 atmosphere, which is the 14.7 PSI. And so it's going to
6 release all that.

7 So if we just look at a 15-mile portion of the
8 pipeline, that's going to release 307 million standard
9 cubic feet of carbon dioxide. And then that's at one
10 atmosphere of pressure. So the lethal dose at
11 40,000 parts per million, which is 4 percent carbon
12 dioxide, will get you 7.7 billion standard cubic feet.

13 Put it in real terms, Bismarck is 35.18 square
14 miles of it -- to the town lines. And so that amount of
15 carbon dioxide at 4 percent will make a volume that's
16 eight feet above the ground at all portions of Bismarck.

17 Q. Okay. And have you looked at the location of
18 the main line valves on the map on the proposed reroute
19 of the Summit pipeline and where they're located at?

20 A. I have.

21 Q. Okay.

22 A. And on the northern section that's proposed to
23 go in just south of 101st Street, you have four valves,
24 three of them in Burleigh County and one just outside of
25 Burleigh County, in Morton County. And on the northern

1 run that goes about pseudo parallel to 132nd Street, you
2 have one valve that's just north of Interstate 84 (sic)
3 and you have one that's about seven miles south of
4 there, which is the first one. That's an isolation
5 valve going into Burleigh County. So --

6 Q. And what's your understanding of the elevations
7 of those main line valves in relation to the elevation
8 of Bismarck itself?

9 A. Well, Bismarck is in the floodplain of the
10 Missouri River. So that puts that at the lowest part,
11 everything below Main Street to the south is going to be
12 at that floodplain or below. So on the north side of
13 Bismarck it has some elevation and hilly ground over
14 there. But the portion that's going straight north and
15 then cuts over to the west and deliberate out of the
16 county towards Morton County, that is the one that's
17 most at risk because you have the -- the wind comes from
18 the northwest in the wintertime and so those three
19 valves -- well, four if you include the Morton County
20 valve, those will be very susceptible to the brittle
21 fracture transition and making it a very weak joint.

22 Once again, the strongest part is the weld, but
23 the metal on both sides is weaker because of martensite
24 and all other things, things if they did not do any
25 stress relaxation treatments of it to get it so that

1 it's not so brittle.

2 But as soon as it goes -- regardless, if it goes
3 below 20 Fahrenheit, a negative 20 Fahrenheit, it's
4 going to be in the brittle transformation zone. And we
5 know that it gets colder than minus 40 in North Dakota.
6 And it's only five months ago.

7 So it's a very imminent threat to life because
8 of the energy that's inside that supercritical fluid.
9 It's got more energy than gas. For those people that
10 know about steam tables, gas can be -- the water vapor
11 can be super heated and you're putting a lot more
12 energy. You got to put in -- from bringing water up
13 from 30 -- well, from 90 degrees Fahrenheit to the
14 boiling point is one-seventh of the energy it takes to
15 boil that water.

16 So the same idea is analogous here too. You've
17 got to pressurize this with so much energy, you're
18 condensing the gas into a liquid or you're condensing
19 the gas directly into a supercritical fluid, which is
20 what I think they're doing with the pumping system here
21 that's located in South Dakota. So they're pressurizing
22 the gas until it turns into a supercritical fluid,
23 getting it towards the high ends of their operating
24 range, which is somewhere around 2,800 PSI, which is
25 effectively 20 atmospheres which is about -- it's a

1 serious amount of energy in that. So when the pressure
2 drops, that's when it's going to turn into gas. If
3 there's a fracture, all that supercritical fluid is
4 going to turn into a gas and that's where it's deadly to
5 humans.

6 Why it's deadly to humans is our blood pH is
7 based on bicarbonate and carbonic acid. When carbon
8 dioxide is dissolved in water, it instantly turns into
9 carbonic acid. So we need to be in proper pH, which is
10 a pH of 7.40. Plus or minus .05 pH units, you got to be
11 around a 17-to-1 bicarbonate to carbonic acid ratio to
12 be a proper buffer. Because when you go below that
13 7.35, you're on your way towards 6.8, which is where
14 diabetic comas start.

15 And so the carbon dioxide -- most of the carbon
16 dioxide in your body, 80 percent of it is dissolved in
17 your bloodstream. You put more carbon dioxide than your
18 body can handle, that's where we pass out. And carbon
19 dioxide will not be able to be dissolved in your veins.
20 It's going to come out in your brain. And that's what
21 shuts you down.

22 Q. Okay. So let me ask you, have you done,
23 calculated the measurements between the five valves in
24 Burleigh County to determine the distances between the
25 valves as shown on the latest drawing of the 50-plus

1 miles that you looked at from Summit?

2 A. I have.

3 Q. Okay.

4 A. So the valve that's around 37th Street and the
5 valve that's up on -- the first valve on 201st Avenue,
6 that's about 15 miles. So with those 15 miles, that's
7 the number I quoted to you, that it's going to be eight
8 feet tall at 4 percent carbon dioxide throughout
9 Bismarck, but it's going to preferentially go to the
10 lower elevations because it's going to cascade downhill.

11 Because carbon dioxide is 1.53 times more dense
12 than air, air which is 80 percent nitrogen, which is
13 diatomic, and about 19.6 percent for oxygen, which is
14 also diatomic. So carbon dioxide at 44 versus the
15 oxygen at 32 versus the nitrogen at 28. So that's how
16 you get to the density piece.

17 Q. Okay. And you said that was how many miles
18 between the valve stations there?

19 A. Approximately 15 miles --

20 Q. Okay.

21 A. -- with a 24-inch pipe. That's how I did my
22 calculations for the million so standard cubic feet.
23 That would be --

24 Q. Okay. So let's say hypothetically that valve at
25 that location breaks, how far would the CO2 travel and

1 where would it travel to? Have you done that
2 calculation?

3 A. Well, it's -- well, going back to when I was at
4 SUBPAC West Coast, we did the drills for -- you know, we
5 were at the emergency action center. We did the drills
6 for contamination being released from Point Loma or from
7 North Island, from the carrier. And so you're looking
8 at -- the first thing you got to figure out is where is
9 the centerline. So you're going to figure out the
10 centerline by actually taking local conditions.

11 So the most dangerous one that would -- even if
12 all the valves were shut, the most dangerous one for the
13 people in Bismarck is one of the two on 201st Avenue
14 Northeast because it's going to -- the carbon dioxide,
15 because of its density, is going to flow downhill. When
16 it flows downhill, it's going to settle in whatever
17 looks like a bowl to it. So it's coming down the edge
18 of the bowl and it's coming down to the bottom. So it's
19 going to settle in there.

20 And it's going to be very concentrated when it
21 comes out because it's going against one atmosphere
22 pressure, it's going to completely dislocate the
23 nitrogen and the oxygen at the point of rupture. It's
24 going --

25 It's just like in a fire. You spray your water

1 at the base of the fire, it flashes into steam, but that
2 is a 777-fold change in volume which displaced all the
3 oxygen and the nitrogen at that one atmosphere and so
4 you don't have enough heat to be able to cause the water
5 to flash into steam.

6 So same idea here. You have all this energy in
7 the sub -- in the supercritical fluid -- sorry I'm
8 stumbling over this one. The supercritical fluid is
9 pressurized. It has all that energy from the pumps,
10 because they did work on this system to raise the energy
11 level that's basically potential energy of your carbon
12 dioxide. It's got the potential to cause it to go to
13 gas. If the temperatures drop below 88 degrees
14 Fahrenheit, it's going to go to liquid first, but it's
15 not going to be able to stay in a liquid because the
16 pressure drops as it leaves the pipe.

17 So either way, whatever the temperature of it
18 is, the energy is in the compressive potential. And so
19 it's going to expand. And so as it expands, when it's
20 at full carbon dioxide without diffusion yet, it's going
21 to start rolling downhill. It's going to be a cascade
22 of gas that's coming down you can't see and you can't
23 smell.

24 If your carbon dioxide detector goes off, before
25 you can walk over to it, you will be passed out if

1 you're in the initial wave. So it's going to be an
2 energy wave that comes at you too because it's going to
3 be like a detonation as that gas comes out and
4 expands --

5 Q. So let's say hypothetically there was a leak at
6 the valve shown on 201st Street -- Avenue Northeast --

7 A. So is that a leak without brittle fracture so
8 it's just a -- had some flaw that caused a leak to
9 start? Is this under flow or no flow conditions?

10 Q. And so what would happen? How far would the
11 flow get even if the pipeline was shut off at the next
12 main valve?

13 A. Okay. So if it's shut off at the next main
14 valve, then you're going to be no flow so it's going to
15 be all the supercritical fluid of carbon dioxide that's
16 trapped inside the pipe. It's going to unload itself.

17 Because when you have a leak from supercritical
18 fluid or liquid carbon dioxide, doesn't really matter,
19 as it expands through that hole, because it's going to
20 go to the gas phase because it doesn't have pressure
21 above one atmosphere coming out of there, which is your
22 14.7 PSI, it is going to super cool that pipe.

23 So the temperatures because of the expansion of
24 the gas -- it's called the Joule-Thomson effect. Just
25 like if you were going to spray a CO2 fire extinguisher

1 there in the conference area, you're going to have a
2 white puff coming out. Why? Because you're freezing
3 all the water vapor. You're seeing frozen water vapor.
4 That's what that dust is. It's not a water vapor. It
5 is ice crystals that are very, very tiny, because the
6 carbon dioxide expanding is very cold. And you'll also
7 have that same white -- white covering of your black
8 cone on your carbon dioxide extinguisher because it's so
9 cold it's going to instantly deposit frost on your cone.

10 Same thing's happening here, but you're stealing
11 the energy out of the pipe. So if there's a flaw, it is
12 going to propagate that flaw across a fault line in the
13 pipe, which is due to the crystallization nature of a
14 weld. And so that is going to expand.

15 That's what brittle fracture is, is when you get
16 it to a brittle material, it loses most -- "brittle"
17 means "not ductile." So it loses its previous
18 characteristics of whatever temperature it was, it is
19 now brittle and it's going to snap based on pressure.

20 You still have that pressure as long as there is
21 supercritical carbon dioxide. Think of it as an energy
22 source. It's going to continue to give its energy until
23 all of it is a gas. And all of it can't be a gas unless
24 the pressure goes below 1,071. And when it's at 1,071
25 PSI, it still has a lot of energy, and that energy can

1 continue to propagate the rupture.

2 Because pressurized gas is -- is gas on both
3 sides. If you ever saw a TXV valve in the summertime
4 from your LP gas while you're barbecuing, yeah, it's
5 very cold on the outside of your TXV, which is a thermal
6 expansion valve, which is what's happening when you have
7 a leak in a high pressure pipe.

8 Because if you look back at steam, even though
9 the steam is only at 500 PSI, it's got so much energy
10 that it's going to continue to cut the pipe like it was
11 a blowtorch. And so you use a broom -- you put a broom
12 up to it so wherever -- because it's so loud. You put a
13 broom up to it because it's going to cut those things
14 off. If you put your hand up there, it's going to
15 cauterize the wound because it's got so much energy;
16 you're not going to bleed out. You're just not going to
17 have any fingers.

18 So this is the same type -- well, it's
19 analogous. It's not the same. The supercritical fluid
20 has a tremendous amount of energy in it even when
21 it's --

22 Q. So getting to my question about, if the valve is
23 shut off, so you have that zero flow condition, how far
24 would that travel in that 15-mile distance between the
25 two valves using the one on Exhibit 122 showing the main

1 line valves for the valve shown on 201st Avenue
2 Northeast? How far would it travel to the south towards
3 Bismarck?

4 A. Yeah, when it travels -- it's going to travel
5 downhill. It's going to get to the south side of
6 Bismarck. And so it's -- until the diffusion effect can
7 take effect, because you're displacing the oxygen and
8 the nitrogen in this cascade of carbon dioxide as it
9 comes out of the pipe.

10 So you have -- you got -- it's not -- the source
11 of the carbon dioxide gas is not going to stop until all
12 of the unisolated supercritical CO2 is expended. So it
13 can get all the way -- it will get to the bottom of the
14 hill in south Bismarck. It will. Because of its
15 density and because of the energy that's being -- that's
16 forcing it downhill.

17 And then the only thing that's going to be
18 mitigating here is if you have high winds at the time.
19 And you can't bet on high winds.

20 Q. Okay. And then what if it isn't in zero flow?
21 In other words, zero flow assumes that the redundancy
22 system or the automatic shut-off valve at the next valve
23 does shut off. What happens if it doesn't shut off and
24 you continue to flow CO2 and it's not zero flow and
25 there's a rupture or break?

1 Q. And you're aware that they operate in the
2 winter; right?

3 A. What type of pipelines are you talking about?

4 Q. Well, there is -- I assume you're aware,
5 Mr. Steinbronn, that there are natural gas pipelines,
6 there are refined products pipelines, there's a CO2
7 pipeline. You're aware of all of those; right?

8 A. Yes.

9 Q. And they all operate in North Dakota, they all
10 have aboveground components, valves and such; right?

11 A. I don't know when they started with the -- when
12 did they actually start with carbon dioxide in the
13 pipelines? And was it -- is it supercritical fluid
14 carbon dioxide that's presently running? I've got to
15 know this because I can't -- I can't give you an
16 informed opinion unless I know that.

17 Q. Right. And so as I understand it,
18 Mr. Steinbronn, your opinion is uninformed by the
19 existence of a CO2 pipeline that is operating in North
20 Dakota? That would be an important fact to know; right?

21 A. Yes, it would. What are the dimensions of that
22 CO2 pipeline so I can be more informed?

23 Q. Yeah, you'd want to know all those things if you
24 were going to provide an informed analysis to this
25 Commission; right?

1 A. I -- from what I have for the anticipated
2 pipeline, I have the dimensions of those things and I
3 have a notice that it's going to be carbon steel. That
4 is what I'm testifying to. For all the other pipelines,
5 I could not testify to them because I don't have data on
6 them.

7 Q. You're not even aware that it exists?

8 A. You just told me it exists.

9 Q. You're not aware how deep it's buried?

10 A. That is correct.

11 Q. You don't know where it is, how cold it gets,
12 whether they've ever experienced the parade of horrors
13 you're talking about when it gets cold in the winter;
14 right?

15 A. Yes.

16 Q. I assume, Mr. Steinbronn, as you looked at the
17 details about this pipeline, you looked at things like
18 testimony on fracture control plans and how the
19 company's plans do address the sorts of issues that
20 you're talking about; right?

21 A. No. That was not released to me.

22 Q. Okay. So you were what, given a set of data
23 from --

24 A. Yes.

25 Q. -- from the lawyer?

1 A. Yes.

2 Q. And then you went on the internet at your -- you
3 found what you stumbled across with internet searches;
4 right?

5 A. It was not stumbling across.

6 Q. Fine. Targeted searches that -- I assume you
7 looked for CO2 pipelines in North Dakota and you found
8 some things fairly friendly --

9 A. I --

10 Q. -- not toward CO2 pipeline in North Dakota.

11 A. I looked for pipelines outside of the United
12 States. Because when I was doing my research on Covid
13 for my biochemistry sources, master's level things, I
14 found that I could find more data outside the United
15 States that was not -- was not abridged or was not spun.
16 So I was looking for things that correlated between
17 other countries.

18 I don't go for just one thing to think that, oh,
19 this has got to be the best. No. I go through
20 different mechanisms because of my previous research
21 searches of my -- all my master's pieces, both in
22 chemistry and physics. You can't just go with one
23 thing. It has to be preponderance of evidence.

24 So I didn't think that CO2 pipelines that were
25 in the same state would give me anything different. I

1 was looking for different.

2 Q. Okay. You looked at, I assume, Mr. Steinbronn,
3 the applicable regulations for the design and
4 construction and inspection of pipelines operating in
5 the United States?

6 A. Yes. And I have a question on that. Do you
7 have --

8 Q. Perhaps after this, Mr. Steinbronn --

9 A. If I could ask this question, please. Do you
10 have failure mode and effects analysis for every type of
11 failure for this pipeline? And do you have a full-scale
12 mock-up with as -- at least two valves in three sections
13 of pipe so that we can look at that?

14 ALJ HOGAN: Mr. Steinbronn, the way these
15 hearings work, it's not an open discussion back and
16 forth so...

17 THE WITNESS: I'm sorry.

18 ALJ HOGAN: You've been offered as a witness so
19 we're going to have you answer the questions this
20 morning.

21 THE WITNESS: Sorry.

22 A. Could you rephrase your question?

23 Q. (BY MR. MAHLBERG) Yeah, that's okay,
24 Mr. Steinbronn. These hearings aren't a natural setting
25 for most people.

1 My question was you're aware of the federal
2 regulations about pipeline safety; right?

3 A. I have some things from the pipeline safety
4 center, yes.

5 Q. And what's the name of the agency that regulates
6 pipeline safety?

7 A. It's escaping me right now.

8 Q. You're aware, Mr. Steinbronn, that there is
9 federal regulation governing the design, construction,
10 and operation of CO2 pipelines in the United States of
11 America; right?

12 A. Yes. I'm also aware that --

13 Q. Did you review any of those regulations relative
14 to Summit's design of its pipeline?

15 A. No.

16 Q. Did you review any of those regulations with
17 respect to the proposed construction of Summit's
18 pipeline?

19 A. That it has to monitor the operations 24/7 and
20 it can shut down a CO2 pipeline if there's a problem.

21 Q. You pulled that from the regulations? Or was
22 that provided to you by someone? I'm just trying to
23 understand the basis of your opinions.

24 A. It's from the pipeline safety trust.

25 Q. And you understand the pipeline safety trust is

1 the regulator?

2 A. It is not.

3 Q. All right. Moving on from that, I guess,
4 Mr. Steinbronn, how far is it from the pipeline to the
5 south of Bismarck?

6 A. From which direction?

7 Q. You tell me. You tell me, Mr. Steinbronn. You
8 were giving an opinion about an analysis that we'll talk
9 about in a second from a location along the pipeline to,
10 I think as you described it, the bottom of the hill in
11 south Bismarck. How far is that distance that you were
12 testifying about?

13 A. Okay. That is approximately 18 miles.

14 Q. And what's the topography between the pipeline
15 and the bottom of the hill in south Bismarck?

16 A. You have a floodplain that goes along the
17 Missouri River. So the portions that are west of US 83
18 are going to be close to the level of the floodplain.
19 Once you go on the east side of interstate -- or the US
20 -- US 83, it's going to be going uphill and it makes a
21 corner and all that is in the hills to the northeast of
22 Bismarck. And it slopes down as you get to US 94 -- let
23 me check that to make sure because these are tiny
24 numbers. Interstate 94. And then that's at the
25 riverbed again that goes through the Lincoln -- the

1 suburb of Bismarck. And it stays fairly flat as it goes
2 across or under the railroad tracks and it's going to be
3 about the same level as Lincoln as it travels down to
4 North Dakota Road 1804, as I understand.

5 Q. Have you been to Bismarck?

6 A. I have not.

7 Q. You've been to north of Bismarck?

8 A. No.

9 Q. Have you looked at topographical maps in the
10 vicinity of this pipeline?

11 A. I have one, but it's not very accurate.

12 Q. Despite all that, you -- as I understand it,
13 Mr. Steinbronn, you're testifying about a dispersion
14 analysis that you performed?

15 A. It's not a dispersion analysis.

16 Q. Well, you just said that the dispersion is going
17 to reach a certain distance. You've not looked at
18 topography. You have to make a whole host of
19 assumptions, Mr. Steinbronn. So which assumptions did
20 you make for the analysis that you performed? And in a
21 compound question, what software did you use to perform
22 the analysis?

23 MR. BAKKE: I'm just going to object to him
24 misstating his testimony. He just described, I think,
25 fairly accurately the topography from north to south --

1 north of Bismarck to the south of Bismarck. So to state
2 that he didn't consider topography, he just asked him
3 about that and he described it, I think, accurately.

4 MR. MAHLBERG: Mr. Bakke can recharacterize the
5 testimony how he wants to. It's a fine question for
6 cross-examination. This witness just said he has not
7 looked at anything other than a topographical map that
8 he says is not very accurate.

9 A. It doesn't -- it doesn't give me feet above mean
10 low level so --

11 ALJ HOGAN: Mr. Steinbronn, the description when
12 you answered the question regarding the topographic area
13 or what you knew about that, is that the assumptions
14 that you made as far as topography?

15 THE WITNESS: I talked to several people that
16 actually live in Bismarck, of what it looks like, even
17 though I haven't been there.

18 ALJ HOGAN: But your description when
19 Mr. Mahlberg asked you about what you knew about the
20 topography, is that what you used --

21 THE WITNESS: Yes.

22 ALJ HOGAN: -- when you -- okay.

23 THE WITNESS: Because it's -- the carbon dioxide
24 is denser than air. It will go -- flow to the lowest
25 level it can. And it's going to fill that --

1 ALJ HOGAN: Well, outside of the
2 characterizations by the attorneys about that, I think
3 that that answers the question about what he used as far
4 as assumption on topography.

5 A. Yep. I used --

6 Q. (BY MR. MAHLBERG) And I'm --

7 (Simultaneous speaking)

8 A. -- to be able to figure out that this is the way
9 it's going to be, I didn't use any software. I didn't
10 use any software when I was shooting torpedoes from our
11 submarine. Everything --

12 Q. Which assumptions did you use for the humidity
13 at the time of a release?

14 A. I didn't mention anything about humidity.

15 Q. Well, I understand that, but I'm assuming,
16 Mr. Steinbronn, that as you talk about an analysis that
17 is alleging where a release is going to travel to, that
18 you're taking into account the variables that would
19 affect that; right?

20 A. Yes.

21 Q. All of them; right?

22 A. The ones that matter.

23 Q. Okay. What was the wind speed and its direction
24 in the event of a release that you're testifying about?

25 A. I didn't mention that either.

1 Q. So wind speed doesn't matter for your analysis?

2 A. Wind speed matters for the brittle fracture
3 transition.

4 Q. In your opinion, wind speed matters more as to
5 whether there is going to be a fracture in the pipeline
6 which may be 48 inches, may be 60 inches below ground,
7 maybe it's aboveground, appurtenances. It matters more
8 as to whether there's going to be a fracture --

9 A. Yes.

10 Q. -- than how the CO2 would move if released?
11 That's your testimony?

12 A. No, that is not my testimony. Without the
13 fracture, there is no release. Without the fracture,
14 there is no release.

15 So if it's a northwest wind, the most dangerous
16 one, it's going to be the one right there on US 83 for
17 the people on the western side -- or on the eastern side
18 of Bismarck. If you have the fracture right near the
19 Missouri bed which is right on the edge of the county
20 between Burleigh and Morton, when it's northwest, that's
21 going to go straight to the heart of Bismarck.

22 If -- even though this is not Burleigh County,
23 the first valve inside Morton, if that one has the
24 fracture, that is going to go and it's going to deposit
25 itself directly in the south portion of Bismarck. And

1 the next valve is not for another ten miles. So if that
2 valve bursts, you have ten miles to the west and you
3 have five miles to the east of that valve station, and
4 that is what I had calculated to be that amount of
5 carbon dioxide, the 4 percent, for the entire
6 31.5 square miles of Bismarck. So if it goes into a
7 bowl on the floodplain, that's going to be
8 proportionately higher percentage. You have less time
9 to be able to respond.

10 Other things that I've looked as the -- is the
11 -- what was called a leak down in Louisiana and it took
12 their emergency crews --

13 MR. MAHLBERG: Your Honor, I'm going to --

14 A. -- two and a half hours --

15 ALJ HOGAN: Mr. Steinbronn, hang on, hang on.

16 THE WITNESS: Yep.

17 ALJ HOGAN: I'm going to stop you there.

18 MR. MAHLBERG: I'm going to ask that the witness
19 be stopped at this point. I've let him go a long time,
20 but we're getting back to this spot where we're just
21 talking and not responsive to a question right now.

22 ALJ HOGAN: Mr. Steinbronn, if you can limit
23 your answers to the question asked, I would appreciate
24 that.

25 THE WITNESS: Yes, ma'am.

1 Q. (BY MR. MAHLBERG) And sorry to cut you off,
2 Mr. Steinbronn, that's just -- that's the way these
3 things work.

4 To confirm, you considered no variables
5 whatsoever in conducting this analysis as to where the
6 CO2 would go in the event of a release; correct?

7 A. No. I considered --

8 Q. You did not consider wind speed; right? You did
9 not consider --

10 MR. BAKKE: Can he answer the question?

11 MR. MAHLBERG: Sure.

12 ALJ HOGAN: Yep.

13 A. The reason why I --

14 ALJ HOGAN: Do you need the question again?

15 THE WITNESS: I think I have it. He's asking
16 about what I need to -- what I considered as variables.

17 Q. (BY MR. MAHLBERG) Well --

18 A. I got to --

19 ALJ HOGAN: Well, he asked you specifically
20 about wind speed.

21 A. Wind speed. Yes, I considered the wind speed
22 for the brittle fracture.

23 Q. My question -- understood. Mr. Steinbronn, my
24 question is, as to the analysis that you are suggesting
25 you performed about where CO2 would travel in the event

1 of an accidental release, you did not consider wind
2 speed for the dispersion of the CO2; right?

3 A. I did. Because how it acts under wind, it's
4 like a temperature inversion. Because you have a higher
5 temperature down below, if you have the wind that comes
6 over the hill, it's going to cause a wedge of the carbon
7 dioxide and that's going to keep it concentrated, it's
8 not going to diffuse as fast, and it's going to push it
9 to the lowest portion. And it's basically going to --
10 like an airfoil, it's going to -- just like on your car,
11 so there's less drag, it's going to go over top of this
12 thing. So it's a stable mass of high density air.

13 Q. What was the wind speed that you used?

14 A. The wind speed that we had just using the normal
15 piece from Dickinson, which is to the west of you guys,
16 they had --

17 Q. What was --

18 A. -- a 29-mile-an-hour wind speed so that's the
19 only thing I considered. This is something that
20 happened five months ago so this is -- this is where I
21 started my -- my analysis of the pipeline.

22 Q. And you plugged 29-mile-per-hour wind speed into
23 your formula that specifically told you how the CO2
24 molecules would act in the event they were released?

25 A. Okay. CO2 molecules depend on the phase. It's

1 going to be gas phase when it leaves the pipeline.
2 Because there's no source of pressurizing it after it
3 leaves the pipeline. It is 1.53 times more dense than
4 air. It's going to seek the lowest level. It's going
5 to flow downhill regardless of the wind. The wind is
6 going to affect the diffusion to bring oxygen back in
7 that was displaced when the supercritical fluid turned
8 into a gas.

9 I'm looking at the mechanics. I'm not looking
10 at software to give you an exact thing based on a whole
11 bunch of things. Weather is not like that. The weather
12 is a fluid and it is energy. Whether that be a cyclone,
13 whether that be a hurricane, whether that be a tornado,
14 or whether it just be straight line wind. It's a fluid
15 and it's energy. Both of those things apply in
16 chemistry and physics.

17 And so I'm -- it's properties of the gas as it
18 leaves the pipeline is all that mattered there. It is
19 going to seek the lowest level. The wind is what's
20 going to affect the diffusion but until --

21 Q. Do you --

22 A. -- have a source of carbon dioxide coming out of
23 one atmosphere, the wind is only causing it to find a
24 different low area. So it matters where the first one
25 happens. But as long as you have the energy and the

1 supercritical fluid in the pipe, if you're piping -- if
2 you're pumping yet because an isolation valve did not
3 shut, you have almost an unlimited amount of carbon
4 dioxide to keep throwing out there. So as it flows
5 downhill, if the wind changes --

6 MR. MAHLBERG: Your Honor.

7 A. -- it's going --

8 ALJ HOGAN: Mr. Steinbronn, I'm going to cut you
9 off there.

10 Q. (BY MR. MAHLBERG) And, again, I apologize that
11 you have to be cut off. It's the same reason that
12 Mr. Bakke asked that the answers just be a little bit
13 more tight. In this setting, it's -- I'll try a yes or
14 no and then, hopefully, we can be done.

15 You did not perform any sort of what you call
16 diffusion analysis or dispersion analysis; right?

17 A. That's correct.

18 Q. Thank you. No further questions.

19 ALJ HOGAN: Mr. Pelham, any questions?

20 CROSS EXAMINATION

21 BY MR. PELHAM:

22 Q. Good morning, sir. I'm just wondering, sir,
23 what other bodies or courts have you provided testimony
24 to in an expert capacity?

25 A. This is my first in a technical hearing

1 situation.

2 Q. Are you familiar with Dakota Gasification plant?

3 A. The Dakota what?

4 Q. The Dakota Gasification plant.

5 A. I am not.

6 MR. PELHAM: I don't have any other questions.

7 Thank you.

8 ALJ HOGAN: Mr. Jorde, any questions?

9 MR. JORDE: Your Honor, yes, I do have a few
10 questions.

11 CROSS EXAMINATION

12 BY MR. JORDE:

13 Q. Sir, does the fact that there's an existing
14 pipeline in western North Dakota change any of the
15 scientific opinions you provided today?

16 A. No. I haven't looked at anything other than
17 this piece.

18 Q. And does the name of the agency that regulates
19 pipeline standards, construction standards, regardless
20 of what anyone calls it, does that change your
21 scientific opinions provided?

22 A. It does not.

23 Q. Now you were asked some questions relative to
24 federal standards by Mr. Mahlberg. And I'm curious,
25 sir, do you remember years ago when seatbelts weren't

1 required in cars?

2 A. Yes.

3 Q. And then people died and the feds strengthened
4 minimum standards; right?

5 A. That's correct.

6 Q. And then people kept dying and being
7 catastrophically injured and then along come airbags now
8 part of minimum safety standards. Are you aware of
9 that?

10 A. I am.

11 Q. And so let's assume if the PSC grants both of
12 Summit's pending applications and then Summit does meet
13 current minimum federal safety standards, does that in
14 any way change any of the scientific opinions you
15 provided today?

16 A. It does not.

17 MR. JORDE: Nothing further. Thank you.

18 ALJ HOGAN: Commissioner Christmann.

19 COMMISSIONER CHRISTMANN: Thank you, Your Honor
20 and Mr. Steinbronn.

21 I think you provided a lot of information and I
22 was trying to take notes, but I think you said along the
23 way that you preferred getting pipeline information from
24 foreign countries because the information was just more
25 available; is that correct?

1 THE WITNESS: That's correct. They also have
2 things that they actually put into the ground so they --
3 according to their research papers and how it's working.

4 COMMISSIONER CHRISTMANN: And so in your
5 research of this, in many other ways like, you know,
6 building codes regarding fires or earthquakes, I've
7 heard for years about how much better America's safety
8 features are than most foreign countries. What is your
9 evaluation when you gather that information on pipelines
10 from foreign sources? Do many of those foreign
11 countries have better overall pipeline safety than
12 America or does America have better overall pipeline
13 safety than those?

14 THE WITNESS: I'm not sure that I'm in a
15 position to answer that one, but what I've found from
16 the Saudis is they're building these pieces away from
17 populated areas and they're going straight into the Red
18 Sea into a containment. So the pipelines are so much
19 shorter from the papers that I've seen.

20 And China, most of their things are, where
21 they're sequestering it, it's all outbound from the
22 cities. The cities are built there to be able to
23 provide workers to be able to do whatever they got to do
24 for their pipelines.

25 COMMISSIONER CHRISTMANN: So am I

1 misunderstanding -- I don't want to mischaracterize you.
2 Would you say that Saudi Arabia and China have better
3 pipeline safety standards than America?

4 THE WITNESS: I don't think I can say either way
5 right now. I'd have to do some more research.

6 COMMISSIONER CHRISTMANN: Okay. And then
7 outside of safety standards in various countries, I'm
8 trying to follow -- I mean, I get your logic on the
9 extreme cold temperatures where there are risers and we
10 get above ground, but when we get below ground, I was
11 struggling to follow that logic.

12 Am I not right that in the winter when we're
13 experiencing -- and, of course, the temperatures
14 fluctuate, it's below 0, it's above 0, sometimes it's
15 above freezing, but we typically have some snow cover
16 too, which I've always understood to kind of insulate
17 the ground and keep it at about 0. But give or take,
18 the ground level should be around 0 when it's real cold
19 for a spell, maybe a little lower.

20 But if you're looking at an area with four feet
21 of frost, say, the temperature of that soil would drop
22 -- or would rise from about 0, roughly, at ground level
23 down to when you get to four feet below in the bottom of
24 the frost, it would be right at 32 because it ceases to
25 be frozen. Am I way off on that?

1 THE WITNESS: That's kind of what it is but you
2 have -- when you have impurities in water, it's going to
3 drive the freezing point lower. So at the frost line,
4 it's actually probably around -- in Fahrenheit, it's
5 probably going to be around 28 degrees or 26 degrees,
6 somewhere around there. So above that frost line it's
7 going to be colder as you get higher.

8 So in North Dakota when you have a frost line of
9 75 inches, that's where your 25, 26 Fahrenheit will be.
10 And above that you're going to have a gradient based on
11 all the resistivity to giving up its heat. And that's
12 going to all matter by how much prevailing wind you have
13 when it's coldest.

14 COMMISSIONER CHRISTMANN: Is 75 -- is 75 inches
15 our normal frost level?

16 THE WITNESS: Yeah. You guys are number three
17 in the nation. Number one is Alaska because they're
18 above the arctic circle. And then Minnesota is the next
19 one. But then North Dakota is number three right behind
20 Minnesota. That's the average frost. So farther north
21 you're going to have it deeper than 75, farther south
22 you may have something a little bit less than 75, but 75
23 is your average of the state.

24 COMMISSIONER CHRISTMANN: And when you were
25 talking about the risers then --

1 THE WITNESS: Yes.

2 COMMISSIONER CHRISTMANN: -- is your presumption
3 that those are uninsulated?

4 THE WITNESS: Insulation doesn't matter because
5 the insulation is going to be subject to the weather
6 also. It's just a matter of time, how much time it
7 takes. Because you're going to have a thermal gradient
8 from your operating fluid to the edges of the wall on
9 the inside and then you're going to have a huge
10 temperature gradient across that three-quarters inch of
11 metal.

12 And then any insulation is just a resistance to
13 releasing heat energy. It's not stopping it. It's not
14 impenetrable to heat. So if you have a cold snap --
15 that's why it says for a day. Ambient temperature of
16 one day causes the brittle fracture transformation and
17 that is not recovered when it goes back up. You have --

18 COMMISSIONER CHRISTMANN: So --

19 THE WITNESS: -- physically changed the
20 metallurgy of the carbon steel once that -- it get --
21 assuming first at the surface. So you're starting with
22 any imperfection in the surface, that's where it's going
23 to start. And then as you have more cycles, then it's
24 going to get deeper into the material. That's how the
25 brittle fracture mechanism is going to achieve itself.

1 COMMISSIONER CHRISTMANN: Did you research much
2 or have any familiarity with Storm Uri and the electric
3 and natural gas problems it caused in Southwest Power
4 Pool and especially ERCOT?

5 THE WITNESS: And where is this located?

6 COMMISSIONER CHRISTMANN: Basically from here
7 down to Texas, the whole Storm Uri thing in 2020, I
8 believe, in February, when we had electrical problems,
9 transmission.

10 THE WITNESS: No, I'm not aware of that. That
11 was during Covid so it was -- everything gets closed in.
12 I was more worried about my students --

13 COMMISSIONER CHRISTMANN: Okay.

14 THE WITNESS: -- were healthy.

15 COMMISSIONER CHRISTMANN: Let me just explain my
16 understanding of something and then you tell me if you
17 think I'm way wrong.

18 So a lot of the problems that we had during
19 Storm Uri with electric shortfalls had to do with the
20 fact that, especially in Texas and Oklahoma, natural gas
21 wells froze up, even though it was colder in North
22 Dakota than it was in Texas and Oklahoma, the difference
23 being ours are built to be in cold weather and so
24 they're insulated and weatherized and in Texas it
25 happens so rarely that they don't bother with that. So

1 theirs froze up, ours didn't, even though it was colder
2 here.

3 THE WITNESS: Yes.

4 COMMISSIONER CHRISTMANN: Wouldn't the same kind
5 of thought be here, too, that PHMSA, there are standards
6 for this and that these risers and such, that perhaps
7 you're wrong, that the insulation does work?

8 THE WITNESS: And what is the source of your
9 heat for your insulation?

10 COMMISSIONER CHRISTMANN: Well, I don't know
11 that, but I just know our other pipelines don't seem to
12 be breaking up badly.

13 THE WITNESS: Insulation is not a barrier to
14 heat loss. It reduces it because it has something
15 called an R factor. That's the resistance to heat
16 conduction. So it's best when there's no wind because
17 you don't have the convection effect of removing heat
18 rapidly. It's going to have a large temperature
19 gradient across it at basically calm wind, but that
20 gradient is going to be greatly reduced when the wind
21 picks up.

22 So most -- I come from Iowa. I went through the
23 storms of '76, '78, and had to carry water to the cattle
24 at 40 below with a 40-mile-an-hour wind. You can run on
25 top of the snow because it is frozen. It is frozen

1 hard. It is at the same temperature as the air because
2 the wind is so much. And so you run across the frozen
3 tundra and you get it to the cattle and it's barely
4 lukewarm after you've run as hard as you can for a
5 hundred meters.

6 So it -- the wind is significant in the
7 convection heat loss of the insulation and as well as
8 the pipe.

9 COMMISSIONER CHRISTMANN: Okay. I have no
10 questions.

11 THE WITNESS: Okay.

12 COMMISSIONER CHRISTMANN: Go ahead. You can
13 finish.

14 THE WITNESS: So the key piece here is if it
15 goes to no flow -- I don't know how your -- what your
16 failsafe on your valves is, but failsafes on valves, if
17 you lose electrical power, they're going to shut. So
18 you're going to have isolated, you're going to be at a
19 no-flow condition, and that's where the weather's going
20 to take it. Because if you have no flow, you have no
21 source of reheating your working fluid.

22 When your working fluid goes down in
23 temperature, you're going to be in liquid phase or the
24 gas phase. Eventually, you're going to be in the gas
25 phase if you lose energy for so long that your pumps are

1 not pumping and your valves are not open. There's where
2 the problem is going to be.

3 COMMISSIONER CHRISTMANN: Okay. I have no other
4 questions. Thank you.

5 ALJ HOGAN: Commissioner Haugen-Hoffart.

6 COMMISSIONER HAUGEN-HOFFART: Good morning.

7 THE WITNESS: Good morning.

8 COMMISSIONER HAUGEN-HOFFART: In your testimony,
9 you started to talk, but you were cut off. So I believe
10 I heard you say that you made some calls to Bismarck
11 regarding your analysis. Was that correct?

12 THE WITNESS: Yes.

13 COMMISSIONER HAUGEN-HOFFART: Can you tell me
14 who you called?

15 THE WITNESS: I can.

16 COMMISSIONER HAUGEN-HOFFART: And summarize them
17 for me, please, who you called and just summarize those
18 telephone conversations.

19 THE WITNESS: Called Brian Bitner and also the
20 lawyer you have there, Mr. Bakke. And I asked some
21 questions about what the layout of Bismarck is. Because
22 knowing what carbon dioxide is and what its physical
23 properties are, regardless of the five different phases
24 it can be in, is essential to any kind of analysis of
25 what would happen if it gets out of the pipe.

1 COMMISSIONER HAUGEN-HOFFART: So when you talk
2 about layout, can you be a little bit more specific
3 there as far as what was provided?

4 THE WITNESS: Yes. I got the map that's got the
5 51.46 miles of anticipated pipeline for Burleigh County,
6 North Dakota. And then I asked questions about, okay,
7 how is Bismarck elevation-wise related to where the
8 proposed pipeline is. And the answers I had was
9 Bismarck butts up against the Missouri River and the
10 southern portion of it, which is south of Main Street,
11 is on the floodplain.

12 So the floodplain is where the majority of it
13 will reside unless the wind is straight out of the west
14 and the fault is on the eastern side of Bismarck below
15 that -- I've got to pull up a magnifying glass here
16 again -- Interstate 94. If it's calm when it actually
17 fractures -- because the energy inside the supercritical
18 fluid carbon dioxide, it's a lot of energy. Because if
19 you just think of gas as having to be compressed, you're
20 putting all that work energy from the pump on the fluid.
21 All that energy ends up in the fluid. That's another
22 portion of the Joule-Thomson effect of pressurizing
23 fluids. So it is going to continue to flow out if the
24 isolation valves --

25 Because here's the other part of supercritical

1 fluid that I understand, is that in petroleum, if you
2 use carbon steel, the oil is going to coat the carbon
3 steel and preserve it against corrosion. Carbon dioxide
4 is a supercritical fluid. If there's one molecule of
5 water, it's going to be acidic. If it's pure, it's
6 going to be caustic. It is not providing any -- any
7 protection to the pipe that it's going through.

8 So one of my first questions was, okay, what are
9 they coating the inside of these things with? So if
10 it's pure --

11 COMMISSIONER HAUGEN-HOFFART: Were you given an
12 answer to that?

13 THE WITNESS: I couldn't get an answer from that
14 because it wasn't released.

15 COMMISSIONER HAUGEN-HOFFART: Okay.

16 THE WITNESS: It wasn't released (inaudible) one
17 of them.

18 COMMISSIONER HAUGEN-HOFFART: Okay. Thank you.

19 THE WITNESS: So (indiscernible) is going to be
20 coated with Teflon or something to keep the pipe from
21 corroding from the inside.

22 The other problem is going to be in the valves.
23 The valves' surfaces --

24 COMMISSIONER HAUGEN-HOFFART: Okay.

25 THE WITNESS: -- themselves. And we have some

1 dimensions of that, but it's getting into the weeds.

2 COMMISSIONER HAUGEN-HOFFART: Okay. Thank you.

3 I have no further questions.

4 ALJ HOGAN: Mr. Dawson, any questions?

5 SUBSTITUTE DECISIONMAKER DAWSON: I'm trying to
6 understand what you said earlier. Did you say that
7 carbon steel gets brittle at a temperature commonly
8 reached in the state of North Dakota?

9 THE WITNESS: In the wintertime, yes.

10 SUBSTITUTE DECISIONMAKER DAWSON: Okay. And so
11 that would be carbon steel in pipelines or on bridges or
12 in cars or anywhere?

13 THE WITNESS: Yes.

14 SUBSTITUTE DECISIONMAKER DAWSON: Okay. And did
15 you say that when there is a -- the pipe is ruptured in
16 any sort of manner, it would be a guillotine break
17 because of the freezing action or the fracturing action?

18 THE WITNESS: Not necessarily. It depends on
19 how much of the pipe has been in brittle before the
20 first leak occurred. So when the leak occurs, you're
21 going to be expanding the fluid. Whether it's high
22 density liquid or whether it's a supercritical carbon
23 dioxide, it's going to be expanding and releasing at one
24 atmosphere, 14.7 PSI. That system itself is going to
25 cause super cooling of the pipe. So whether it happens

1 at 100 degrees or whether it happens at a negative
2 40 degrees, it's going to get a lot cooler very fast.

3 Just like your CO2 fire extinguisher. Release
4 that thing from -- just pressurized gas, CO2 inside of
5 it, to the outside at one atmosphere, it's going to put
6 -- deposit frost on the cone and then --

7 SUBSTITUTE DECISIONMAKER DAWSON: Okay.

8 THE WITNESS: -- it conducts electricity.
9 That's why it's a problem for people by electrical
10 fires.

11 SUBSTITUTE DECISIONMAKER DAWSON: Thank you.

12 ALJ HOGAN: Mr. Bakke, any redirect?

13 MR. BAKKE: Just briefly, Your Honor.

14 REDIRECT EXAMINATION

15 BY MR. BAKKE:

16 Q. In relation to this issue of pipeline
17 regulations, you were asked about that. And the entity
18 that governs pipelines in the U.S. is called PHMSA,
19 P-H-M-S-A. However, they are in the process of
20 formulating specific pipeline standards on CO2 because
21 the current pipeline standards deal with all materials
22 in pipeline: natural gas, oil, etcetera.

23 Is what needs to be considered here is
24 information and standards specific to CO2 because, as
25 you pointed out for other things such as natural gas or

1 oil, there's different considerations from a chemistry
2 standpoint and a physics standpoint --

3 MR. MAHLBERG: I'm going to object. Mr. Bakke
4 is about a minute into a question. It's pure testimony.
5 And this witness has testified he's not familiar with
6 the federal regulations. And if he's going to be asked
7 to be opined about potential changes to federal
8 regulations, he does not have foundation for that
9 opinion.

10 MR. BAKKE: I can phrase it a different way.

11 ALJ HOGAN: Please do.

12 Q. (BY MR. BAKKE) So is it important to know
13 what's going to be inside the pipeline in determining
14 what standards should be adhered to?

15 A. Absolutely. No doubt.

16 Q. Okay. And then you talked about carbon steel
17 getting brittle and you said for some products inside
18 the pipeline there is either Teflon insulation or
19 there's actually some insulative material that occurs
20 due to the product inside the pipeline; is that correct?

21 A. That is close. I was expecting Teflon to be
22 there because of the caustic nature without water and
23 the acidic nature with water as an impurity inside the
24 supercritical carbon dioxide. So that matters.

25 The natural gas is just compressed gas. It

1 doesn't have a -- as far as I know, it doesn't have any
2 caustic nature or any acidic nature because it's just
3 methane. It's compressed methane. And so the petroleum
4 by nature is nonpolar. It's not going to be invasive to
5 a metal and cause it to corrode.

6 Q. And is that -- is that part of what makes carbon
7 dioxide in a supercritical phase so dangerous in a
8 pipeline, is it has chemical constituents and makeup
9 that's different than many products that go in pipelines
10 such as natural gas and oil?

11 A. Carbon dioxide is a very unique gas when it's in
12 the supercritical fluid stage. It's -- most of the
13 research that I've been able to read through and
14 understand was that they're using it in systems like the
15 Rankine cycle for air conditioning. You're using it as
16 a working fluid. It's not coming in from one side, open
17 -- it's not an open source kind of piece. You're not
18 open from one side and putting it to some other side.
19 It's inside of a closed loop and the pipes are tiny.

20 So when you put high pressure -- this goes right
21 back to main condensers in submarines. Your most
22 critical weld is in the main condenser. Why? Because
23 we're going to have submergence pressure of the seawater
24 and that seawater is 35,000 parts per million of
25 chlorine regardless of everything else that's in it.

1 That's going to cause your chlorine pitting of it.

2 So those are the critical pieces. And they have
3 to be heat treated to make sure they're not going to
4 leak. We have tattletales inside of the main condenser
5 to see if we're getting seawater, but the last thing is
6 having salinity alarms when seawater starts going into
7 our feed water which we're going to put into our steam
8 generators which (indiscernible) primary fluid on the
9 other side of those U-tubes.

10 So that is the critical piece. You have to --
11 we have to have the seawater on the inside of it because
12 we need the steam to condense on the outside. The steam
13 condensing on the outside keeps all that metal from
14 being cold. Because we go into the arctic waters as
15 well, just like the Nautilus did before back in what,
16 1958.

17 So we have to be able to withstand the
18 temperature changes. That's why we don't use carbon
19 steel. We use Inconel and that, because it's resistant
20 to chloride pitting as well as it doesn't have any phase
21 transformation that turns into a brittle substance.

22 While you have your fluids moving and your fluid
23 temperatures on the inside are good, that's why you
24 haven't seen many failures yet if they've been reusing
25 supercritical fluid that's above 88 degrees.

1 Q. Okay.

2 A. Because even with the --

3 Q. Let me stop you there and just a couple of final
4 questions.

5 Is the time of year that Bismarck and Burleigh
6 County would be at greatest risk is during the winter
7 months in extreme cold --

8 A. Yes.

9 Q. -- situations?

10 Okay. And in terms of the wind speed, the wind
11 direction, all variables that can change day to day,
12 temperature, humidity, is that part of the danger is you
13 just don't know when you might have a failure or a
14 rupture or a loss of power to this CO2 pipeline, is you
15 -- you want to plan for the worst and hope for the best?

16 A. Well, you have to plan for the worst because
17 emergency action on this thing is just going to be so
18 short. It's colorless. It's scentless. You can't even
19 taste it until it's 30 percent, and that's too late.
20 4 percent is going to cause you to pass out within four
21 minutes. And so that's what I base my -- what volume of
22 pipe you would need to be able to fill the whole valley
23 there with carbon dioxide bigger than 4 percent. So --

24 Q. Okay. Thank you, Mr. Steinbronn.

25 A. -- there's nothing you can't -- the warning will

1 be way too short.

2 Q. Okay. Thank you, Mr. Steinbronn. I don't have
3 anything further.

4 ALJ HOGAN: Mr. Mahlberg, any other questions?

5 MR. MAHLBERG: No thank you, Your Honor.

6 ALJ HOGAN: Mr. Pelham.

7 MR. PELHAM: No questions.

8 ALJ HOGAN: Mr. Jorde.

9 MR. JORDE: No questions.

10 ALJ HOGAN: Any other commissioner questions or
11 Mr. Dawson?

12 All right. That's all the questions we have for
13 you, Mr. Steinbronn. Thank you for testifying this
14 morning.

15 THE WITNESS: Thank you for having me.

16 ALJ HOGAN: All right. Mr. Jorde, I think the
17 next witness was yours. And it's about 11:45. I think
18 you indicated before that you anticipate this to be a
19 short testimony.

20 MR. JORDE: Well, I've been wrong --

21 ALJ HOGAN: I know you can't control the other
22 parties but --

23 MR. JORDE: Well, no, it's all good. Can I ask
24 Your Honor a question? Are you intending to break at
25 12:30 today or just in 15 minutes? Because that would

1 affect what we do.

2 ALJ HOGAN: We don't have a hard break at noon
3 so I think we can go a little over today if we need to.
4 So I think we want to be in the neighborhood of 12,
5 12:30, but I don't think there's any hard deadlines
6 today.

7 MR. JORDE: That helps very much. So in that
8 case, I will call Dr. John Abraham who appears
9 virtually, Your Honor.

10 ALJ HOGAN: Mr. Abraham, can you hear me, or Dr.
11 Abraham.

12 JOHN ABRAHAM: Yeah, I can. I'm trying to get
13 my camera to work and it looks like it's having trouble
14 with the camera so I can try to fix that. Can I testify
15 if my camera is not working?

16 ALJ HOGAN: Yes, I think it's okay as long as we
17 can hear you.

18 MR. JORDE: You can. I prefer to see you, but
19 on the GoTo Meeting, Doctor, next to the mic, do you see
20 that camera button? There we go.

21 ALJ HOGAN: There you are.

22 MR. JORDE: All right.

23 ALJ HOGAN: Dr. Abraham, I'll have you start by
24 stating your full name for the record and spelling your
25 last name.

1 JOHN ABRAHAM: Sure, sure. My name is John,
2 J-O-H-N, Patrick, P-A-T-R-I-C-K, Abraham, just like
3 Lincoln, A-B-R-A-H-A-M.

4 ALJ HOGAN: And, Dr. Abraham, before you testify
5 today, I'm required by law to advise you on the
6 penalties for perjury in the state of North Dakota.

7 Perjury is a Class C felony, punishable by a
8 maximum fine of \$10,000, a maximum five years'
9 imprisonment, or both.

10 Do you understand what perjury is?

11 JOHN ABRAHAM: I do.

12 ALJ HOGAN: And being advised of the potential
13 penalties for perjury, do you promise to tell the truth
14 in this case today?

15 JOHN ABRAHAM: I do.

16 ALJ HOGAN: All right. Thank you.

17 Go ahead, Mr. Jorde.

18 MR. JORDE: Yes. Thank you.

19 JOHN ABRAHAM,

20 being first duly sworn, was examined and testified as
21 follows:

22 DIRECT EXAMINATION

23 BY MR. JORDE:

24 Q. Doctor, we've marked as exhibit -- Landowner
25 Exhibit 43 a copy of your resume. And I would like to

1 ask you a few questions, and basically if you can kind
2 of essentially give the Commission a little flavor for
3 your education, experience, background, specifically in
4 mechanical engineering and, most poignantly for today,
5 in dispersion and modeling and computational fluid
6 dynamics. So, with that, I'll just kind of let you
7 highlight the key points to give the Commission a flavor
8 of your expertise.

9 A. Yeah, sure. And I can start talking, Mr. Jorde,
10 even before you get the exhibit up, if that's okay with
11 you.

12 Q. That's fine. I would ask that -- I think the
13 Commission might have it in front of them. And,
14 frankly, let me just offer it, I don't think there's
15 going to be objections, and then everyone will be able
16 to look at it.

17 MR. JORDE: I would offer Landowners 43.

18 ALJ HOGAN: Is there any objection to Landowner
19 43?

20 UNIDENTIFIED SPEAKER: 43?

21 ALJ HOGAN: Yes, 43.

22 MR. DUBLINSKE: And 43 is just the CV, not any
23 testimony; correct, Mr. Jorde?

24 MR. JORDE: That's -- that's correct.

25 MR. DUBLINSKE: No objection.

1 ALJ HOGAN: Mr. Pelham.

2 MR. PELHAM: No objection.

3 ALJ HOGAN: All right. 43 is received.

4 Q. (BY MR. JORDE) Okay. So please summarize the
5 salient -- the salient points.

6 A. Sure. And I'll be brief. So I have three
7 degrees in the field of mechanical engineering with a
8 special emphasis on an area called thermal sciences
9 which deal with flow. And it's the flow of heat and
10 it's also the flow of fluids and mass. And, by the way,
11 fluids can be liquids like water or they can be gases
12 like air. Both of those refer to fluids. So that's my
13 primary specialty. I do work in other disciplines of
14 engineering, but that's the relevant experience that I
15 bring to the table for this -- this case.

16 I have performed about 400 or 450 -- produced
17 400 or so pieces of research. Most of those are peer
18 reviewed in the scientific literature. And many of
19 those deal with a topic called CFD, which is short for
20 "computational fluid dynamics." And that is using
21 computers to predict where fluids will travel. And, in
22 addition, my scientific research heavily focuses on heat
23 transfer; how things get heated up and what happens when
24 they get heated up.

25 In addition to that, I have written textbook

1 chapters or textbook material on how to perform fluid
2 flow analysis and I've also published a peer-reviewed
3 study on carbon dioxide plumes that emerge after a
4 rupture, a pipeline rupture, and where they go.

5 So that's a brief summary of my -- oh, and,
6 lastly, I've got a lot of experience with what's called
7 "overland flooding," about 40 different journal papers
8 on the topic of water management and many of those
9 include flooding.

10 Q. And then do you edit or have you edited or been
11 a part of any type of publications that publish
12 scientific articles or research in any of these fields?

13 A. Yes. I'm the editor-in-chief of two of the top
14 journals in numerical heat transfer that deals with this
15 topic called CFD. I'm also the primary editor on the
16 top-ranked book series in heat transfer which also deals
17 with fluid flow. And I'm also the editor on another
18 series published by CRC Press on the same topic. So I'm
19 editor of four different publications.

20 Q. And, sir, approximately how many times, be it
21 agency or courtroom proceedings, have you testified as
22 an expert in your various fields of expertise?

23 A. I've testified in trials or hearings such as
24 this in the low 20s. Maybe 22 or 23 times. And I've
25 sat for depositions approximately 50 times.

1 Q. Now getting to the North Dakota specific matter
2 before us here, and to speed this along a bit, is it
3 true or does it fit with your recollection that over a
4 year ago I had contacted you to see if you would be
5 interested in providing technical expertise in this
6 particular matter?

7 A. Yeah. That's what I remember. In the first
8 maybe quarter of last year, that's my recollection, we
9 had our first contact related to this case.

10 Q. And then at some point -- you probably don't
11 necessarily remember, but at some point this matter was
12 decided, at least initially the PSC made a ruling
13 denying the application and I never ended up utilizing
14 you last year. Is that kind of a fair summary?

15 A. Yeah, that's correct.

16 Q. But over a year ago when I initially contacted
17 you, is it true that I asked if you would be willing and
18 able to review and vet Summit's or their consultants'
19 data related to any of their dispersion modeling or risk
20 analysis?

21 A. Yes. That's what I understood part of my
22 primary tasks to be.

23 Q. And then without stating the obvious, I guess in
24 order to review Summit's, what they claim or present as
25 the dispersion, the plume analysis, the risk, their

1 methodology, inputs, outputs, would you need all of
2 those things in order to vet their ultimate conclusions?

3 A. Well, yeah. I mean, to state the obvious, it's
4 true, I need to see their work in order to evaluate
5 their work. And I haven't been provided any of their
6 materials. And it's my understanding that it hasn't
7 been made available. So what you stated is correct.

8 Q. And do you recall that last year there were some
9 attempts to get that material, but then ultimately the
10 Commission had denied the application, and then again
11 this year there's been renewed attempts, but we don't
12 have those Summit documents. Is that your
13 understanding?

14 A. That is my understanding.

15 Q. All right. And so it's impossible then for you
16 to perform the task on behalf of the landowner clients
17 of reviewing and vetting and testing the inputs and the
18 values that Summit may or may not have used in whatever
19 risk analysis they did unless you are furnished all that
20 documentation and the methodology behind it. Is that
21 correct?

22 A. Yeah. I mean, that's correct. I mean, I can't
23 review what I don't have access to. And that's a short
24 way of putting it. You were a little more eloquent,
25 but, yes, that is correct.

1 Q. All right. So until such time that that's
2 provided, you wouldn't be able to perform the function
3 for which I asked you for assistance in this case;
4 correct?

5 A. Correct.

6 Q. All right.

7 MR. JORDE: I don't have any further questions
8 of this witness. Sir, I'll turn you over to cross, if
9 there are any, on the limited topics we discussed in
10 direct.

11 ALJ HOGAN: Mr. Dublinske, any questions?

12 MR. DUBLINSKE: No questions, Your Honor.

13 ALJ HOGAN: Mr. Pelham.

14 MR. PELHAM: I don't have any questions. Thank
15 you.

16 ALJ HOGAN: Mr. Bakke.

17 MR. BAKKE: No questions, but "Go Tommies."

18 THE WITNESS: Yes, "Go Tommies." Thank you for
19 that.

20 ALJ HOGAN: Commissioner Christmann.

21 COMMISSIONER CHRISTMANN: None, Your Honor.
22 Thank you.

23 ALJ HOGAN: Commissioner Haugen-Hoffart.

24 COMMISSIONER HAUGEN-HOFFART: No, I do not.

25 ALJ HOGAN: Mr. Dawson.

1 SUBSTITUTE DECISIONMAKER DAWSON: No questions.

2 ALJ HOGAN: All right. Well, you got the least
3 amount of questions in our hearing so far, Dr. Abraham.

4 THE WITNESS: It's so anticlimactic. I expected
5 a grilling. And if you need me to come back, I'd be
6 happy to do so.

7 MR. JORDE: Thank you, Doctor.

8 ALJ HOGAN: Thank you for appearing this
9 morning.

10 All right. I think we will take our lunch break
11 next, but I just want to confirm, I think, Mr. Jorde,
12 you have all the witnesses this afternoon, so could you
13 confirm who you're calling this afternoon?

14 MR. JORDE: So, yes. And maybe to everyone's
15 joy, I'm not sure, but based on how everything has
16 gone -- and let me just preface, you know, I -- I'm
17 familiar with not getting my way and so no hard feelings
18 there, but based on how the rulings and things have
19 gone, I'm only going to have one more witness and that
20 would be Mr. Howard who's waiting on the line. I think
21 I could have him on and off in 15 minutes, and that's my
22 last witness.

23 ALJ HOGAN: For today or for the hearing?

24 MR. JORDE: For today.

25 ALJ HOGAN: For today.

1 MR. JORDE: No. But I want to be clear, just so
2 this is not a trick, on June 3rd I'm planning on having
3 one witness. So I'm saying I'm cutting the rest of my
4 experts loose, is what I'm telling you.

5 ALJ HOGAN: And what you're asking is to take
6 Mr. Howard's testimony now --

7 MR. JORDE: I think his entire testimony is
8 going to take less than 25 minutes and then we're done,
9 unless Mr. Dublinske has anyone that can be in rebuttal
10 on either remote or in person, but then I'm done for
11 today.

12 ALJ HOGAN: Mr. Bakke, you don't have anybody
13 else available for today?

14 MR. BAKKE: I do not. My one witness, as I
15 said, had a medical issue so she can't be here.

16 ALJ HOGAN: Okay. Mr. Dublinske, I don't know
17 if you were aware of possible hearing time this
18 afternoon but --

19 MR. DUBLINSKE: Mr. Jorde and I talked about
20 that last night but we -- I did not know who all he was
21 going to pass on or not and so we were still waiting to
22 see what happened today to determine rebuttal. We do
23 not have witnesses lined up. We can certainly move them
24 to Monday morning instead of Monday afternoon to
25 accommodate the change in space. If Mr. Bakke's

1 concluded and Mr. Jorde only has one, we can have
2 everybody ready earlier in the day, but, unfortunately,
3 we can't have folks ready yet this afternoon.

4 ALJ HOGAN: Any objection to taking Mr. Howard's
5 testimony and then recessing for the rest of the day?

6 COMMISSIONER CHRISTMANN: Your Honor, I'm only
7 speaking for myself. I don't object to doing that. I
8 do have this question. I think I understood Mr. Jorde
9 to say that when we finish with this witness, he will
10 just have one on Monday. Which one is that?

11 MR. JORDE: Yes. That -- so it's Jon Hagerott,
12 an affected landowner who unfortunately couldn't make
13 it. I tried him the first three days of this week. So
14 that's an affected landowner. I don't know if
15 Mr. Rockstad, another affected landowner would testify.
16 He would be remote. He's out of state. But to be very
17 clear, I am not going to be calling any of my
18 non-landowner witnesses, and those are the only two
19 landowner witnesses that would potentially testify on
20 June 3rd.

21 COMMISSIONER CHRISTMANN: Okay.

22 ALJ HOGAN: Are you two okay with proceeding?

23 COMMISSIONER HAUGEN-HOFFART: Yes.

24 ALJ HOGAN: Okay. Yes. And so I'm not sure, is
25 it Mr. Howard or Dr. Howard?

1 MR. JORDE: Mr. Howard, yes.

2 ALJ HOGAN: Mr. Howard.

3 Mr. Howard, can you hear me okay?

4 JASON HOWARD: Yes. Can you hear me?

5 ALJ HOGAN: Yes.

6 JASON HOWARD: Great.

7 ALJ HOGAN: I will have you start by stating
8 your full name and spelling your last name for the
9 record.

10 JASON HOWARD: Full name is Jason Richard
11 Howard, H-O-W-A-R-D.

12 ALJ HOGAN: And, Mr. Howard, I know you were on
13 and off this morning. Did you hear me go through the
14 penalties for perjury already today?

15 JASON HOWARD: Yes.

16 ALJ HOGAN: And do you understand what perjury
17 is?

18 JASON HOWARD: I do.

19 ALJ HOGAN: And being advised of the potential
20 penalties for perjury, do you promise to tell the truth
21 in this case today?

22 JASON HOWARD: I do.

23 ALJ HOGAN: All right. Thank you.
24 Go ahead, Mr. Jorde.

25 MR. JORDE: And I'm sorry, I beg your pardon, I

1 want to circle back to Commissioner Christmann's
2 question. I did have one more witness and that -- I
3 forgot, he's not on my list. That's Victor Schock.
4 I've been communicating with Mr. Pelham. It's simply a
5 -- basically procedural questions, and he would take
6 about three minutes. So I -- I could call him today, on
7 the 3rd or on the 4th. It doesn't matter. But I just
8 want to be clear that I forgot to mention Mr. Schock.

9 **JASON HOWARD,**

10 being first duly sworn, was examined and testified as
11 follows:

12 DIRECT EXAMINATION

13 BY MR. JORDE:

14 Q. But with that, Mr. Howard, thank you for waiting
15 so patiently.

16 You've prepared prefiled or direct testimony in
17 this matter. I'll tell you it's been marked in these
18 proceedings as Exhibit 47. That's not relevant to you.
19 But do you recall providing prefiled testimony of a
20 couple pages and then attached to it some -- well, your
21 resume and then various maps that you prepared?

22 A. Yes.

23 ALJ HOGAN: Can you hang on, Mr. Jorde? Do we
24 have hard copies of those?

25 MR. JORDE: Oh, sorry. I thought Roseanne had

1 passed those out. I apologize.

2 ALJ HOGAN: They're coming around just now so...

3 MR. JORDE: Okay.

4 Q. (BY MR. JORDE) So while those are circulating,
5 maybe I can just have you tell a little bit to summarize
6 your resume and your expertise in the GIS mapping field.

7 A. Sure. I have 25 years -- I think it's 25 years
8 of professional expertise in the GIS field. Currently
9 working for Maricopa Association of Governments in
10 Phoenix, Arizona, where I have been the GIS program
11 manager for, I think, about 16 years now. I've been at
12 the agency about 17 total. Got my undergraduate degree
13 in geography from the University of Colorado, Colorado
14 Springs, and a master's in geography at Arizona State
15 University.

16 Q. And by looking at your resume, sir, without
17 going through every page, it's -- almost everything you
18 have listed there in your professional career has to do
19 with GIS mapping or your geography or cartography. And
20 for the benefit of the Commission, what does "GIS" stand
21 for?

22 A. Geographic information systems.

23 Q. And today, sir, so much can be done if you have
24 access to various software systems and data. And just
25 kind of summarize generally what your methods were and

1 what you did here to produce the attachments to
2 Exhibit 47?

3 A. Okay. Well, there's the -- the attachments that
4 go county-by-county and depict the pipeline route as
5 provided by Summit as well as a one-mile buffer. That
6 one-mile buffer was based on emergency response
7 information from Satartia, Mississippi. And this
8 actually originated from work I have been doing in Iowa
9 and the -- we and basically the -- I would call my
10 steering committee of individuals who are volunteers in
11 Iowa came up with this one-mile buffer because it did
12 track with what happened in Satartia. And for
13 everyone's edification, Satartia was about a mile from
14 the pipeline rupture so we chose that as a good buffer
15 for that pipeline.

16 Q. And let me just stop you there for a second
17 because I'm going to offer the exhibit in a moment and
18 I'm going to get into those attachments in a little bit
19 more detail, but in terms of the process, like the
20 ingredients that went into this, if we could -- you
21 started with Summit's publicly-available maps, I think,
22 as maybe -- was it January 2024, what were available on
23 the North Dakota PSC website; is that right?

24 A. That's correct.

25 Q. Okay. And then you take their maps, their data,

1 and you accept that as true. And then you look for, in
2 your first set, was it residences within various
3 distances?

4 A. Yes. I've been referring to them as "dwelling
5 units" throughout this whole process --

6 Q. Okay.

7 A. -- again, back to Iowa. But for what we're
8 dealing with here in North Dakota, they're just going to
9 be single-family residences. We're not getting in -- I
10 didn't identify -- I don't think I identified any
11 apartments or any other type of dwelling unit. So
12 basically dwelling units is single-family residences.
13 That's where that one-mile buffer really comes in, is
14 that's kind of the defining boundary. I wanted to
15 identify houses within a mile either side of the
16 pipeline. And that was done visually.

17 So once I had located the pipeline, got
18 my one-mile buffer, I went through using aerial imagery
19 that's publicly available through ESRI and identified
20 what -- what I could identify from that as dwelling
21 units. I tried to use some Google Street View if I
22 could if there was any question, but that's kind of hit
23 and miss with the coverage there. So that's how I
24 identified those dwelling units.

25 Q. Okay. And then, again, at this point I'm just

1 laying some kind of quick foundation for each set of the
2 attachments.

3 So then moving to what you refer to as
4 Attachment 3, that's the landslide area. And then kind
5 of the ingredients there, what was the under -- you
6 accepted as true Summit's route based on their PSC-filed
7 data. And then it looks like, did you overlay that on
8 something?

9 A. Yes. That -- that I paired with
10 publicly-available landslide data from the North Dakota
11 Geological Survey. And these are existing landslides
12 that the Geological Survey has identified.

13 Q. All right. And then it looks like, lastly,
14 which would be, I believe, Attachment 4, it's two color
15 aerials -- or is that part of the other attachment? It
16 looks like you go into detail on the landslides. Okay.

17 A. Yeah, that -- that's the color -- that's just
18 detail where there's an intersection between known
19 landslides and the pipeline route.

20 Q. Okay.

21 MR. JORDE: With that, I would offer Exhibit 47.

22 ALJ HOGAN: Any objection to 47?

23 MR. DUBLINSKE: No objection.

24 ALJ HOGAN: Mr. Pelham.

25 MR. PELHAM: No objection.

1 ALJ HOGAN: 47 is received.

2 Q. (BY MR. JORDE) And so, again, the Commission
3 has that and I don't need to get into every nitty-gritty
4 detail, but I just want to, for the record, make sure to
5 touch on a couple things.

6 So in the first several pages you're looking at
7 dwelling units. And you've defined how you went about
8 that and what it excludes. And then you select the
9 distances of 400 feet or less, and then 401 foot up to
10 1,855, and then greater than 1,855 but yet still within
11 the one-mile buffer. Is that fair?

12 A. Correct.

13 Q. And, sir, approximately how many dwelling units,
14 based on your definition, so not apartments or things
15 other than what's, I think, single-family residences,
16 did you come up with in that 401 to 1,855 distance?

17 A. 163 dwelling units.

18 Q. All right. And, again, you didn't do hospitals
19 or daycare centers or other sensitive things. You were
20 focused simply on dwelling units; correct?

21 A. That's correct. The hospitals, daycares,
22 nursing homes, those would be group quarters and I would
23 have difficulty -- it would be more difficult for me to
24 identify their capacity anyway.

25 Q. Okay. Thank you for that clarification.

1 And then if I toggle down to the landslide data,
2 it looks like you've got -- and I'm looking at on page,
3 what is 19 of the exhibit, you've got the -- showing
4 kind of the eastern portion of North Dakota and Cass,
5 Richland, Sargent, Dickey counties, and then you get
6 over to the area by Bismarck on page 20.

7 And tell me why you highlighted and included
8 page -- the last two pages of the color aerial versions?

9 A. Those are -- those are the areas where Summit's
10 pipeline route crosses known landslide areas.

11 Q. Okay. All right.

12 A. So to be clear -- to be clear, the Geological
13 Survey has identified existing landslides, land -- you
14 know, it's already moved but they -- there's -- that
15 doesn't exclude the potential for future movement.

16 Q. All right. And to be clear and fair to you,
17 you're not here to opine on the relative risks of being
18 in that area. This is for demonstrative and educational
19 purposes for the Commission and their consideration
20 based on your GIS expertise; correct?

21 A. That is correct.

22 Q. All right. Sir, I thank you. With that, again,
23 it's very detailed and I'm going to leave it there and
24 see if there's any cross-examination questions for you.
25 Thank you.

1 ALJ HOGAN: Mr. Dublinske, any questions?

2 MR. DUBLINSKE: No questions, Your Honor.

3 ALJ HOGAN: Mr. Pelham.

4 CROSS EXAMINATION

5 BY MR. PELHAM:

6 Q. Sir, I'm just wondering, did you do any other
7 potential route analysis in comparison to the population
8 numbers that would determine your one-mile buffer for
9 the proposed --

10 A. I did not. I did not. I took Summit's --
11 Summit's route as written.

12 Q. Do you know whether or not a potential route
13 would exist in the state of North Dakota that would
14 avoid all population, human population?

15 A. I do not. I do not. But just judging by what I
16 can see of North Dakota's landscape, it's fairly
17 sparsely populated.

18 Q. Thank you, sir. I don't have any other
19 questions for you.

20 ALJ HOGAN: Mr. Bakke, any questions?

21 MR. BAKKE: Yes, just briefly.

22 CROSS EXAMINATION

23 BY MR. BAKKE:

24 Q. Could you turn to page 9 of Exhibit 47 where you
25 have the map of Burleigh County?

1 A. Burleigh, got it.

2 Q. Okay. And did you happen to count up how many
3 dwelling units there were within the -- which are the
4 yellow ones from 401 feet to 1,855 feet?

5 A. I haven't, but I can if you can humor me for a
6 minute.

7 Q. Sure. And then I'm going to have the same
8 question regarding the greater than 1,855 feet but still
9 within one mile.

10 (Pause)

11 A. So Burleigh. You were looking for the 401 --

12 Q. 401 to 1,855 first.

13 (Pause)

14 A. So we should have -- in the 401 to 1,855 range,
15 we should have 58 units.

16 Q. Okay. And then from the 1,855 feet to 1 mile,
17 how many have you identified in Burleigh County?

18 A. We should have 170.

19 Q. Dwelling units?

20 A. Dwelling units.

21 Q. Okay. And how is "dwelling units" defined?

22 A. Basically, for this, it's -- it would be a
23 single-family home or a multi-family residence, but I
24 did not -- I did not identify any apartment dwellings in
25 Burleigh County.

1 Q. Okay. So your definition of "dwelling units"
2 would be occupied structures by humans?

3 A. Occupiable. I can't -- I can't speak to whether
4 they are occupied or not. I can't -- likewise, I can't
5 really identify whether a home is abandoned or not from
6 aerials. I can generally get a pretty good idea whether
7 a house is abandoned, just kind of based on, you know,
8 what kind of activity looks like is taking place around
9 it. And I did try to exclude those.

10 Q. So you didn't identify any abandoned dwelling
11 units in Burleigh County within the one-mile buffer?

12 A. I would have been trying not to include those.

13 Q. Okay. And then how about within the 400 feet or
14 less, were there any identified? There's a lot of dots
15 here so it's kind of hard to see.

16 A. Yes, there's -- there was -- there was one, I
17 think. Let me just verify that.

18 (Pause)

19 A. Yeah. No, not within 400. The one -- the one
20 within 400 was in -- there was actually one within 400
21 and that was Sargent County.

22 Q. Okay. And then in looking at the -- all of the
23 maps of North Dakota identifying the dwelling units,
24 including Burleigh County through all the other ones in
25 Exhibit 47 that goes -- continues on after that, it

1 looked to me like the -- the county by far that had the
2 greatest number of dwelling units within one mile of the
3 proposed location of the Summit pipeline route is
4 Burleigh County. Is that accurate?

5 A. That would -- that would be my guess.

6 Q. I mean, rather dramatic difference between
7 Burleigh County and the other counties in terms of the
8 number of dwelling units within one mile?

9 A. Correct.

10 Q. Okay. That's all the questions --

11 A. Yeah, I might --

12 Q. -- I had.

13 A. Okay.

14 Q. Go ahead.

15 A. I might add that rather than including the count
16 of the individual dwelling units at the bottom of the
17 map in the legend, I included an estimated impact
18 population, and that would more or less track with the
19 number of dwelling units since your persons per
20 household across these counties is fairly -- fairly
21 consistent.

22 Q. Okay. And for Burleigh County, that -- the
23 estimated impacted population was 992?

24 A. Correct.

25 Q. Which, in comparison to the other counties, is

1 substantially more?

2 A. That is -- yes, it is substantially more.

3 Q. Okay.

4 MR. BAKKE: That's all the questions I have.

5 ALJ HOGAN: Commissioner Christmann.

6 COMMISSIONER CHRISTMANN: Are you familiar with
7 North Dakota code and what our setback requirement is
8 from occupied structures?

9 THE WITNESS: I believe it was 500 feet.

10 COMMISSIONER CHRISTMANN: And then did you say
11 why you chose to base this on 400 rather than 500?

12 THE WITNESS: I carried that over from our work
13 at -- well, my work in Iowa where -- I'll just tell you
14 where that originated from. The 400 foot was a number
15 that Iowa Farm Bureau came up with as recommending
16 keeping -- keeping structures away from. And so the
17 400 feet was a bit more conservative and it carried over
18 -- we just carried that over to North Dakota. And
19 within that -- within that -- if you're looking at
20 the 500-foot-threshold, at that point you're only
21 talking about two -- is it two? Yeah, it's, I think,
22 two dwelling units across the entire pipeline in North
23 Dakota.

24 COMMISSIONER CHRISTMANN: Does Iowa, like from a
25 legislature or some official elected body, have a

1 setback requirement? I'm curious why you chose to use
2 Farm Bureau's.

3 THE WITNESS: That's what was available. I
4 don't -- to my knowledge, there's not a statewide
5 standard. I believe individual counties are attempting
6 to adopt something, but all we really have to go on is
7 Iowa Farm Bureau's recommendation --

8 COMMISSIONER CHRISTMANN: So the State of Iowa
9 doesn't have a setback requirement?

10 THE WITNESS: Not that I'm aware of.

11 COMMISSIONER CHRISTMANN: Okay. And then
12 regarding the landslide areas, so it's just the two of
13 them and they're pretty close together, one in Cass and
14 one in Richland counties; right?

15 THE WITNESS: Yes.

16 COMMISSIONER CHRISTMANN: And where did you get
17 that information from?

18 THE WITNESS: That's available online from the
19 North Dakota Geological Survey --

20 COMMISSIONER CHRISTMANN: Are you aware -- are
21 you aware that these applications are sent to the North
22 Dakota Geological Survey and they provide comments to us
23 on things that should be avoided or things that should
24 be used with certain limitations or things like that?

25 THE WITNESS: Well, I am now.

1 COMMISSIONER CHRISTMANN: Okay. Thank you. No
2 other questions.

3 ALJ HOGAN: Commissioner Haugen-Hoffart.

4 COMMISSIONER HAUGEN-HOFFART: Thank you for your
5 testimony. I have no questions.

6 ALJ HOGAN: Mr. Dawson, any questions?

7 SUBSTITUTE DECISIONMAKER DAWSON: Why did you
8 choose 1,855 feet?

9 THE WITNESS: 1,855 feet is based on
10 publicly-available data from Navigator's modeling for
11 South Dakota and Illinois. And so that was the
12 distances -- the CO2 plume could travel with a
13 concentration of 40,000 parts per million and from an
14 8-inch pipeline. We didn't -- we don't have anything
15 else from Summit so the Navigator data is all we have to
16 go on at this point.

17 SUBSTITUTE DECISIONMAKER DAWSON: No further
18 questions.

19 ALJ HOGAN: Any redirect, Mr. Jorde?

20 MR. JORDE: No.

21 Thank you, Mr. Howard. I don't have any
22 questions. I appreciate it.

23 THE WITNESS: Okay.

24 ALJ HOGAN: All right. Thank you, Mr. Howard,
25 for testifying for us today.

1 THE WITNESS: Thank you, Chair.

2 ALJ HOGAN: All right. Any other matters we
3 need to address before we conclude?

4 Mr. Pelham?

5 MR. PELHAM: Thank you, Your Honor. I would
6 like to address Mr. Jorde's comment about calling Victor
7 Schock to the stand. I've communicated with Mr. Leibel
8 as to the -- what I understand the general nature of the
9 questions that Mr. Schock is going to be asked. I
10 provided some information to Mr. Jorde last night. I
11 don't know if that's satisfactory or not.

12 I would note that Mr. Schock was not listed as a
13 witness. He was subsequently listed as a witness on one
14 of the forms. But I would like to get this matter
15 resolved now rather than later.

16 MR. JORDE: And I'm happy to call him right now.
17 Like I said, it would just take a few minutes. I will
18 list him for June 4th if we don't get it done. I don't
19 want to be difficult about this. And it's not going to
20 be any gotcha questions for him. I just need to
21 complete the record on this matter.

22 ALJ HOGAN: Mr. Pelham, when you mean "get it
23 done," do you mean call Mr. Schock?

24 MR. PELHAM: I think we do it now.

25 ALJ HOGAN: Okay. Mr. Schock, do you want to

1 take the witness stand? I'll have you start by stating
2 your full name for the record and spelling your last
3 name.

4 MR. DUBLINSKE: Your Honor, if we may, it is
5 obviously a bit -- there are some issues with calling
6 staff counsel. My understanding from the conversation
7 that Mr. Pelham had with Mr. Leibel was that this was an
8 issue that could be resolved by stipulation rather than
9 by calling the witness. On the basis of that
10 representation, we agreed to provide certain
11 information, which I understand Mr. Pelham provided last
12 night, that we thought was for the purpose of resolving
13 this issue by stipulation rather than calling the
14 witness. And I am not aware of what changed since that
15 representation was made, but we certainly kept our end
16 of the deal to allow the information to be provided to
17 Mr. Jorde.

18 MR. PELHAM: If I might just respond, Mr. Jorde
19 hasn't communicated with me. I mean, ordinarily, I
20 would pick up the phone and call someone, but that
21 didn't happen. So I communicated that information to
22 him. I had a communication not with Mr. Jorde but with
23 his colleague, Mr. Leibel, who's not -- unable to be
24 here today, but I provided the information, but
25 apparently it's not satisfactory given Mr. Jorde's

1 representations earlier this morning to still seek to
2 call Mr. Schock. So I don't know what the -- what the
3 issue is.

4 ALJ HOGAN: Mr. Jorde, can you enlighten us?

5 MR. JORDE: Sure. Is there a restriction on
6 calling Mr. Schock as a witness? If not, we're,
7 frankly, kind of wasting our time with all this. I'm
8 going to be done with him in three minutes or not. So
9 if there's not a restriction, can we just proceed,
10 respectfully, please?

11 ALJ HOGAN: I personally have never looked into
12 that issue. I mean, I -- Mr. Schock has obviously
13 questioned witnesses in this proceeding so far and is
14 probably going to be assisting in the decision-making
15 process so I think it is an unusual request. I don't
16 know -- I don't know the substance of the information
17 that was requested or provided. I know -- all I know is
18 there's been discussions that have been had between the
19 parties outside of our hearing regarding calling
20 Mr. Schock as a witness.

21 So I think if there was a way to put this
22 information into the record without calling him as a
23 witness, that would be better. Because I do have
24 concerns about opening a potential can of worms there.

25 MR. JORDE: Well, I'm not going to ask him any

1 opinions. This is just fact -- you know, I just need to
2 get some facts into the record through him. So -- I
3 mean, I'm sorry, I'm not trying to be difficult, but I
4 just -- unless there's a legal prohibition on calling
5 him as a witness, I don't see how this is any different
6 than anyone else that's testified.

7 MR. BAKKE: And, Your Honor, if I could, just
8 for the record, you said there were communications
9 between the parties. I'm not in the loop on this at
10 all. I checked my emails just now and I don't see an
11 email from Mr. Pelham, but sometimes on my phone they
12 stack so I don't know if that was sent to me as well.

13 MR. PELHAM: No, it wasn't. I didn't send you
14 anything.

15 MR. BAKKE: Yeah. So I don't even know what the
16 -- what the issue is so I'm -- just so you know, I
17 wasn't one of the parties involved in any of these
18 communications, but I guess probably I should be.

19 ALJ HOGAN: Well, I guess -- I've noted my -- my
20 thoughts on potential concerns. I haven't looked into
21 this issue so I guess I can't say for certain whether or
22 not it is or it isn't an issue.

23 Mr. Pelham, I assume, since you're maybe
24 reluctantly saying --

25 MR. PELHAM: Well, I mean, look, my preference

1 is to provide the information that Mr. Jorde is
2 requesting. I provided him the information that I
3 understand that he's requested, but he's still insisting
4 on calling Mr. Schock.

5 There's past precedence for Commission staff
6 being called as witnesses at hearings so I don't think
7 that there's any legal preclusion from it. But, you
8 know, again, we're spending however much time we spent
9 talking about this, was already attempted to be resolved
10 prior to spending the time on it.

11 My preference is to work with Mr. Jorde on that,
12 but from what I understand and him still insisting on
13 calling Mr. Schock, that would not result in any -- in
14 any ability to do that. So rather than doing that, my
15 preference would be, is to just get it done now.

16 MR. DUBLINSKE: Your Honor, my only concern --
17 and obviously, you know, there have been a lot of things
18 that we certainly believe, rightly or wrongly, are
19 undertaken for delay. What we don't want is a situation
20 where Mr. Schock is up here for a couple of procedural
21 questions and then there's later an argument, not
22 necessarily by Mr. Jorde but by anybody, that in that
23 case Mr. Schock should not be able to advise the
24 Commission, for example, and whether or not that hinders
25 the Commission's processes.

1 Again, I haven't fully researched it. I know
2 that that is an issue in some states. That's the sort
3 of thing I'm trying to avoid.

4 And if we can just stipulate to the information
5 that Mr. Jorde wants, it solves all those problems. It
6 prevents all of those potentialities down the road. And
7 I thought we had that worked out and, you know, I guess
8 my -- my bad for us cooperating.

9 ALJ HOGAN: Mr. Jorde, is there any reason why
10 you can't stipulate?

11 MR. JORDE: Well, I wouldn't -- well, I guess my
12 answer to that would be there's no reason why I called
13 any -- I mean, sure, there's multiple ways to do
14 anything. There's no prohibition on what I'm
15 requesting. And I respectfully request to just get on
16 with this, please.

17 MR. PELHAM: Well, before that, Judge, I would
18 -- I would just like a stipulation, at least from
19 Mr. Jorde, that he's not going to later object to
20 Mr. Schock's further involvement in the case because of
21 the fact that he was called as a witness.

22 MR. JORDE: Absolutely not, meaning I will
23 stipulate to that.

24 MR. PELHAM: Sure.

25 MR. JORDE: I don't want Mr. Schock off the

1 case. He clearly knows what he's doing. So that is not
2 the intent. Absolutely.

3 MR. PELHAM: And I appreciate that, Mr. Jorde.
4 And that was Mr. Dublinske's comment so I just wanted to
5 make sure that that wasn't an issue.

6 So I don't have an objection to doing it and
7 having Mr. Schock examined on the limited procedural
8 basis that's been represented. And if there's a
9 question that's objectionable, then I'll object.

10 MR. JORDE: Absolutely.

11 ALJ HOGAN: All right. Does that satisfy your
12 concern, Mr. Dublinske?

13 MR. DUBLINSKE: It really is Mr. Pelham's issue.
14 If Mr. Pelham's comfortable, we don't object.

15 ALJ HOGAN: Okay. All right. Mr. Schock, do
16 you want to state your full name and spell your last
17 name for the record?

18 VICTOR SCHOCK: Victor Schock, S-C-H-O-C-K.

19 ALJ HOGAN: And I know you've heard me go
20 through the penalties for perjury numerous times --

21 VICTOR SCHOCK: Many, many times.

22 ALJ HOGAN: -- over the last couple days. Yep.
23 And do you understand what perjury is?

24 VICTOR SCHOCK: I do.

25 ALJ HOGAN: And being advised of the potential

1 penalties for perjury, do you promise to tell the truth
2 in this case today?

3 VICTOR SCHOCK: Yes, I do.

4 ALJ HOGAN: All right. Thank you.

5 Go ahead, Mr. Jorde.

6 MR. JORDE: Thank you.

7 VICTOR SCHOCK,

8 being first duly sworn, was examined and testified as
9 follows:

10 DIRECT EXAMINATION

11 BY MR. JORDE:

12 Q. And thank you, Mr. Schock, for bearing with us.
13 And for what may seem like stating the obvious, sir, you
14 are the director of the Public Utilities of the North
15 Dakota Public Service Commission; correct?

16 A. Yes.

17 Q. And you have responsibilities related to the
18 Summit Carbon pipeline docket that brings us here today;
19 is that correct?

20 A. Correct.

21 Q. And as a part of those responsibilities, without
22 telling me any details, is it true that you or the
23 persons working with you at the Public Service
24 Commission receive documents from all sorts of sources,
25 from Summit, from third parties, from state agencies,

1 from other people concerned in this docket?

2 A. Correct.

3 Q. And is the -- is the -- do you see yourself as
4 the PSC as both a party to the proceedings and an
5 advisor to the Commission?

6 MR. PELHAM: I would object. I think that calls
7 for a legal conclusion.

8 ALJ HOGAN: I agree.

9 MR. JORDE: Okay.

10 ALJ HOGAN: The objection is sustained.

11 MR. JORDE: That's fine. I mean, I guess I can
12 figure out what that answer is.

13 Q. (BY MR. JORDE) And, sir, in this particular
14 case, it's been proven that Summit did provide certain
15 dispersion modeling or certain type of documents or data
16 or information related to dispersion modeling or
17 methodologies and pipeline risk assessment to the PSC.
18 Is that limited fact true?

19 A. Yes.

20 Q. And for that type of data that was provided by
21 Summit to the PSC, are you aware that that data has not
22 been provided to the other parties in this matter
23 pursuant to a protective order?

24 A. I'm not sure what parties Summit may or may not
25 have provided it to. I know the Commission has not

1 provided that to any of the parties.

2 Q. Okay. That's fair.

3 And are you able, without telling me any of the
4 content, any of the findings, any of the inputs, any of
5 the relevant underlying data, are you in a position to
6 tell me, for instance, like the title or the name of the
7 documents that the PSC received relative to the
8 dispersion or risk that the PSC has not provided to the
9 parties?

10 MR. PELHAM: I'm just going to state an
11 objection that, by answering this question, there's no
12 waiver on behalf of the Commission as to its previously
13 determined order. But with that stated --

14 MR. JORDE: Yep, yep. I'll stipulate to that,
15 Mr. Pelham.

16 MR. PELHAM: Okay.

17 MR. DUBLINSKE: And, Your Honor, for the record,
18 we would also reserve our rights and want to make sure
19 that disclosing the titles of the documents is not
20 intended to be a waiver on behalf of SCS Carbon
21 Transport either.

22 MR. JORDE: So stipulated.

23 ALJ HOGAN: All right. Go ahead.

24 A. So with that, so I guess the titles, and I had
25 to -- they're lengthy so I had to write them down for

1 myself, but it's "Dispersion Modeling Methodology," is
2 one of the documents. The other is "Pipeline Risk
3 Assessment Overview Report."

4 Q. Okay. And, again, I'm not trying to circumvent,
5 I don't want you to tell me anything about the content
6 of those documents, but is that, sir, to your
7 understanding the sum and substance of any type of
8 dispersion or plume modeling analysis or inputs of any
9 kind that the Commission has received from Summit that
10 also have not been provided to the parties by the
11 Commission?

12 A. So I guess the way I would characterize it is
13 the Commission specifically asked Summit for dispersion
14 modeling at one of the hearings last year, I forget
15 which one or exactly which date, and these documents
16 were what we received in that response to that request.

17 Q. Understood. And -- okay. And that includes
18 that pipeline risk assessment document you referenced;
19 correct?

20 A. Correct.

21 Q. All right. I think that's all I have, sir. I
22 just wanted to lay that foundation. I appreciate your
23 willingness to answer those questions.

24 ALJ HOGAN: Mr. Dublinske, any questions?

25 MR. DUBLINSKE: No questions, Your Honor.

1 ALJ HOGAN: Mr. Pelham.

2 MR. PELHAM: No, Your Honor.

3 ALJ HOGAN: Mr. Bakke.

4 MR. BAKKE: No, Your Honor.

5 ALJ HOGAN: Commissioner Christmann.

6 COMMISSIONER CHRISTMANN: None.

7 ALJ HOGAN: Commissioner Haugen-Hoffart.

8 COMMISSIONER HAUGEN-HOFFART: No.

9 ALJ HOGAN: Mr. Dawson.

10 SUBSTITUTE DECISIONMAKER DAWSON: None for me.

11 ALJ HOGAN: All right. Thank you, Mr. Schock.

12 All right. Any other matters we need to address

13 before we conclude today?

14 Commissioner Christmann?

15 COMMISSIONER CHRISTMANN: I just am clarifying.

16 Mr. Jorde said he intended to call Landowner Hagerott

17 and maybe Rockstad on Monday, but did Mr. Bakke -- what

18 witnesses is he calling?

19 MR. BAKKE: So we may call Bailey Elkins, but

20 that's our witness who has some medical issues so I just

21 don't know how that's going to -- and possibly

22 work-related. I'll try to find out as soon as I can.

23 But I suppose, you know, depending on the -- I don't

24 want to get into someone's personal information --

25 COMMISSIONER CHRISTMANN: Sure.

1 MR. BAKKE: -- but depending on her condition, I
2 may not know until Monday.

3 COMMISSIONER CHRISTMANN: But that's the only
4 one.

5 MR. BAKKE: That's the only one, yeah.

6 COMMISSIONER CHRISTMANN: And do we know who
7 Summit is calling for --

8 ALJ HOGAN: Rebuttal?

9 COMMISSIONER CHRISTMANN: Rebuttal or anything
10 like that.

11 MR. DUBLINSKE: Your Honor, consistent with the
12 practice and the proceeding thus far, we can file that
13 list tomorrow.

14 ALJ HOGAN: And, Mr. Dublinske, you might want
15 to have them available for the a.m. too --

16 MR. DUBLINSKE: Absolutely.

17 ALJ HOGAN: -- because we may --

18 MR. DUBLINSKE: We will have them available all
19 day on Monday.

20 ALJ HOGAN: Okay. Any other matters to address?

21 MR. JORDE: Your Honor, first of all, I want to
22 thank everyone for the remote option. It's worked
23 extremely well and it's saved the landowners a
24 significant amount of money. Is it going to be possible
25 to have this same arrangement for June 4th in Linton or

1 are you, Your Honor, in a position to give me guidance
2 on that, if you can?

3 ALJ HOGAN: We use -- not "we." The Commission
4 uses another company that helps with -- well, maybe I
5 should defer because you guys might know more
6 information than my last update which was two days ago,
7 I think.

8 UNIDENTIFIED SPEAKER: Yeah, the same hearing
9 room, same link and everything should be used by Dakota
10 Sound in the Linton hearing. They're the ones who run
11 our off-site hearings. But, yeah, they will have GoTo
12 Meeting. And that's, in fact, how we report it back
13 here to broadcast it out. So it should be up and
14 available.

15 MR. SCHOCK: This is Victor. I just want to
16 reel that in just a smidgeon because I have heard from
17 Dakota Sound. They don't have certainty of an internet
18 connection in that location. They were -- the last I
19 spoke to them, they were trying to work that out, but I
20 haven't received confirmation that they have a solid
21 internet connection. So what they advised me is they
22 should be able to get audio out of there, but they're
23 not a hundred percent sure about video and they were
24 still kind of working out those details.

25 UNIDENTIFIED SPEAKER: So, if anything, they

1 might just do a phone call with them.

2 MR. SCHOCK: Right.

3 UNIDENTIFIED SPEAKER: Okay.

4 MR. JORDE: Okay. So worst case, remote
5 participation is still going to be available on June
6 4th, it might be audio only; correct?

7 MR. SCHOCK: I would say that's fair.

8 MR. JORDE: Is that fair? Okay. Very good.
9 That helps with planning.

10 And the reason I ask is, for instance, if over
11 the weekend here Ms. Bailey isn't able to go and then
12 something happens with Mr. Hagerott, I want to -- I'll
13 send an email out and then maybe I could have them call
14 in to Linton. I just want it to be a little flexible.
15 So I appreciate that.

16 COMMISSIONER CHRISTMANN: Well, Your Honor, I
17 just want to say I am now starting to get concerned
18 about the potential of, oh, well, we'll knock off early
19 Thursday, we won't do much of anything on Monday --
20 yeah, Monday, and we'll jam everything into Tuesday so
21 we can't possibly get done and then the Commission
22 should start scheduling more hearing dates.

23 ALJ HOGAN: Yeah, that would be my concern too
24 because Emmons County filed their witness list, I
25 believe, yesterday afternoon and they have a potential

1 four to five witnesses so -- and, plus, the Commission
2 made it clear that the Wahpeton and the Linton hearings
3 were primarily to hear from affected landowners in those
4 areas and to take public testimony. So like
5 Commissioner Christmann said, that day was not designed
6 to be a catchall for everything else that didn't fit
7 elsewhere.

8 MR. JORDE: Yeah, I don't know if those comments
9 are directed at me. I don't -- I'm hopeful Summit won't
10 delay in their rebuttal because they'll have the most --
11 you know, the most lengthy witnesses. But like I said,
12 Jon Hagerott's scheduled for June 3rd. I'm simply --
13 and apparently it's not the preference to do it on the
14 4th so I'll try to continue to have him available on
15 June 3rd and maybe Mr. Rockstad. But those are my only
16 two witnesses regardless of where they fit in. And I'm
17 not bringing anybody else.

18 ALJ HOGAN: Do you mean for the Linton hearing?

19 MR. JORDE: I mean --

20 ALJ HOGAN: Are you having any witnesses for
21 Linton?

22 MR. JORDE: No, I mean -- yeah. So in Linton we
23 have one landowner that's in -- the Kertzmanns. So Mitch
24 and Julia, they're Emmons County landowners and so they
25 were going to testify in Linton. But like my prior

1 landowners, they should be pretty -- pretty brief.

2 ALJ HOGAN: Mr. Bakke.

3 MR. BAKKE: Yeah. And then June 3rd remote is
4 still available; correct? Yeah, okay. Yeah, okay,
5 because I -- Ms. Elkins may decide that's the best
6 option for her if she can testify.

7 ALJ HOGAN: And maybe it makes sense,
8 Mr. Schock, once we get confirmation from Dakota Sound
9 on Linton's setup, maybe you could send an email to
10 everybody and let us know.

11 MR. SCHOCK: I can, but most of the time they
12 don't go down until the evening before so they may be
13 speculating until they can get onsite and get things
14 hooked up.

15 ALJ HOGAN: Okay.

16 MR. SCHOCK: So we may not know until the
17 morning of --

18 ALJ HOGAN: Okay.

19 MR. SCHOCK: -- or very late the evening before
20 so...

21 ALJ HOGAN: Well, as helpful as that is, I
22 wouldn't -- probably not video, probably audio.

23 MR. SCHOCK: Yeah.

24 ALJ HOGAN: All right. Any other matters?

25 All right. We will recess for the rest of the

1 day and reconvene Monday morning.

2 -----

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

CERTIFICATE OF TRANSCRIPTIONIST

STATE OF NORTH DAKOTA) ss.

I, Lisa A. Hulm, CET-783, a certified electronic transcriber, do hereby certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter, to the best of my professional skills and abilities. I further state that I was not present during these recorded proceedings, and I am only the transcriber of the recorded proceedings.

I further certify that I am not a relative or employee or attorney or counsel of any of the parties hereto, nor a relative or employee of such attorney or counsel; nor do I have any interest in the outcome or events of the action.

Dated this date of October 30, 2025.

Lisa A. Hulm

LISA A. HULM, CET-783

The foregoing certification of this transcript does not apply to the reproduction of the same by any means, unless under the direct control and/or direction of the certifying transcriber.

\$	17 [2] - 65:14, 136:12 17-to-1 [1] - 80:11 170 [1] - 143:18 180 [1] - 94:13 18,000 [1] - 75:23 1804 [1] - 95:4 19 [1] - 141:3 19.6 [1] - 81:13 1954 [1] - 64:18 1956 [1] - 64:18 1958 [1] - 120:16 1986 [1] - 71:6	3	5	992 [1] - 145:23	
\$10,000 [3] - 5:1, 60:9, 124:8 \$2,000 [1] - 31:12	2	3 [2] - 10:15, 139:4 30 [4] - 68:20, 73:11, 79:13, 121:19 30-day [1] - 65:7 30-thousand-square-foot [1] - 51:16 307 [1] - 77:8 30th [1] - 3:3 31.5 [1] - 99:6 32 [2] - 81:15, 107:24 333 [1] - 75:24 35,000 [1] - 119:24 35.18 [1] - 77:13 350 [2] - 40:6, 70:4 37th [1] - 81:4 39 [1] - 70:25 3rd [6] - 132:2, 133:20, 135:7, 164:12, 164:15, 165:3	5 [3] - 28:23, 29:14, 32:7 5,700 [1] - 75:22 50 [3] - 54:20, 54:22, 127:25 50-degree [1] - 73:23 50-plus [1] - 80:25 500 [4] - 24:7, 86:9, 146:9, 146:11 500-foot-threshold [1] - 146:20 51 [3] - 4:2, 4:4, 4:12 51.46 [2] - 68:9, 114:5 52nd [1] - 52:16 58 [1] - 143:15	A	
'76 [1] - 111:23 '78 [1] - 111:23	2,200 [1] - 69:25 2,800 [1] - 79:24 20 [10] - 9:21, 55:13, 56:3, 71:17, 73:18, 75:14, 79:3, 79:25, 141:6 200 [4] - 52:5, 70:5, 70:10, 72:14 201st [4] - 81:5, 82:13, 84:6, 87:1 2020 [1] - 110:7 2023 [6] - 5:24, 10:15, 14:7, 14:9, 15:13, 34:4 2024 [13] - 3:3, 5:20, 10:15, 11:5, 11:6, 14:6, 18:23, 18:25, 19:12, 25:14, 40:16, 41:9, 137:22 20s [1] - 127:24 21 [2] - 19:12, 25:14 21st [3] - 18:21, 18:24, 41:9 22 [3] - 52:5, 62:21, 127:24 23 [1] - 127:24 24 [1] - 46:16 24-inch [1] - 81:21 247 [1] - 93:19 24th [3] - 11:4, 11:6, 40:16 25 [6] - 51:19, 52:5, 108:9, 132:8, 136:7 25-degree [1] - 74:18 26 [2] - 108:5, 108:9 27-country [1] - 65:11 28 [2] - 81:15, 108:5 28th [1] - 71:6 29 [1] - 70:25 29-mile-an-hour [1] - 101:18 29-mile-per-hour [1] - 101:22 29-miles-per-hour [1] - 70:25 2:30 [1] - 11:7	4	6	A-B-R-A-H-A-M [1] - 124:3 a.m [2] - 3:3, 161:15 abandon [1] - 53:22 abandoned [4] - 48:5, 144:5, 144:7, 144:10 abatement [1] - 67:19 ability [1] - 153:14 able [35] - 7:1, 16:8, 20:24, 26:21, 30:7, 32:15, 35:23, 36:22, 39:9, 39:25, 49:6, 49:12, 59:7, 63:13, 63:22, 73:23, 74:25, 76:19, 80:19, 83:4, 83:15, 97:8, 99:9, 106:22, 106:23, 119:13, 120:17, 121:22, 125:15, 128:18, 130:2, 153:23, 158:3, 162:22, 163:11 aboveground [6] - 72:7, 72:19, 76:2, 76:16, 89:10, 98:7 Abraham [7] - 123:8, 123:10, 123:11, 123:23, 124:2, 124:4, 131:3 ABRAHAM [5] - 123:12, 124:1, 124:11, 124:15, 124:19 abridged [1] - 91:15 absolutely [5] - 118:15, 154:22, 155:2, 155:10, 161:16 academy [1] - 51:16 accept [1] - 138:1 accepted [1] - 139:6 access [2] - 129:23, 136:24 accidental [1] - 101:1 accommodate [2] - 33:14, 132:25 according [1] - 106:3 accordingly [1] - 49:14 account [1] - 97:18 accurate [7] - 8:19, 18:2, 22:15, 69:2, 95:11, 96:8, 145:4 accurately [2] - 95:25, 96:3 achieve [1] - 109:25 acid [3] - 80:7, 80:9, 80:11	
0	0 [9] - 70:7, 71:17, 74:19, 75:5, 107:14, 107:17, 107:18, 107:22 05 [1] - 80:10	4	7		
1	1 [1] - 143:16 1,071 [2] - 85:24 1,200 [1] - 69:25 1,855 [10] - 140:10, 140:16, 143:4, 143:8, 143:12, 143:14, 143:16, 148:8, 148:9 1.53 [2] - 81:11, 102:3 100 [5] - 69:25, 70:8, 74:12, 74:16, 117:1 101 [3] - 7:16, 7:17, 50:11 101st [1] - 77:23 104 [1] - 62:7 105 [1] - 75:8 10:15 [2] - 59:15, 59:17 11:45 [1] - 122:17 12 [2] - 56:2, 123:4 122 [1] - 86:25 12:30 [2] - 122:25, 123:5 13 [2] - 46:16, 64:23 132nd [1] - 78:1 136 [6] - 28:22, 29:14, 29:18, 29:23, 34:15, 36:11 14 [1] - 55:16 14.7 [3] - 77:5, 84:22, 116:24 15 [5] - 81:6, 81:19, 122:25, 131:21 15-mile [2] - 77:7, 86:24 15-minute [1] - 59:3 150 [1] - 52:5 16 [1] - 136:11 163 [1] - 140:17	4 [10] - 5:24, 34:4, 36:11, 77:11, 77:15, 81:8, 99:5, 121:20, 121:23, 139:14 4,500 [2] - 52:3, 52:18 40 [4] - 79:5, 111:24, 117:2, 127:7 40,000 [3] - 31:15, 77:11, 148:13 40-mile-an-hour [1] - 111:24 400 [11] - 58:4, 126:16, 126:17, 140:9, 144:13, 144:19, 144:20, 146:11, 146:14, 146:17 401 [6] - 140:9, 140:16, 143:4, 143:11, 143:12, 143:14 43 [7] - 124:25, 125:17, 125:19, 125:20, 125:21, 125:22, 126:3 43rd [2] - 47:13, 50:21 44 [1] - 81:14 450 [1] - 126:16 47 [7] - 135:18, 137:2, 139:21, 139:22, 140:1, 142:24, 144:25 48 [4] - 73:4, 73:23, 74:6, 98:6 4th [6] - 33:21, 135:7, 149:18, 161:25, 163:6, 164:14	8	8	
			8		
			8 [2] - 5:20, 56:2 8-inch [1] - 148:14 80 [4] - 37:23, 45:16, 80:16, 81:12 80th [4] - 47:12, 47:20, 52:17 83 [3] - 94:17, 94:20, 98:16 84 [1] - 78:2 88 [3] - 69:24, 83:13, 120:25 8:30 [2] - 3:2, 3:3		
			9		
			9 [4] - 62:21, 75:9, 142:24 90 [1] - 79:13 94 [3] - 94:22, 94:24, 114:16		

<p>acidic [3] - 115:5, 118:23, 119:2</p> <p>acknowledged [4] - 22:23, 23:6, 41:11, 41:18</p> <p>acquire [2] - 48:3, 49:6</p> <p>acquired [2] - 51:19, 57:21</p> <p>acre [1] - 48:17</p> <p>acreage [1] - 48:20</p> <p>acres [5] - 48:9, 48:21, 48:22, 51:15, 51:19</p> <p>act [1] - 101:24</p> <p>action [6] - 23:2, 65:16, 82:5, 116:17, 121:17</p> <p>activity [1] - 144:8</p> <p>acts [1] - 101:3</p> <p>actual [1] - 44:25</p> <p>add [2] - 10:8, 145:15</p> <p>addition [3] - 40:24, 126:22, 126:25</p> <p>address [12] - 3:10, 12:20, 13:8, 13:9, 13:18, 15:9, 16:20, 90:19, 149:3, 149:6, 160:12, 161:20</p> <p>addressed [2] - 13:11, 18:13</p> <p>addressing [1] - 13:7</p> <p>adhered [1] - 118:14</p> <p>adjacent [3] - 8:11, 23:19, 28:5</p> <p>adjust [1] - 38:22</p> <p>adjustment [1] - 33:19</p> <p>adjustments [1] - 49:14</p> <p>administration [1] - 61:16</p> <p>admits [1] - 15:20</p> <p>admitted [1] - 15:22</p> <p>adopt [1] - 147:6</p> <p>advice [1] - 24:12</p> <p>advise [4] - 4:23, 60:5, 124:5, 153:23</p> <p>advised [6] - 5:5, 60:13, 124:12, 134:19, 155:25, 162:21</p> <p>advisor [1] - 157:5</p> <p>advocated [1] - 7:7</p> <p>aerial [2] - 138:18, 141:8</p> <p>aerials [2] - 139:15, 144:6</p> <p>affect [5] - 31:21, 97:19, 102:6, 102:20, 123:1</p> <p>affected [6] - 23:25, 69:18, 133:12, 133:14, 133:15,</p>	<p>164:3</p> <p>affiliated [1] - 18:13</p> <p>affirmatively [1] - 16:11</p> <p>aft [1] - 65:19</p> <p>afternoon [6] - 131:12, 131:13, 132:18, 132:24, 133:3, 163:25</p> <p>Ag [1] - 19:20</p> <p>agencies [1] - 156:25</p> <p>agency [4] - 93:5, 104:18, 127:21, 136:12</p> <p>ago [7] - 54:22, 79:6, 101:20, 104:25, 128:4, 128:16, 162:6</p> <p>agree [8] - 27:22, 27:23, 28:5, 33:12, 53:9, 55:5, 55:8, 157:8</p> <p>agreed [2] - 18:25, 150:10</p> <p>ahead [9] - 5:10, 39:3, 60:18, 112:12, 124:17, 134:24, 145:14, 156:5, 158:23</p> <p>air [11] - 64:21, 65:5, 73:14, 81:12, 96:24, 101:12, 102:4, 112:1, 119:15, 126:12</p> <p>airbags [1] - 105:7</p> <p>airfoil [1] - 101:10</p> <p>alarms [2] - 64:22, 120:6</p> <p>Alaska [1] - 108:17</p> <p>alleging [1] - 97:17</p> <p>allow [3] - 33:24, 34:8, 150:16</p> <p>almost [4] - 74:14, 75:12, 103:3, 136:17</p> <p>Amber [1] - 35:24</p> <p>ambient [6] - 69:21, 70:9, 70:12, 72:16, 74:15, 109:15</p> <p>America [4] - 93:11, 106:12, 107:3</p> <p>America's [1] - 106:7</p> <p>amount [9] - 48:17, 71:13, 77:14, 80:1, 86:20, 99:4, 103:3, 131:3, 161:24</p> <p>analogous [3] - 71:9, 79:16, 86:19</p> <p>analogy [1] - 71:10</p> <p>analysis [23] - 71:10, 89:24, 92:10, 94:8, 95:14, 95:15, 95:20, 95:22, 97:16, 98:1, 100:5, 100:24, 101:21, 103:16,</p>	<p>113:11, 113:24, 127:2, 128:20, 128:25, 129:19, 142:7, 159:8</p> <p>Andrew [1] - 19:17</p> <p>angles [1] - 40:5</p> <p>answer [11] - 24:4, 33:24, 34:8, 92:19, 100:10, 106:15, 115:12, 115:13, 154:12, 157:12, 159:23</p> <p>answered [2] - 31:6, 96:12</p> <p>answering [3] - 17:24, 42:17, 158:11</p> <p>answers [5] - 71:23, 97:3, 99:23, 103:12, 114:8</p> <p>anticipate [1] - 122:18</p> <p>anticipated [3] - 68:8, 90:1, 114:5</p> <p>anticlimactic [1] - 131:4</p> <p>anyway [1] - 140:24</p> <p>apartment [1] - 143:24</p> <p>apartments [2] - 138:11, 140:14</p> <p>apologize [3] - 34:20, 103:10, 136:1</p> <p>appear [2] - 32:20, 59:7</p> <p>appearing [1] - 131:8</p> <p>applicable [1] - 92:3</p> <p>application [4] - 3:5, 5:23, 128:13, 129:10</p> <p>applications [2] - 105:12, 147:21</p> <p>apply [1] - 102:15</p> <p>appreciate [6] - 39:15, 99:23, 148:22, 155:3, 159:22, 163:15</p> <p>appropriate [3] - 9:19, 12:18, 14:21</p> <p>approximation [1] - 7:3</p> <p>appurtenances [1] - 98:7</p> <p>Arabia [2] - 66:4, 107:2</p> <p>archaeological [1] - 38:25</p> <p>arctic [2] - 108:18, 120:14</p> <p>area [27] - 23:24, 27:4, 28:2, 36:3, 44:20, 49:13, 50:16, 50:22, 51:2, 51:4, 51:7, 51:11, 51:22, 51:24, 52:18, 53:9, 53:13, 56:13, 69:20, 85:1, 96:12, 102:24,</p>	<p>107:20, 126:8, 139:4, 141:6, 141:18</p> <p>areas [10] - 8:11, 35:22, 36:4, 39:9, 64:2, 106:17, 141:9, 141:10, 147:12, 164:4</p> <p>argument [1] - 153:21</p> <p>Arizona [2] - 136:10, 136:14</p> <p>arrangement [1] - 161:25</p> <p>art [1] - 62:16</p> <p>articles [1] - 127:12</p> <p>aside [2] - 10:12, 26:25</p> <p>aspects [1] - 20:7</p> <p>assessment [2] - 157:17, 159:18</p> <p>Assessment [1] - 159:3</p> <p>assessments [2] - 31:2, 45:25</p> <p>assistance [2] - 24:23, 130:3</p> <p>assistant [2] - 62:3, 62:25</p> <p>assisted [1] - 51:22</p> <p>assisting [1] - 151:14</p> <p>Association [1] - 136:9</p> <p>assume [9] - 8:12, 27:2, 34:25, 89:4, 90:16, 91:6, 92:2, 105:11, 152:23</p> <p>assumes [1] - 87:21</p> <p>assuming [2] - 97:15, 109:21</p> <p>assumption [1] - 97:4</p> <p>assumptions [4] - 95:19, 96:13, 97:12</p> <p>assurance [1] - 6:20</p> <p>atmosphere [9] - 77:4, 77:5, 77:10, 82:21, 83:3, 84:21, 102:23, 116:24, 117:5</p> <p>atmospheres [1] - 79:25</p> <p>atmospheric [1] - 69:19</p> <p>attached [1] - 135:20</p> <p>Attachment [2] - 139:4, 139:14</p> <p>attachment [1] - 139:15</p> <p>attachments [4] - 137:1, 137:3, 137:18, 139:2</p> <p>attempted [1] - 153:9</p> <p>attempting [2] - 12:15, 147:5</p> <p>attempts [3] - 22:19, 129:9, 129:11</p>	<p>attention [1] - 7:15</p> <p>attorney [1] - 56:20</p> <p>attorneys [2] - 88:8, 97:2</p> <p>audio [3] - 162:22, 163:6, 165:22</p> <p>August [7] - 5:24, 10:15, 14:7, 14:8, 15:13, 33:21, 34:4</p> <p>automatic [1] - 87:22</p> <p>available [18] - 30:15, 30:20, 105:25, 129:7, 132:13, 137:21, 137:22, 138:19, 139:10, 147:3, 147:18, 148:10, 161:15, 161:18, 162:14, 163:5, 164:14, 165:4</p> <p>Avenue [7] - 50:21, 51:2, 51:3, 81:5, 82:13, 84:6, 87:1</p> <p>average [4] - 48:22, 73:7, 108:20, 108:23</p> <p>avoid [4] - 13:17, 64:3, 142:14, 154:3</p> <p>avoidable [1] - 65:21</p> <p>avoided [1] - 147:23</p> <p>award [1] - 64:10</p> <p>aware [21] - 10:5, 11:25, 27:2, 88:20, 88:23, 89:1, 89:4, 89:7, 90:7, 90:9, 93:1, 93:8, 93:12, 105:8, 110:10, 132:17, 147:10, 147:20, 147:21, 150:14, 157:21</p>
B				
<p>background [7] - 22:12, 61:4, 61:5, 62:22, 64:6, 66:3, 125:3</p> <p>backwards [1] - 71:24</p> <p>backyard [1] - 44:3</p> <p>bad [1] - 154:8</p> <p>badly [1] - 111:12</p> <p>Bailey [2] - 160:19, 163:11</p> <p>BAKKE [38] - 4:14, 5:15, 12:23, 13:10, 15:8, 17:1, 17:2, 29:17, 29:25, 33:22, 34:6, 56:9, 56:17, 58:6, 58:22, 59:5, 59:10, 59:20, 60:19, 60:24, 95:23, 100:10, 117:13, 117:15, 118:10, 118:12, 130:17,</p>				

<p>132:14, 142:21, 142:23, 146:4, 152:7, 152:15, 160:4, 160:19, 161:1, 161:5, 165:3</p> <p>Bakke [21] - 5:10, 12:13, 33:19, 34:2, 38:13, 56:8, 57:5, 58:18, 58:20, 60:18, 96:4, 103:12, 113:20, 117:12, 118:3, 130:16, 132:12, 142:20, 160:3, 160:17, 165:2</p> <p>Bakke's [2] - 12:15, 132:25</p> <p>band [1] - 69:23</p> <p>bands [1] - 72:21</p> <p>barbecuing [1] - 86:4</p> <p>barely [1] - 112:3</p> <p>barrier [1] - 111:13</p> <p>base [3] - 83:1, 121:21, 146:11</p> <p>based [21] - 7:18, 7:22, 8:18, 9:24, 19:8, 69:11, 70:16, 73:5, 80:7, 85:19, 102:10, 108:10, 131:15, 131:18, 137:6, 139:6, 140:14, 141:20, 144:7, 148:9</p> <p>basis [3] - 93:23, 150:9, 155:8</p> <p>battle [1] - 62:2</p> <p>BC101 [1] - 57:2</p> <p>bearing [1] - 156:12</p> <p>bed [1] - 98:19</p> <p>beg [1] - 134:25</p> <p>beginning [3] - 22:23, 41:11, 55:4</p> <p>behalf [3] - 129:16, 158:12, 158:20</p> <p>behind [2] - 108:19, 129:20</p> <p>below [23] - 66:25, 67:4, 73:22, 74:21, 75:1, 75:2, 75:4, 75:5, 75:14, 75:15, 78:11, 78:12, 79:3, 80:12, 83:13, 85:24, 98:6, 101:5, 107:10, 107:14, 107:23, 111:24, 114:14</p> <p>bends [1] - 40:5</p> <p>benefit [1] - 136:20</p> <p>best [10] - 20:13, 21:23, 33:14, 34:22, 44:14, 54:17, 91:19, 111:16, 121:15, 165:5</p> <p>bet [2] - 50:2, 87:19</p> <p>better [6] - 9:10,</p>	<p>106:7, 106:11, 106:12, 107:2, 151:23</p> <p>between [13] - 35:8, 71:17, 80:23, 80:24, 81:18, 86:24, 91:16, 94:14, 98:20, 139:18, 145:6, 151:18, 152:9</p> <p>bicarbonate [2] - 80:7, 80:11</p> <p>big [2] - 39:17, 48:2</p> <p>bigger [2] - 28:16, 121:23</p> <p>billion [1] - 77:12</p> <p>binder [2] - 7:16, 50:13</p> <p>biochemistry [1] - 91:13</p> <p>Bismarck [60] - 6:1, 9:6, 11:11, 11:12, 21:23, 26:19, 27:3, 27:18, 28:2, 28:24, 29:14, 30:5, 33:20, 34:3, 37:19, 38:16, 46:9, 51:15, 51:19, 51:21, 53:9, 54:22, 56:22, 57:4, 57:6, 57:9, 57:23, 69:1, 69:20, 77:13, 77:16, 78:8, 78:9, 78:13, 81:9, 82:13, 87:3, 87:6, 87:14, 94:5, 94:11, 94:15, 94:22, 95:1, 95:5, 95:7, 96:1, 96:16, 98:18, 98:21, 98:25, 99:6, 113:10, 113:21, 114:7, 114:9, 114:14, 121:5, 141:6</p> <p>bit [20] - 20:8, 20:9, 24:12, 24:14, 51:9, 52:24, 61:3, 64:6, 72:1, 73:13, 74:2, 76:12, 103:12, 108:22, 114:2, 128:2, 136:5, 137:18, 146:17, 150:5</p> <p>Bitner [1] - 113:19</p> <p>black [2] - 7:16, 85:7</p> <p>blame [1] - 65:17</p> <p>bleed [1] - 86:16</p> <p>blew [1] - 65:13</p> <p>blocks [1] - 58:1</p> <p>blood [1] - 80:6</p> <p>bloodstream [1] - 80:17</p> <p>blowing [1] - 65:17</p> <p>blowtorch [1] - 86:11</p> <p>blue [1] - 30:12</p> <p>Bo [1] - 11:16</p> <p>board [1] - 64:19</p>	<p>bodies [1] - 103:23</p> <p>body [3] - 80:16, 80:18, 146:25</p> <p>Boeshans [6] - 6:22, 6:23, 8:19, 11:17, 19:4, 19:16</p> <p>boil [1] - 79:15</p> <p>boiling [1] - 79:14</p> <p>book [3] - 68:6, 68:16, 127:16</p> <p>bother [1] - 110:25</p> <p>bottom [7] - 43:18, 82:18, 87:13, 94:10, 94:15, 107:23, 145:16</p> <p>bought [1] - 44:2</p> <p>boundary [2] - 46:14, 138:14</p> <p>bow [3] - 82:17, 82:18, 99:7</p> <p>box [1] - 69:24</p> <p>Brady [1] - 11:15</p> <p>brain [1] - 80:20</p> <p>brand [1] - 72:24</p> <p>brand-new [1] - 72:24</p> <p>break [9] - 58:24, 59:1, 59:2, 59:3, 87:25, 116:16, 122:24, 123:2, 131:10</p> <p>breaking [1] - 111:12</p> <p>breaks [1] - 81:25</p> <p>Brian [1] - 113:19</p> <p>bridges [1] - 116:11</p> <p>brief [3] - 126:6, 127:5, 165:1</p> <p>briefed [1] - 16:21</p> <p>briefly [4] - 33:7, 68:2, 117:13, 142:21</p> <p>bring [4] - 49:15, 49:16, 102:6, 126:15</p> <p>bringing [2] - 79:12, 164:17</p> <p>brings [1] - 156:18</p> <p>Britannica [1] - 68:21</p> <p>brittle [30] - 63:10, 71:7, 71:16, 72:22, 73:16, 74:11, 75:11, 75:16, 75:19, 76:3, 76:17, 76:21, 76:23, 76:25, 78:20, 79:1, 79:4, 84:7, 85:15, 85:16, 85:19, 98:2, 100:22, 109:16, 109:25, 116:7, 116:19, 118:17, 120:21</p> <p>broadcast [1] - 162:13</p> <p>Broadway [2] - 11:10, 11:12</p> <p>broom [3] - 86:11, 86:13</p> <p>brought [4] - 14:17,</p>	<p>14:19, 14:20, 22:10</p> <p>Bruce [1] - 19:16</p> <p>Bryce [1] - 35:24</p> <p>bucks [1] - 31:15</p> <p>buffer [10] - 80:12, 137:5, 137:6, 137:11, 137:14, 138:13, 138:18, 140:11, 142:8, 144:11</p> <p>build [3] - 48:8, 51:20, 57:22</p> <p>Building [2] - 11:10, 11:12</p> <p>building [4] - 32:4, 51:17, 106:6, 106:16</p> <p>built [4] - 31:23, 32:10, 106:22, 110:23</p> <p>bunch [3] - 62:16, 63:20, 102:11</p> <p>Bureau [1] - 146:15</p> <p>Bureau's [2] - 147:2, 147:7</p> <p>buried [4] - 72:5, 73:3, 74:21, 90:9</p> <p>Burleigh [43] - 7:15, 7:18, 7:21, 14:6, 14:10, 15:10, 27:3, 27:19, 28:22, 29:13, 29:17, 29:23, 40:9, 40:12, 42:6, 42:22, 47:15, 66:1, 68:8, 69:9, 69:15, 72:3, 72:15, 76:3, 77:24, 77:25, 78:5, 80:24, 98:20, 98:22, 114:5, 121:5, 142:25, 143:1, 143:11, 143:17, 143:25, 144:11, 144:24, 145:4, 145:7, 145:22</p> <p>burst [1] - 75:18</p> <p>bursts [1] - 99:2</p> <p>business [2] - 54:9, 61:16</p> <p>busy [1] - 58:18</p> <p>but.. [1] - 24:17</p> <p>button [1] - 123:20</p> <p>butts [1] - 114:9</p> <p>buy [4] - 28:16, 48:16, 49:1, 49:11</p> <p>buyers [1] - 36:13</p> <p>buying [1] - 48:8</p> <p>BY [28] - 5:15, 17:2, 29:25, 33:9, 34:1, 34:13, 38:9, 56:17, 60:24, 88:12, 92:23, 97:6, 100:1, 100:17, 103:10, 103:21, 104:12, 117:15, 118:12, 124:23, 126:4, 135:13,</p>	<p>136:4, 140:2, 142:5, 142:23, 156:11, 157:13</p>
C				
<p>calculated [2] - 80:23, 99:4</p> <p>calculation [1] - 82:2</p> <p>calculations [1] - 81:22</p> <p>calm [2] - 111:19, 114:16</p> <p>camera [4] - 123:13, 123:14, 123:15, 123:20</p> <p>campus [1] - 51:20</p> <p>CAMS [1] - 64:20</p> <p>canceled [1] - 41:22</p> <p>capacity [2] - 103:24, 140:24</p> <p>Capitol [1] - 3:8</p> <p>car [1] - 101:10</p> <p>Carbon [8] - 3:5, 3:6, 10:24, 19:21, 53:8, 54:4, 156:18, 158:20</p> <p>carbon [74] - 63:9, 64:15, 64:24, 65:2, 65:6, 65:9, 65:20, 66:7, 67:6, 68:14, 68:18, 68:22, 68:24, 69:13, 70:8, 71:13, 71:14, 71:15, 71:16, 72:2, 74:17, 75:21, 77:1, 77:9, 77:11, 77:15, 80:7, 80:15, 80:17, 80:18, 81:8, 81:11, 81:14, 82:14, 83:11, 83:20, 83:24, 84:15, 84:18, 85:6, 85:8, 85:21, 87:8, 87:11, 88:3, 89:12, 89:14, 90:3, 96:23, 99:5, 101:6, 102:22, 103:3, 109:20, 113:22, 114:18, 115:2, 115:3, 116:7, 116:11, 116:22, 118:16, 118:24, 119:6, 119:11, 120:18, 121:23, 127:3</p> <p>carbonic [3] - 80:7, 80:9, 80:11</p> <p>career [2] - 51:16, 136:18</p> <p>careful [1] - 17:24</p> <p>carried [3] - 146:12, 146:17, 146:18</p> <p>carrier [1] - 82:7</p> <p>carry [1] - 111:23</p> <p>cars [2] - 105:1,</p>				

<p>116:12 cartography [1] - 136:19 cascade [3] - 81:10, 83:21, 87:8 case [24] - 5:7, 5:18, 5:21, 10:4, 15:11, 16:2, 20:22, 60:15, 65:23, 68:5, 69:12, 88:4, 123:8, 124:14, 126:15, 128:9, 130:3, 134:21, 153:23, 154:20, 155:1, 156:2, 157:14, 163:4 Case [1] - 3:4 Cass [2] - 141:4, 147:13 catastrophically [1] - 105:7 catchall [1] - 164:6 Catholic [1] - 51:20 cattle [2] - 111:23, 112:3 caused [3] - 71:7, 84:8, 110:3 causes [1] - 109:16 causing [1] - 102:23 caustic [3] - 115:6, 118:22, 119:2 cauterize [1] - 86:15 CDC [1] - 68:17 ceases [1] - 107:24 CEC [1] - 65:8 Center [1] - 62:6 center [3] - 51:23, 82:5, 93:4 centerline [2] - 82:9, 82:10 centers [1] - 140:19 central [1] - 64:21 Century [2] - 51:2, 51:3 CEO [1] - 11:21 certain [13] - 3:15, 31:17, 39:18, 41:15, 65:23, 69:12, 70:16, 95:17, 147:24, 150:10, 152:21, 157:14, 157:15 certainly [3] - 132:23, 150:15, 153:18 certainty [1] - 162:17 CFD [2] - 126:19, 127:15 Chad [2] - 4:15, 4:21 CHAD [5] - 4:18, 4:21, 5:4, 5:8, 5:11 Chair [1] - 149:1 Challenger [1] - 71:5 challenging [1] - 45:24 chance [2] - 6:3, 58:25</p>	<p>change [15] - 6:8, 6:12, 6:14, 6:25, 23:24, 67:8, 67:9, 67:13, 70:17, 83:2, 104:14, 104:20, 105:14, 121:11, 132:25 changed [2] - 109:19, 150:14 changes [5] - 66:14, 66:23, 103:5, 118:7, 120:18 changing [1] - 40:11 chapters [1] - 127:1 characteristics [3] - 66:14, 66:23, 85:18 characterizations [1] - 97:2 characterize [1] - 159:12 charge [1] - 65:10 check [2] - 68:10, 94:23 checked [1] - 152:10 checks [1] - 69:3 chemical [1] - 119:8 Chemical [1] - 64:8 chemistry [8] - 61:8, 62:11, 62:17, 64:7, 64:10, 91:22, 102:16, 118:1 chief [1] - 127:13 China [4] - 66:5, 73:1, 106:20, 107:2 Chinese [1] - 70:2 chloride [1] - 120:20 chlorine [2] - 119:25, 120:1 choice [1] - 13:21 choose [1] - 148:8 choosing [1] - 13:2 chose [3] - 137:14, 146:11, 147:1 Christmann [8] - 3:13, 42:2, 105:18, 130:20, 146:5, 160:5, 160:14, 164:5 CHRISTMANN [7] - 42:3, 42:10, 42:13, 42:19, 42:24, 43:4, 43:7, 43:12, 43:18, 43:23, 44:1, 44:4, 44:10, 44:16, 44:19, 44:22, 45:1, 45:5, 45:9, 45:13, 45:17, 45:20, 46:3, 46:7, 46:11, 46:13, 46:19, 46:24, 47:2, 47:8, 47:16, 47:22, 48:1, 48:19, 49:1, 49:24, 105:19, 106:4, 106:25, 107:6, 108:14, 108:24,</p>	<p>109:2, 109:18, 110:1, 110:6, 110:13, 110:15, 111:4, 111:10, 112:9, 112:12, 113:3, 130:21, 133:6, 133:21, 146:6, 146:10, 146:24, 147:8, 147:11, 147:16, 147:20, 148:1, 160:6, 160:15, 160:25, 161:3, 161:6, 161:9, 163:16 Christmann's [1] - 135:1 circle [2] - 108:18, 135:1 circulate [1] - 65:5 circulating [1] - 136:4 circumstances [1] - 7:4 circumvent [1] - 159:4 cities [2] - 106:22 citizen [2] - 13:13, 16:10 citizens [6] - 13:1, 13:16, 13:21, 15:20, 15:22, 42:6 city [7] - 21:23, 22:1, 26:18, 30:19, 47:10, 54:16, 57:9 claim [2] - 13:3, 128:24 claimed [1] - 66:4 Clairmont [1] - 35:9 clarification [1] - 140:25 clarify [2] - 40:20, 42:15 clarifying [1] - 160:15 class [1] - 61:7 Class [3] - 4:25, 60:8, 124:7 clay [1] - 74:3 clear [12] - 13:11, 41:3, 47:3, 54:13, 59:23, 132:1, 133:17, 135:8, 141:12, 141:16, 164:2 clearly [1] - 155:1 clients [1] - 129:16 clock [2] - 3:1, 59:17 close [8] - 36:24, 46:13, 51:19, 54:15, 54:16, 94:18, 118:21, 147:13 closed [3] - 51:18, 110:11, 119:19 closer [5] - 8:22, 9:5, 9:6, 53:13, 57:9 CO2 [35] - 3:6, 10:5,</p>	<p>26:25, 27:4, 64:7, 64:19, 65:3, 69:13, 69:17, 74:21, 76:4, 81:25, 84:25, 87:12, 87:24, 89:6, 89:19, 89:22, 91:7, 91:10, 91:24, 93:10, 93:20, 98:10, 100:6, 100:25, 101:2, 101:23, 101:25, 117:3, 117:4, 117:20, 117:24, 121:14, 148:12 coal [2] - 48:5, 49:2 Coast [1] - 82:4 coat [1] - 115:2 coated [1] - 115:20 coating [1] - 115:9 code [1] - 146:7 codes [1] - 106:6 cold [26] - 72:19, 72:24, 72:25, 73:8, 73:13, 73:14, 73:24, 74:5, 74:6, 74:7, 74:9, 74:10, 74:22, 74:23, 85:6, 85:9, 86:5, 88:18, 90:11, 90:13, 107:9, 107:18, 109:14, 110:23, 120:14, 121:7 colder [5] - 73:8, 79:5, 108:7, 110:21, 111:1 coldest [1] - 108:13 colleague [1] - 150:23 College [1] - 62:15 color [3] - 139:14, 139:17, 141:8 Colorado [2] - 136:13 colorless [1] - 121:18 comas [1] - 80:14 comfortable [1] - 155:14 coming [12] - 40:12, 55:25, 72:9, 75:10, 82:17, 82:18, 83:22, 84:21, 85:2, 102:22, 119:16, 136:2 commanding [1] - 62:5 comment [3] - 38:13, 149:6, 155:4 commenting [1] - 32:16 comments [2] - 147:22, 164:8 commercial [5] - 50:19, 50:20, 52:20, 52:24, 53:1 Commission's [4] - 14:18, 33:20, 34:4, 153:25 commissioners [11] -</p>	<p>10:21, 12:9, 20:5, 25:25, 28:8, 30:1, 57:18, 60:25, 61:4, 64:5, 88:8 committee [1] - 137:10 commonly [1] - 116:7 communicated [3] - 149:7, 150:19, 150:21 communicating [2] - 59:10, 135:4 communication [2] - 25:11, 150:22 communications [3] - 25:24, 152:8, 152:18 community [2] - 21:23, 54:18 company [5] - 14:23, 28:24, 34:25, 36:12, 162:4 company's [1] - 90:19 comparison [4] - 35:25, 37:6, 142:7, 145:25 compartment [2] - 64:1, 64:2 compensated [1] - 49:4 compensation [1] - 49:5 complete [3] - 4:5, 13:3, 149:21 completely [2] - 40:11, 82:22 components [1] - 89:10 compound [1] - 95:21 compressed [4] - 66:6, 114:19, 118:25, 119:3 compressible [2] - 67:14, 67:16 compressive [1] - 83:18 compromise [1] - 24:5 computational [2] - 125:5, 126:20 computer [1] - 40:21 computers [1] - 126:21 concentrated [2] - 82:20, 101:7 concentration [1] - 148:13 concern [5] - 10:9, 26:10, 153:16, 155:12, 163:23 concerned [2] - 157:1, 163:17 concerns [8] - 17:22, 21:6, 24:3, 24:4, 38:25, 55:2, 151:24,</p>
--	--	--	---	--

<p>152:20 conclude [2] - 149:3, 160:13 concluded [1] - 133:1 conclusion [1] - 157:7 conclusions [1] - 129:2 condense [1] - 120:12 condenser [2] - 119:22, 120:4 condensers [1] - 119:21 condensing [3] - 79:18, 120:13 condition [3] - 86:23, 112:19, 161:1 conditioning [1] - 119:15 conditions [3] - 69:19, 82:10, 84:9 conduct [2] - 74:1, 74:5 conducting [1] - 100:5 conduction [1] - 111:16 conductivity [1] - 74:4 conductor [1] - 70:15 conducts [1] - 117:8 cone [3] - 85:8, 85:9, 117:6 conference [1] - 85:1 confess [1] - 88:16 confident [1] - 52:8 confidential [6] - 13:4, 15:5, 16:13, 17:11, 17:12, 17:14 confidentially [1] - 56:10 configuration [1] - 31:22 confirm [4] - 15:24, 100:4, 131:11, 131:13 confirmation [2] - 162:20, 165:8 connect [1] - 51:4 connection [2] - 162:18, 162:21 connections [1] - 62:24 conservative [1] - 146:17 consider [4] - 96:2, 100:8, 100:9, 101:1 consideration [1] - 141:19 considerations [1] - 118:1 considered [8] - 21:12, 68:4, 100:4, 100:7, 100:16, 100:21, 101:19, 117:23</p>	<p>consistent [2] - 145:21, 161:11 constituents [1] - 119:8 construction [5] - 73:4, 92:4, 93:9, 93:17, 104:19 consultants [1] - 128:18 contact [2] - 23:25, 128:9 contacted [8] - 10:18, 10:22, 19:4, 19:6, 19:7, 128:4, 128:16 contacts [3] - 10:13, 25:14, 25:20 containment [1] - 106:18 contamination [1] - 82:6 content [4] - 21:5, 40:19, 158:4, 159:5 continue [12] - 17:22, 23:12, 30:22, 32:22, 50:6, 51:14, 85:22, 86:1, 86:10, 87:24, 114:23, 164:14 continues [1] - 144:25 continuing [1] - 21:6 control [3] - 62:25, 90:18, 122:21 convection [5] - 70:21, 71:1, 73:25, 111:17, 112:7 conversation [2] - 23:10, 150:6 conversations [5] - 18:10, 23:20, 25:5, 25:16, 113:18 convince [1] - 7:7 cool [2] - 70:7, 84:22 cooler [1] - 117:2 cooling [1] - 116:25 cooperating [1] - 154:8 copies [1] - 135:24 copy [4] - 26:4, 40:25, 66:9, 124:25 Coral [1] - 62:2 cordial [1] - 25:11 core [1] - 63:18 corner [5] - 28:15, 45:24, 45:25, 46:1, 94:21 Corps [1] - 62:5 correct [57] - 5:18, 5:21, 5:22, 8:23, 10:2, 18:23, 18:24, 23:2, 23:13, 27:6, 29:8, 29:12, 29:16, 30:18, 31:19, 35:2, 37:17, 41:6, 42:12, 43:14, 48:11, 48:25,</p>	<p>52:12, 57:4, 90:10, 100:6, 103:17, 105:5, 105:25, 106:1, 113:11, 118:20, 125:23, 125:24, 128:15, 129:7, 129:21, 129:22, 129:25, 130:4, 130:5, 137:24, 140:12, 140:20, 140:21, 141:20, 141:21, 145:9, 145:24, 156:15, 156:19, 156:20, 157:2, 159:19, 159:20, 163:6, 165:4 correctly [1] - 42:17 correlated [1] - 91:16 corridor [1] - 26:20 corrode [1] - 119:5 corroding [1] - 115:21 corrosion [1] - 115:3 costly [2] - 54:1, 54:2 costs [1] - 31:12 Council [6] - 10:19, 11:9, 11:22, 17:4, 40:17, 42:8 counsel [1] - 150:6 count [2] - 143:2, 145:15 counties [6] - 141:5, 145:7, 145:20, 145:25, 147:5, 147:14 countries [5] - 91:17, 105:24, 106:8, 106:11, 107:7 country [1] - 69:20 County [46] - 7:16, 7:18, 7:21, 14:6, 14:10, 26:3, 27:3, 27:19, 28:22, 29:13, 29:18, 29:23, 40:9, 40:12, 42:6, 42:22, 47:15, 66:1, 68:9, 69:9, 69:15, 72:3, 72:15, 76:3, 77:24, 77:25, 78:5, 78:16, 78:19, 80:24, 98:22, 114:5, 121:6, 142:25, 143:17, 143:25, 144:11, 144:21, 144:24, 145:4, 145:7, 145:22, 163:24, 164:24 county [6] - 22:1, 78:16, 98:19, 137:4, 145:1 County's [1] - 15:10 county-by-county [1] - 137:4</p>	<p>couple [7] - 36:7, 38:12, 121:3, 135:20, 140:5, 153:20, 155:22 course [3] - 70:5, 72:5, 107:13 Court [2] - 16:3, 16:4 courtroom [1] - 127:21 courts [1] - 103:23 cover [1] - 107:15 coverage [1] - 138:23 covered [1] - 46:4 covering [2] - 31:19, 85:7 Covid [2] - 91:12, 110:11 crack [1] - 75:25 CRC [1] - 127:18 credit [1] - 62:9 credits [1] - 62:17 Creek [1] - 33:1 crews [1] - 99:12 criteria [3] - 18:6, 18:12, 21:12 critical [7] - 66:18, 66:25, 67:5, 119:22, 120:2, 120:10 cross [4] - 61:18, 96:6, 130:8, 141:24 CROSS [8] - 33:8, 34:12, 38:8, 88:11, 103:20, 104:11, 142:4, 142:22 cross-decked [1] - 61:18 cross-examination [2] - 96:6, 141:24 crosses [1] - 141:10 crystallization [1] - 85:13 crystals [1] - 85:5 cubic [3] - 77:9, 77:12, 81:22 curb [1] - 30:20 curious [2] - 104:24, 147:1 current [4] - 47:10, 68:18, 105:13, 117:21 curve [1] - 74:14 curves [1] - 40:5 cut [8] - 63:3, 63:12, 86:10, 86:13, 100:1, 103:8, 103:11, 113:9 cuts [1] - 78:15 cutting [2] - 28:15, 132:3 CV [1] - 125:22 cycle [1] - 119:15 cycles [2] - 75:15, 109:23</p>	<p>cyclone [1] - 102:12</p> <hr/> <p style="text-align: center;">D</p> <hr/> <p>Dakota [56] - 4:24, 10:19, 11:8, 11:21, 15:6, 17:4, 40:6, 40:10, 40:16, 60:7, 65:25, 68:9, 68:11, 69:20, 70:20, 72:14, 73:7, 74:22, 75:13, 79:5, 79:21, 88:2, 88:21, 88:24, 89:9, 89:20, 91:7, 91:10, 95:4, 104:2, 104:3, 104:4, 104:14, 108:8, 108:19, 110:22, 114:6, 116:8, 124:6, 128:1, 137:23, 138:8, 139:10, 141:4, 142:13, 144:23, 146:7, 146:18, 146:23, 147:19, 147:22, 148:11, 156:15, 162:9, 162:17, 165:8 Dakota's [1] - 142:16 damage [1] - 62:25 danger [2] - 68:20, 121:12 dangerous [4] - 82:11, 82:12, 98:15, 119:7 data [18] - 7:19, 7:22, 39:6, 90:5, 90:22, 91:14, 128:19, 136:24, 137:25, 139:7, 139:10, 141:1, 148:10, 148:15, 157:15, 157:20, 157:21, 158:5 date [5] - 7:1, 7:13, 13:18, 24:21, 159:15 dates [1] - 163:22 Dawson [7] - 56:6, 58:15, 116:4, 122:11, 130:25, 148:6, 160:9 DAWSON [10] - 56:7, 116:5, 116:10, 116:14, 117:7, 117:11, 131:1, 148:7, 148:17, 160:10 daycare [1] - 140:19 daycares [1] - 140:21 days [6] - 62:6, 62:21, 68:20, 133:13, 155:22, 162:6 deadlines [1] - 123:5 deadly [2] - 80:4, 80:6</p>
--	---	---	--	--

<p>deal [5] - 23:7, 117:21, 126:9, 126:19, 150:16</p> <p>dealing [3] - 22:5, 23:19, 138:8</p> <p>deals [2] - 127:14, 127:16</p> <p>dealt [1] - 22:17</p> <p>decide [3] - 13:12, 16:13, 165:5</p> <p>decided [4] - 14:3, 14:15, 16:14, 128:12</p> <p>decision [4] - 14:19, 15:1, 48:20, 151:14</p> <p>decision-making [1] - 151:14</p> <p>decked [1] - 61:18</p> <p>deep [3] - 75:6, 75:9, 90:9</p> <p>deeper [2] - 108:21, 109:24</p> <p>defer [1] - 162:5</p> <p>defined [2] - 140:7, 143:21</p> <p>defining [1] - 138:14</p> <p>definitely [1] - 9:10</p> <p>definition [2] - 140:14, 144:1</p> <p>definitive [1] - 55:22</p> <p>degree [3] - 61:8, 70:25, 136:12</p> <p>degrees [16] - 69:25, 70:7, 70:9, 71:17, 73:11, 74:12, 74:16, 79:13, 83:13, 108:5, 117:1, 117:2, 120:25, 126:7</p> <p>delay [4] - 20:24, 32:9, 153:19, 164:10</p> <p>deliberate [1] - 78:15</p> <p>demonstrative [1] - 141:18</p> <p>denied [2] - 5:24, 129:10</p> <p>dense [4] - 66:6, 66:13, 81:11, 102:3</p> <p>denser [1] - 96:24</p> <p>density [10] - 51:10, 51:12, 51:13, 67:8, 67:13, 81:16, 82:15, 87:15, 101:12, 116:22</p> <p>denying [1] - 128:13</p> <p>Department [1] - 26:3</p> <p>depict [1] - 137:4</p> <p>depicted [1] - 36:10</p> <p>deposit [3] - 85:9, 98:24, 117:6</p> <p>depositions [1] - 127:25</p> <p>depth [2] - 65:5, 74:20</p> <p>describe [2] - 54:4, 68:2</p>	<p>described [6] - 37:16, 52:10, 69:5, 94:10, 95:24, 96:3</p> <p>describing [2] - 35:13, 35:16</p> <p>description [2] - 96:11, 96:18</p> <p>design [3] - 92:3, 93:9, 93:14</p> <p>designed [1] - 164:5</p> <p>despite [1] - 95:12</p> <p>destructive [1] - 63:14</p> <p>detail [6] - 68:3, 88:16, 137:19, 139:16, 139:18, 140:4</p> <p>detailed [1] - 141:23</p> <p>details [5] - 21:9, 21:10, 90:17, 156:22, 162:24</p> <p>detector [1] - 83:24</p> <p>detectors [1] - 64:16</p> <p>determination [1] - 15:4</p> <p>determine [4] - 14:14, 80:24, 132:22, 142:8</p> <p>determined [2] - 45:10, 158:13</p> <p>determining [1] - 118:13</p> <p>detonation [1] - 84:3</p> <p>develop [6] - 23:24, 47:6, 47:9, 47:11, 48:4, 49:7</p> <p>developed [6] - 27:18, 30:19, 32:14, 32:15, 35:8, 47:7</p> <p>developer [3] - 23:19, 35:3, 49:5</p> <p>developers [3] - 32:19, 42:5, 42:21</p> <p>development [23] - 8:22, 9:6, 9:13, 9:18, 26:25, 28:10, 36:5, 44:20, 45:21, 46:8, 47:5, 47:19, 48:24, 49:23, 50:7, 50:16, 50:19, 52:2, 52:4, 52:15, 52:21, 56:13, 57:16</p> <p>Development [4] - 34:25, 35:5, 37:15, 37:18</p> <p>developments [5] - 27:2, 27:3, 27:10, 28:19, 51:10</p> <p>diabetic [1] - 80:14</p> <p>diagram [3] - 66:8, 66:10, 69:2</p> <p>diagrams [1] - 63:21</p> <p>diatomic [2] - 81:13, 81:14</p> <p>Dickey [1] - 141:5</p> <p>Dickinson [2] - 70:20,</p>	<p>101:15</p> <p>died [2] - 65:20, 105:3</p> <p>Diego [2] - 62:1, 62:4</p> <p>difference [3] - 45:18, 110:22, 145:6</p> <p>different [17] - 19:2, 39:10, 51:25, 67:10, 72:25, 74:3, 91:20, 91:25, 92:1, 102:24, 113:23, 118:1, 118:10, 119:9, 127:7, 127:19, 152:5</p> <p>difficult [4] - 48:14, 140:23, 149:19, 152:3</p> <p>difficulty [1] - 140:23</p> <p>diffuse [1] - 101:8</p> <p>diffusion [5] - 83:20, 87:6, 102:6, 102:20, 103:16</p> <p>dimensions [4] - 44:5, 89:21, 90:2, 116:1</p> <p>Diocese [1] - 51:18</p> <p>dioxide [54] - 64:15, 64:16, 64:24, 65:2, 65:6, 65:9, 65:20, 66:7, 67:6, 68:18, 68:22, 68:24, 70:8, 77:1, 77:9, 77:12, 77:15, 80:8, 80:15, 80:16, 80:17, 80:19, 81:8, 81:11, 81:14, 82:14, 83:12, 83:20, 83:24, 84:15, 84:18, 85:6, 85:8, 85:21, 87:8, 87:11, 88:3, 89:12, 89:14, 96:23, 99:5, 101:7, 102:22, 103:4, 113:22, 114:18, 115:3, 116:23, 118:24, 119:7, 119:11, 121:23, 127:3</p> <p>DIRECT [5] - 5:14, 60:23, 124:22, 135:12, 156:10</p> <p>direct [2] - 130:10, 135:16</p> <p>directed [1] - 164:9</p> <p>direction [3] - 94:6, 97:23, 121:11</p> <p>directly [5] - 6:17, 8:5, 51:17, 79:19, 98:25</p> <p>director [1] - 156:14</p> <p>disagree [1] - 54:8</p> <p>disaster [1] - 68:22</p> <p>disciplines [1] - 126:13</p> <p>disclosing [2] - 21:5, 158:19</p> <p>discount [4] - 28:13, 37:10, 37:11, 49:19</p> <p>discounted [1] - 48:21</p>	<p>discovered [1] - 23:1</p> <p>discredit [1] - 24:16</p> <p>discuss [4] - 17:10, 20:10, 21:6, 21:15</p> <p>discussed [7] - 17:6, 20:6, 20:16, 20:19, 33:19, 34:2, 130:9</p> <p>discussion [8] - 12:24, 19:1, 21:6, 21:19, 23:17, 27:1, 37:12, 92:15</p> <p>discussions [7] - 7:5, 7:8, 7:9, 22:16, 40:11, 40:13, 151:18</p> <p>dislocate [1] - 82:22</p> <p>Dispersion [1] - 159:1</p> <p>dispersion [27] - 10:25, 12:10, 12:25, 13:2, 13:16, 15:4, 20:10, 20:15, 21:7, 21:11, 21:24, 22:8, 24:24, 41:5, 95:13, 95:15, 95:16, 101:2, 103:16, 125:5, 128:19, 128:25, 157:15, 157:16, 158:8, 159:8, 159:13</p> <p>displaced [2] - 83:2, 102:7</p> <p>displacing [1] - 87:7</p> <p>dissolved [4] - 68:23, 80:8, 80:16, 80:19</p> <p>distance [8] - 6:13, 6:21, 56:1, 86:24, 94:11, 95:17, 140:16</p> <p>distances [4] - 80:24, 138:3, 140:9, 148:12</p> <p>docket [3] - 3:19, 156:18, 157:1</p> <p>Doctor [2] - 123:19, 131:7</p> <p>doctor [1] - 124:24</p> <p>document [3] - 68:15, 69:23, 159:18</p> <p>documentation [1] - 129:20</p> <p>documents [11] - 65:24, 68:2, 68:3, 129:12, 156:24, 157:15, 158:7, 158:19, 159:2, 159:6, 159:15</p> <p>dog [1] - 19:23</p> <p>domain [4] - 23:4, 23:12, 41:16, 49:4</p> <p>donated [1] - 51:15</p> <p>done [27] - 15:13, 15:24, 22:25, 23:1, 39:18, 39:21, 39:22, 41:12, 41:13, 41:15, 46:1, 51:9, 65:11, 65:22, 66:2, 80:22, 82:1, 103:14, 132:8,</p>	<p>132:10, 136:23, 138:16, 149:18, 149:23, 151:8, 153:15, 163:21</p> <p>dose [2] - 68:18, 77:10</p> <p>dots [1] - 144:14</p> <p>doubt [1] - 118:15</p> <p>Dow [1] - 64:8</p> <p>down [34] - 12:13, 16:25, 49:15, 49:16, 50:21, 54:20, 55:23, 62:1, 65:6, 70:9, 71:2, 71:12, 71:25, 72:18, 73:6, 73:10, 74:14, 74:16, 80:21, 82:17, 82:18, 83:22, 93:20, 94:22, 95:3, 99:11, 101:5, 107:23, 110:7, 112:22, 141:1, 154:6, 158:25, 165:12</p> <p>downhill [8] - 81:10, 82:15, 82:16, 83:21, 87:5, 87:16, 102:5, 103:5</p> <p>downtown [2] - 11:11, 11:12</p> <p>downward [1] - 37:20</p> <p>drag [1] - 101:11</p> <p>dramatic [1] - 145:6</p> <p>draw [1] - 7:15</p> <p>drawing [1] - 80:25</p> <p>drawn [1] - 34:16</p> <p>drills [2] - 82:4, 82:5</p> <p>drive [2] - 43:8, 108:3</p> <p>Drive [2] - 35:9</p> <p>driven [1] - 52:24</p> <p>drop [6] - 66:24, 67:23, 74:19, 83:13, 107:21</p> <p>drops [3] - 67:4, 80:2, 83:16</p> <p>dry [1] - 66:11</p> <p>dual [1] - 62:9</p> <p>DUBLINSKE [14] - 125:22, 125:25, 130:12, 132:19, 139:23, 142:2, 150:4, 153:16, 155:13, 158:17, 159:25, 161:11, 161:16, 161:18</p> <p>Dublinske [7] - 130:11, 132:9, 132:16, 142:1, 155:12, 159:24, 161:14</p> <p>Dublinske's [1] - 155:4</p> <p>ductile [1] - 85:17</p> <p>due [3] - 15:8, 85:13, 118:20</p>
---	---	--	---	---

<p>duly [5] - 5:12, 60:21, 124:20, 135:10, 156:8</p> <p>dumb [1] - 71:25</p> <p>during [6] - 16:25, 63:4, 69:22, 110:11, 110:18, 121:6</p> <p>dust [1] - 85:4</p> <p>duties [1] - 63:16</p> <p>dwelling [2] - 138:4, 138:11, 138:12, 138:20, 138:24, 140:7, 140:13, 140:17, 140:20, 143:3, 143:19, 143:20, 143:21, 144:1, 144:10, 144:23, 145:2, 145:8, 145:16, 145:19, 146:22</p> <p>dwelling [3] - 52:4, 52:18, 143:24</p> <p>dying [1] - 105:6</p> <p>dynamics [2] - 125:6, 126:20</p>	<p>127:13</p> <p>education [1] - 125:3</p> <p>educational [2] - 61:5, 141:18</p> <p>effect [9] - 17:19, 26:24, 49:16, 69:22, 84:24, 87:6, 87:7, 111:17, 114:22</p> <p>effectively [1] - 79:25</p> <p>effects [3] - 68:19, 68:24, 92:10</p> <p>eight [3] - 44:18, 77:16, 81:7</p> <p>either [15] - 14:24, 21:11, 28:4, 31:9, 36:25, 42:19, 57:12, 66:6, 83:17, 97:25, 107:4, 118:18, 132:10, 138:15, 158:21</p> <p>elected [2] - 43:20, 146:25</p> <p>electric [2] - 110:2, 110:19</p> <p>electrical [5] - 32:23, 32:24, 110:8, 112:17, 117:9</p> <p>electricity [1] - 117:8</p> <p>elementary [1] - 58:1</p> <p>Elementary [1] - 58:2</p> <p>elevation [3] - 78:7, 78:13, 114:7</p> <p>elevation-wise [1] - 114:7</p> <p>elevations [2] - 78:6, 81:10</p> <p>Elkins [2] - 160:19, 165:5</p> <p>eloquent [1] - 129:24</p> <p>elsewhere [1] - 164:7</p> <p>email [5] - 3:12, 17:9, 152:11, 163:13, 165:9</p> <p>emails [1] - 152:10</p> <p>emerge [1] - 127:3</p> <p>emergency [9] - 21:16, 21:20, 21:25, 24:24, 25:2, 82:5, 99:12, 121:17, 137:6</p> <p>eminent [3] - 23:4, 23:12, 41:16</p> <p>Emmons [2] - 163:24, 164:24</p> <p>emphasis [1] - 126:8</p> <p>employed [2] - 12:3, 12:7</p> <p>encumbered [13] - 27:19, 27:20, 28:10, 30:9, 32:11, 32:21, 36:6, 43:13, 43:15, 44:6, 44:11, 44:17, 45:11</p> <p>encumbering [1] -</p>	<p>37:21</p> <p>encumbrance [1] - 36:15</p> <p>end [2] - 76:13, 150:15</p> <p>ended [1] - 128:13</p> <p>ends [2] - 79:23, 114:21</p> <p>energy [3] - 11:25, 79:8, 79:9, 79:12, 79:14, 79:17, 80:1, 83:6, 83:9, 83:10, 83:11, 83:18, 84:2, 85:11, 85:21, 85:22, 85:25, 86:9, 86:15, 86:20, 87:15, 102:12, 102:15, 102:25, 109:13, 112:25, 114:17, 114:18, 114:20, 114:21</p> <p>engaged [1] - 37:12</p> <p>engineered [1] - 61:15</p> <p>Engineering [2] - 19:14, 68:7</p> <p>engineering [5] - 68:12, 68:16, 125:4, 126:7, 126:14</p> <p>enlighten [1] - 151:4</p> <p>entire [3] - 99:5, 132:7, 146:22</p> <p>entity [1] - 117:17</p> <p>entryway [1] - 19:18</p> <p>ERCOT [1] - 110:4</p> <p>escaping [1] - 93:7</p> <p>especially [3] - 74:5, 110:4, 110:20</p> <p>ESRI [1] - 138:19</p> <p>essential [1] - 113:24</p> <p>essentially [1] - 125:2</p> <p>estate [1] - 23:18</p> <p>estimate [1] - 45:2</p> <p>estimated [2] - 145:17, 145:23</p> <p>etcetera [2] - 30:21, 117:22</p> <p>evaluate [1] - 129:4</p> <p>evaluation [1] - 106:9</p> <p>evening [2] - 165:12, 165:19</p> <p>event [7] - 10:1, 13:18, 61:20, 97:24, 100:6, 100:25, 101:24</p> <p>eventually [1] - 112:24</p> <p>evidence [6] - 15:16, 16:1, 28:2, 33:23, 39:6, 91:23</p> <p>evidentiary [1] - 16:6</p> <p>exact [3] - 7:1, 38:14, 102:10</p> <p>exactly [3] - 26:11, 32:4, 159:15</p> <p>EXAMINATION [15] - 5:14, 33:8, 34:12,</p>	<p>38:8, 56:16, 60:23, 88:11, 103:20, 104:11, 117:14, 124:22, 135:12, 142:4, 142:22, 156:10</p> <p>examination [2] - 96:6, 141:24</p> <p>examined [6] - 5:12, 60:21, 124:20, 135:10, 155:7, 156:8</p> <p>example [7] - 35:24, 44:6, 44:8, 48:4, 49:2, 49:3, 153:24</p> <p>excavated [1] - 48:6</p> <p>excited [1] - 51:21</p> <p>exclude [2] - 141:15, 144:9</p> <p>excludes [1] - 140:8</p> <p>exclusive [1] - 41:3</p> <p>excuse [2] - 7:25, 70:7</p> <p>executive [1] - 11:21</p> <p>exhibit [9] - 3:16, 3:23, 4:7, 43:5, 71:16, 124:24, 125:10, 137:17, 141:3</p> <p>Exhibit [16] - 4:2, 4:4, 4:12, 7:16, 7:17, 29:18, 34:15, 36:11, 50:11, 86:25, 124:25, 135:18, 137:2, 139:21, 142:24, 144:25</p> <p>exist [1] - 142:13</p> <p>existence [1] - 89:19</p> <p>existing [4] - 8:11, 104:13, 139:11, 141:13</p> <p>exists [2] - 90:7, 90:8</p> <p>expand [2] - 83:19, 85:14</p> <p>expanding [3] - 85:6, 116:21, 116:23</p> <p>expands [3] - 83:19, 84:4, 84:19</p> <p>expansion [2] - 84:23, 86:6</p> <p>expected [1] - 131:4</p> <p>expecting [1] - 118:21</p> <p>expended [1] - 87:12</p> <p>expense [1] - 30:25</p> <p>expenses [1] - 31:15</p> <p>experience [9] - 27:8, 27:25, 28:9, 62:23, 64:6, 64:7, 125:3, 126:14, 127:6</p> <p>experienced [4] - 32:7, 69:19, 70:23, 90:12</p> <p>experiencing [1] - 107:13</p> <p>expert [6] - 18:5,</p>	<p>18:13, 22:8, 22:12, 103:24, 127:22</p> <p>expertise [6] - 125:8, 127:22, 128:5, 136:6, 136:8, 141:20</p> <p>experts [1] - 132:4</p> <p>explain [4] - 24:2, 29:25, 50:9, 110:15</p> <p>explained [2] - 23:23, 48:15</p> <p>exposed [1] - 72:4</p> <p>express [1] - 18:8</p> <p>Express [1] - 3:6</p> <p>expressed [2] - 18:9, 20:23</p> <p>extent [2] - 22:6, 33:12</p> <p>extinguisher [3] - 84:25, 85:8, 117:3</p> <p>extreme [3] - 72:4, 107:9, 121:7</p> <p>extremely [1] - 161:23</p> <p>extremes [2] - 74:22, 74:23</p>
E				F
<p>early [1] - 163:18</p> <p>earthquakes [1] - 106:6</p> <p>easement [1] - 32:2</p> <p>easements [7] - 22:19, 41:19, 41:21, 53:18, 53:20, 53:23, 53:24</p> <p>easier [1] - 50:14</p> <p>east [24] - 7:8, 8:5, 9:17, 26:18, 33:19, 34:3, 38:16, 38:23, 38:25, 39:5, 46:9, 46:15, 47:9, 47:20, 51:18, 52:15, 53:13, 53:16, 53:25, 54:16, 55:10, 57:6, 94:19, 99:3</p> <p>eastern [9] - 6:8, 6:12, 6:15, 6:20, 6:24, 46:14, 98:17, 114:14, 141:4</p> <p>easy [3] - 37:22, 53:20, 55:1</p> <p>edge [3] - 46:24, 82:17, 98:19</p> <p>edges [1] - 109:8</p> <p>edification [1] - 137:13</p> <p>edit [1] - 127:10</p> <p>edited [1] - 127:10</p> <p>editor [4] - 127:13, 127:15, 127:17, 127:19</p> <p>editor-in-chief [1] -</p>				<p>facilitate [1] - 22:2</p> <p>facility [1] - 57:22</p> <p>fact [14] - 8:21, 9:1, 9:5, 16:5, 20:16, 26:12, 56:25, 89:20, 104:13, 110:20, 152:1, 154:21, 157:18, 162:12</p> <p>factor [1] - 111:15</p> <p>factors [1] - 152:2</p> <p>Fahrenheit [10] - 69:25, 70:25, 71:18, 73:24, 79:3, 79:13, 83:14, 108:4, 108:9</p> <p>failsafe [1] - 112:16</p> <p>failsafes [1] - 112:16</p> <p>failure [5] - 72:23, 92:10, 92:11, 121:13</p> <p>failures [1] - 120:24</p> <p>fair [10] - 37:3, 37:7, 37:13, 39:20, 128:14, 140:11, 141:16, 158:2, 163:7, 163:8</p> <p>fairly [6] - 91:8, 95:1, 95:25, 142:16, 145:20</p> <p>falls [1] - 16:19</p> <p>familiar [5] - 8:12, 104:2, 118:5, 131:17, 146:6</p> <p>familiarity [1] - 110:2</p> <p>family [12] - 30:7, 51:9, 51:10, 51:12, 51:13, 52:1, 52:2,</p>

<p>138:9, 138:12, 140:15, 143:23</p> <p>far [24] - 9:18, 26:6, 32:5, 36:4, 46:20, 53:14, 54:10, 55:24, 63:15, 72:13, 81:25, 84:10, 86:23, 87:2, 94:4, 94:11, 96:14, 97:3, 114:3, 119:1, 131:3, 145:1, 151:13, 161:12</p> <p>Farm [3] - 146:15, 147:2, 147:7</p> <p>Fast [1] - 35:25</p> <p>fast [2] - 101:8, 117:2</p> <p>fault [2] - 85:12, 114:14</p> <p>feasible [1] - 33:13</p> <p>features [1] - 106:8</p> <p>February [6] - 18:21, 18:24, 19:12, 25:14, 41:9, 110:8</p> <p>federal [7] - 38:19, 93:1, 93:9, 104:24, 105:13, 118:6, 118:7</p> <p>feds [1] - 105:3</p> <p>feed [1] - 120:7</p> <p>feelings [1] - 131:17</p> <p>feet [24] - 72:6, 73:22, 75:4, 75:9, 75:23, 77:9, 77:12, 77:16, 81:8, 81:22, 96:9, 107:20, 107:23, 140:9, 143:4, 143:8, 143:16, 144:13, 146:9, 146:17, 148:8, 148:9</p> <p>feet'ish [1] - 75:7</p> <p>Feist [1] - 19:17</p> <p>Fellows [1] - 62:14</p> <p>felony [3] - 4:25, 60:8, 124:7</p> <p>felt [3] - 21:11, 21:12, 21:22</p> <p>few [10] - 25:16, 38:7, 42:3, 48:9, 48:21, 56:18, 88:15, 104:9, 125:1, 149:17</p> <p>field [3] - 126:7, 136:6, 136:8</p> <p>fields [2] - 127:12, 127:22</p> <p>fighting [1] - 24:8</p> <p>figure [7] - 25:1, 48:22, 63:15, 82:8, 82:9, 97:8, 157:12</p> <p>figuring [1] - 52:5</p> <p>file [2] - 15:18, 161:12</p> <p>filed [7] - 3:25, 6:7, 15:25, 16:17, 27:14, 139:6, 163:24</p> <p>fill [2] - 96:25, 121:22</p> <p>final [2] - 26:23, 121:3</p>	<p>findings [1] - 158:4</p> <p>fine [9] - 5:1, 7:14, 45:14, 60:9, 91:6, 96:5, 124:8, 125:12, 157:11</p> <p>finger [1] - 74:13</p> <p>fingers [1] - 86:17</p> <p>finish [2] - 112:13, 133:9</p> <p>fire [4] - 82:25, 83:1, 84:25, 117:3</p> <p>fires [2] - 106:6, 117:10</p> <p>first [48] - 4:13, 4:16, 5:12, 13:9, 14:2, 15:10, 16:21, 17:13, 21:24, 23:24, 25:2, 27:17, 27:18, 27:20, 30:1, 30:15, 31:10, 38:12, 56:18, 56:23, 56:24, 60:21, 61:13, 63:1, 63:5, 64:15, 69:17, 71:6, 78:4, 81:5, 82:8, 83:14, 98:23, 102:24, 103:25, 109:21, 115:8, 116:20, 124:20, 128:7, 128:9, 133:13, 135:10, 138:2, 140:6, 143:12, 156:8, 161:21</p> <p>fit [5] - 36:23, 37:1, 128:3, 164:6, 164:16</p> <p>five [20] - 5:1, 30:17, 31:7, 31:14, 36:19, 36:20, 43:13, 50:17, 58:1, 60:9, 66:9, 68:19, 75:4, 79:6, 80:23, 99:3, 101:20, 113:23, 124:8, 164:1</p> <p>fix [1] - 123:14</p> <p>flash [1] - 83:5</p> <p>flashes [1] - 83:1</p> <p>flashing [1] - 67:5</p> <p>flat [1] - 95:1</p> <p>flavor [2] - 125:2, 125:7</p> <p>flaw [4] - 75:17, 84:8, 85:11, 85:12</p> <p>flexible [1] - 163:14</p> <p>flick [1] - 74:12</p> <p>flood [1] - 88:4</p> <p>flooding [2] - 127:7, 127:9</p> <p>floodplain [7] - 78:9, 78:12, 94:16, 94:18, 99:7, 114:11, 114:12</p> <p>flow [24] - 70:11, 72:12, 82:15, 84:9, 84:11, 84:14, 86:23, 87:20, 87:21, 87:24, 88:1, 96:24, 102:5,</p>	<p>112:15, 112:19, 112:20, 114:23, 126:9, 126:10, 127:2, 127:17</p> <p>flowing [2] - 66:24, 70:18</p> <p>flows [2] - 82:16, 103:4</p> <p>fluctuate [1] - 107:14</p> <p>fluid [41] - 66:21, 66:22, 66:24, 67:4, 67:12, 67:14, 67:19, 67:25, 70:8, 79:8, 79:19, 79:22, 80:3, 83:7, 83:8, 84:15, 84:18, 86:19, 89:13, 102:7, 102:12, 102:14, 103:1, 109:8, 112:21, 112:22, 114:18, 114:20, 114:21, 115:1, 115:4, 116:21, 119:12, 119:16, 120:8, 120:22, 120:25, 125:5, 126:20, 127:1, 127:17</p> <p>fluids [6] - 114:23, 120:22, 126:10, 126:11, 126:12, 126:21</p> <p>focus [1] - 27:8</p> <p>focused [1] - 140:20</p> <p>focuses [1] - 126:22</p> <p>folks [1] - 133:3</p> <p>follow [4] - 24:20, 56:18, 107:8, 107:11</p> <p>follow-up [1] - 56:18</p> <p>follows [5] - 5:13, 60:22, 124:21, 135:11, 156:9</p> <p>foot [2] - 140:9, 146:14</p> <p>footprint [1] - 31:22</p> <p>forces [1] - 66:19</p> <p>forcing [1] - 87:16</p> <p>foreign [4] - 105:24, 106:8, 106:10</p> <p>forget [1] - 159:14</p> <p>forgot [2] - 135:3, 135:8</p> <p>form [1] - 77:2</p> <p>forms [1] - 149:14</p> <p>formula [1] - 101:23</p> <p>formulated [1] - 69:12</p> <p>formulating [1] - 117:20</p> <p>forth [1] - 92:16</p> <p>foundation [4] - 33:22, 118:8, 139:1, 159:22</p> <p>four [13] - 31:14, 43:16, 69:3, 72:6,</p>	<p>75:4, 77:23, 78:19, 107:20, 107:23, 121:20, 127:19, 164:1</p> <p>fracture [27] - 63:11, 71:16, 72:22, 73:16, 75:11, 75:17, 75:19, 76:4, 76:17, 76:22, 76:23, 76:25, 78:21, 80:3, 84:7, 85:15, 90:18, 98:2, 98:5, 98:8, 98:13, 98:18, 98:24, 100:22, 109:16, 109:25</p> <p>fractures [1] - 114:17</p> <p>fracturing [1] - 116:17</p> <p>frankly [2] - 125:14, 151:7</p> <p>free [1] - 76:8</p> <p>Freedom [1] - 62:7</p> <p>freeze [6] - 63:1, 63:6, 63:7, 63:9, 63:12, 73:6</p> <p>freezer [1] - 73:10</p> <p>freezing [4] - 85:2, 107:15, 108:3, 116:17</p> <p>freshman [1] - 64:10</p> <p>friend [1] - 65:9</p> <p>friendly [1] - 91:8</p> <p>front [2] - 28:21, 125:13</p> <p>frost [16] - 73:6, 73:8, 73:18, 73:22, 73:24, 75:2, 75:4, 85:9, 107:21, 107:24, 108:3, 108:6, 108:8, 108:15, 108:20, 117:6</p> <p>frosted [1] - 73:20</p> <p>froze [2] - 110:21, 111:1</p> <p>frozen [5] - 85:3, 107:25, 111:25, 112:2</p> <p>frustration [1] - 20:23</p> <p>fuel [1] - 63:18</p> <p>full [10] - 4:19, 59:25, 70:11, 83:20, 92:11, 123:24, 134:8, 134:10, 150:2, 155:16</p> <p>full-scale [1] - 92:11</p> <p>fully [3] - 14:24, 16:21, 154:1</p> <p>function [1] - 130:2</p> <p>furnished [1] - 129:19</p> <p>future [3] - 50:7, 50:10, 141:15</p>	<p style="text-align: center;">G</p> <p>Gaia [2] - 57:19, 57:20</p> <p>gas [54] - 26:24, 27:9, 27:21, 28:11, 30:13, 32:11, 32:21, 34:18, 66:6, 66:11, 66:17, 66:20, 67:1, 67:7, 67:9, 67:21, 67:25, 76:6, 77:2, 79:9, 79:10, 79:18, 79:19, 79:22, 80:2, 80:4, 83:13, 83:22, 84:3, 84:20, 84:24, 85:23, 86:2, 86:4, 87:11, 89:5, 102:1, 102:8, 102:17, 110:3, 110:20, 112:24, 114:19, 117:4, 117:22, 117:25, 118:25, 119:10, 119:11</p> <p>gases [1] - 126:11</p> <p>Gasification [2] - 104:2, 104:4</p> <p>gather [1] - 106:9</p> <p>general [2] - 17:3, 149:8</p> <p>generally [3] - 37:15, 136:25, 144:6</p> <p>generators [1] - 120:8</p> <p>gentleman [1] - 27:11</p> <p>geographic [1] - 136:22</p> <p>geography [3] - 136:13, 136:14, 136:19</p> <p>Geological [5] - 139:11, 139:12, 141:12, 147:19, 147:22</p> <p>GIS [9] - 7:18, 7:22, 39:8, 136:6, 136:8, 136:10, 136:19, 136:20, 141:20</p> <p>given [6] - 17:5, 40:9, 76:4, 90:22, 115:11, 150:25</p> <p>glass [1] - 114:15</p> <p>GLUDT [8] - 4:8, 12:12, 29:20, 33:7, 33:9, 34:1, 34:9, 58:9</p> <p>Gludt [2] - 33:6, 58:8</p> <p>Google [1] - 138:21</p> <p>gosh [1] - 54:24</p> <p>gotcha [1] - 149:20</p> <p>GoTo [2] - 123:19, 162:11</p> <p>governed [1] - 65:8</p> <p>governing [1] - 93:9</p> <p>government [1] - 42:6</p>
--	---	---	---	---

<p>Governments [1] - 136:9 governs [1] - 117:18 gradient [5] - 108:10, 109:7, 109:10, 111:19, 111:20 graduating [1] - 61:10 grant [1] - 14:3 granted [2] - 13:19, 16:20 grants [1] - 105:11 gray [2] - 51:8, 51:24 great [4] - 20:17, 57:22, 68:3, 134:6 greater [2] - 140:10, 143:8 greatest [2] - 121:6, 145:2 greatly [1] - 111:20 green [2] - 8:2, 8:16 greeted [1] - 19:17 grilling [1] - 131:5 gritty [1] - 140:3 ground [13] - 73:12, 73:15, 73:19, 74:22, 77:16, 78:13, 98:6, 106:2, 107:10, 107:17, 107:18, 107:22 group [4] - 23:8, 61:21, 61:22, 140:22 groups [1] - 62:2 growth [4] - 26:13, 26:20, 54:18, 54:22 guess [15] - 4:4, 9:8, 34:24, 43:22, 94:3, 128:23, 145:5, 152:18, 152:19, 152:21, 154:7, 154:11, 157:11, 158:24, 159:12 guidance [1] - 162:1 guillotine [1] - 116:16 gutter [1] - 30:20 guys [7] - 54:10, 65:14, 65:19, 65:20, 101:15, 108:16, 162:5</p>	<p>86:14 handle [2] - 3:17, 80:18 hang [3] - 99:15, 135:23 happy [4] - 9:11, 24:5, 131:6, 149:16 hard [10] - 7:7, 40:25, 45:23, 112:1, 112:4, 123:2, 123:5, 131:17, 135:24, 144:15 Harold [1] - 19:13 hassle [1] - 53:25 Haugen [6] - 50:3, 56:12, 113:5, 130:23, 148:3, 160:7 HAUGEN [28] - 50:5, 50:9, 50:25, 52:9, 52:14, 52:22, 53:3, 53:6, 54:1, 54:3, 55:7, 55:11, 55:15, 56:4, 113:6, 113:8, 113:13, 113:16, 114:1, 115:11, 115:15, 115:18, 115:24, 116:2, 130:24, 133:23, 148:4, 160:8 Haugen-Hoffart [5] - 50:3, 113:5, 130:23, 148:3, 160:7 HAUGEN-HOFFART [28] - 50:5, 50:9, 50:25, 52:9, 52:14, 52:22, 53:3, 53:6, 54:1, 54:3, 55:7, 55:11, 55:15, 56:4, 113:6, 113:8, 113:13, 113:16, 114:1, 115:11, 115:15, 115:18, 115:24, 116:2, 130:24, 133:23, 148:4, 160:8 Haugen-Hoffart's [1] - 56:12 hazards [1] - 68:13 head [1] - 45:8 healthy [1] - 110:14 hear [12] - 8:25, 38:11, 53:15, 59:22, 59:23, 76:10, 123:10, 123:17, 134:3, 134:4, 134:13, 164:3 heard [9] - 9:4, 10:7, 55:16, 56:2, 57:15, 106:7, 113:10, 155:19, 162:16 hearing [15] - 3:7, 13:7, 13:18, 15:16, 16:25, 56:23, 103:25, 131:3,</p>	<p>131:23, 132:17, 151:19, 162:8, 162:10, 163:22, 164:18 hearings [9] - 12:4, 15:13, 92:15, 92:24, 127:23, 153:6, 159:14, 162:11, 164:2 heart [1] - 98:21 heat [22] - 70:18, 70:21, 71:1, 73:11, 73:14, 74:4, 74:5, 76:19, 83:4, 108:11, 109:13, 109:14, 111:9, 111:14, 111:15, 111:17, 112:7, 120:3, 126:9, 126:22, 127:14, 127:16 heated [4] - 76:21, 79:11, 126:23, 126:24 heavily [1] - 126:22 held [1] - 3:7 help [1] - 50:19 helpful [2] - 25:25, 165:21 helps [4] - 47:15, 123:7, 162:4, 163:9 Hennen [1] - 19:18 high [11] - 61:6, 64:2, 64:22, 71:15, 79:23, 86:7, 87:18, 87:19, 101:12, 116:21, 119:20 higher [5] - 66:19, 99:8, 101:4, 108:7 highlight [1] - 125:7 highlighted [1] - 141:7 hill [4] - 87:14, 94:10, 94:15, 101:6 hills [1] - 94:21 hilly [1] - 78:13 himself [1] - 20:8 hinders [1] - 153:24 hire [2] - 22:24, 41:12 history [1] - 20:8 hit [2] - 52:8, 138:22 hitting [1] - 52:6 Hoffart [5] - 50:3, 113:5, 130:23, 148:3, 160:7 HOFFART [28] - 50:5, 50:9, 50:25, 52:9, 52:14, 52:22, 53:3, 53:6, 54:1, 54:3, 55:7, 55:11, 55:15, 56:4, 113:6, 113:8, 113:13, 113:16, 114:1, 115:11, 115:15, 115:18, 115:24, 116:2, 115:15, 115:18, 115:24, 116:2,</p>	<p>130:24, 133:23, 148:4, 160:8 Hoffart's [1] - 56:12 hold [2] - 23:13, 31:12 hold-out [1] - 23:13 holding [3] - 31:7, 31:14, 31:15 hole [1] - 84:19 home [4] - 31:22, 143:23, 144:5 homes [4] - 9:13, 51:10, 51:12, 140:22 honest [1] - 14:23 Honor [39] - 3:24, 4:2, 4:8, 4:14, 12:12, 15:9, 29:17, 29:20, 33:7, 38:6, 56:9, 58:9, 58:17, 60:19, 88:10, 99:13, 103:6, 104:9, 105:19, 117:13, 122:5, 122:24, 123:9, 130:12, 130:21, 133:6, 142:2, 149:5, 150:4, 152:7, 153:16, 158:17, 159:25, 160:2, 160:4, 161:11, 161:21, 162:1, 163:16 hooked [1] - 165:14 hope [1] - 121:15 hopeful [1] - 164:9 hopefully [2] - 49:4, 103:14 hoping [1] - 50:17 horribles [1] - 90:12 hospice [1] - 57:22 hospitals [2] - 140:18, 140:21 host [1] - 95:18 hours [2] - 65:14, 99:14 house [5] - 28:14, 36:23, 43:24, 76:20, 144:7 House [1] - 57:19 household [1] - 145:20 houses [1] - 138:15 housing [1] - 27:18 Howard [13] - 58:19, 58:21, 131:20, 133:25, 134:1, 134:2, 134:3, 134:11, 134:12, 135:14, 148:21, 148:24 HOWARD [7] - 134:4, 134:6, 134:10, 134:15, 134:18, 134:22, 135:9 Howard's [2] - 132:6,</p>	<p>133:4 huge [1] - 109:9 human [2] - 68:21, 142:14 humans [3] - 80:5, 80:6, 144:2 humidity [3] - 97:12, 97:14, 121:12 humor [1] - 143:5 hundred [3] - 75:8, 112:5, 162:23 hurricane [1] - 102:13 hypothetically [2] - 81:24, 84:5</p>
I				
<p>I-94 [3] - 8:6, 8:12, 50:18 ice [3] - 66:11, 73:9, 85:5 idea [5] - 34:23, 71:8, 79:16, 83:6, 144:6 identified [7] - 138:10, 138:19, 138:24, 139:12, 141:13, 143:17, 144:14 identify [7] - 138:10, 138:15, 138:20, 140:24, 143:24, 144:5, 144:10 identifying [1] - 144:23 Illinois [1] - 148:11 imagery [1] - 138:18 immediate [3] - 23:2, 65:16, 68:20 imminent [1] - 79:7 impact [5] - 9:13, 26:13, 28:3, 74:10, 145:17 impacted [3] - 47:24, 69:14, 145:23 impenetrable [1] - 109:14 imperfection [1] - 109:22 implied [1] - 17:19 implying [1] - 12:16 important [4] - 22:3, 25:4, 89:20, 118:12 impossible [1] - 129:15 impression [1] - 24:19 imprisonment [3] - 5:2, 60:10, 124:9 impurities [2] - 66:23, 108:2 impurity [1] - 118:23 in-person [1] - 10:14 inability [1] - 39:5 inappropriate [1] -</p>				

<p>21:11 inaudible [1] - 115:16 inc [2] - 34:25, 35:5 inch [2] - 70:1, 109:10 inches [9] - 73:4, 73:6, 74:6, 75:1, 75:8, 98:6, 108:9, 108:14 incident [2] - 20:22, 25:4 include [4] - 12:24, 78:19, 127:9, 144:12 included [3] - 41:15, 141:7, 145:17 includes [1] - 159:17 including [3] - 15:17, 144:24, 145:15 Inconel [1] - 120:19 inconvenient [1] - 38:21 incorporated [1] - 52:20 incorrectly [1] - 37:17 independent [3] - 18:5, 18:13, 22:8 Indiana [2] - 61:2, 75:3 Indianapolis [5] - 61:2, 62:4, 62:6, 62:13, 73:21 indicated [3] - 16:23, 27:21, 122:18 indiscernible [2] - 115:19, 120:8 indiscernible) [1] - 76:9 individual [3] - 18:5, 145:16, 147:5 individuals [2] - 13:1, 137:10 industry [1] - 11:25 influence [1] - 53:12 influenced [1] - 53:8 information [40] - 7:22, 13:1, 14:3, 16:3, 17:5, 17:7, 18:1, 18:3, 18:4, 18:12, 22:4, 22:9, 24:24, 25:6, 38:19, 41:3, 43:3, 66:3, 69:11, 105:21, 105:23, 105:24, 106:9, 117:24, 136:22, 137:7, 147:17, 149:10, 150:11, 150:16, 150:21, 150:24, 151:16, 151:22, 153:1, 153:2, 154:4, 157:16, 160:24, 162:6 informed [3] - 89:16, 89:22, 89:24 ingredients [2] -</p>	<p>137:20, 139:5 initial [1] - 84:1 injured [1] - 105:7 inputs [4] - 129:1, 129:17, 158:4, 159:8 inside [26] - 64:1, 68:11, 68:13, 71:8, 71:24, 72:12, 73:24, 75:18, 75:19, 79:8, 84:16, 98:23, 109:9, 114:17, 115:9, 115:21, 117:4, 118:13, 118:17, 118:20, 118:23, 119:19, 120:4, 120:11, 120:23 insisting [2] - 153:3, 153:12 inspection [1] - 92:4 installed [2] - 27:4, 27:5 instance [2] - 158:6, 163:10 instantaneous [2] - 65:7, 68:20 instantly [2] - 80:8, 85:9 instead [2] - 49:2, 132:24 instruct [1] - 17:16 instruction [2] - 17:5, 17:10 instructor [1] - 61:14 insulate [1] - 107:16 insulated [1] - 110:24 insulation [11] - 70:14, 70:15, 73:19, 109:4, 109:5, 109:12, 111:7, 111:9, 111:13, 112:7, 118:18 insulative [1] - 118:19 intended [2] - 158:20, 160:16 intending [1] - 122:24 intends [1] - 9:5 intent [1] - 155:2 intentions [2] - 28:17, 53:16 interchange [2] - 50:18, 53:2 interest [3] - 21:23, 52:6, 54:17 interested [2] - 37:11, 128:5 internet [5] - 68:10, 91:2, 91:3, 162:17, 162:21 intersection [1] - 139:18 Interstate [3] - 78:2, 94:24, 114:16 interstate [6] - 46:8,</p>	<p>46:20, 46:21, 46:23, 50:22, 94:19 intertwined [1] - 21:3 intervenor [3] - 5:18, 14:7, 53:9 introduction [1] - 25:9 invasive [1] - 119:4 inventory [4] - 30:8, 37:16, 37:18 inversion [1] - 101:4 investigated [1] - 26:2 investor [1] - 20:1 invited [1] - 10:22 involved [2] - 15:12, 152:17 involvement [1] - 154:20 IOSD [1] - 64:8 Iowa [12] - 61:7, 61:8, 61:9, 111:22, 137:8, 137:11, 138:7, 146:13, 146:15, 146:24, 147:7, 147:8 Iraq [1] - 62:7 Iraqi [1] - 62:7 irrespective [3] - 16:2, 57:10, 57:11 Island [1] - 82:7 island [3] - 35:8, 35:11, 35:17 isolated [1] - 112:18 isolation [3] - 78:4, 103:2, 114:24 issue [21] - 12:21, 14:1, 14:14, 14:15, 15:9, 16:6, 16:7, 59:6, 76:13, 117:16, 132:15, 150:8, 150:13, 151:3, 151:12, 152:16, 152:21, 152:22, 154:2, 155:5, 155:13 issues [8] - 13:18, 14:19, 16:15, 21:16, 54:10, 90:19, 150:5, 160:20 itself [11] - 61:20, 63:24, 63:25, 65:13, 74:11, 78:8, 84:16, 98:25, 109:25, 116:24</p>	<p>Jason [1] - 134:10 Jeff [2] - 27:11, 59:20 JEFF [5] - 59:23, 60:2, 60:12, 60:16, 60:20 Jeffery [1] - 60:2 Jerome [1] - 19:17 job [1] - 63:16 John [2] - 123:8, 124:1 JOHN [6] - 123:12, 124:1, 124:2, 124:11, 124:15, 124:19 joined [1] - 61:9 joint [3] - 61:21, 61:22, 78:21 joints [1] - 62:23 Jon [2] - 133:11, 164:12 Jorde [30] - 3:12, 38:4, 58:12, 104:8, 122:8, 122:16, 124:17, 125:9, 125:23, 131:11, 132:19, 133:1, 133:8, 134:24, 135:23, 148:19, 149:10, 150:17, 150:18, 150:22, 151:4, 153:1, 153:11, 153:22, 154:5, 154:9, 154:19, 155:3, 156:5, 160:16 JORDE [57] - 3:18, 4:4, 38:6, 38:9, 41:25, 58:13, 58:17, 104:9, 104:12, 105:17, 122:9, 122:20, 122:23, 123:7, 123:18, 123:22, 124:18, 124:23, 125:17, 125:24, 126:4, 130:7, 131:7, 131:14, 131:24, 132:1, 132:7, 133:11, 134:1, 134:25, 135:13, 135:25, 136:3, 136:4, 139:21, 140:2, 148:20, 149:16, 151:5, 151:25, 154:11, 154:22, 154:25, 155:10, 156:6, 156:11, 157:9, 157:11, 157:13, 158:14, 158:22, 161:21, 163:4, 163:8, 164:8, 164:19, 164:22 Jorde's [2] - 149:6, 150:25</p>	<p>Joule [2] - 84:24, 114:22 Joule-Thomson [2] - 84:24, 114:22 journal [1] - 127:7 journals [1] - 127:14 joy [1] - 131:15 JTG [1] - 63:19 Judge [1] - 154:17 judging [2] - 75:3, 142:15 Julia [1] - 164:24 June [8] - 132:2, 133:20, 149:18, 161:25, 163:5, 164:12, 164:15, 165:3 justify [1] - 38:20 Justin [2] - 11:15, 11:18</p> <p style="text-align: center;">K</p> <p>keep [6] - 75:5, 76:21, 101:7, 103:4, 107:17, 115:20 keeping [2] - 146:16 keeps [1] - 120:13 Kenexis [1] - 68:12 kept [2] - 105:6, 150:15 Kertzmans [1] - 164:23 key [2] - 112:14, 125:7 kilometers [2] - 70:4 kind [31] - 19:2, 20:7, 35:8, 43:14, 45:10, 51:8, 52:20, 64:14, 73:1, 73:19, 76:1, 107:16, 108:1, 111:4, 113:24, 119:17, 125:1, 125:6, 128:14, 136:25, 138:14, 138:22, 139:1, 139:4, 141:4, 144:7, 144:8, 144:15, 151:7, 159:9, 162:24 knock [1] - 163:18 knowing [2] - 49:7, 113:22 knowledge [4] - 12:2, 18:6, 23:11, 147:4 known [3] - 14:20, 139:18, 141:10 knows [1] - 155:1 Kringstad [2] - 11:15, 11:18 Kursk [1] - 65:12</p>
		<p>J</p> <p>jam [1] - 163:20 January [6] - 11:4, 11:6, 14:6, 40:16, 71:6, 137:22 JASON [7] - 134:4, 134:6, 134:10, 134:15, 134:18, 134:22, 135:9</p>		

L				
<p>lack [1] - 33:22 laid [1] - 52:21 Lake [1] - 68:22 lake [1] - 68:23 land [6] - 47:17, 47:20, 48:8, 49:1, 49:23, 141:13 landing [1] - 63:17 landowner [13] - 33:15, 33:21, 34:5, 49:3, 56:20, 129:16, 133:12, 133:14, 133:15, 133:18, 133:19, 164:23 Landowner [3] - 124:24, 125:18, 160:16 landowners [10] - 22:18, 22:20, 23:13, 23:19, 41:16, 41:23, 161:23, 164:3, 164:24, 165:1 Landowners [2] - 4:11, 125:17 landscape [1] - 142:16 landslide [5] - 139:4, 139:10, 141:1, 141:10, 147:12 landslides [4] - 139:11, 139:16, 139:19, 141:13 large [4] - 32:23, 61:20, 76:20, 111:18 larger [2] - 44:3, 67:11 last [27] - 3:12, 3:25, 4:20, 28:12, 29:8, 34:16, 39:8, 43:12, 46:4, 60:1, 120:5, 123:25, 128:8, 128:14, 129:8, 131:22, 132:20, 134:8, 141:8, 149:10, 150:2, 150:11, 155:16, 155:22, 159:14, 162:6, 162:18 lastly [2] - 127:6, 139:13 late [2] - 121:19, 165:19 latest [1] - 80:25 launched [1] - 64:18 Law [1] - 67:18 law [5] - 4:23, 38:20, 60:5, 73:5, 124:5 lawyer [2] - 90:25, 113:20 lay [1] - 159:22 layers [1] - 39:9</p>	<p>laying [1] - 139:1 layout [2] - 113:21, 114:2 leak [11] - 10:5, 21:17, 84:5, 84:7, 84:8, 84:17, 86:7, 99:11, 116:20, 120:4 learn [4] - 5:25, 33:18, 34:1, 57:8 learned [6] - 10:3, 17:6, 17:11, 17:21, 18:3, 71:9 learning [1] - 57:3 least [13] - 6:6, 12:24, 28:3, 29:11, 34:19, 39:19, 41:11, 67:22, 71:25, 92:12, 128:12, 131:2, 154:18 leave [1] - 141:23 leaves [4] - 83:16, 102:1, 102:3, 102:18 left [3] - 7:17, 24:18, 48:10 legal [7] - 14:12, 15:9, 16:7, 21:1, 152:4, 153:7, 157:7 legend [1] - 145:17 legislature [1] - 146:25 Leibel [3] - 149:7, 150:7, 150:23 lends [1] - 63:24 lengthy [2] - 158:25, 164:11 less [12] - 48:9, 49:8, 71:11, 74:17, 74:18, 99:8, 101:11, 108:22, 132:8, 140:9, 144:14, 145:18 lethal [2] - 68:18, 77:10 level [12] - 10:8, 83:11, 91:13, 94:18, 95:3, 96:10, 96:25, 102:4, 102:19, 107:18, 107:22, 108:15 levels [6] - 64:22, 64:24, 65:1, 65:2, 65:6, 68:18 lie [1] - 45:2 life [2] - 68:21, 79:7 likewise [1] - 144:4 limit [3] - 47:10, 65:7, 99:22 limitations [1] - 147:24 limited [3] - 130:9, 155:7, 157:18 limits [2] - 65:7 Lincoln [3] - 94:25, 95:3, 124:3</p>	<p>line [31] - 7:24, 8:6, 16:18, 16:22, 30:21, 34:16, 38:12, 40:3, 63:7, 63:15, 73:6, 73:8, 73:18, 73:22, 73:24, 75:2, 75:5, 76:2, 76:15, 76:24, 76:25, 77:18, 78:7, 85:12, 87:1, 102:14, 108:3, 108:6, 108:8, 131:20 lined [1] - 132:23 lines [2] - 32:24, 77:14 link [4] - 3:14, 3:15, 58:23, 162:9 Linton [8] - 161:25, 162:10, 163:14, 164:2, 164:18, 164:21, 164:22, 164:25 Linton's [1] - 165:9 liquid [16] - 63:6, 66:12, 66:17, 66:20, 67:2, 67:14, 67:15, 67:25, 70:6, 76:6, 79:18, 83:14, 83:15, 84:18, 112:23, 116:22 liquids [1] - 126:11 list [4] - 135:3, 149:18, 161:13, 163:24 listed [3] - 136:18, 149:12, 149:13 literature [1] - 126:18 litigate [1] - 12:16 litigating [2] - 12:18, 14:22 live [2] - 63:2, 96:16 living [1] - 51:22 LLC [1] - 3:6 Loa [1] - 64:17 local [1] - 82:10 located [10] - 11:9, 30:5, 40:9, 57:24, 57:25, 61:1, 77:19, 79:21, 110:5, 138:17 location [20] - 6:12, 7:6, 8:4, 8:11, 8:12, 9:19, 26:22, 31:16, 31:19, 50:10, 57:2, 57:13, 69:5, 69:6, 74:21, 77:17, 81:25, 94:9, 145:3, 162:18 locations [3] - 32:6, 39:19, 69:14 logic [2] - 107:8, 107:11 Loma [1] - 82:6 look [17] - 6:3, 10:24, 22:8, 22:14, 28:18, 43:13, 43:24, 51:6, 54:21, 54:22, 55:21, 77:7, 86:8, 92:13,</p>	<p>125:16, 138:1, 152:25 looked [18] - 68:10, 68:21, 75:13, 77:17, 81:1, 90:16, 90:17, 91:7, 91:11, 92:2, 95:9, 95:17, 96:7, 99:10, 104:16, 145:1, 151:11, 152:20 looking [17] - 30:6, 55:23, 55:24, 68:13, 73:5, 82:7, 91:16, 92:1, 102:9, 107:20, 136:16, 140:6, 141:2, 143:11, 144:22, 146:19 looks [11] - 34:16, 35:24, 46:17, 82:17, 96:16, 123:13, 139:7, 139:13, 139:16, 141:2, 144:8 loop [2] - 119:19, 152:9 loose [1] - 132:4 lose [2] - 112:17, 112:25 loses [2] - 85:16, 85:17 loss [3] - 111:14, 112:7, 121:14 losses [1] - 74:13 loud [2] - 59:23, 86:12 Louisiana [2] - 10:5, 99:11 low [6] - 64:22, 70:19, 71:14, 96:10, 102:24, 127:24 lower [7] - 37:25, 49:12, 51:9, 51:12, 81:10, 107:19, 108:3 lowered [1] - 37:6 lowest [5] - 78:10, 96:24, 101:9, 102:4, 102:19 LP [1] - 86:4 lukewarm [1] - 112:4 lunch [1] - 131:10 lying [1] - 65:16</p>	<p>100:11, 100:17, 103:6, 103:10, 118:3, 122:5 Main [2] - 78:11, 114:10 main [13] - 69:6, 76:2, 76:15, 76:24, 76:25, 77:18, 78:7, 84:12, 84:13, 86:25, 119:21, 119:22, 120:4 maintain [4] - 64:21, 65:1, 69:24, 73:23 maintenance [1] - 74:25 major [1] - 20:1 majority [1] - 114:12 makeup [1] - 119:8 managed [1] - 46:2 management [5] - 21:16, 21:20, 21:25, 25:3, 127:8 manager [1] - 136:11 Mandan [1] - 27:3 manner [1] - 116:16 map [15] - 7:18, 10:12, 39:8, 43:13, 50:23, 57:2, 68:8, 69:4, 69:5, 72:13, 77:18, 96:7, 114:4, 142:25, 145:17 mapping [2] - 136:6, 136:19 maps [6] - 54:21, 95:9, 135:21, 137:21, 137:25, 144:23 March [1] - 5:20 Marian [2] - 62:14, 62:15 Maricopa [1] - 136:9 Marine [1] - 62:5 Marines [1] - 62:7 mark [1] - 3:16 marked [4] - 3:25, 28:22, 124:24, 135:17 market [4] - 28:2, 28:3, 37:8 marketing [1] - 37:7 marking [1] - 3:22 maroon [1] - 51:8 martensite [1] - 78:23 Mary [2] - 19:13, 42:11 mass [2] - 101:12, 126:10 master's [7] - 61:16, 62:10, 62:16, 62:17, 91:13, 91:21, 136:14 material [6] - 74:12, 85:16, 109:24, 118:19, 127:1, 129:9 Materials [1] - 68:7 materials [5] - 3:13,</p>
			M	
			<p>ma'am [1] - 99:25 machinist [1] - 73:1 magnifying [1] - 114:15 Mahlberg [4] - 88:9, 96:19, 104:24, 122:4 MAHLBERG [14] - 88:10, 88:12, 92:23, 96:4, 97:6, 99:13, 99:18, 100:1,</p>	

<p>3:15, 68:16, 117:21, 129:6</p> <p>matter [17] - 5:17, 16:5, 67:24, 84:18, 97:22, 98:1, 108:12, 109:4, 109:6, 128:1, 128:6, 128:11, 135:7, 135:17, 149:14, 149:21, 157:22</p> <p>mattered [1] - 102:18</p> <p>matters [10] - 3:10, 98:2, 98:4, 98:7, 102:24, 118:24, 149:2, 160:12, 161:20, 165:24</p> <p>Mauna [1] - 64:17</p> <p>maximum [6] - 5:1, 60:9, 124:8</p> <p>mean [27] - 9:9, 12:21, 13:6, 13:12, 13:22, 19:21, 22:11, 25:10, 38:18, 39:21, 96:9, 107:8, 129:3, 129:22, 145:6, 149:22, 149:23, 150:19, 151:12, 152:3, 152:25, 154:13, 157:11, 164:18, 164:19, 164:22</p> <p>meaning [4] - 30:19, 32:8, 57:2, 154:22</p> <p>means [2] - 65:5, 85:17</p> <p>meant [1] - 27:21</p> <p>measurements [1] - 80:23</p> <p>measuring [1] - 46:18</p> <p>mechanical [2] - 125:4, 126:7</p> <p>mechanics [1] - 102:9</p> <p>mechanism [1] - 109:25</p> <p>mechanisms [1] - 91:20</p> <p>medical [4] - 59:6, 59:7, 132:15, 160:20</p> <p>medium [2] - 51:12, 71:15</p> <p>meet [1] - 105:12</p> <p>meeting [32] - 10:17, 11:4, 11:13, 11:14, 12:17, 14:6, 17:3, 17:21, 17:23, 18:8, 18:16, 18:17, 18:21, 18:22, 19:8, 19:11, 19:15, 20:5, 20:6, 21:2, 22:22, 22:23, 23:22, 24:1, 24:8, 24:18, 25:13, 25:17, 25:20, 40:16, 41:9, 42:7</p>	<p>Meeting [2] - 123:19, 162:12</p> <p>meetings [6] - 10:14, 10:17, 18:20, 24:22, 25:15, 42:20</p> <p>melting [1] - 73:11</p> <p>Memorial [1] - 14:10</p> <p>mention [3] - 97:14, 97:25, 135:8</p> <p>mentioned [4] - 10:12, 20:16, 42:24, 50:6</p> <p>metal [7] - 75:16, 75:21, 78:23, 109:11, 119:5, 120:13</p> <p>metallurgical [1] - 68:6</p> <p>metallurgically [1] - 72:11</p> <p>metallurgy [1] - 109:20</p> <p>meters [2] - 75:22, 112:5</p> <p>methane [2] - 119:3</p> <p>methodologies [1] - 157:17</p> <p>methodology [2] - 129:1, 129:20</p> <p>Methodology [1] - 159:1</p> <p>methods [1] - 136:25</p> <p>mic [1] - 123:19</p> <p>microphone [1] - 4:17</p> <p>microseconds [1] - 75:25</p> <p>middle [2] - 51:1, 51:4</p> <p>Midwest [1] - 3:6</p> <p>might [14] - 47:6, 50:6, 52:23, 54:19, 58:17, 121:13, 125:13, 145:11, 145:15, 150:18, 161:14, 162:5, 163:1, 163:6</p> <p>mile [16] - 46:22, 47:9, 137:5, 137:6, 137:11, 137:13, 138:13, 138:15, 138:18, 140:11, 142:8, 143:9, 143:16, 144:11, 145:2, 145:8</p> <p>miles [27] - 9:21, 40:6, 46:18, 47:17, 52:10, 55:13, 55:16, 56:2, 56:3, 68:9, 70:5, 70:10, 72:14, 77:14, 78:3, 81:1, 81:6, 81:17, 81:19, 88:24, 94:13, 99:1, 99:2, 99:3, 99:6, 114:5</p> <p>military [2] - 61:9, 62:20</p> <p>millimeter [1] - 71:12</p>	<p>million [5] - 77:8, 77:11, 81:22, 119:24, 148:13</p> <p>mind [1] - 58:20</p> <p>mine [2] - 49:2, 65:10</p> <p>mines [1] - 48:5</p> <p>minimum [4] - 75:8, 105:4, 105:8, 105:13</p> <p>Minnesota [2] - 108:18, 108:20</p> <p>minus [4] - 70:24, 74:12, 79:5, 80:10</p> <p>minute [4] - 29:4, 68:20, 118:4, 143:6</p> <p>minutes [7] - 121:21, 122:25, 131:21, 132:8, 135:6, 149:17, 151:8</p> <p>mischaracterize [1] - 107:1</p> <p>mislead [1] - 47:4</p> <p>miss [1] - 138:23</p> <p>Mississippi [5] - 9:24, 10:1, 20:23, 55:23, 137:7</p> <p>Missouri [4] - 78:10, 94:17, 98:19, 114:9</p> <p>misstating [1] - 95:24</p> <p>misunderstanding [3] - 26:16, 32:3, 107:1</p> <p>Mitch [1] - 164:23</p> <p>mitigated [1] - 76:15</p> <p>mitigating [1] - 87:18</p> <p>mixed [2] - 11:17, 52:19</p> <p>mock [2] - 63:20, 92:12</p> <p>mock-up [1] - 92:12</p> <p>mock-ups [1] - 63:20</p> <p>mode [1] - 92:10</p> <p>model [7] - 13:3, 13:14, 13:16, 20:24, 21:7, 21:11, 21:24</p> <p>Modeling [1] - 159:1</p> <p>modeling [16] - 10:25, 12:10, 12:25, 15:5, 20:10, 20:15, 22:9, 24:25, 41:5, 125:5, 128:19, 148:10, 157:15, 157:16, 159:8, 159:14</p> <p>molecule [1] - 115:4</p> <p>molecules [2] - 101:24, 101:25</p> <p>moment [1] - 137:17</p> <p>Monday [10] - 59:11, 132:24, 133:10, 160:17, 161:2, 161:19, 163:19, 163:20, 166:1</p> <p>money [2] - 20:25, 161:24</p> <p>monitor [2] - 40:21,</p>	<p>93:19</p> <p>monitoring [2] - 64:21, 64:23</p> <p>months [4] - 62:21, 79:6, 101:20, 121:7</p> <p>morning [25] - 3:1, 3:11, 4:13, 4:14, 4:16, 4:18, 4:23, 5:16, 34:14, 42:3, 43:5, 60:5, 88:13, 88:14, 92:20, 103:22, 113:6, 113:7, 122:14, 131:9, 132:24, 134:13, 151:1, 165:17, 166:1</p> <p>Morton [7] - 26:3, 71:4, 77:25, 78:16, 78:19, 98:20, 98:23</p> <p>most [26] - 48:20, 50:20, 64:25, 66:5, 66:11, 66:15, 69:2, 74:17, 78:17, 80:15, 82:11, 82:12, 85:16, 92:25, 98:15, 106:8, 106:20, 111:22, 119:12, 119:21, 125:4, 126:17, 164:10, 164:11, 165:11</p> <p>motion [18] - 12:14, 12:16, 12:18, 12:23, 13:5, 13:6, 13:9, 13:19, 14:9, 14:12, 14:22, 14:24, 15:19, 15:25, 16:13, 16:16, 16:19, 16:21</p> <p>move [13] - 7:7, 8:21, 9:5, 38:15, 51:11, 52:23, 53:21, 56:21, 57:3, 57:8, 70:22, 98:10, 132:23</p> <p>moved [6] - 53:13, 57:1, 57:6, 57:7, 57:9, 141:14</p> <p>movement [1] - 141:15</p> <p>moving [7] - 6:20, 8:7, 53:16, 57:13, 94:3, 120:22, 139:3</p> <p>multi [4] - 51:10, 51:13, 52:2, 143:23</p> <p>multi-family [4] - 51:10, 51:13, 52:2, 143:23</p> <p>multiple [2] - 12:13, 154:13</p>	<p>60:1, 93:5, 104:18, 123:24, 123:25, 124:1, 134:8, 134:10, 150:2, 150:3, 155:16, 155:17, 158:6</p> <p>named [1] - 5:17</p> <p>nation [1] - 108:17</p> <p>national [2] - 17:7, 17:8</p> <p>natural [14] - 26:24, 27:9, 27:21, 28:11, 32:21, 34:18, 89:5, 92:24, 110:3, 110:20, 117:22, 117:25, 118:25, 119:10</p> <p>nature [9] - 40:10, 54:8, 85:13, 118:22, 118:23, 119:2, 119:4, 149:8</p> <p>Nature [1] - 68:7</p> <p>Nautilus [2] - 64:18, 120:15</p> <p>Naval [2] - 61:14, 62:5</p> <p>navigation [1] - 62:2</p> <p>Navigator [1] - 148:15</p> <p>Navigator's [1] - 148:10</p> <p>Navy [1] - 62:20</p> <p>near [5] - 6:8, 8:4, 27:9, 37:2, 98:18</p> <p>necessarily [3] - 116:18, 128:11, 153:22</p> <p>need [27] - 3:10, 13:8, 20:12, 22:4, 25:10, 32:5, 46:7, 52:19, 52:25, 53:2, 56:10, 57:23, 80:9, 100:14, 100:16, 120:12, 121:22, 123:3, 129:1, 129:4, 131:5, 140:3, 149:3, 149:20, 152:1, 160:12</p> <p>needed [2] - 25:9, 53:20</p> <p>needs [3] - 16:20, 25:1, 117:23</p> <p>negative [10] - 9:12, 70:20, 70:24, 71:13, 71:17, 73:10, 73:18, 75:14, 79:3, 117:1</p> <p>negotiate [2] - 48:15, 49:12</p> <p>negotiated [2] - 10:23, 37:20</p> <p>negotiating [1] - 49:11</p> <p>negotiation [1] - 37:14</p> <p>neighborhood [1] - 123:4</p> <p>Ness [10] - 10:18,</p>
			N	
				<p>name [19] - 4:19, 4:20, 11:17, 27:11, 59:25,</p>

<p>10:22, 11:2, 11:17, 11:20, 12:3, 12:7, 42:25, 43:1</p> <p>Ness's [1] - 12:11</p> <p>net [1] - 49:16</p> <p>never [5] - 24:21, 57:12, 57:15, 128:13, 151:11</p> <p>new [7] - 15:9, 16:3, 43:5, 46:14, 51:15, 63:17, 72:24</p> <p>next [17] - 18:16, 18:20, 28:14, 47:17, 48:2, 50:17, 52:4, 59:4, 59:18, 84:11, 84:13, 87:22, 99:1, 108:18, 122:17, 123:19, 131:11</p> <p>nice [2] - 22:13, 40:2</p> <p>night [6] - 3:13, 3:25, 29:8, 132:20, 149:10, 150:12</p> <p>nitrogen [6] - 63:6, 81:12, 81:15, 82:23, 83:3, 87:8</p> <p>nitty [1] - 140:3</p> <p>nitty-gritty [1] - 140:3</p> <p>no-flow [1] - 112:19</p> <p>nobody [1] - 55:21</p> <p>non [4] - 61:22, 63:14, 63:19, 133:18</p> <p>non-destructive [1] - 63:14</p> <p>non-landowner [1] - 133:18</p> <p>non-nuclear [2] - 61:22, 63:19</p> <p>none [3] - 130:21, 160:6, 160:10</p> <p>nonpolar [1] - 119:4</p> <p>noon [1] - 123:2</p> <p>normal [3] - 74:15, 101:14, 108:15</p> <p>normally [1] - 72:9</p> <p>north [20] - 8:6, 8:14, 46:8, 46:20, 46:22, 46:24, 47:13, 51:11, 51:14, 52:15, 53:19, 57:7, 57:25, 78:2, 78:12, 78:14, 95:7, 95:25, 96:1, 108:20</p> <p>North [49] - 4:24, 10:18, 11:8, 11:21, 15:5, 17:4, 40:6, 40:10, 40:16, 60:6, 65:13, 65:25, 68:9, 68:11, 69:20, 70:20, 73:7, 74:22, 75:13, 79:5, 82:7, 88:20, 88:24, 89:9, 89:19, 91:7, 91:10, 95:4, 104:14, 108:8, 108:19, 110:21,</p>	<p>114:6, 116:8, 124:6, 128:1, 137:23, 138:8, 139:10, 141:4, 142:13, 142:16, 144:23, 146:7, 146:18, 146:22, 147:19, 147:21, 156:14</p> <p>Northeast [4] - 50:21, 82:14, 84:6, 87:2</p> <p>northeast [3] - 51:20, 61:7, 94:21</p> <p>northern [2] - 77:22, 77:25</p> <p>northwest [8] - 28:23, 29:14, 30:5, 51:6, 72:9, 78:18, 98:15, 98:20</p> <p>not-for-profit [1] - 11:24</p> <p>note [2] - 14:4, 149:12</p> <p>noted [1] - 152:19</p> <p>notes [2] - 40:25, 105:22</p> <p>nothing [4] - 25:21, 70:14, 105:17, 121:25</p> <p>notice [1] - 90:3</p> <p>Nuclear [2] - 61:10, 61:14</p> <p>nuclear [10] - 61:12, 61:21, 61:22, 63:18, 63:19, 63:25, 64:12, 64:16</p> <p>number [9] - 55:22, 81:7, 108:16, 108:17, 108:19, 145:2, 145:8, 145:19, 146:14</p> <p>numbers [7] - 44:25, 45:5, 52:8, 55:18, 55:19, 94:24, 142:8</p> <p>numerical [1] - 127:14</p> <p>numerous [3] - 7:5, 7:8, 155:20</p> <p>nursing [1] - 140:22</p> <p>Nyos [1] - 68:22</p>	<p>157:10, 158:11</p> <p>objectionable [1] - 155:9</p> <p>objections [3] - 34:6, 40:19, 125:15</p> <p>objective [1] - 52:3</p> <p>observed [1] - 32:18</p> <p>obtained [1] - 41:21</p> <p>obvious [3] - 128:23, 129:3, 156:13</p> <p>obviously [3] - 150:5, 151:12, 153:17</p> <p>occupiable [1] - 144:3</p> <p>occupied [3] - 144:2, 144:4, 146:8</p> <p>occurred [3] - 14:12, 57:10, 116:20</p> <p>occurs [2] - 116:20, 118:19</p> <p>OCS [1] - 61:11</p> <p>off-site [1] - 162:11</p> <p>offer [7] - 4:4, 29:5, 29:17, 125:14, 125:17, 137:17, 139:21</p> <p>offered [2] - 27:16, 92:18</p> <p>offering [2] - 65:18, 68:4</p> <p>office [3] - 10:23, 12:11, 40:17</p> <p>officer [1] - 62:5</p> <p>Officer [1] - 61:10</p> <p>official [2] - 3:20, 146:25</p> <p>officials [1] - 21:25</p> <p>often [1] - 65:4</p> <p>oil [10] - 26:24, 27:9, 27:21, 28:11, 32:11, 32:21, 115:2, 117:22, 118:1, 119:10</p> <p>Oklahoma [2] - 110:20, 110:22</p> <p>Olson [2] - 27:11, 28:6</p> <p>Olson's [2] - 27:13, 29:9</p> <p>once [12] - 52:7, 63:11, 65:15, 66:15, 73:21, 75:19, 76:8, 78:22, 94:19, 109:20, 138:17, 165:8</p> <p>one [99] - 3:12, 7:9, 10:17, 24:16, 24:19, 25:10, 25:17, 26:23, 28:19, 29:4, 31:13, 32:25, 35:3, 35:4, 42:16, 42:19, 43:14, 43:19, 44:6, 44:8, 53:13, 57:16, 62:9, 64:9, 64:11, 64:15, 64:17, 65:19, 74:17,</p>	<p>74:18, 76:24, 77:4, 77:9, 77:24, 78:2, 78:3, 78:4, 78:16, 79:14, 82:11, 82:12, 82:13, 82:21, 83:3, 83:8, 84:21, 86:25, 91:18, 91:22, 95:11, 98:16, 98:23, 102:23, 102:24, 106:15, 108:17, 108:19, 109:16, 115:4, 115:8, 115:16, 116:23, 117:5, 119:16, 119:18, 131:19, 132:3, 132:14, 133:1, 133:10, 135:2, 137:5, 137:6, 137:11, 138:13, 138:18, 140:11, 142:8, 143:9, 144:11, 144:16, 144:19, 144:20, 145:2, 145:8, 147:13, 147:14, 149:13, 152:17, 159:2, 159:14, 159:15, 161:4, 161:5, 164:23</p> <p>one-mile [8] - 137:5, 137:6, 137:11, 138:13, 138:18, 140:11, 142:8, 144:11</p> <p>one-on-one [1] - 24:16</p> <p>one-seventh [1] - 79:14</p> <p>one-third [2] - 74:17, 74:18</p> <p>ones [6] - 13:20, 32:14, 97:22, 143:4, 144:24, 162:10</p> <p>ongoing [1] - 30:25</p> <p>online [1] - 147:18</p> <p>onsite [1] - 165:13</p> <p>open [8] - 58:3, 58:4, 76:18, 92:15, 113:1, 119:16, 119:17, 119:18</p> <p>opened [1] - 3:15</p> <p>opening [1] - 151:24</p> <p>operate [2] - 89:1, 89:9</p> <p>operating [6] - 69:18, 69:24, 79:23, 89:19, 92:4, 109:8</p> <p>operation [4] - 58:3, 58:4, 88:17, 93:10</p> <p>operations [2] - 65:12, 93:19</p> <p>opine [1] - 141:17</p> <p>opined [1] - 118:7</p>	<p>opinion [8] - 28:6, 53:15, 74:20, 89:16, 89:18, 94:8, 98:4, 118:9</p> <p>opinions [8] - 27:16, 68:4, 69:12, 93:23, 104:15, 104:21, 105:14, 152:1</p> <p>opportunity [5] - 13:15, 15:11, 15:14, 15:21, 27:13</p> <p>option [2] - 161:22, 165:6</p> <p>order [16] - 14:3, 14:7, 14:8, 15:3, 16:14, 17:25, 21:4, 33:21, 34:4, 37:25, 52:25, 128:24, 129:2, 129:4, 157:23, 158:13</p> <p>ordinarily [1] - 150:19</p> <p>organization [1] - 11:24</p> <p>original [7] - 6:21, 6:25, 7:23, 8:1, 9:2, 57:1, 57:11</p> <p>originally [1] - 8:16</p> <p>originated [2] - 137:8, 146:14</p> <p>Orlando [2] - 61:15</p> <p>outbound [1] - 106:21</p> <p>outer [2] - 70:23, 71:11</p> <p>outline [1] - 51:8</p> <p>outputs [1] - 129:1</p> <p>outside [16] - 51:24, 65:6, 68:14, 72:21, 73:25, 77:4, 77:24, 86:5, 91:11, 91:14, 97:1, 107:7, 117:5, 120:12, 120:13, 151:19</p> <p>overall [3] - 48:21, 106:11, 106:12</p> <p>overhaul [2] - 61:19, 63:18</p> <p>overland [1] - 127:7</p> <p>overlay [1] - 139:7</p> <p>Overview [1] - 159:3</p> <p>own [5] - 28:24, 29:15, 47:17, 47:18, 47:20</p> <p>owned [2] - 29:15, 35:5</p> <p>owner [2] - 28:14, 43:25</p> <p>oxygen [7] - 65:1, 81:13, 81:15, 82:23, 83:3, 87:7, 102:6</p>
	O			
<p>O-rings [1] - 71:5</p> <p>object [8] - 33:22, 95:23, 118:3, 133:7, 154:19, 155:9, 155:14, 157:6</p> <p>objection [17] - 4:6, 4:8, 12:12, 16:24, 29:19, 29:20, 29:22, 125:18, 125:25, 126:2, 133:4, 139:22, 139:23, 139:25, 155:6,</p>				
			P	
			P-H-M-S-A [1] -	

<p>117:19</p> <p>p.m [1] - 11:7</p> <p>Pacific [1] - 65:12</p> <p>page [12] - 17:13, 30:1, 30:2, 31:10, 34:16, 36:11, 43:12, 136:17, 141:2, 141:6, 141:8, 142:24</p> <p>pages [3] - 135:20, 140:6, 141:8</p> <p>paired [1] - 139:9</p> <p>paper [2] - 23:14, 70:2</p> <p>papers [4] - 69:1, 106:3, 106:19, 127:7</p> <p>parade [1] - 90:12</p> <p>parallel [1] - 78:1</p> <p>parameters [1] - 20:13</p> <p>pardon [1] - 134:25</p> <p>part [19] - 6:13, 18:6, 31:3, 37:14, 48:10, 50:19, 51:6, 55:20, 63:5, 78:10, 78:22, 105:8, 114:25, 119:6, 121:12, 127:11, 128:21, 139:15, 156:21</p> <p>partially [1] - 43:15</p> <p>participation [1] - 163:5</p> <p>particular [5] - 19:8, 23:22, 37:5, 128:6, 157:13</p> <p>parties [11] - 16:18, 122:22, 151:19, 152:9, 152:17, 156:25, 157:22, 157:24, 158:1, 158:9, 159:10</p> <p>parts [3] - 77:11, 119:24, 148:13</p> <p>party [5] - 5:18, 5:21, 10:4, 13:23, 157:4</p> <p>Pascal's [1] - 67:17</p> <p>pass [4] - 29:4, 80:18, 121:20, 132:21</p> <p>passed [2] - 83:25, 136:1</p> <p>past [2] - 64:4, 153:5</p> <p>path [1] - 12:13</p> <p>patiently [1] - 135:15</p> <p>Patrick [1] - 124:2</p> <p>PATRICK [1] - 124:2</p> <p>pattern [2] - 26:13, 27:17</p> <p>Paul [1] - 60:2</p> <p>Pause [4] - 56:15, 143:10, 143:13, 144:18</p> <p>paved [1] - 30:20</p> <p>pay [3] - 30:22, 31:1, 48:9</p> <p>paying [2] - 31:10, 48:20</p>	<p>Pebble [1] - 32:25</p> <p>peer [2] - 126:17, 127:2</p> <p>peer-reviewed [1] - 127:2</p> <p>Pelham [22] - 4:9, 13:25, 15:12, 16:17, 29:21, 34:10, 58:10, 103:19, 122:6, 126:1, 130:13, 135:4, 139:24, 142:3, 149:4, 149:22, 150:7, 150:11, 152:11, 152:23, 158:15, 160:1</p> <p>PELHAM [25] - 4:10, 14:2, 29:22, 34:11, 34:13, 58:11, 103:21, 104:6, 122:7, 126:2, 130:14, 139:25, 142:5, 149:5, 149:24, 150:18, 152:13, 152:25, 154:17, 154:24, 155:3, 157:6, 158:10, 158:16, 160:2</p> <p>Pelham's [2] - 155:13, 155:14</p> <p>penalties [10] - 4:24, 5:6, 60:6, 60:14, 124:6, 124:13, 134:14, 134:20, 155:20, 156:1</p> <p>pending [4] - 12:14, 13:6, 16:16, 105:12</p> <p>people [32] - 12:17, 22:4, 22:24, 23:3, 23:9, 24:7, 24:15, 25:1, 26:7, 33:1, 36:16, 36:18, 41:12, 41:19, 42:25, 54:7, 54:13, 55:22, 55:25, 66:12, 66:15, 71:3, 73:9, 79:9, 82:13, 92:25, 96:15, 98:17, 105:3, 105:6, 117:9, 157:1</p> <p>per [10] - 48:17, 64:9, 64:11, 69:25, 75:22, 75:23, 77:11, 119:24, 145:19, 148:13</p> <p>percent [14] - 37:23, 45:16, 71:14, 77:11, 77:15, 80:16, 81:8, 81:12, 81:13, 99:5, 121:19, 121:20, 121:23, 162:23</p> <p>percentage [1] - 99:8</p> <p>percentages [3] -</p>	<p>44:25, 45:9, 45:14</p> <p>perform [5] - 95:21, 103:15, 127:1, 129:16, 130:2</p> <p>performance [1] - 64:10</p> <p>performed [4] - 95:14, 95:20, 100:25, 126:16</p> <p>perhaps [3] - 21:1, 92:8, 111:6</p> <p>periscope [1] - 65:5</p> <p>perjury [18] - 4:24, 4:25, 5:3, 5:6, 60:6, 60:8, 60:11, 60:14, 124:6, 124:7, 124:10, 124:13, 134:14, 134:16, 134:20, 155:20, 155:23, 156:1</p> <p>permit [1] - 32:4</p> <p>person [4] - 10:14, 18:20, 43:3, 132:10</p> <p>personal [1] - 160:24</p> <p>personally [1] - 151:11</p> <p>persons [3] - 41:15, 145:19, 156:23</p> <p>perspective [3] - 45:18, 47:14, 71:24</p> <p>Petroleum [6] - 10:19, 11:8, 11:21, 17:4, 40:17, 42:7</p> <p>petroleum [2] - 115:1, 119:3</p> <p>Peyton [1] - 11:15</p> <p>pH [4] - 80:6, 80:9, 80:10</p> <p>phase [18] - 66:7, 66:8, 66:10, 66:11, 66:12, 66:13, 67:6, 67:21, 69:2, 69:14, 84:20, 101:25, 102:1, 112:23, 112:24, 112:25, 119:7, 120:20</p> <p>phases [4] - 66:17, 67:22, 67:24, 113:23</p> <p>PHMSA [2] - 111:5, 117:18</p> <p>Phoenix [1] - 136:10</p> <p>phone [8] - 7:4, 18:19, 19:8, 19:9, 25:20, 150:20, 152:11, 163:1</p> <p>phonetic [2] - 11:16, 64:18</p> <p>photographs [5] - 28:22, 29:8, 29:13, 30:2, 30:3</p> <p>phrase [2] - 38:14, 118:10</p> <p>phrasing [3] - 38:20,</p>	<p>39:16, 41:10</p> <p>physical [2] - 66:14, 113:22</p> <p>physically [1] - 109:19</p> <p>physics [6] - 62:12, 62:18, 71:9, 91:22, 102:16, 118:2</p> <p>pi [1] - 75:23</p> <p>pick [1] - 150:20</p> <p>picks [1] - 111:21</p> <p>pictures [7] - 28:20, 29:11, 30:4, 30:5, 30:6, 36:8, 43:5</p> <p>pie [2] - 43:15, 43:19</p> <p>pie-shaped [2] - 43:15, 43:19</p> <p>piece [13] - 49:11, 63:13, 66:14, 72:20, 73:3, 75:10, 75:16, 81:16, 101:15, 104:17, 112:14, 119:17, 130:10</p> <p>pieces [4] - 91:21, 106:16, 120:2, 126:17</p> <p>Pioneer [1] - 3:8</p> <p>pipe [26] - 63:14, 63:24, 64:4, 72:11, 72:24, 76:1, 76:20, 81:21, 83:16, 84:16, 84:22, 85:11, 85:13, 86:7, 86:10, 87:9, 92:13, 103:1, 112:8, 113:25, 115:7, 115:20, 116:15, 116:19, 116:25, 121:22</p> <p>Pipeline [1] - 159:2</p> <p>pipeline [125] - 3:7, 6:1, 7:6, 7:8, 7:23, 8:21, 9:16, 9:19, 10:5, 17:23, 19:3, 20:2, 20:7, 21:17, 22:19, 26:12, 26:17, 27:4, 27:5, 28:15, 30:10, 30:13, 32:11, 32:21, 34:18, 36:2, 36:6, 36:9, 36:15, 36:23, 36:24, 37:21, 37:24, 38:15, 45:23, 46:15, 47:18, 49:3, 49:12, 49:13, 49:20, 52:11, 53:12, 53:16, 54:16, 54:24, 55:1, 55:9, 56:21, 57:6, 61:12, 65:24, 68:5, 68:8, 68:13, 68:14, 69:7, 69:13, 69:18, 70:23, 72:3, 74:8, 74:21, 76:4, 76:16, 77:8, 77:19, 84:11, 88:24, 89:7, 89:19, 89:22, 90:2, 90:17,</p>	<p>91:10, 92:11, 93:2, 93:3, 93:6, 93:14, 93:18, 93:20, 93:24, 93:25, 94:4, 94:9, 94:14, 95:10, 98:5, 101:21, 102:1, 102:3, 102:18, 104:14, 104:19, 105:23, 106:11, 106:12, 107:3, 114:5, 114:8, 117:16, 117:20, 117:21, 117:22, 118:13, 118:18, 118:20, 119:8, 121:14, 127:4, 137:4, 137:14, 137:15, 138:16, 138:17, 139:19, 141:10, 145:3, 146:22, 148:14, 156:18, 157:17, 159:18</p> <p>pipelines [26] - 26:24, 26:25, 27:9, 27:21, 28:3, 28:11, 88:17, 88:20, 89:3, 89:5, 89:6, 89:13, 90:4, 91:7, 91:11, 91:24, 92:4, 93:10, 106:9, 106:18, 106:24, 111:11, 116:11, 117:18, 119:9</p> <p>pipes [3] - 62:24, 63:23, 119:19</p> <p>pipng [2] - 63:20, 103:1</p> <p>pitting [2] - 120:1, 120:20</p> <p>place [5] - 11:4, 14:6, 14:8, 16:15, 144:8</p> <p>places [4] - 48:7, 66:3, 66:10, 66:15</p> <p>plan [3] - 47:6, 121:15, 121:16</p> <p>planned [1] - 50:16</p> <p>planning [6] - 8:21, 24:7, 50:20, 57:3, 132:2, 163:9</p> <p>plans [7] - 47:8, 47:11, 50:7, 50:10, 57:18, 90:18, 90:19</p> <p>plant [2] - 104:2, 104:4</p> <p>plants [1] - 64:12</p> <p>plat [1] - 32:2</p> <p>plate [1] - 75:18</p> <p>plotted [1] - 75:18</p> <p>plenty [2] - 7:24, 7:25</p> <p>plugged [1] - 101:22</p> <p>plume [6] - 13:14, 41:5, 55:24, 128:25, 148:12, 159:8</p>
---	--	---	--	--

<p>plumes [1] - 127:3</p> <p>plus [4] - 62:16, 75:7, 80:10, 164:1</p> <p>poignantly [1] - 125:4</p> <p>Point [12] - 28:18, 28:23, 29:14, 30:4, 32:7, 36:7, 43:10, 44:5, 44:7, 45:15, 49:18, 82:6</p> <p>point [19] - 12:24, 13:23, 13:24, 20:9, 51:3, 66:16, 66:18, 73:11, 76:22, 79:14, 82:23, 99:19, 108:3, 128:10, 128:11, 138:25, 146:20, 148:16</p> <p>pointed [2] - 15:12, 117:25</p> <p>points [2] - 125:7, 126:5</p> <p>pole [1] - 31:16</p> <p>poles [1] - 30:12</p> <p>Pool [1] - 110:4</p> <p>populated [2] - 106:17, 142:17</p> <p>population [6] - 68:25, 142:7, 142:14, 145:18, 145:23</p> <p>portion [13] - 6:15, 49:13, 49:20, 54:15, 63:5, 63:25, 77:7, 78:14, 98:25, 101:9, 114:10, 114:22, 141:4</p> <p>portions [2] - 77:16, 94:17</p> <p>position [6] - 13:25, 15:19, 26:17, 106:15, 158:5, 162:1</p> <p>possible [8] - 7:10, 33:13, 38:14, 38:15, 38:21, 39:17, 132:17, 161:24</p> <p>possibly [2] - 160:21, 163:21</p> <p>potential [19] - 5:5, 13:17, 33:14, 36:13, 60:13, 83:11, 83:12, 83:18, 118:7, 124:12, 134:19, 141:15, 142:7, 142:12, 151:24, 152:20, 155:25, 163:18, 163:25</p> <p>potentialities [1] - 154:6</p> <p>potentially [1] - 133:19</p> <p>pounds [1] - 69:25</p> <p>Powder [1] - 35:9</p> <p>Powell [3] - 12:3, 15:17, 15:20</p>	<p>Power [3] - 61:10, 61:14, 110:3</p> <p>power [3] - 61:12, 112:17, 121:14</p> <p>PowerPoint [3] - 40:21, 40:25, 41:6</p> <p>practice [1] - 161:12</p> <p>practices [1] - 23:18</p> <p>pre [1] - 33:20</p> <p>precedence [1] - 153:5</p> <p>preclusion [1] - 153:7</p> <p>predict [1] - 126:21</p> <p>preface [1] - 131:16</p> <p>prefer [1] - 123:18</p> <p>preference [5] - 38:22, 152:25, 153:11, 153:15, 164:13</p> <p>preferentially [1] - 81:9</p> <p>preferred [1] - 105:23</p> <p>prefiled [2] - 135:16, 135:19</p> <p>prepared [3] - 7:18, 135:16, 135:21</p> <p>preponderance [1] - 91:23</p> <p>present [10] - 11:14, 12:17, 14:22, 15:2, 19:15, 35:23, 38:18, 41:10, 66:17, 128:24</p> <p>presentation [5] - 12:10, 17:13, 40:18, 40:20, 41:4</p> <p>presented [1] - 14:16</p> <p>presenting [2] - 15:16, 43:3</p> <p>presently [1] - 89:14</p> <p>preserve [1] - 115:3</p> <p>Press [1] - 127:18</p> <p>pressure [24] - 41:19, 66:19, 66:25, 67:4, 67:8, 67:10, 67:13, 67:16, 67:18, 67:23, 75:18, 76:7, 77:10, 80:1, 82:22, 83:16, 84:20, 85:19, 85:20, 85:24, 86:7, 119:20, 119:23</p> <p>pressurize [2] - 66:13, 79:17</p> <p>pressurized [4] - 64:25, 83:9, 86:2, 117:4</p> <p>pressurizing [3] - 79:21, 102:2, 114:22</p> <p>presumably [1] - 49:3</p> <p>presume [1] - 48:9</p> <p>presumption [1] - 109:2</p> <p>pretty [8] - 22:22, 39:17, 41:10, 46:4, 144:6, 147:13, 165:1</p>	<p>prevailing [1] - 108:12</p> <p>prevents [1] - 154:6</p> <p>previous [2] - 85:17, 91:20</p> <p>previously [3] - 5:16, 42:21, 158:12</p> <p>price [8] - 37:5, 37:20, 37:25, 49:6, 49:12, 49:14, 49:16</p> <p>primarily [3] - 27:12, 35:22, 164:3</p> <p>primary [6] - 27:16, 39:4, 120:8, 126:13, 127:15, 128:22</p> <p>private [7] - 13:1, 13:13, 13:15, 13:21, 15:20, 15:22, 16:9</p> <p>privileged [1] - 16:13</p> <p>problem [6] - 55:20, 65:15, 93:20, 113:2, 115:22, 117:9</p> <p>problems [8] - 26:19, 54:19, 54:20, 65:3, 110:3, 110:8, 110:18, 154:5</p> <p>procedural [4] - 14:5, 135:5, 153:20, 155:7</p> <p>procedures [1] - 15:6</p> <p>proceed [2] - 15:2, 151:9</p> <p>proceeding [3] - 133:22, 151:13, 161:12</p> <p>proceedings [6] - 14:11, 14:18, 15:10, 127:21, 135:18, 157:4</p> <p>process [7] - 9:20, 37:14, 67:3, 117:19, 137:19, 138:5, 151:15</p> <p>processes [1] - 153:25</p> <p>produce [1] - 137:1</p> <p>produced [1] - 126:16</p> <p>product [1] - 118:20</p> <p>products [3] - 89:6, 118:17, 119:9</p> <p>professional [2] - 136:8, 136:18</p> <p>profit [2] - 11:24, 48:23</p> <p>Program [2] - 61:10, 62:14</p> <p>program [4] - 62:10, 62:12, 62:17, 136:10</p> <p>prohibition [2] - 152:4, 154:14</p> <p>project [6] - 3:7, 19:21, 20:9, 54:12, 54:14</p> <p>projects [2] - 32:13, 32:14</p>	<p>promise [5] - 5:6, 60:14, 124:13, 134:20, 156:1</p> <p>Promontory [12] - 28:18, 28:23, 29:14, 30:4, 32:7, 36:4, 36:7, 43:10, 44:5, 44:7, 45:15, 49:18</p> <p>propagate [3] - 75:25, 85:12, 86:1</p> <p>propagates [2] - 75:19, 75:20</p> <p>propagation [1] - 75:17</p> <p>proper [2] - 80:9, 80:12</p> <p>properties [4] - 28:4, 33:15, 102:17, 113:23</p> <p>Properties [1] - 68:7</p> <p>property [10] - 26:25, 28:5, 28:14, 35:3, 37:21, 37:24, 37:25, 49:11, 57:21</p> <p>proportionately [1] - 99:8</p> <p>proposal [1] - 46:14</p> <p>propose [1] - 8:10</p> <p>proposed [17] - 5:25, 6:1, 6:20, 9:17, 27:5, 40:6, 52:11, 55:16, 65:24, 69:6, 72:5, 77:18, 77:22, 93:17, 114:8, 142:9, 145:3</p> <p>protected [1] - 15:5</p> <p>protection [1] - 115:7</p> <p>protective [5] - 14:3, 14:8, 15:3, 21:4, 157:23</p> <p>proven [1] - 157:14</p> <p>provide [7] - 32:16, 89:24, 106:23, 147:22, 150:10, 153:1, 157:14</p> <p>provided [26] - 6:19, 7:23, 25:6, 29:7, 93:22, 103:23, 104:15, 104:21, 105:15, 105:21, 114:3, 129:5, 130:2, 137:5, 149:10, 150:11, 150:16, 150:24, 151:17, 153:2, 157:20, 157:22, 157:25, 158:1, 158:8, 159:10</p> <p>providing [3] - 115:6, 128:5, 135:19</p> <p>PSC [10] - 27:14, 105:11, 128:12, 137:23, 139:6, 157:4, 157:17, 157:21, 158:7, 158:8</p>	<p>PSC-filed [1] - 139:6</p> <p>pseudo [1] - 78:1</p> <p>PSI [6] - 77:5, 79:24, 84:22, 85:25, 86:9, 116:24</p> <p>PU-22-391 [1] - 3:5</p> <p>public [6] - 13:13, 16:10, 21:25, 22:18, 33:3, 164:4</p> <p>Public [6] - 3:4, 6:7, 51:15, 156:14, 156:15, 156:23</p> <p>publications [2] - 127:11, 127:19</p> <p>publicly [4] - 137:21, 138:19, 139:10, 148:10</p> <p>publicly-available [3] - 137:21, 139:10, 148:10</p> <p>publish [1] - 127:11</p> <p>published [2] - 127:2, 127:18</p> <p>puff [1] - 85:2</p> <p>pull [2] - 73:14, 114:15</p> <p>pulled [1] - 93:21</p> <p>pulls [1] - 32:3</p> <p>pump [2] - 67:15, 114:20</p> <p>pumping [7] - 70:10, 70:11, 72:13, 79:20, 88:2, 103:2, 113:1</p> <p>pumps [3] - 83:9, 88:2, 112:25</p> <p>punishable [3] - 4:25, 60:8, 124:7</p> <p>purchase [1] - 49:15</p> <p>purchasing [1] - 36:14</p> <p>pure [3] - 115:5, 115:10, 118:4</p> <p>purpose [1] - 150:12</p> <p>purposes [3] - 27:1, 47:19, 141:19</p> <p>pursuant [1] - 157:23</p> <p>push [2] - 67:17, 101:8</p> <p>put [18] - 16:10, 37:22, 47:13, 63:1, 63:12, 70:3, 70:6, 77:13, 79:12, 80:17, 86:11, 86:12, 86:14, 106:2, 117:5, 119:20, 120:7, 151:21</p> <p>puts [1] - 78:10</p> <p>putting [5] - 28:17, 79:11, 114:20, 119:18, 129:24</p>
Q				
<p>Qatar [1] - 66:4</p> <p>qualification [1] -</p>				

<p>63:22 qualified [1] - 22:13 quarter [2] - 48:3, 128:8 quarters [2] - 109:10, 140:22 questioned [1] - 151:13 questioning [2] - 16:19, 16:22 questionings [1] - 38:12 questions [69] - 17:3, 33:4, 33:6, 34:9, 34:10, 34:15, 38:3, 38:5, 38:7, 42:4, 49:25, 50:4, 56:5, 56:6, 56:7, 56:18, 56:19, 58:6, 58:8, 58:14, 88:7, 88:9, 92:19, 103:18, 103:19, 104:6, 104:8, 104:10, 104:23, 112:10, 113:4, 113:21, 114:6, 115:8, 116:3, 116:4, 121:4, 122:4, 122:7, 122:9, 122:10, 122:12, 125:1, 130:7, 130:11, 130:12, 130:14, 130:17, 131:1, 131:3, 135:5, 141:24, 142:1, 142:2, 142:19, 142:20, 145:10, 146:4, 148:2, 148:5, 148:6, 148:18, 148:22, 149:9, 149:20, 153:21, 159:23, 159:24, 159:25 quick [1] - 139:1 quickly [1] - 56:13 quoted [1] - 81:7</p>	<p>ranked [1] - 127:16 Rankine [1] - 119:15 rapid [1] - 75:17 rapidly [1] - 111:18 rarely [1] - 110:25 Rastetter [5] - 19:16, 19:19, 20:7, 41:9, 41:20 rates [1] - 52:6 rather [7] - 145:6, 145:15, 146:11, 149:15, 150:8, 150:13, 153:14 ratio [1] - 80:11 reach [1] - 95:17 reached [1] - 116:8 reaction [1] - 9:7 reactor [2] - 64:1 read [4] - 23:14, 26:6, 29:10, 119:13 reading [1] - 29:9 ready [3] - 32:10, 133:2, 133:3 real [5] - 23:18, 49:22, 71:4, 77:13, 107:18 realize [3] - 37:9, 54:23, 73:9 really [16] - 16:6, 21:1, 22:10, 23:8, 24:21, 25:17, 25:21, 26:12, 37:22, 51:21, 53:2, 84:18, 138:13, 144:5, 147:6, 155:13 rearrange [1] - 59:12 reason [9] - 13:10, 36:13, 39:4, 40:9, 100:13, 103:11, 154:9, 154:12, 163:10 reasons [2] - 40:19, 59:8 rebuttal [5] - 132:9, 132:22, 161:8, 161:9, 164:10 receive [2] - 17:9, 156:24 received [11] - 3:12, 4:12, 14:9, 29:24, 69:5, 126:3, 140:1, 158:7, 159:9, 159:16, 162:20 recent [1] - 53:7 recently [1] - 23:15 recess [1] - 165:25 Recess [1] - 59:16 recessing [1] - 133:5 recharacterize [1] - 96:4 recognize [1] - 8:2 recollection [3] - 44:14, 128:3, 128:8 recommendation [1] - 147:7</p>	<p>recommending [1] - 146:15 reconsideration [2] - 14:9, 14:22 recontact [1] - 24:20 reconvene [2] - 59:14, 166:1 reconvening [1] - 3:4 record [15] - 4:5, 4:20, 16:12, 29:7, 59:25, 123:24, 134:9, 140:4, 149:21, 150:2, 151:22, 152:2, 152:8, 155:17, 158:17 recovered [1] - 109:17 red [3] - 7:24, 8:1, 8:5 Red [1] - 106:17 redirect [3] - 56:8, 117:12, 148:19 REDIRECT [2] - 56:16, 117:14 reduced [1] - 111:20 reduces [1] - 111:14 redundancy [1] - 87:21 reel [1] - 162:16 refer [2] - 126:12, 139:3 reference [1] - 50:11 referenced [2] - 55:12, 159:18 referring [1] - 138:4 refined [1] - 89:6 reflect [1] - 20:22 reflex [1] - 76:1 refreshed [1] - 46:8 refueling [1] - 61:19 regard [2] - 6:17, 21:20 regarding [7] - 23:18, 96:12, 106:6, 113:11, 143:8, 147:12, 151:19 regardless [8] - 48:17, 48:18, 79:2, 102:5, 104:19, 113:23, 119:25, 164:16 regards [5] - 17:23, 21:20, 22:17, 28:9, 68:4 regulates [2] - 93:5, 104:18 regulation [2] - 38:19, 93:9 regulations [8] - 92:3, 93:2, 93:13, 93:16, 93:21, 117:17, 118:6, 118:8 regulator [1] - 94:1 reheating [1] - 112:21 reiterate [1] - 22:7</p>	<p>reiterated [2] - 20:21, 25:4 related [10] - 19:2, 26:8, 36:14, 41:4, 114:7, 128:9, 128:19, 156:17, 157:16, 160:22 relation [14] - 9:16, 12:10, 12:25, 13:2, 17:21, 22:18, 56:19, 57:18, 65:23, 65:24, 69:4, 76:16, 78:7, 117:16 relationship [1] - 54:4 relative [4] - 93:13, 104:23, 141:17, 158:7 relaxation [1] - 78:25 release [11] - 77:1, 77:6, 77:8, 97:13, 97:17, 97:24, 98:13, 98:14, 100:6, 101:1, 117:3 released [7] - 68:24, 82:6, 90:21, 98:10, 101:24, 115:14, 115:16 releasing [2] - 109:13, 116:23 relevant [4] - 33:2, 126:14, 135:18, 158:5 reluctantly [1] - 152:24 remainder [1] - 51:25 remember [6] - 7:12, 11:3, 19:6, 104:25, 128:7, 128:11 remote [5] - 132:10, 133:16, 161:22, 163:4, 165:3 removing [1] - 111:17 renewed [1] - 129:11 repeat [2] - 33:25, 42:16 rephrase [1] - 92:22 Report [1] - 159:3 report [1] - 162:12 reports [1] - 41:1 representation [3] - 6:24, 150:10, 150:15 representations [1] - 151:1 representative [1] - 34:18 representatives [6] - 10:14, 18:18, 19:12, 22:17, 42:7, 42:22 represented [1] - 155:8 representing [1] - 13:24 request [10] - 9:22,</p>	<p>18:11, 22:7, 33:15, 33:21, 34:5, 56:21, 151:15, 154:15, 159:16 requested [3] - 3:14, 151:17, 153:3 requesting [2] - 153:2, 154:15 required [4] - 4:23, 60:5, 105:1, 124:5 requirement [4] - 73:4, 146:7, 147:1, 147:9 requirements [1] - 62:9 reroute [12] - 5:25, 6:13, 7:25, 8:1, 8:6, 8:11, 8:20, 9:5, 34:2, 53:7, 57:12, 77:18 reroutes [1] - 33:14 rescinded [1] - 41:22 research [10] - 91:12, 91:20, 106:3, 106:5, 107:5, 110:1, 119:13, 126:17, 126:22, 127:12 researched [1] - 154:1 Reserve [1] - 62:5 reserve [1] - 158:18 Reserves [1] - 61:25 reside [1] - 114:13 residence [1] - 143:23 residences [4] - 138:2, 138:9, 138:12, 140:15 residential [2] - 28:4, 28:10 resides [1] - 27:12 resistance [2] - 109:12, 111:15 resistant [3] - 70:17, 74:2, 120:19 resistivity [1] - 108:11 resolved [3] - 149:15, 150:8, 153:9 resolving [1] - 150:12 resources [1] - 21:1 respect [2] - 15:8, 93:17 respectful [1] - 55:3 respectfully [2] - 151:10, 154:15 respond [3] - 25:3, 99:9, 150:18 responded [3] - 12:15, 14:23, 16:18 responders [2] - 21:25, 25:2 response [4] - 21:16, 21:21, 137:6, 159:16 responsibilities [2] - 156:17, 156:21 responsive [1] - 99:21</p>
R				
<p>R-value [1] - 70:15 rad [1] - 64:2 railroad [1] - 95:2 raise [3] - 67:12, 67:15, 83:10 ran [1] - 19:17 Ranch [16] - 6:8, 8:5, 8:8, 8:22, 9:14, 46:10, 46:11, 50:16, 52:4, 56:11, 57:14, 57:17, 57:19, 57:21, 57:25, 58:2 range [2] - 79:24, 143:14</p>				

<p>rest [4] - 8:11, 132:3, 133:5, 165:25</p> <p>restore [1] - 63:4</p> <p>restriction [2] - 151:5, 151:9</p> <p>restrictions [1] - 36:14</p> <p>result [2] - 37:20, 153:13</p> <p>resume [4] - 124:25, 135:21, 136:6, 136:16</p> <p>retired [1] - 62:8</p> <p>reusing [1] - 120:24</p> <p>review [9] - 14:24, 27:13, 68:25, 69:11, 93:13, 93:16, 128:18, 128:24, 129:23</p> <p>reviewed [3] - 65:23, 126:18, 127:2</p> <p>reviewing [1] - 129:17</p> <p>Richard [1] - 134:10</p> <p>Richland [2] - 141:5, 147:14</p> <p>Richter [1] - 19:17</p> <p>rid [1] - 63:13</p> <p>Ridge [1] - 35:9</p> <p>rightly [1] - 153:18</p> <p>rights [1] - 158:18</p> <p>Rim [1] - 65:11</p> <p>rings [1] - 71:5</p> <p>rise [1] - 107:22</p> <p>riser [1] - 75:9</p> <p>risers [3] - 107:9, 108:25, 111:6</p> <p>rises [1] - 72:17</p> <p>risk [15] - 21:16, 21:20, 41:5, 76:3, 76:14, 76:17, 78:17, 121:6, 128:19, 128:25, 129:19, 157:17, 158:8, 159:18</p> <p>Risk [1] - 159:2</p> <p>risks [1] - 141:17</p> <p>River [3] - 78:10, 94:17, 114:9</p> <p>riverbed [1] - 94:25</p> <p>Road [2] - 35:9, 95:4</p> <p>road [5] - 16:25, 30:20, 35:10, 54:21, 154:6</p> <p>roads [1] - 35:19</p> <p>Rockstad [3] - 133:15, 160:17, 164:15</p> <p>rolled [2] - 72:24, 72:25</p> <p>rolling [1] - 83:21</p> <p>Ron [6] - 10:18, 10:22, 11:17, 11:20, 42:25, 43:1</p> <p>rooftops [2] - 52:25,</p>	<p>53:1</p> <p>Room [1] - 3:8</p> <p>room [1] - 162:9</p> <p>Roseanne [2] - 3:18, 135:25</p> <p>roughly [4] - 30:16, 31:11, 70:5, 107:22</p> <p>route [24] - 6:8, 6:12, 6:21, 6:24, 6:25, 7:24, 8:1, 8:14, 8:21, 9:2, 38:22, 40:12, 57:1, 57:11, 137:4, 139:6, 139:19, 141:10, 142:7, 142:11, 142:12, 145:3</p> <p>routed [3] - 8:16, 9:17, 9:20</p> <p>rudimentary [1] - 7:22</p> <p>rule [1] - 16:4</p> <p>ruling [1] - 128:12</p> <p>rulings [1] - 131:18</p> <p>run [6] - 62:14, 78:1, 111:24, 112:2, 112:4, 162:10</p> <p>running [3] - 32:25, 46:15, 89:14</p> <p>rupture [7] - 82:23, 86:1, 87:25, 121:14, 127:4, 137:14</p> <p>ruptured [1] - 116:15</p> <p>Russians [1] - 65:15</p>	<p>137:12, 137:13</p> <p>satisfactory [2] - 149:11, 150:25</p> <p>satisfy [1] - 155:11</p> <p>Saudi [2] - 66:4, 107:2</p> <p>Saudis [1] - 106:16</p> <p>save [1] - 65:18</p> <p>saved [3] - 20:25, 65:14, 161:23</p> <p>saw [6] - 9:24, 12:9, 18:2, 39:8, 63:5, 86:3</p> <p>scale [2] - 34:19, 92:11</p> <p>scared [3] - 33:1, 33:3, 37:1</p> <p>scenario [1] - 20:22</p> <p>scentless [1] - 121:18</p> <p>schedule [1] - 59:12</p> <p>scheduled [1] - 164:12</p> <p>scheduling [1] - 163:22</p> <p>Schock [22] - 135:3, 135:8, 149:7, 149:9, 149:12, 149:23, 149:25, 151:2, 151:6, 151:12, 151:20, 153:4, 153:13, 153:20, 153:23, 154:25, 155:7, 155:15, 155:18, 156:12, 160:11, 165:8</p> <p>SCHOCK [12] - 155:18, 155:21, 155:24, 156:3, 156:7, 162:15, 163:2, 163:7, 165:11, 165:16, 165:19, 165:23</p> <p>Schock's [1] - 154:20</p> <p>scholar [1] - 64:8</p> <p>school [3] - 58:1, 61:6, 61:7</p> <p>School [3] - 19:14, 58:2, 61:14</p> <p>Schools [1] - 51:15</p> <p>sciences [1] - 126:8</p> <p>scientific [6] - 104:15, 104:21, 105:14, 126:18, 126:22, 127:12</p> <p>Scott [1] - 19:18</p> <p>scrubbers [2] - 64:19, 65:3</p> <p>SCS [2] - 3:5, 158:20</p> <p>Sea [2] - 65:13, 106:18</p> <p>seal [2] - 63:6, 63:12</p> <p>seals [2] - 63:2, 63:9</p> <p>searches [3] - 91:3, 91:6, 91:21</p> <p>seatbelts [1] - 104:25</p>	<p>seawater [5] - 119:23, 119:24, 120:5, 120:6, 120:11</p> <p>second [9] - 14:4, 28:1, 42:18, 61:17, 61:24, 75:22, 75:23, 94:9, 137:16</p> <p>section [4] - 46:15, 48:3, 77:22</p> <p>sections [3] - 47:13, 51:25, 92:12</p> <p>secure [1] - 22:19</p> <p>security [2] - 17:7, 17:8</p> <p>see [37] - 6:6, 6:22, 7:21, 8:4, 8:8, 8:10, 8:16, 13:13, 20:24, 22:4, 25:1, 26:8, 35:11, 38:10, 39:9, 43:18, 44:1, 46:19, 47:6, 50:6, 50:23, 51:7, 52:1, 76:18, 83:22, 120:5, 123:18, 123:19, 128:4, 129:4, 132:22, 141:24, 142:16, 144:15, 152:5, 152:10, 157:3</p> <p>seeing [2] - 43:13, 85:3</p> <p>seek [3] - 102:4, 102:19, 151:1</p> <p>seem [2] - 111:11, 156:13</p> <p>select [2] - 13:21, 140:8</p> <p>selectively [1] - 13:12</p> <p>sell [6] - 27:20, 28:13, 30:8, 32:8, 32:12, 49:8</p> <p>seller [1] - 48:14</p> <p>selling [2] - 32:9, 45:23</p> <p>send [4] - 29:11, 152:13, 163:13, 165:9</p> <p>sense [2] - 16:1, 165:7</p> <p>sensitive [1] - 140:19</p> <p>sent [4] - 26:4, 62:7, 147:21, 152:12</p> <p>separate [1] - 65:1</p> <p>sequestering [1] - 106:21</p> <p>series [3] - 44:11, 127:16, 127:18</p> <p>serious [1] - 80:1</p> <p>Service [4] - 3:4, 6:7, 156:15, 156:23</p> <p>services [1] - 30:20</p> <p>set [6] - 10:12, 24:21, 72:25, 90:22, 138:2, 139:1</p> <p>setback [4] - 36:23,</p>	<p>146:7, 147:1, 147:9</p> <p>setbacks [1] - 31:17</p> <p>setting [3] - 26:25, 92:24, 103:13</p> <p>settle [2] - 82:16, 82:19</p> <p>setup [1] - 165:9</p> <p>seven [5] - 30:17, 31:8, 44:15, 44:18, 78:3</p> <p>seventh [1] - 79:14</p> <p>several [3] - 88:23, 96:15, 140:6</p> <p>sewer [1] - 30:21</p> <p>shape [1] - 72:18</p> <p>shaped [2] - 43:15, 43:19</p> <p>share [1] - 41:20</p> <p>shell [2] - 70:23, 71:11</p> <p>Sheriff's [1] - 26:3</p> <p>ship [2] - 63:19, 64:25</p> <p>shipyard [1] - 63:8</p> <p>shooting [1] - 97:10</p> <p>shop [1] - 47:15</p> <p>short [5] - 121:18, 122:1, 122:19, 126:19, 129:23</p> <p>shorten [1] - 71:23</p> <p>shorter [1] - 106:19</p> <p>shortfalls [1] - 110:19</p> <p>show [8] - 6:8, 13:21, 24:7, 28:19, 30:3, 30:6, 39:6, 69:5</p> <p>showed [2] - 16:9, 39:18</p> <p>showing [6] - 12:25, 13:23, 28:23, 32:2, 86:25, 141:3</p> <p>shown [14] - 7:23, 8:2, 13:16, 15:22, 21:24, 31:9, 31:17, 35:4, 36:10, 40:18, 57:2, 80:25, 84:6, 87:1</p> <p>shows [2] - 3:2, 59:17</p> <p>shut [10] - 82:12, 84:11, 84:13, 86:23, 87:22, 87:23, 93:20, 103:3, 112:17</p> <p>shut-off [1] - 87:22</p> <p>shuts [1] - 80:21</p> <p>sic [1] - 78:2</p> <p>side [20] - 46:9, 46:15, 47:13, 53:13, 53:19, 53:25, 54:17, 55:10, 57:6, 78:12, 87:5, 94:19, 98:17, 114:14, 119:16, 119:18, 120:9, 138:15</p> <p>sides [2] - 78:23, 86:3</p> <p>sign [2] - 23:4, 41:16</p> <p>signed [1] - 61:13</p>
S				
<p>S-C-H-O-C-K [1] - 155:18</p> <p>S-T-E-I-N-B-R-O-N-N [1] - 60:3</p> <p>safe [2] - 9:19, 74:21</p> <p>safety [14] - 17:22, 54:18, 93:2, 93:3, 93:6, 93:24, 93:25, 105:8, 105:13, 106:7, 106:11, 106:13, 107:3, 107:7</p> <p>sake [1] - 71:25</p> <p>sale [4] - 29:2, 30:16, 32:10, 37:23</p> <p>saleable [1] - 49:8</p> <p>sales [2] - 49:14, 49:16</p> <p>salient [2] - 126:5</p> <p>salinity [1] - 120:6</p> <p>salvage [1] - 65:12</p> <p>salvaging [1] - 65:10</p> <p>San [2] - 62:1, 62:3</p> <p>Sargent [2] - 141:5, 144:21</p> <p>sat [1] - 127:25</p> <p>Satartia [5] - 9:25, 20:23, 137:7,</p>				

<p>significance [1] - 25:19</p> <p>significant [5] - 20:25, 25:24, 32:9, 112:6, 161:24</p> <p>signifies [1] - 30:13</p> <p>signing [1] - 41:19</p> <p>Silver [16] - 6:8, 8:5, 8:7, 8:22, 9:13, 46:10, 46:11, 50:16, 52:4, 56:10, 57:14, 57:17, 57:19, 57:21, 57:25, 58:2</p> <p>simply [3] - 135:4, 140:20, 164:12</p> <p>simultaneous [2] - 71:20, 97:7</p> <p>single [8] - 30:7, 51:9, 51:12, 52:1, 138:9, 138:12, 140:15, 143:23</p> <p>single-family [5] - 30:7, 138:9, 138:12, 140:15, 143:23</p> <p>site [1] - 162:11</p> <p>sites [2] - 39:10, 68:12</p> <p>siting [1] - 3:5</p> <p>situated [1] - 26:18</p> <p>situation [3] - 9:10, 104:1, 153:19</p> <p>situations [2] - 23:7, 121:9</p> <p>size [1] - 31:21</p> <p>slopes [1] - 94:22</p> <p>smell [1] - 83:23</p> <p>smidgeon [1] - 162:16</p> <p>smoother [1] - 24:14</p> <p>snap [4] - 74:6, 74:13, 85:19, 109:14</p> <p>snow [2] - 107:15, 111:25</p> <p>so.. [12] - 19:3, 19:10, 19:22, 19:25, 21:4, 23:16, 24:14, 25:12, 33:3, 92:16, 136:2, 165:20</p> <p>software [5] - 95:21, 97:9, 97:10, 102:10, 136:24</p> <p>soil [3] - 74:1, 74:2, 107:21</p> <p>sold [12] - 35:22, 35:25, 36:3, 36:6, 36:8, 37:6, 38:1, 43:20, 44:17, 44:23, 45:16, 46:2</p> <p>solid [3] - 66:10, 66:16, 162:20</p> <p>Solutions [4] - 10:24, 19:22, 53:8, 54:5</p> <p>solves [1] - 154:5</p> <p>someone [4] - 6:16, 55:16, 93:22, 150:20</p>	<p>sometime [2] - 5:24, 59:12</p> <p>sometimes [6] - 28:13, 48:16, 63:1, 107:14, 152:11</p> <p>somewhere [3] - 75:22, 79:24, 108:6</p> <p>son [1] - 73:1</p> <p>soon [5] - 51:17, 71:11, 71:12, 79:2, 160:22</p> <p>sooner [1] - 54:25</p> <p>sorry [16] - 10:15, 11:6, 11:16, 18:24, 35:13, 39:3, 39:15, 43:7, 71:21, 83:7, 92:17, 92:21, 100:1, 134:25, 135:25, 152:3</p> <p>sort [4] - 30:9, 103:15, 116:16, 154:2</p> <p>sorts [2] - 90:19, 156:24</p> <p>Sound [3] - 162:10, 162:17, 165:8</p> <p>sound [2] - 75:20, 75:21</p> <p>source [7] - 85:22, 87:10, 102:2, 102:22, 111:8, 112:21, 119:17</p> <p>sources [4] - 69:3, 91:13, 106:10, 156:24</p> <p>south [15] - 51:22, 77:23, 78:3, 78:11, 87:2, 87:5, 87:14, 94:5, 94:11, 94:15, 95:25, 96:1, 98:25, 108:21, 114:10</p> <p>South [4] - 72:14, 79:21, 88:2, 148:11</p> <p>southern [1] - 114:10</p> <p>Southwest [1] - 110:3</p> <p>space [1] - 132:25</p> <p>sparsely [1] - 142:17</p> <p>speaking [3] - 71:20, 97:7, 133:7</p> <p>special [3] - 31:2, 45:25, 126:8</p> <p>specials [2] - 30:22, 31:10</p> <p>specialty [1] - 126:13</p> <p>specific [8] - 21:10, 25:22, 34:4, 66:9, 114:2, 117:20, 117:24, 128:1</p> <p>specifically [1] - 36:10, 36:17, 36:21, 37:19, 65:25, 69:15, 100:19, 101:23, 125:3, 159:13</p> <p>specifics [2] - 20:15,</p>	<p>20:17</p> <p>speculating [1] - 165:13</p> <p>speed [15] - 97:23, 98:1, 98:2, 98:4, 100:8, 100:20, 100:21, 101:2, 101:13, 101:14, 101:18, 101:22, 121:10, 128:2</p> <p>spell [3] - 4:20, 107:19, 155:16</p> <p>spelling [4] - 59:25, 123:24, 134:8, 150:2</p> <p>spending [2] - 153:8, 153:10</p> <p>spent [1] - 153:8</p> <p>spoken [1] - 23:15</p> <p>spot [1] - 99:20</p> <p>spray [2] - 82:25, 84:25</p> <p>Springs [1] - 136:14</p> <p>spun [1] - 91:15</p> <p>square [3] - 70:1, 77:13, 99:6</p> <p>stable [1] - 101:12</p> <p>stack [1] - 152:12</p> <p>staff [2] - 150:6, 153:5</p> <p>stage [1] - 119:12</p> <p>stand [3] - 136:20, 149:7, 150:1</p> <p>standard [4] - 77:8, 77:12, 81:22, 147:5</p> <p>standards [13] - 104:19, 104:24, 105:4, 105:8, 105:13, 107:3, 107:7, 111:5, 117:20, 117:21, 117:24, 118:14</p> <p>standpoint [3] - 14:5, 118:2</p> <p>stands [1] - 15:2</p> <p>start [13] - 51:17, 59:24, 65:15, 80:14, 83:21, 84:9, 89:12, 109:23, 123:23, 125:9, 134:7, 150:1, 163:22</p> <p>started [8] - 3:2, 3:9, 59:18, 70:12, 89:11, 101:21, 113:9, 137:21</p> <p>starting [5] - 30:1, 70:6, 70:8, 109:21, 163:17</p> <p>starts [1] - 120:6</p> <p>State [5] - 3:8, 61:8, 61:9, 136:14, 147:8</p> <p>state [16] - 4:19, 4:24, 8:19, 38:20, 60:6, 91:25, 96:1, 108:23, 116:8, 124:6, 129:3,</p>	<p>133:16, 142:13, 155:16, 156:25, 158:10</p> <p>statement [6] - 22:11, 26:11, 26:14, 26:15, 39:17, 53:10</p> <p>statements [1] - 17:18</p> <p>states [1] - 154:2</p> <p>States [5] - 72:25, 91:12, 91:15, 92:5, 93:10</p> <p>statewide [1] - 147:4</p> <p>stating [6] - 59:25, 123:24, 128:23, 134:7, 150:1, 156:13</p> <p>station [4] - 70:10, 70:11, 72:13, 99:3</p> <p>stations [1] - 81:18</p> <p>status [2] - 16:13, 59:6</p> <p>stay [2] - 20:13, 83:15</p> <p>staying [1] - 9:1</p> <p>stays [1] - 95:1</p> <p>stealing [1] - 85:10</p> <p>steam [10] - 64:13, 67:6, 79:10, 83:1, 83:5, 86:8, 86:9, 120:7, 120:12</p> <p>steel [12] - 63:9, 68:14, 69:13, 72:2, 90:3, 109:20, 115:2, 115:3, 116:7, 116:11, 118:16, 120:19</p> <p>steels [3] - 71:16, 74:17, 75:21</p> <p>steering [1] - 137:10</p> <p>Steinbronn [32] - 58:22, 59:20, 59:21, 60:2, 60:4, 60:25, 76:10, 88:6, 88:13, 89:5, 89:18, 90:16, 92:2, 92:8, 92:14, 92:24, 93:8, 94:4, 94:7, 95:13, 95:19, 96:11, 97:16, 99:15, 99:22, 100:2, 100:23, 103:8, 105:20, 121:24, 122:2, 122:13</p> <p>STEINBRONN [5] - 59:23, 60:2, 60:12, 60:16, 60:20</p> <p>still [26] - 8:15, 13:24, 18:11, 26:17, 30:8, 65:8, 72:12, 73:17, 73:22, 74:4, 74:5, 74:24, 75:9, 75:10, 85:20, 85:25, 88:2, 132:21, 140:10, 143:8, 151:1, 153:3, 153:12, 162:24, 163:5, 165:4</p>	<p>stipulate [4] - 154:4, 154:10, 154:23, 158:14</p> <p>stipulation [1] - 158:22</p> <p>stipulation [3] - 150:8, 150:13, 154:18</p> <p>stop [8] - 20:12, 68:1, 70:17, 71:22, 87:11, 99:17, 121:3, 137:16</p> <p>stopped [1] - 99:19</p> <p>stopping [1] - 109:13</p> <p>Storm [3] - 110:2, 110:7, 110:19</p> <p>storms [1] - 111:23</p> <p>straight [7] - 40:3, 74:14, 78:14, 98:21, 102:14, 106:17, 114:13</p> <p>straighter [1] - 34:20</p> <p>stranded [1] - 65:19</p> <p>Street [12] - 47:12, 47:21, 51:5, 52:17, 77:23, 78:1, 78:11, 81:4, 84:6, 114:10, 138:21</p> <p>street [2] - 47:14, 51:18</p> <p>streets [2] - 35:20, 43:9</p> <p>strengthened [1] - 105:3</p> <p>stress [2] - 76:8, 78:25</p> <p>strongest [2] - 72:20, 78:22</p> <p>structures [4] - 31:18, 144:2, 146:8, 146:16</p> <p>struggling [1] - 107:11</p> <p>students [2] - 58:4, 110:12</p> <p>studied [2] - 18:4, 68:4</p> <p>studies [1] - 41:1</p> <p>study [2] - 55:20, 127:3</p> <p>studying [1] - 64:7</p> <p>stuff [6] - 22:12, 47:5, 48:16, 52:20, 65:8, 71:24</p> <p>stumbled [1] - 91:3</p> <p>stumbling [2] - 83:8, 91:5</p> <p>sub [1] - 83:7</p> <p>subcooled [1] - 64:13</p> <p>subdivisions [1] - 27:18</p> <p>subject [3] - 14:12, 72:8, 109:5</p> <p>subjects [1] - 62:10</p> <p>submarine [13] - 61:13, 61:17, 61:18, 61:23, 61:24, 63:1, 63:3, 63:8, 63:17,</p>
--	--	---	--	--

<p>63:22, 63:23, 63:24, 97:11</p> <p>submarines [4] - 62:3, 64:16, 65:11, 119:21</p> <p>submergence [1] - 119:23</p> <p>submitted [1] - 53:8</p> <p>SUBPAC [1] - 82:4</p> <p>subsequent [2] - 25:20, 25:24</p> <p>subsequently [2] - 10:3, 149:13</p> <p>substance [3] - 120:21, 151:16, 159:7</p> <p>substantially [2] - 146:1, 146:2</p> <p>substantiate [1] - 39:7</p> <p>suburb [1] - 95:1</p> <p>suggest [1] - 15:25</p> <p>suggested [1] - 28:3</p> <p>suggesting [1] - 100:24</p> <p>sum [1] - 159:7</p> <p>summarize [5] - 113:16, 113:17, 126:4, 136:5, 136:25</p> <p>summary [3] - 40:25, 127:5, 128:14</p> <p>summer [1] - 69:22</p> <p>summertime [2] - 69:21, 86:3</p> <p>Summit [79] - 4:6, 5:23, 5:25, 6:6, 6:11, 6:16, 7:23, 8:20, 8:21, 9:4, 9:16, 9:19, 10:13, 10:14, 10:24, 12:3, 12:7, 12:14, 12:25, 13:12, 13:21, 17:4, 17:11, 17:16, 17:23, 18:10, 18:14, 18:17, 19:11, 19:20, 19:21, 20:1, 21:7, 21:17, 22:16, 22:18, 22:22, 23:21, 23:23, 24:12, 24:19, 25:15, 27:5, 33:13, 38:13, 41:10, 41:20, 41:22, 53:8, 53:15, 54:4, 55:3, 56:22, 56:25, 65:24, 68:5, 69:6, 69:17, 72:3, 76:15, 77:19, 81:1, 105:12, 129:12, 129:18, 137:5, 145:3, 148:15, 156:18, 156:25, 157:14, 157:21, 157:24, 159:9, 159:13, 161:7, 164:9</p> <p>Summit's [11] - 56:20, 93:14, 93:17, 105:12, 128:18,</p>	<p>128:24, 137:21, 139:6, 141:9, 142:10, 142:11</p> <p>super [5] - 66:6, 70:7, 79:11, 84:22, 116:25</p> <p>supercritical [33] - 66:20, 66:22, 67:4, 67:12, 67:14, 67:25, 69:13, 70:8, 76:4, 76:6, 77:1, 79:8, 79:19, 79:22, 80:3, 83:7, 83:8, 84:15, 84:17, 85:21, 86:19, 87:12, 89:13, 102:7, 103:1, 114:17, 114:25, 115:4, 116:22, 118:24, 119:7, 119:12, 120:25</p> <p>superheated [1] - 64:14</p> <p>supply [1] - 88:3</p> <p>suppose [1] - 160:23</p> <p>supposed [1] - 48:13</p> <p>supposedly [1] - 56:20</p> <p>surface [7] - 72:10, 74:7, 74:9, 74:24, 75:16, 109:21, 109:22</p> <p>surfaces [1] - 115:23</p> <p>surprise [2] - 33:18, 34:1</p> <p>surprised [1] - 9:8</p> <p>surrounded [1] - 35:19</p> <p>Survey [5] - 139:11, 139:12, 141:13, 147:19, 147:22</p> <p>survive [1] - 88:5</p> <p>susceptible [4] - 72:22, 73:12, 75:11, 78:20</p> <p>sustain [1] - 16:24</p> <p>sustained [1] - 157:10</p> <p>sworn [5] - 5:12, 60:21, 124:20, 135:10, 156:8</p> <p>system [6] - 63:2, 64:21, 79:20, 83:10, 87:22, 116:24</p> <p>systems [6] - 63:20, 66:5, 66:6, 119:14, 136:22, 136:24</p>	<p>task [3] - 61:21, 61:22, 129:16</p> <p>tasks [1] - 128:22</p> <p>taste [1] - 121:19</p> <p>tattletales [1] - 120:4</p> <p>taxes [3] - 30:22, 31:1, 31:10</p> <p>Teachers [1] - 62:13</p> <p>teaching [3] - 62:8, 62:11, 62:16</p> <p>Teaching [1] - 62:14</p> <p>technical [3] - 68:15, 103:25, 128:5</p> <p>Teflon [3] - 115:20, 118:18, 118:21</p> <p>telephone [1] - 113:18</p> <p>temperature [32] - 66:19, 67:1, 67:5, 67:10, 67:23, 69:14, 69:21, 69:23, 70:6, 70:9, 70:13, 70:17, 70:22, 71:2, 71:4, 72:11, 72:16, 73:18, 74:18, 83:17, 85:18, 101:4, 101:5, 107:21, 109:10, 109:15, 111:18, 112:1, 112:23, 116:7, 120:18, 121:12</p> <p>temperatures [10] - 68:11, 72:4, 72:19, 74:15, 75:14, 83:13, 84:23, 107:9, 107:13, 120:23</p> <p>ten [3] - 51:15, 99:1, 99:2</p> <p>terms [11] - 16:6, 18:3, 25:15, 37:23, 41:4, 55:5, 55:6, 77:13, 121:10, 137:19, 145:7</p> <p>tested [3] - 18:4, 18:12, 61:23</p> <p>testified [13] - 5:12, 5:17, 14:5, 15:18, 60:21, 88:15, 118:5, 124:20, 127:21, 127:23, 135:10, 152:6, 156:8</p> <p>testify [10] - 4:22, 59:11, 60:5, 90:5, 123:14, 124:4, 133:15, 133:19, 164:25, 165:6</p> <p>testifying [6] - 90:4, 94:12, 95:13, 97:24, 122:13, 148:25</p> <p>testimony [31] - 3:9, 8:18, 20:12, 26:2, 26:4, 27:13, 27:22, 27:23, 29:9, 29:10, 33:23, 42:4, 46:4,</p>	<p>53:7, 90:18, 95:24, 96:5, 98:11, 98:12, 103:23, 113:8, 118:4, 122:19, 125:23, 132:6, 132:7, 133:5, 135:16, 135:19, 148:5, 164:4</p> <p>testing [2] - 63:14, 129:17</p> <p>Texas [4] - 110:7, 110:20, 110:22, 110:24</p> <p>textbook [2] - 126:25, 127:1</p> <p>thaw [1] - 73:12</p> <p>theirs [1] - 111:1</p> <p>themselves [1] - 115:25</p> <p>thereafter [1] - 5:24</p> <p>therefore [1] - 75:24</p> <p>thereof [1] - 68:19</p> <p>thermal [3] - 86:5, 109:7, 126:8</p> <p>they've [5] - 23:6, 24:15, 70:2, 90:12, 120:24</p> <p>thick [1] - 71:12</p> <p>thing's [1] - 85:10</p> <p>thinking [2] - 42:20, 47:9</p> <p>Thiokol [1] - 71:5</p> <p>third [6] - 61:18, 63:8, 63:17, 74:17, 74:18, 156:25</p> <p>Thomson [2] - 84:24, 114:22</p> <p>thoughts [1] - 152:20</p> <p>thousand [1] - 88:23</p> <p>threat [1] - 79:7</p> <p>threaten [1] - 23:12</p> <p>threatening [2] - 23:3, 41:15</p> <p>threats [2] - 41:18, 41:21</p> <p>three [14] - 62:6, 67:24, 73:22, 75:7, 77:24, 78:18, 92:12, 108:16, 108:19, 109:10, 126:6, 133:13, 135:6, 151:8</p> <p>three-quarters [1] - 109:10</p> <p>throughout [4] - 63:23, 67:18, 81:8, 138:5</p> <p>throw [1] - 73:9</p> <p>throwing [1] - 103:4</p> <p>Thursday [1] - 163:19</p> <p>tie [1] - 42:4</p> <p>tight [1] - 103:13</p> <p>timing [1] - 16:2</p> <p>tiny [3] - 85:5, 94:23,</p>	<p>119:19</p> <p>title [1] - 158:6</p> <p>titles [2] - 158:19, 158:24</p> <p>today [41] - 3:3, 3:7, 3:19, 5:7, 8:18, 12:19, 14:17, 15:23, 16:15, 18:11, 33:10, 47:6, 54:19, 56:23, 56:24, 59:7, 60:15, 61:1, 104:15, 105:15, 122:25, 123:3, 123:6, 124:5, 124:14, 125:4, 131:23, 131:24, 131:25, 132:11, 132:13, 132:22, 134:14, 134:21, 135:6, 136:23, 148:25, 150:24, 156:2, 156:18, 160:13</p> <p>together [2] - 18:25, 147:13</p> <p>toggle [1] - 141:1</p> <p>Tommies [2] - 130:17, 130:18</p> <p>tomorrow [2] - 59:13, 161:13</p> <p>took [7] - 11:4, 14:6, 23:2, 30:5, 62:6, 99:11, 142:10</p> <p>top [7] - 19:23, 45:7, 74:1, 101:11, 111:25, 127:13, 127:16</p> <p>top-ranked [1] - 127:16</p> <p>topic [7] - 10:11, 21:15, 26:23, 126:19, 127:8, 127:15, 127:18</p> <p>topics [2] - 88:15, 130:9</p> <p>topographic [1] - 96:12</p> <p>topographical [2] - 95:9, 96:7</p> <p>topography [7] - 94:14, 95:18, 95:25, 96:2, 96:14, 96:20, 97:4</p> <p>tore [1] - 41:22</p> <p>tornado [1] - 102:13</p> <p>torpedoes [1] - 97:10</p> <p>tort [1] - 73:5</p> <p>total [2] - 62:19, 136:12</p> <p>touch [2] - 88:15, 140:5</p> <p>toward [1] - 91:10</p> <p>towards [8] - 8:7, 56:21, 57:4, 57:13,</p>
	T			
<p>table [1] - 126:15</p> <p>tables [1] - 79:10</p> <p>tall [1] - 81:8</p> <p>tapes [1] - 65:18</p> <p>targeted [1] - 91:6</p>				

<p>78:16, 79:23, 80:13, 87:2</p> <p>town [3] - 32:18, 43:8, 77:14</p> <p>toxicity [1] - 65:20</p> <p>trace [1] - 63:22</p> <p>track [3] - 52:7, 137:12, 145:18</p> <p>tracks [1] - 95:2</p> <p>tract [1] - 48:10</p> <p>tracts [1] - 48:2</p> <p>train [1] - 25:2</p> <p>training [2] - 61:12, 61:20</p> <p>transfer [5] - 71:1, 74:4, 126:23, 127:14, 127:16</p> <p>transform [2] - 74:11, 75:15</p> <p>transformation [8] - 63:11, 71:17, 73:16, 75:11, 76:22, 79:4, 109:16, 120:21</p> <p>transition [2] - 78:21, 98:3</p> <p>transmission [2] - 32:24, 110:9</p> <p>Transport [2] - 3:6, 158:21</p> <p>trapped [1] - 84:16</p> <p>travel [9] - 81:25, 82:1, 86:24, 87:2, 87:4, 97:17, 100:25, 126:21, 148:12</p> <p>traveled [2] - 55:24, 56:2</p> <p>travels [2] - 87:4, 95:3</p> <p>treated [1] - 120:3</p> <p>treatments [1] - 78:25</p> <p>tremendous [1] - 86:20</p> <p>trials [1] - 127:23</p> <p>trick [1] - 132:2</p> <p>tried [3] - 24:15, 133:13, 138:21</p> <p>triple [1] - 66:16</p> <p>Troops [1] - 62:13</p> <p>trouble [1] - 123:13</p> <p>true [9] - 8:23, 57:20, 128:3, 128:17, 129:4, 138:1, 139:6, 156:22, 157:18</p> <p>trust [2] - 93:24, 93:25</p> <p>truth [6] - 5:6, 39:22, 60:14, 124:13, 134:20, 156:1</p> <p>try [13] - 7:7, 24:1, 24:3, 24:4, 24:5, 37:22, 71:22, 103:13, 123:14, 144:9, 160:22, 164:14</p> <p>trying [18] - 24:11,</p>	<p>24:16, 25:11, 39:16, 40:3, 47:23, 59:12, 65:17, 93:22, 105:22, 107:8, 116:5, 123:12, 144:12, 152:3, 154:3, 159:4, 162:19</p> <p>tubes [1] - 120:9</p> <p>Tuesday [1] - 163:20</p> <p>tundra [1] - 112:3</p> <p>turn [14] - 4:17, 7:17, 10:11, 18:16, 26:23, 39:8, 48:23, 67:1, 67:2, 67:3, 80:2, 80:4, 130:8, 142:24</p> <p>turned [1] - 102:7</p> <p>turns [3] - 79:22, 80:8, 120:21</p> <p>twain [2] - 51:10, 51:12</p> <p>two [27] - 15:22, 27:16, 30:2, 46:17, 47:13, 47:17, 52:10, 59:3, 66:15, 67:22, 72:21, 75:23, 82:13, 86:25, 92:12, 99:14, 127:13, 133:18, 133:22, 139:14, 141:8, 146:21, 146:22, 147:12, 162:6, 164:16</p> <p>TXV [2] - 86:3, 86:5</p> <p>type [11] - 40:21, 41:4, 52:19, 86:18, 89:3, 92:10, 127:11, 138:11, 157:15, 157:20, 159:7</p> <p>typically [3] - 28:12, 69:19, 107:15</p>	<p>107:16, 128:21, 133:8, 159:17</p> <p>undertaken [1] - 153:19</p> <p>underway [2] - 63:3, 64:25</p> <p>undeveloped [1] - 48:11</p> <p>unencumbered [2] - 44:23, 45:14</p> <p>unfortunately [2] - 133:2, 133:12</p> <p>UNIDENTIFIED [6] - 3:24, 4:2, 125:20, 162:8, 162:25, 163:3</p> <p>uninformed [1] - 89:18</p> <p>uninhabitable [1] - 48:7</p> <p>uninsulated [1] - 109:3</p> <p>unique [1] - 119:11</p> <p>unisolated [2] - 77:1, 87:12</p> <p>unit [1] - 138:11</p> <p>United [5] - 72:24, 91:11, 91:14, 92:5, 93:10</p> <p>units [22] - 80:10, 138:5, 138:12, 138:21, 138:24, 140:7, 140:13, 140:17, 140:20, 143:3, 143:15, 143:19, 143:20, 143:21, 144:1, 144:11, 144:23, 145:2, 145:8, 145:16, 145:19, 146:22</p> <p>University [5] - 19:13, 42:10, 62:15, 136:13, 136:15</p> <p>unless [6] - 85:23, 89:16, 114:13, 129:19, 132:9, 152:4</p> <p>unlimited [2] - 88:3, 103:3</p> <p>unload [1] - 84:16</p> <p>unsold [5] - 43:14, 43:17, 44:6, 44:12, 44:23</p> <p>untruthful [3] - 26:5, 26:8, 26:15</p> <p>unusual [1] - 151:15</p> <p>up [57] - 11:17, 14:17, 14:19, 14:20, 15:1, 22:10, 24:7, 24:20, 41:22, 42:4, 46:1, 47:12, 47:17, 49:18, 51:14, 51:20, 51:25, 55:19, 55:25, 56:1, 56:18, 61:13, 63:7,</p>	<p>63:15, 65:13, 65:17, 72:17, 73:11, 79:12, 81:5, 86:12, 86:13, 86:14, 92:12, 108:11, 109:17, 110:21, 111:1, 111:12, 111:21, 114:9, 114:15, 114:21, 125:10, 126:23, 126:24, 128:13, 132:23, 137:11, 140:9, 140:16, 143:2, 146:15, 150:20, 153:20, 162:13, 165:14</p> <p>update [3] - 19:2, 59:5, 162:6</p> <p>uphill [1] - 94:20</p> <p>upload [1] - 3:19</p> <p>ups [1] - 63:20</p> <p>upset [1] - 9:9</p> <p>upstream [1] - 63:13</p> <p>Uri [3] - 110:2, 110:7, 110:19</p> <p>US [5] - 94:17, 94:19, 94:20, 94:22, 98:16</p> <p>usable [1] - 48:18</p> <p>uses [1] - 162:4</p> <p>Utilities [1] - 156:14</p> <p>utilizing [1] - 128:13</p>	<p>79:10, 85:3, 85:4</p> <p>variables [4] - 97:18, 100:4, 100:16, 121:11</p> <p>various [7] - 18:19, 20:7, 107:7, 127:22, 135:21, 136:24, 138:2</p> <p>vast [1] - 40:10</p> <p>veins [1] - 80:19</p> <p>velocity [2] - 75:20, 75:21</p> <p>ventilate [1] - 65:4</p> <p>verified [1] - 18:5</p> <p>verify [2] - 68:15, 144:17</p> <p>verifying [1] - 68:17</p> <p>versions [1] - 141:8</p> <p>versus [2] - 81:14, 81:15</p> <p>vet [2] - 128:18, 129:2</p> <p>vetting [1] - 18:12</p> <p>vetted [1] - 129:17</p> <p>vicinity [1] - 95:10</p> <p>VICTOR [5] - 155:18, 155:21, 155:24, 156:3, 156:7</p> <p>Victor [4] - 135:3, 149:6, 155:18, 162:15</p> <p>victory [1] - 66:4</p> <p>video [3] - 76:12, 162:23, 165:22</p> <p>View [1] - 138:21</p> <p>view [1] - 20:9</p> <p>violate [2] - 17:25, 20:20</p> <p>violating [1] - 20:12</p> <p>virtually [2] - 58:19, 123:9</p> <p>visual [1] - 41:4</p> <p>visually [1] - 138:16</p> <p>voice [1] - 9:20</p> <p>volo [1] - 68:23</p> <p>volume [5] - 67:9, 67:11, 77:15, 83:2, 121:21</p> <p>voluntarily [1] - 16:9</p> <p>volunteers [1] - 137:10</p>
				W
				<p>W-A-C-H-T-E-R [1] - 4:21</p> <p>Wachter [20] - 4:15, 4:16, 4:21, 4:22, 5:16, 14:5, 15:23, 17:3, 29:4, 33:5, 33:10, 34:14, 34:25, 35:5, 37:15, 37:18, 38:10, 50:1, 56:18,</p>

<p>58:16 WACHTER [5] - 4:18, 4:21, 5:4, 5:8, 5:11 Wade [9] - 6:22, 7:5, 11:16, 11:17, 18:25, 19:16, 26:1, 26:14, 43:2 Wahpeton [1] - 164:2 waiting [5] - 58:23, 131:20, 132:21, 135:14 waiver [7] - 12:17, 13:3, 13:12, 14:11, 16:7, 158:12, 158:20 walk [1] - 83:25 wall [1] - 109:8 walls [1] - 67:19 wants [2] - 96:5, 154:5 warning [1] - 121:25 wasting [1] - 151:7 water [18] - 64:13, 79:10, 79:12, 79:15, 80:8, 82:25, 83:4, 85:3, 85:4, 108:2, 111:23, 115:5, 118:22, 118:23, 120:7, 126:11, 127:8 waterline [1] - 30:21 waters [1] - 120:14 wave [2] - 84:1, 84:2 ways [3] - 13:22, 106:5, 154:13 weak [1] - 78:21 weaker [1] - 78:23 weather [8] - 69:18, 73:13, 74:22, 74:23, 102:11, 109:5, 110:23 weather's [1] - 112:19 weatherized [1] - 110:24 website [1] - 137:23 websites [1] - 73:5 wedge [1] - 101:6 weeds [1] - 116:1 week [6] - 14:11, 15:15, 15:21, 16:17, 27:11, 133:13 weekend [1] - 163:11 weld [4] - 62:23, 78:22, 85:14, 119:22 welds [3] - 62:23, 72:21 wells [1] - 110:21 West [1] - 82:4 west [10] - 8:7, 8:15, 56:21, 57:4, 57:13, 78:15, 94:17, 99:2, 101:15, 114:13 western [2] - 98:17, 104:14 whatsoever [1] - 100:5</p>	<p>whip [1] - 76:8 white [3] - 85:2, 85:7 whole [8] - 16:18, 48:10, 72:18, 95:18, 102:10, 110:7, 121:22, 138:5 wide [1] - 76:18 willing [1] - 128:17 willingness [1] - 159:23 wind [34] - 71:1, 78:17, 97:23, 98:1, 98:2, 98:4, 98:15, 100:8, 100:20, 100:21, 101:1, 101:3, 101:5, 101:13, 101:14, 101:18, 101:22, 102:5, 102:14, 102:19, 102:23, 103:5, 108:12, 111:16, 111:19, 111:20, 111:24, 112:2, 112:6, 114:13, 121:10 windchill [9] - 70:20, 70:21, 71:2, 71:3, 71:7, 72:4, 72:8, 72:10 winds [3] - 72:9, 87:18, 87:19 winner [1] - 64:10 winter [5] - 75:12, 89:2, 90:13, 107:12, 121:6 winters [1] - 75:12 wintertime [3] - 70:19, 78:18, 116:9 Wisconsin [1] - 27:12 wise [1] - 114:7 withstand [1] - 120:17 WITNESS [103] - 20:11, 20:18, 42:9, 42:12, 42:15, 42:23, 43:1, 43:6, 43:11, 43:16, 43:20, 43:24, 44:2, 44:8, 44:13, 44:18, 44:21, 44:24, 45:4, 45:7, 45:12, 45:15, 45:19, 45:22, 46:6, 46:10, 46:12, 46:17, 46:22, 47:1, 47:3, 47:11, 47:20, 47:25, 48:12, 48:25, 49:9, 50:2, 50:4, 50:8, 50:12, 50:15, 51:1, 52:12, 52:16, 52:23, 53:5, 53:11, 54:2, 54:6, 55:9, 55:14, 55:17, 92:17, 92:21, 96:15, 96:21, 96:23, 99:16, 99:25, 100:15, 106:1,</p>	<p>106:14, 107:4, 108:1, 108:16, 109:1, 109:4, 109:19, 110:5, 110:10, 110:14, 111:3, 111:8, 111:13, 112:11, 112:14, 113:7, 113:12, 113:15, 113:19, 114:4, 115:13, 115:16, 115:19, 115:25, 116:9, 116:13, 116:18, 117:8, 122:15, 130:18, 131:4, 146:9, 146:12, 147:3, 147:10, 147:15, 147:18, 147:25, 148:9, 148:23, 149:1 witness [30] - 4:13, 27:10, 58:18, 58:20, 59:6, 59:18, 92:18, 96:6, 99:18, 118:5, 122:17, 130:8, 131:19, 131:22, 132:3, 132:14, 133:9, 135:2, 149:13, 150:1, 150:9, 150:14, 151:6, 151:20, 151:23, 152:5, 154:21, 160:20, 163:24 witnesses [14] - 13:15, 15:11, 15:14, 131:12, 132:23, 133:18, 133:19, 151:13, 153:6, 160:18, 164:1, 164:11, 164:16, 164:20 wondered [1] - 25:23 wondering [6] - 35:7, 35:23, 36:11, 58:20, 103:22, 142:6 word [1] - 37:16 words [1] - 87:21 work-related [1] - 160:22 workers [1] - 106:23 works [2] - 43:2, 47:24 world [1] - 49:22 worms [1] - 151:24 worried [1] - 110:12 worry [1] - 24:6 worst [4] - 20:22, 121:15, 121:16, 163:4 worst-case [1] - 20:22 wound [1] - 86:15 write [1] - 158:25 written [4] - 17:9,</p>	<p>27:13, 126:25, 142:11 wrongly [1] - 153:18</p> <hr/> <p style="text-align: center;">Y</p> <hr/> <p>yard [1] - 28:16 year [17] - 30:23, 31:2, 31:10, 31:12, 39:8, 46:5, 52:6, 64:9, 64:11, 121:5, 128:4, 128:8, 128:14, 128:16, 129:8, 129:11, 159:14 years [13] - 30:17, 31:8, 31:14, 50:17, 52:5, 54:20, 54:22, 62:21, 104:25, 106:7, 136:7, 136:11 years' [3] - 5:1, 60:9, 124:8 yellow [2] - 30:12, 143:4 yesterday [7] - 12:20, 12:22, 16:23, 30:6, 53:7, 55:16, 163:25 yourself [2] - 32:19, 157:3</p> <hr/> <p style="text-align: center;">Z</p> <hr/> <p>zero [5] - 86:23, 87:20, 87:21, 87:24, 88:1 zigzag [2] - 39:11, 39:12 zigzagging [1] - 39:24 zone [1] - 79:4 zoning [2] - 23:23, 24:7 Zoom [1] - 58:23</p>
--	--	---	---