

THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY
TRANSCANADA KEYSTONE PIPELINE, LP FOR
A PERMIT UNDER THE SOUTH DAKOTA ENERGY HP09-001
CONVERSION AND TRANSMISSION FACILITY
ACT TO CONSTRUCT THE KEYSTONE XL PROJECT

Transcript of Proceedings
November 2, 2009
Volume I, Pages 1-168

BEFORE THE PUBLIC UTILITIES COMMISSION,
STEVE KOLBECK, VICE CHAIRMAN
GARY HANSON, COMMISSIONER

COMMISSION STAFF
John Smith
Kara Semmler
Greg Rislov
Tim Binder
Stacy Splittstoesser
Nathan Solem
Bob Knadle
Anissa Grambihler

APPEARANCES

James E. Moore appearing on behalf of the Applicant
Brett M. Koenecke appearing as co-counsel on behalf of the
Applicant
James White appearing as co-counsel on behalf of the
Applicant
Bill Taylor appearing as co-counsel on behalf of the
Applicant
Paul Blackburn appearing on behalf of Dakota Rural
Action

Reported By Cheri McComsey Wittler, RPR, CRR

1 TRANSCRIPT OF PROCEEDINGS, held in the
2 above-entitled matter, at the South Dakota State Capitol
3 Building, 500 East Capitol Avenue, Pierre, South Dakota,
4 on the 2nd day of November, 2009, commencing at
5 9 o'clock a.m.

6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1 ALSO PRESENT:
2 Kelly Fuller, Plains Justice

3
4 INDEX

5 APPLICANT WITNESSES DIRECT CROSS REDIRECT RECROSS

6	Robert Jones	11	--	--	--
	Richard Gale	13	15	--	--
7	Steve Hicks	23	26,27	43	--
	Jon Schmidt	44	48	--	--
8	Meera Kothari	57	58	70	71,73
	Donald Scott	75	76	92	95
9	John Hayes	97	98	118	120
	Heidi Tillquist				

11 APPLICANT EXHIBITS M O R

12	1 - Application w/Exh. A-C	2	8	9
	2 - Robert Jones Testimony	2	8	9
13	3 - Richard Gale Testimony	2	8	9
	4 - Jon Schmidt Testimony	2	8	9
14	5 - Schmidt Rebuttal	2	8	9
	6 - Steve Hicks Direct	2	8	9
15	7 - Steve Hicks Rebuttal	2	8	9
	8 - Meera Kothari	2	8	9
16	Testimony			
	9 - Meera Kothari Rebuttal	2	8	9
17	10 - Donald Scott Testimony	2	8	9
	11 - John Hayes Testimony	2	8	9
18	12 - Heidi Tillquist	2	8	9
	Testimony			
19	13 - Tom Oster Direct	2	8	9
	14 - Data Request No. 1	2	8	9
20	15 - Data Request No. 2	2	8	9
	16 - Data Request No. 3	2	8	9
21	17 - Data Request No. 4	2	8	9

23 (Applicant Exhibits 1 through 17 are marked)
24
25

1 COMMISSIONER KOLBECK: Good morning, everyone.

2 I'll get the internet turned on. And welcome everyone
3 who's on the internet. My name is Steve Kolbeck, and we
4 will get the hearing in HP09-001 started here.

5 Just a housekeeping note before we start, for
6 all of the witnesses and everyone in here you do have a
7 little sheet by the microphone. It says, "Please turn on
8 the microphone before you speak." You must speak close
9 and clear in the microphone, and when you are done
10 speaking turn it off.

11 There is a green light on the microphone so we
12 don't want to delay the hearing by having to go back and
13 repeat yourself so just make a special note of that if
14 you're up to the microphone. Be sure it's on.

15 We will begin the hearing in Docket HP09-001,
16 In the Matter of the Application by TransCanada Keystone
17 Pipeline LP for a permit under the South Dakota Energy
18 Conversion and Transmission Facilities Act to Construct
19 the Keystone XL Project.

20 The time is approximately 9 a.m. The date is
21 November 2, 2009. And the location of the hearing is in
22 Room 414 in the State Capitol in Pierre, South Dakota.

23 As I said, I am Steve Kolbeck. And with me is
24 Commissioner Gary Hanson. I think that Commissioner
25 Dusty Johnson has H1N1. So he won't be able to be at the

1 hearing today. He is sick. He will make it just as soon
2 as he can. Hopefully he will be better yet today and be
3 here tomorrow.

4 I am presiding over this hearing this morning.
5 The hearing was noticed pursuant to the Commission's
6 Order for the Notice of Hearing issued October 15, 2009.
7 The issue at this hearing is whether TransCanada Keystone
8 Pipeline, LP shall be given a permit to construct the
9 Keystone crude oil pipeline in South Dakota.

10 It is the Applicant that has the burden of
11 proof, and under 49-41B-22 that burden of proof is
12 four-fold.

13 First, that the proposed facility will comply
14 with all applicable laws and rules. Second, the facility
15 will not pose a threat of serious injury to the
16 environment nor to the social and economic condition of
17 the inhabitants or expected inhabitants in the siting
18 area. Third, that the facility will not substantially
19 impair the health, safety, or welfare of the inhabitants.
20 And, finally, that the facility will not unduly interfere
21 with the orderly development of the region with due
22 consideration having been given to the views of governing
23 bodies of affected local units of government.

24 All parties have the right to be present and to
25 be represented by an attorney. All persons testifying

1 will be sworn in and subject to cross-examination by the
2 parties. The Commission's final decision may be appealed
3 by the parties to the State Circuit Court and the State
4 Supreme Court.

5 John Smith, the Commission's counsel, will act
6 as Hearing Examiner and will conduct the hearing subject
7 to the Commission's oversight. He may provide
8 recommended rulings on procedural and evidentiary
9 matters. The Commission may overrule its counsel's
10 preliminary rulings throughout the hearing. If not
11 overruled, the preliminary rulings will become final
12 rulings.

13 With that, I'll turn it over to Mr. Smith to
14 conduct this hearing.

15 MR. SMITH: Thank you, Mr. Chairman. Good
16 morning, everyone. I think we'll begin by taking the
17 appearances of parties. And we'll begin with the
18 Applicant, Mr. Koenecke.

19 Would you please introduce your team of people,
20 at least the legal component of it.

21 MR. KOENECKE: Thank you, Mr. Smith. Good
22 morning. Good morning, Commissioners and others who are
23 present. My name is Brett Koenecke. I'm a lawyer from
24 Pierre and representing the Applicant in this proceeding.
25 Along with me are William G. Taylor and James Moore of

1 Sioux Falls. We have a complement of Keystone witnesses
2 seated behind me. We'll introduce them at the time it's
3 appropriate unless the Commission would direct otherwise.

4 Everyone is present who has offered direct
5 testimony with the exception of John Phillips. And he's
6 been substituted for by Steve Hicks some time ago. That
7 should be no surprise to any of the parties.

8 So everyone's here and present, and we're ready
9 to begin at the Commission's direction.

10 MR. SMITH: Thank you. We'll take appearances
11 of Interveners. I note that Dakota Rural Action is here.

12 Mr. Blackburn.

13 MR. BLACKBURN: Yeah. My name is Paul
14 Blackburn. And I'm here with Kelly Fuller who is the
15 Plains Justice Communication Director. And that's who we
16 have here today with us.

17 MR. SMITH: Thank you. Are there any other
18 Interveners, parties Intervener in the case who wish to
19 appear here today?

20 Seeing or hearing no one, staff.

21 MS. SEMMLER: Thank you. This is Kara Semmler
22 appearing for staff. I am here with other staff
23 analysts, Tim Binder, Stacy Splittstoesser, Nathan Solem,
24 and Bob Knadle. We do have expert witnesses also that we
25 will introduce at the time they testify.

1 MR. SMITH: Thank you. With that, are there any
2 preliminary matters that any of the parties wish to have
3 heard before we commence the introduction of evidence?

4 MR. KOENECKE: Mr. Smith, Brett Koenecke. I've
5 provided everyone here this morning that I know of with a
6 copy of our exhibit list, Exhibits 1 through 17. It's
7 the Application, the updated direct, and rebuttal
8 testimonies of our witnesses and the four data requests
9 which we submitted to staff. We have provided those
10 documents during the course of the proceedings to staff
11 and to the Intervener who's present here this morning.

12 I've also got a copy, a complete written copy,
13 of those documents up at the witness desk. And we would
14 ask the parties to consider stipulating those documents
15 into the record at this time for use by the Commissioners
16 and by the parties during the hearing. We think doing so
17 will greatly improve the efficiency of the hearing
18 process this week.

19 MR. SMITH: Other parties' responses to
20 Mr. Koenecke's suggestion or Motion I'll call it.

21 MR. BLACKBURN: DRA is willing to stipulate to
22 those.

23 MR. SMITH: Staff.

24 MS. SEMMLER: Staff is also willing to
25 stipulate.

1 MR. SMITH: Okay. Then I'm going to rule
2 that -- and, again, as I understand it, how are they
3 marked? TC?

4 MR. KOENECKE: Yes. TC-1 and then the numbers
5 corresponding down the sheet of paper. If anyone needs
6 more of those I've got plenty here.

7 MR. SMITH: I'm thereby ruling that Exhibits
8 TC-1 through 17 are admitted per stipulation of the
9 parties.

10 MR. KOENECKE: Thank you.

11 MR. BLACKBURN: And, Mr. Smith, I have one
12 housekeeping matter disciplinary issue.

13 MR. SMITH: Please proceed.

14 MR. BLACKBURN: I am appearing pro hac vice and
15 normally it requires that my co-counsel Caitlin Collier
16 be here but she had a trial scheduled this week. At this
17 point I've taken the oath of office, and I have paperwork
18 to send in. But, otherwise, I'm good to go, and in order
19 to appear technically I have to have the Commission's
20 consent to appear without Ms. Collier.

21 MR. SMITH: It sounds reasonable to me. Is
22 there objection from any of the other parties?

23 MR. KOENECKE: No objection.

24 MR. SMITH: Staff?

25 MS. SEMMLER: No.

1 MR. SMITH: Commissioners, unless you have an
2 objection, I'm going to provide the necessary consent for
3 Mr. Blackburn to appear without local counsel.

4 COMMISSIONER KOLBECK: That's fine.

5 MR. SMITH: Okay. So done.

6 MR. BLACKBURN: Thank you.

7 MR. SMITH: Are there any other preliminary
8 matters to come before the Commission before we begin?

9 Hearing none, Mr. Kolbeck -- or Commissioner
10 Kolbeck.

11 COMMISSIONER KOLBECK: I just wanted to mention
12 that when you do speak please speak clearly and loudly.
13 We do have a court reporter. Cheri is over here. We
14 will be taking breaks to give her a break. We anticipate
15 one about every hour and a half.

16 So kind of keep that in mind as we go through
17 the testimony and how you lay out your case today. Thank
18 you.

19 MR. SMITH: Thank you. One other thing. And
20 maybe -- I see Anissa's walked back in the room now. In
21 terms of these new rooms present certain challenges in
22 terms of just testimonial logistics. And, you know,
23 we're going to do the best we can. Usually --

24 The problem we usually have is a lot of times,
25 you know, lawyers, you need to get up and walk around and

1 do this and that. And, Anissa, do we have this set up to
2 where that's possible? Are those mics movable on those
3 desks if need be?

4 MS. GRAMBIHLER: No.

5 MR. SMITH: They're not?

6 MS. GRAMBIHLER: No. They can just slide them
7 side to side. That's it.

8 MR. SMITH: Okay. So we'll just have to do the
9 best we can, folks. Maybe it's possible -- if you're
10 going to question at the witness stand, perhaps we can
11 utilize the second mic that's at the witness stand for
12 that purpose.

13 And with that, Mr. Koenecke, please proceed with
14 your direct case.

15 MR. KOENECKE: Thank you, Mr. Smith. The
16 Applicant calls Robert Jones to the stand.

17 (The witness is sworn by the court reporter)

18 DIRECT EXAMINATION

19 BY MR. KOENECKE:

20 Q. Good morning, Mr. Jones.

21 A. **Good morning, Mr. Koenecke.**

22 Q. Will you state your name and address for the record,
23 please.

24 A. **My name is Robert Edward Jones. I reside at
25 56 Strata Crescent in Calgary, Alberta.**

1 Q. Can you tell us by whom you're employed and in what
2 capacity?

3 A. **I'm employed by TransCanada Pipelines.**

4 Q. And what's your position with TransCanada Pipelines?

5 A. **I'm the vice president of the Keystone Pipelines.**

6 Q. Did you provide written testimony for this
7 proceeding?

8 A. **Yes, I did.**

9 Q. And I've got a copy of it there in front of you to
10 your right.

11 A. **I have it.**

12 Q. Marked as Exhibit 2.

13 A. **I have it.**

14 Q. Is that your testimony?

15 A. **Yes, it is.**

16 Q. Do you have any additions or corrections to that
17 testimony?

18 A. **No, I do not.**

19 Q. If I asked you each of those questions this morning
20 here at this hearing, would your answers be the same as
21 contained therein?

22 A. **Yes, they would be.**

23 MR. KOENECKE: I have no further questions, and
24 I pass the witness for cross-examination.

25 MR. SMITH: Okay. Mr. Blackburn, apparently --

1 MR. BLACKBURN: Just had a little water spill
 2 there.
 3 MR. SMITH: That's okay.
 4 MR. BLACKBURN: No questions.
 5 MR. SMITH: Staff, questions of Mr. Jones?
 6 MS. SEMMLER: No questions.
 7 MR. SMITH: Well, I guess you're -- oh,
 8 Commissioners, do you have questions of Mr. Jones?
 9 Sorry.
 10 COMMISSIONER KOLBECK: I don't at this time.
 11 COMMISSIONER HANSON: No.
 12 MR. SMITH: Your moment in the limelight is
 13 pretty short. You may step down.
 14 THE WITNESS: Thank you very much.
 15 MR. MOORE: Call Richard Gale.
 16 (The witness is sworn by the court reporter)
 17 DIRECT EXAMINATION
 18 BY MR. MOORE:
 19 **Q.** Can you introduce yourself to the Commissioners,
 20 please.
 21 **A.** **My name is Richard Gale. I'm vice president with**
 22 **Trow Engineering, Incorporated, which is a consultant to**
 23 **TransCanada Pipelines.**
 24 **Q.** Where do you live and work?
 25 **A.** **I live in Tallahassee, Florida.**

1 **Q.** What's your address there?
 2 **A.** **Home address or work address?**
 3 **Q.** Work address is fine.
 4 **A.** **1300 Metropolitan Boulevard, Suite 200, Tallahassee,**
 5 **Florida.**
 6 **Q.** And what is your role with respect to the proposed
 7 Keystone XL Pipeline Project?
 8 **A.** **I am Trow's director for the project and the**
 9 **environmental and regulatory manager on this project.**
 10 **Q.** You've submitted prefiled direct testimony that is
 11 before you marked as Exhibit 3; is that correct?
 12 **A.** **That is correct.**
 13 **Q.** And do you have any changes or corrections to that
 14 testimony?
 15 **A.** **No, I do not.**
 16 **Q.** And if I asked you all of the questions that are
 17 contained in that testimony, would your answers be the
 18 same today?
 19 **A.** **Yes, they would.**
 20 MR. MOORE: I have no further questions for
 21 Mr. Gale at this time.
 22 MR. SMITH: Mr. Blackburn.
 23 MR. BLACKBURN: No questions.
 24 MR. SMITH: Staff.
 25 MS. SEMMLER: I have just a quick clarification.

1 CROSS-EXAMINATION
 2 BY MS. SEMMLER:
 3 **Q.** In a recently filed Application update the pump
 4 stations it's indicated will require some additional
 5 acreage. And if you're not the proper witness to ask,
 6 just let me know.
 7 What's the need for that additional acreage? Why
 8 that change?
 9 **A.** **Mostly I'm involved in the overall siting of the**
 10 **pump stations and getting the necessary information to**
 11 **the field when they conduct this with the landowners.**
 12 **But the most part of this is each one of these pump**
 13 **stations are site specific to the location that they're**
 14 **placed in.**
 15 **And when detailed engineering takes place for the**
 16 **layout of the facilities based upon the location of**
 17 **roads, et cetera, and the way the pipeline is coming**
 18 **through, sometimes additional area is needed just to**
 19 **place all the equipment in as it needs to be from an**
 20 **engineering perspective.**
 21 **Q.** So it sounds like it really was just some detail
 22 changes that have occurred as more information's
 23 available?
 24 **A.** **That's correct. And to make it, you know, fit right**
 25 **for the pipeline and for the facility structure that**

1 **needs to be there.**
 2 **Q.** Would you be the proper person to ask about permits
 3 necessary for some of the construction camp issues?
 4 **A.** **No, I would not. That would be somebody later.**
 5 **Q.** We'll wait then. Thanks.
 6 MR. SMITH: Thank you. Any follow-up -- any
 7 Commissioner questions?
 8 Commissioner Hanson.
 9 COMMISSIONER HANSON: Thank you, Mr. Smith.
 10 Could you tell me -- and, likewise, I'm not certain if
 11 you're the right witness or perhaps you could just give
 12 us a flavor of information on it and another witness can
 13 give us better information later.
 14 But can you tell us somewhat the particular
 15 challenges you were confronted with on siting for the
 16 location of properties that you were responsible for, the
 17 pump stations and such?
 18 THE WITNESS: For the pump stations?
 19 COMMISSIONER HANSON: Right. And I'm not
 20 particularly concerned with distance between pump
 21 stations, things like that, so much as the layout of the
 22 terrain and things of that nature.
 23 THE WITNESS: So some of those would be
 24 constructability issues that perhaps Steve Hicks could
 25 address, but from an overall perspective you do kind of

1 have to start with the spacing. I mean, it all starts
 2 from a hydraulic standpoint when you're looking at pump
 3 stations and you kind of are given -- from an initial
 4 hydraulics run that's done, you're given basically you
 5 need this many pump stations and they need to be
 6 approximately this many miles apart.

7 So from that perspective it's initially a
 8 desktop exercise where you're given the distance and you
 9 place the pump stations accordingly. You try and place
 10 those as near to roads as you possibly can.

11 Once you've done that you kind of send that back
 12 and hydraulics are run again and you kind of get an idea
 13 of some flexibility that you might be able to move the
 14 pump station either upstream or downstream. So you kind
 15 of start getting fixed in somewhat to your location.

16 And then from that particular perspective it
 17 gets pushed down to become more of a land function in
 18 contacting landowners and trying to find an agreeable or
 19 willing landowner to place the pump stations on that
 20 particular tract of land.

21 Once you've done that and you've worked with the
 22 landowners, of course, you move toward a survey process.
 23 You're doing topographic survey and environmental and
 24 cultural surveys. At that particular time it's kind of
 25 when you -- and as you site that when the pipeline's come

1 through and you have your pump station located as near to
 2 the road as you can for access you start -- you do look
 3 at the terrain, et cetera, and how much ground you may
 4 have to move and if you'll need some additional space to
 5 lay out your equipment.

6 So you do -- and depending on how it fits
 7 against that road, sometimes you have to elongate the
 8 station or whatever, and you require more acreage or more
 9 area for the pump station.

10 So each one of these is treated independently as
 11 you look at them. It's just not a standard cookie cutter
 12 type approach that's taken. So each one is built site
 13 specific to the location they're in.

14 COMMISSIONER HANSON: Thank you. And how or
 15 what degree of variance do you have in distance when
 16 you're siting a pump station?

17 Obviously, they have to be within a certain
 18 distance of another pump station so you can maintain the
 19 proper pressure. Can you -- do you have very -- you
 20 indicated that there is a variance to an extent. Do you
 21 know I assume what that variance is?

22 THE WITNESS: Initially each one was different.
 23 So I can't specifically give you an exact variance for
 24 each one of them. But some of them were on the range you
 25 can move them a mile, some less. But at this particular

1 point in time now they're pretty much fixed locations in
 2 terms of where they need to be, but from a more detailed
 3 engineering perspective I'd have to defer that question
 4 to another witness.

5 COMMISSIONER HANSON: Thank you. Thank you,
 6 Mr. Smith.

7 MR. SMITH: Commissioner Kolbeck, any other
 8 questions?

9 COMMISSIONER KOLBECK: No. Actually I had the
 10 same questions as Commissioner Hanson. Maybe just one
 11 clarifying question.

12 You said right now you're down to pretty much
 13 site specific. Can it still move 10 feet, 20 feet? You
 14 first mentioned a mile, and now you've got to down to a
 15 smaller section.

16 Is that pump station when you get there -- could
 17 it still move after the backhoe's in the ground and
 18 you're putting the pipe in? Can that still move?

19 THE WITNESS: I guess I don't specifically
 20 understand your question.

21 COMMISSIONER KOLBECK: I've talked to people on
 22 the first pipeline, and they said they thought everything
 23 was going to come through, they thought everything was
 24 finalized and then some things have changed. Up until
 25 what point could it change? At any time? And then how

1 far could that change?

2 THE WITNESS: I mean, during the construction of
 3 the pipeline nothing is necessarily set until the date of
 4 construction of the pipeline's put in the ground because
 5 it's subject to the variety of factors, things that are
 6 unforeseen when you're constructing the pipeline or any
 7 other situation.

8 So the ability to move the pipeline is still
 9 there during the construction. We want to stay within
 10 our existing footprint to the extent that we can in terms
 11 of the survey corridor.

12 I mean, when you mentioned can the pump station
 13 move 10 feet here or there? The pump station itself,
 14 sure. The actual limits of what you may need to purchase
 15 can move slightly here or there. And the configuration
 16 within that as long as it hasn't been constructed is
 17 subject to slight modifications. But nothing significant
 18 at this time.

19 COMMISSIONER KOLBECK: Could you be a little
 20 more specific on slight modifications? Would that be
 21 30 feet? 10 feet? Half-mile?

22 THE WITNESS: I don't have a specific distance.
 23 I mean, like I said, the 10 to 30 feet that you mentioned
 24 would not necessarily be a problem.

25 COMMISSIONER KOLBECK: Okay. But you could do

1 nothing without the landowner's permission; correct?

2 THE WITNESS: That is correct. I mean, during
3 the acquisition process when we're purchasing pump
4 stations and their sites we're dealing with the landowner
5 that whole entire time to get an agreeable site on his
6 property to purchase that pump station.

7 COMMISSIONER KOLBECK: All right. Thank you.

8 MR. SMITH: I might have one follow-up question
9 again. Maybe I just -- there's so many bundles of
10 testimony there. I can't remember who did what.

11 But in terms of the pump station -- the chart on
12 page 102 of the Application, it lists the number of
13 buildings within 1 mile. And generally, I mean, what
14 we've heard in previous cases it's usually the issues
15 with pump stations is people's -- is noise.

16 Is that something you dealt with, or would that
17 be one of the other witnesses that --

18 THE WITNESS: The specific questions related to
19 noise would be another witness. As far as the siting of
20 these locations and just providing the data in terms of
21 how far away we are from a specific receptor, we provided
22 that information, but I'm not here to speak about the
23 noise aspect related to the pump stations.

24 MR. SMITH: Okay. Maybe I'll reserve that then.
25 And was attempting to -- within, you know, the tolerances

1 that you have, to locate those in such a way that you --
2 I guess to put it just in a -- bluntly is to get those
3 pump stations as far away from the nearest occupied
4 residence as you could within the physical -- you know,
5 the physical limitations that you've got to deal with?

6 THE WITNESS: Yes. Specifically when we site
7 these pump station locations we are looking for access.
8 Access is very important to be able to get to the pump
9 station.

10 But we're also very concerned in looking at how
11 this relates to landowners and where it's located within
12 their property and to get it to a suitable location that
13 everyone can live with.

14 MR. SMITH: Okay. Thank you. Any other
15 Commissioner questions?

16 Commissioner Hanson, you're studying there. Do
17 you have any follow-up questions?

18 COMMISSIONER HANSON: Well, I'm glad it's on the
19 record that I'm studying.

20 No. No further questions. Thank you,
21 Mr. Smith.

22 MR. SMITH: Mr. Moore.

23 MR. MOORE: I have no follow up. Thank you.

24 MR. SMITH: With that, you're excused then,
25 Mr. Gale.

1 MR. BLACKBURN: Mr. Chairman, I have a
2 suggestion based on something that Mr. Smith just said,
3 and that is that perhaps TransCanada could -- as you
4 said, there's large numbers of witnesses, and the
5 different evidence is bundled in different ways.

6 Perhaps TransCanada could describe not only --
7 just say the name of the exhibit but also describe
8 briefly what the person will be testifying so that
9 everybody could reference who this person is more
10 complete.

11 MR. SMITH: That's a good idea. Normally we --
12 in the past we've always had at least some very brief
13 explanation of what the scope is. And maybe that's a
14 good idea just so we can kind of keep everybody -- keep
15 track of everyone here.

16 Thank you. We'll do that.

17 MR. TAYLOR: Commissioners, Mr. Smith,
18 William Taylor for TransCanada. Call Steve Hicks.

19 (The witness is sworn by the court reporter)

20 DIRECT EXAMINATION

21 BY MR. TAYLOR:

22 Q. Mr. Hicks, would you state your full name and
23 address for the record, please.

24 A. **My name is Steve Hicks. My address is**
25 **7505 Northwest Tiffany Springs Parkway, Suite 400,**

1 **Kansas City, Missouri.**

2 Q. By whom are you employed?

3 A. **TransCanada.**

4 Q. And will you tell the Commission, please, what your
5 role in this project is, your title.

6 A. **Yes.**

7 Q. And also please tell the Commission the scope of
8 your testimony.

9 A. **Okay. I am the manager for the U.S. Steele City**
10 **pipeline portion of the project from the Canadian border**
11 **to Steele City, Nebraska.**

12 **My function in this is the construction management**
13 **and construction administration.**

14 Q. Mr. Hicks, you adopted the testimony of
15 John Phillips and filed some responsive testimony of your
16 own; is that correct?

17 A. **That's correct.**

18 Q. And that testimony is of record?

19 A. **Yes.**

20 Q. And you're also responsible for some of the exhibits
21 contained in the Application?

22 A. **Yes, I am.**

23 MR. SMITH: Mr. Hicks, could I have you pull the
24 mic just a little bit closer. For some reason the mics
25 in this particular room are just not that sensitive.

1 Thank you very much.

2 **Q.** If I asked you the questions posed, would you give
3 the same answers you gave in your prefiled testimony?

4 **A. Yes, I would.**

5 MR. TAYLOR: Surrender the witness for
6 cross-examination.

7 MR. SMITH: Were you going to give -- well, did
8 he give his little summary at all, Mr. Taylor?

9 **Q.** If you'd like to please Mr. Smith, Mr. Hicks, if
10 you'll tell the Commission -- give a summary of what the
11 testimony that you've offered is and the exhibits that
12 you've offered.

13 **A. Yes. My testimony is over the construction**
14 **management portion of the Steele City U.S. pipeline.**
15 **That also includes construction administration. It is --**
16 **it involves the land acquisition part of the project. It**
17 **involves the construction, construction techniques. It**
18 **involves the soils from the standpoint of how we're going**
19 **to handle it during construction and all the activities**
20 **related in the construction activities and how we handle**
21 **it.**

22 MR. SMITH: Thank you.

23 **A. Including the CMRP, Construction Mitigation**
24 **Reclamation Plan.**

25 MR. TAYLOR: Now I'll surrender the witness.

1 MR. SMITH: Mr. Blackburn.

2 CROSS-EXAMINATION

3 BY MR. BLACKBURN:

4 **Q.** Just to confirm, are you in a position to testify as
5 to the proposed schedule for the pipeline?

6 **A. Yes. The overall schedule, yes.**

7 **Q.** What is the window for start of construction for
8 this pipeline? We understand that the general date has
9 been in 2011. The start of construction for the northern
10 segment?

11 **A. Yes.**

12 **Q.** What's the full window for the start of construction
13 that TransCanada has contemplated?

14 **A. The window right now is to start in May of 2011.**
15 **That's tentative. That depends on a number of factors,**
16 **including the environmental windows, any frost laws that**
17 **would be applied. But at this time it's where -- we're**
18 **targeting 2011, May of 2011.**

19 **Q.** Has TransCanada considered a start date in 2012?

20 **A. No. We will start the second year -- you know,**
21 **after a break in the wintertime we will start the second**
22 **year of construction either in May or June of 2012.**
23 **There again, that will depend on the environmental**
24 **windows and when we can begin construction.**

25 **Q.** And that is of the northern segment from Hardisty to

1 Steele City?

2 **A. Yes.**

3 MR. BLACKBURN: Thank you. No further
4 questions.

5 MR. SMITH: Staff.

6 CROSS-EXAMINATION

7 BY MS. SEMMLER:

8 **Q.** I have a question specific to the construction
9 camps. We couldn't find in your Application where you
10 indicate how you'll be handling waste water.

11 What's the waste water treatment plan?

12 **A. Okay. The camps themselves will be all inclusive,**
13 **including they will contain a waste water treatment plant**
14 **for each camp and the -- that will include -- they'll be**
15 **large enough to include the living quarters and the**
16 **contractor yard that's associated with it.**

17 **Q.** What type of plants will you be looking at?

18 **A. I'm not sure at this time. We are actually involved**
19 **in the preliminary discussions of going out for bids for**
20 **the camps. We are in that process now. In that document**
21 **it will contain specifications to all the sizes and types**
22 **of equipment that we install in the camp.**

23 **Q.** Is TransCanada aware of the DENR process for waste
24 water treatment, and are those -- those details are just
25 still being developed or --

1 **A. We are undergoing -- I'm not the person to speak on**
2 **the permitting process, but I do know there's a -- a lot**
3 **of regulations surrounding the camp. We are aware of all**
4 **of those. We are in the process of identifying and**
5 **understanding what we need to do to get the permits for**
6 **each and also identifying who will get the permits,**
7 **whether it's TransCanada on some of them or the actual**
8 **camp vendor and installation person themselves.**

9 MS. SEMMLER: Staff does have some questions
10 specifically regarding the waste water treatment and a
11 well, if it's necessary, which was indicated in the
12 Application and who specifically we could ask about those
13 permits as required by the State of South Dakota.

14 So if not this witness, I guess we'll reserve
15 that question if those details are available at this
16 time.

17 **A. Right. I will -- I can tell you that our plan is --**
18 **our first choice is to have a well on site. And as far**
19 **as permitting for that, I think that would -- I would**
20 **defer that process and understanding of that.**

21 MR. SMITH: Other questions, staff?

22 MS. SEMMLER: None. Thank you.

23 MR. SMITH: Thank you. Commissioner questions.

24 COMMISSIONER HANSON: Thank you, Mr. Chair --

25 Mr. Smith.

1 Mr. Hicks, could you share with us as I look at
2 what you are responsible for here and it shows that you
3 have 25 years of experience, it reminds me of a little
4 sign I always kept on my desk years ago in another
5 position I had that said "You're totally and irrevocably
6 responsible for everything. Have a nice day."

7 And I look at the list of things that you have
8 here, and it looks like you're totally and irrevocably
9 responsible for everything.

10 THE WITNESS: Well, they're shared duties in
11 this. That's the other caveat here. But I am
12 responsible for the construction management of pieces of
13 this testimony and also share the responsibility.
14 There's also a cross between engineering and permitting
15 and things like that that we work together with, but
16 you're right.

17 COMMISSIONER HANSON: Certainly. Can you give
18 us an idea of with all of the experience that you have of
19 any unique challenges that you're confronted with with
20 this project as it crosses South Dakota?

21 THE WITNESS: I think there are a number of
22 challenges. I don't think it's anything that we haven't
23 experienced in other areas. I think the general
24 remoteness of the project itself is one of the
25 challenges, one of the main challenges we have in

1 constructing our pipeline in -- obtaining supplies.
2 Housing, as we've just talked about. We do have a number
3 of different terrains that we go through. They're not
4 unusual, but they are challenging no doubt. We have all
5 sorts of terrains and all sorts of types.

6 We have agricultural land. All of those things
7 together, like I say, it's not uncommon but they are all
8 challenging.

9 COMMISSIONER HANSON: Speak to us just a little
10 bit about the terrain challenges. And I understand
11 there's some -- certainly some river valley type areas
12 and crossing the rivers. I'm familiar -- I think we're
13 all familiar with those. But there are some areas where
14 there's some significant cliff areas it seems like would
15 require a lot of excavation or some unique construction
16 methods.

17 How do you get past -- and I know you don't go
18 through buttes. You try to bypass them. But there are
19 certain areas where you just have to go through some
20 large changes in the land structure. I'm wondering if
21 you can tell us how you go about that.

22 THE WITNESS: Okay. First of all, to answer the
23 first part of your question, I think on the rivers
24 themselves we will be using the horizontal directional
25 drilling techniques, which is the least disturbance of

1 crossing streams. We've identified I think 10 areas that
2 we're -- 10 rivers that we will horizontally drill.
3 We're in the process at this time of working with a
4 consultant to identify entry and exit points for that and
5 where they would be, whether -- and taking in
6 consideration, like you said, the cliffs, the terrain,
7 the -- all the different aspects of that where the best
8 entry and exit points are, the potential for any problems
9 that we might -- we're trying to plan up front to
10 minimize any disturbance that we could to that.

11 We also have buttes in the slopes that we do.
12 Sometimes we will cut the slope to make it safe for our
13 operations to travel up and down the pipeline right of
14 way. After -- once we've completed the project or
15 completed the activities through there and clean it up,
16 we do put the land back to the contours, the original
17 contours.

18 But we do try to minimize our risk in the hills
19 by leveling -- for lack of a better term, leveling some
20 of the contours to make it safe for passage of our
21 equipment.

22 COMMISSIONER HANSON: Thank you. And you
23 certainly can't level a cliff. You can't rebuild the
24 cliff.

25 THE WITNESS: Right.

1 COMMISSIONER HANSON: Do you, in fact, say
2 deconstruct or excavate a cliff so that there's an
3 opening in that?

4 THE WITNESS: No, we don't. What I meant by
5 that is we level it -- we level the surface. If it's on
6 a slope, we level the surface, and we might have what we
7 call a side cut to move dirt from the top to the other
8 edge where it would be -- as we go up the hill it would
9 be level for our equipment, and it would be safe for our
10 equipment.

11 But in no means do we cut through a hill to make
12 it level. Level to the ground. I just meant level on
13 the -- from the standpoint of side cuts where we can go
14 up the hill without tipping equipment.

15 COMMISSIONER HANSON: Thank you. So for a
16 cliff, for instance -- and I'm asking this because at
17 some of our public hearings -- meetings there were people
18 who expressed that they have it on their property and
19 were concerned, and I'm certainly curious about how -- do
20 you bore through the tunnel -- in essence, you bore
21 through those areas?

22 THE WITNESS: No, not particular. Particularly
23 we follow the contour of the land. Depending on the
24 cliff, it's hard to say without specifically knowing what
25 you're talking about.

1 The first choice is to reroute around the area.
 2 And we are doing that now. We've temporarily -- or
 3 initially we've gone through and done our surveys. We
 4 have people on the ground now that are looking with --
 5 working with landowners to see where the best place is to
 6 route our pipeline, and we are working on that as a first
 7 choice to reroute the pipeline.

8 Secondly, if we do encounter a hill, we will
 9 blade the right of way to whatever the landowner agrees
 10 to. And then we will remove portions of that hill not to
 11 level it to the ground but just to make it where it's
 12 passable for our equipment. And we will have hills on
 13 the project.

14 COMMISSIONER HANSON: Thank you.

15 Thank you, Mr. Smith.

16 MR. SMITH: Commissioner Kolbeck.

17 COMMISSIONER KOLBECK: Yeah. Of the things that
 18 you've listed in your testimony, Mr. Hicks, do you know
 19 how many of those -- your question number 7 there, for
 20 which portion of the Application are you responsible, do
 21 you know how many of those you need a permit for, an
 22 additional permit?

23 I would imagine --

24 THE WITNESS: Not off the top of my head.

25 COMMISSIONER KOLBECK: It kind of goes to

1 staff's question. Sewer or water you probably need a
 2 permit for that. Do you know how many of those items you
 3 listed you need permits for?

4 THE WITNESS: There are permits for a number of
 5 things. Any water body crossings we have road permits
 6 that we have to have road access to. We'll have
 7 hydrostatic testing withdrawal permits, air -- there are
 8 a lot of them there. I think the permitting side would
 9 better be answered by someone else.

10 COMMISSIONER KOLBECK: Okay. No problem. The
 11 other thing when we took public comment about the
 12 pipeline months ago there was concern about emergency
 13 medical services and hospitals.

14 Could you address some of those concerns as to
 15 what you plan -- how to mitigate those concerns.

16 THE WITNESS: Yes. Absolutely. One of the
 17 things that -- one of the decisions that probably was
 18 prompted by our public meetings was the institution of
 19 the camps that we had. And part of the reason for
 20 that -- there's certainly reasons.

21 One is the safety of our personnel in getting
 22 them to and from work every day. And, secondly, just
 23 what you're saying. At each camp we'll have a medical
 24 facility. We will have -- we will do minor injuries, and
 25 we will treat colds, cuts, bruises, things like that that

1 are minor in nature that would -- that is the majority of
 2 our injuries on the job.

3 So with that said, the other thing we will do is
 4 once we assign the contractors to the spreads and
 5 understand who will be in that area, we will identify the
 6 medical facilities that we need to contact. If it's
 7 above a minor injury, we have -- first of all, you know,
 8 I would like to say that TransCanada has a very good
 9 safety record, one of the best in the industry that we --
 10 you know, our culture is to put safety first.

11 And we will have a plan that addresses each
 12 medical facility, each medical Medevac service or
 13 thereabout in proximity to the camp and proximity to our
 14 job.

15 So if there is by some chance a injury that
 16 requires that, our construction contractor would help
 17 develop this plan, and they would know immediately who to
 18 contact depending on the nature of the injury. But for
 19 the most part we think we will be able to handle our own
 20 day-to-day injuries that we have or small nicks and
 21 things through our camp doctor -- or not doctor but camp
 22 facility.

23 COMMISSIONER KOLBECK: And you do have a -- you
 24 will have a plan in place for -- if there was -- in the
 25 unfortunate incident there was a larger injury?

1 THE WITNESS: Absolutely. We'll identify all
 2 the services that are available and the time from each
 3 location to be able to get to that -- to aid in that
 4 injury.

5 COMMISSIONER KOLBECK: At any time would the
 6 local emergency medical technicians be utilized, or would
 7 TransCanada handle most of this internally?

8 THE WITNESS: I would say that we'll have to
 9 plan that. I don't know at this time. And if we had --
 10 it depends on where we are and what facilities are
 11 available. It will be -- you know, we'll have to just
 12 plan it per location. And if it's -- you know, if it's
 13 two hours to the job site, we may have to call Medevac to
 14 come in. If the contractor has -- if we decide that we
 15 have our own service to transport people, you know, we
 16 would do that. But I think in most cases we would use
 17 the local facilities.

18 COMMISSIONER KOLBECK: And are they -- they
 19 would be aware of that?

20 THE WITNESS: Everyone will be aware of that.
 21 That will be in our training sessions for both our
 22 foreman and superintendents on the job. The employees
 23 will be -- go through an awareness training of what to do
 24 during the injuries. And then our contractors will each
 25 develop the plan and have a good idea of where they go,

1 depending on where they are on the job for medical
2 services.

3 COMMISSIONER KOLBECK: How about -- I'm sorry.
4 How about schools? Have you been in contact with them?
5 That's one thing that you mentioned here that -- do you
6 anticipate a large influx of students?

7 THE WITNESS: We don't anticipate -- very few,
8 if any. We aren't going to allow children in the camp
9 due to safety precautions. So we think the effect on the
10 schools is almost nil.

11 COMMISSIONER KOLBECK: And then one other thing
12 is the environmental inspection. Could you give me a
13 little background on that, what that entails?

14 Is that another permit through the DENR or
15 something else?

16 THE WITNESS: No. We have inspectors on the
17 project that we'll have per spread, and we'll have at
18 least one on each spread. A spread being a construction
19 contract that is typically in our case 80 to 95 miles in
20 length.

21 For each spread we'll have a number of
22 environmental inspectors. Depending on the nature of
23 that spread, they'll do things such as monitor our
24 erosion control. They will look for -- be involved in
25 any small spills that we have due to fuel or anything

1 like that. They'll monitor our fuel tanks in the storage
2 yard to make sure the berms are able to contain any fuel
3 spills.

4 They'll be on the job site looking at any
5 environmental issues that we have, and they'll monitor
6 the contract -- contractor.

7 COMMISSIONER KOLBECK: And one last question.
8 The population and demographics, have you ever worked in
9 this sparsely of a populated area?

10 THE WITNESS: Yes.

11 COMMISSIONER KOLBECK: So there's no additional
12 concerns, or this isn't unique to you?

13 THE WITNESS: Well, part of my experience has
14 been that I worked in a camp in Oman, in the Middle East.
15 So that's the only thing I can relate it to.

16 I understand the challenges that you're facing,
17 but, yes, it is very unique in the U.S. to have this
18 sparse of a population.

19 COMMISSIONER KOLBECK: Do you anticipate any
20 additional problems because of the sparsity?

21 THE WITNESS: Well, I think there's -- I don't
22 say that I would say problems. I think there are just
23 challenges that you have to plan for. And fortunately
24 for us, you know, we're here at this testimony today and
25 fortunately we have a year and a half before we start

1 construction.

2 So we have a lot of time to plan, and we're
3 trying to take advantage of all of that time that we have
4 to hopefully get our construction contractors under
5 contract early where they can work with us in developing
6 these plans because of the remoteness.

7 It is a challenge. It's probably our number one
8 challenge on this project.

9 COMMISSIONER KOLBECK: And I would -- this is
10 just myself speaking, but I do have some serious concerns
11 about the emergency medical technicians and the
12 availability of them due to the sparsely populated areas.

13 You're looking at towns of 2 to 300 people, and
14 you're lucky to have maybe two or three people that are
15 medically trained. So please pay extra close attention
16 to that.

17 THE WITNESS: Yes. I understand. I was at the
18 hearings. Although I didn't participate, I was at the
19 open sessions. So I did hear the issues and concerns
20 from the public.

21 COMMISSIONER KOLBECK: All right. Thank you.
22 No more questions.

23 MR. SMITH: Okay. Thank you. It may not be the
24 right person. It might be Mr. Schmidt or Ms. Tillquist.
25 But on the -- you know, one of the other concerns

1 expressed out particularly in Buffalo if you were out
2 there was, you know, paleontological and cultural
3 resources.

4 And, you know, in terms of the on-site
5 environmental inspector, I mean, somewhere in here I
6 remember the reading that there was a suggestion at least
7 maybe by the SHPO or somebody that you have someone who
8 is an expert in that, in being able to identify strikes
9 of either funerary objects or paleontological resources.

10 Would you be the person to explain what kind of
11 training and -- you say you're going to provide
12 environmental training to your trenchers and all of your
13 field people. Would you be the person who could discuss
14 that element?

15 THE WITNESS: Not in detail. But to tell you
16 how we handle -- if there is a strike, we will
17 immediately shut the work down. We will not work within
18 100 feet of that site.

19 We'll notify the landowner. We'll notify the
20 proper authorities within the given time frame. And we
21 will not work in that area until the time -- until we're
22 released to go back to work.

23 From the aspect of what type of training, I
24 don't know what type of training that we would give these
25 people other than to identify when we do -- if we would

1 hit something like that, just to stop work and let the
2 authorities take care of the rest of it.

3 MR. SMITH: And I guess my question and maybe
4 again is just in terms of training, I mean, it hits me
5 that, number one is if you don't know what you're looking
6 at, you don't know you've hit it, you know. And if there
7 was any thought about some level of awareness training or
8 something for like the trenching operators and that so
9 they can tell when they have encountered something.

10 THE WITNESS: I'm not aware of that type of
11 training. And maybe that's something somebody can
12 answer. But I'm not aware of that type of training that
13 we would have.

14 I would like to say that we are identifying as
15 much of our cultural resources as we can in the surveying
16 process and trying to identify where these potential
17 sites are and have almost completed that.

18 MR. SMITH: Okay. And I saw that, and I
19 thought -- I liked that. I thought that was a good
20 element of the plan that you're doing.

21 THE WITNESS: We've had monitors from the tribes
22 with those cultural resources that have been present at
23 that time too.

24 MR. SMITH: Other Commissioner questions?
25 Follow up? Okay. In terms of the pump stations, one

1 last thing on the pump station locations and getting
2 them -- I mean, goodness knows there's enough empty space
3 out there, you know, and attempting to get them enough
4 distance between you and residences, is that your area or
5 is that somebody else?

6 THE WITNESS: No. I think from the standpoint
7 of what you're saying is that the placement of it is the
8 routing issue. But one of the things I would like to add
9 to that is when we were talking about how to construct
10 and why some need more than others, you know, the land
11 that we acquire is not always square or rectangular or
12 whatever so sometimes you need more space just due to
13 some of it is not usable.

14 And other times there are, you know, different
15 terrain that you can't construct on. So that's the real
16 reason for adding additional space. All the pump
17 stations are designed almost equally. And it's --
18 they're almost cookie cutter type installations.

19 MR. SMITH: Thanks. I think, you know, again,
20 it usually comes up when we hear concerns or after
21 construction complaints that -- noise is usually the
22 issue whenever you're dealing with whatever it is we get
23 involved in here.

24 And I guess that was my query as to whether
25 you're the person to -- you know, sometimes just a fairly

1 minor change in location can make a huge difference in
2 terms of whether or not somebody's going to later feel
3 that they've been -- now had their environment changed,
4 you know, in terms of now having to live with industrial
5 noise.

6 Is that you, or is that -- okay. Okay. Thank
7 you.

8 Any other Commissioner follow up?
9 Mr. Taylor.

10 MR. TAYLOR: Thank you, Mr. Smith. Just one
11 question.

12 REDIRECT EXAMINATION

13 BY MR. TAYLOR:

14 Q. Mr. Hicks, you described what you will require
15 contractors to do by way of provision and emergency
16 services to take care of injuries.

17 What you didn't mention is that you also will
18 require your contractor to be involved in contacts with
19 the local emergency services and so forth and to evaluate
20 those services and to coordinate with those service
21 providers; right?

22 A. **That's right.**

23 Q. And in rural areas where you will tax or could
24 conceivably tax local emergency services then it's the
25 company's policy to provide its own emergency services,

1 transport, for example, or paramedical assistance; is
2 that correct?

3 A. **That's correct. And we will outline that in our
4 emergency medical plan that we will work with the
5 contractors on.**

6 MR. TAYLOR: Thank you. That's all I have.

7 MR. SMITH: I think you may step down. Are
8 there any other questions from other parties?
9 Thank you.

10 Mr. Koenecke, your team, Applicant, please all
11 your next witness.

12 MR. MOORE: Call Jon Schmidt to the stand.
13 (The witness is sworn by the court reporter)

14 DIRECT EXAMINATION

15 BY MR. MOORE:

16 Q. Can you state your name and work address, please.

17 A. **My name is Jon Schmidt. I work for Trow Engineering
18 Consultants, 1300 Metropolitan Boulevard, Suite 200,
19 Tallahassee, Florida.**

20 Q. What is your role with the Keystone XL Pipeline
21 Project?

22 A. **I lead the environmental and regulatory portions of
23 the project. So that would include all the permitting
24 questions you're begging to ask, the survey,
25 environmental surveys, pretty much the overall regulatory**

1 process as it relates to the DOS and federal processes as
2 well as state processes.

3 Q. You've submitted prefiled direct testimony in this
4 case that has been marked as Exhibit 4. Do you have that
5 before you?

6 A. Yes.

7 Q. And do you have any changes or additions to that
8 prefiled testimony?

9 A. No.

10 Q. And if you were asked all the questions that are
11 contained in that prefiled testimony, would your answers
12 be the same today?

13 A. Yes.

14 Q. You also filed in advance rebuttal testimony that is
15 marked as Exhibit 5. Do you have that before you?

16 A. Yes.

17 Q. And, again, if you were asked all the questions that
18 are contained in that rebuttal testimony, would your
19 answers be the same today?

20 A. Yes.

21 Q. Dr. Schmidt, one of your responsibilities on the
22 project relates to permitting. There were some questions
23 that were asked of Mr. Hicks with respect to permitting
24 for the waste water treatment facilities that will be
25 associated with the camps.

1 Is that within your area of responsibility?

2 A. Yes.

3 Q. And could you just generally describe what steps
4 have been taken so far to address that issue?

5 A. **So far what we've done is we've identified the
6 regulatory processes that may apply to the camp based on
7 what information we know about how it's going to be
8 designed.**

9 **At this point what we're trying to do is provide the
10 camp vendors who will bid on the construction of the
11 camps regulatory information on standards they have to
12 meet in the State of South Dakota and Montana as well.**

13 **And then once we get the bids in and the successful
14 bidder is chosen, we will work with the camp vendors to
15 make sure that they apply for the correct permits and
16 that they meet the standards that are set by the State of
17 South Dakota.**

18 **So to get to the waste water treatment issue, we
19 have to see what kind of units that they propose to bring
20 forward in their bids. For instance, offshore oil
21 platforms typically have a stand-alone waste water
22 treatment plant that is built and designed to minimize
23 emissions on offshore platforms.**

24 **We expect them to come in with some kind of concept
25 like that where they would design a waste water treatment**

1 facility to meet the demands of the number of people, how
2 much water is going to be used, what kind of waste
3 streams will be in that water.

4 **So what we've done is we've provided them with the
5 regulatory standards that they have to meet, and we're
6 waiting for them to come back with the bids.**

7 Q. There were also some questions about paleontological
8 resources. And with respect to the survey work that has
9 been done, could you just address in general your
10 responsibility for that work?

11 A. **Yes. So what we've done is we've hired contractors
12 to go out and do cultural resource surveys under 106 with
13 the Department of State as the lead and working with the
14 State SHPO here in South Dakota. Those surveys are about
15 93 percent done on properties where we've had permission
16 to survey.**

17 **We provided those results to the Department of
18 State, and they work with the South Dakota SHPO to
19 determine eligibility of sites. But in large what we try
20 and do is avoid any site that's potentially eligible for
21 listing under 106.**

22 **For paleontological we had a firm that specializes
23 in those surveys also conduct surveys for paleontological
24 resources and work with the South Dakota Museum of
25 Geology on identifying potential sites for the surveys.**

1 **So surveys were done on state and federal land and
2 also in Harding County on the private property by the
3 landowners that hired their own paleontologists for those
4 surveys.**

5 MR. MOORE: I have no additional questions for
6 Dr. Schmidt at this time and would tender him for
7 cross-examination.

8 MR. SMITH: Thank you. Mr. Blackburn.

9 CROSS-EXAMINATION

10 BY MR. BLACKBURN:

11 Q. So you're familiar with all the permits required for
12 this process in general?

13 A. In general, yes.

14 Q. I wouldn't expect that you would have all of them
15 memorized. The permit processes for the paleontological
16 and cultural resources are required under Section 106
17 which is a federal requirement; is that correct?

18 A. That's correct.

19 Q. Is there a state law that requires that kind of
20 permit?

21 A. On state lands.

22 Q. Does the State of South Dakota have a permit process
23 related to abandonment of pipelines?

24 A. I'm not aware.

25 Q. Does the Federal Government have a permit process

1 related to abandonment of pipelines on on-shore
 2 facilities?
 3 **A. I'm aware under different regulatory regimes there's**
 4 **different federal agencies that have different**
 5 **jurisdictions. FERC has a process for FERC regulated**
 6 **interstate and natural gas pipelines.**

7 **Q.** For crude oil pipelines such as this is there a
 8 federal process related to abandonment of pipelines?

9 **A. I'm not aware of one off the top of my head.**

10 MR. BLACKBURN: Thank you. No further
 11 questions.

12 MR. SMITH: Staff.

13 MS. SEMMLER: No questions. Thank you.

14 MR. SMITH: Commissioners.

15 COMMISSIONER HANSON: Thank you, Mr. Smith.

16 Doctor, in your testimony you state that a Draft
 17 EIS is anticipated to be released in late summer or early
 18 fall of 2009 and that the -- in early 2010 a Final EIS is
 19 expected to be released.

20 Can you give us any better dates at this time?

21 THE WITNESS: All we know is that it will be
 22 later in 2009. It's not in our control.

23 COMMISSIONER HANSON: Do you have an idea if
 24 it's -- if 2010, how early we might be able to see that?

25 THE WITNESS: Possibly in the first half of

1 2010.

2 COMMISSIONER HANSON: Okay. Are there any
 3 significant challenges in the EIS process with this
 4 project that are not commonly found in other projects?

5 THE WITNESS: Well, you have -- you have
 6 challenges that are specific to the states you cross.

7 But there have been other projects in Montana and
 8 South Dakota and these states. Nothing that we can't
 9 work through the issue with the regulators as far as I
 10 can see.

11 COMMISSIONER HANSON: Thank you. Thank you,
 12 Doctor.

13 MR. SMITH: Commissioner Kolbeck.

14 COMMISSIONER KOLBECK: Yeah. With regard to the
 15 permits, and you spoke about the camps, am I correct in
 16 understanding that, that it is up to the contractors to
 17 get the permits or it's up to TransCanada to get the
 18 permits?

19 THE WITNESS: TransCanada will oversee the
 20 permits that will be acquired. At this time I believe
 21 that TransCanada will be responsible for making sure the
 22 major federal permits are acquired.

23 So, for instance, there's a general construction
 24 stone water permit that's required for the pipeline right
 25 of way. The camps would be included in that. And that's

1 required through the State of South Dakota. It's a
 2 federal permit that's handled by the State under the NPDS
 3 program.

4 But the contractor will get the permits for the
 5 facilities themselves. But we're going to oversee that.
 6 TransCanada will review those permits before they were
 7 submitted. And they'll make sure that the contractor
 8 adheres to them.

9 COMMISSIONER KOLBECK: So under the -- hopefully
 10 unlikely situation that a permit is not required, who is
 11 in trouble? TransCanada?

12 THE WITNESS: Ultimately.

13 COMMISSIONER KOLBECK: Ultimately. Okay. You
 14 carry the burden ultimately of permitting?

15 THE WITNESS: That's the way I believe it
 16 stands.

17 COMMISSIONER KOLBECK: Okay. Mr. Blackburn's
 18 question of the remediation of a pipeline, have you ever
 19 had that occur where a pipeline had to be removed? Have
 20 you ever worked with an environment like that?

21 THE WITNESS: In natural gas pipelines,
 22 particularly ones built in the '30s and '40s some were
 23 taken out of service, abandoned in place. It just
 24 depends on the state and where it is and what type of
 25 regulations exist at the time that the abandonment is

1 contemplated.

2 COMMISSIONER KOLBECK: And just to keep apples
 3 to apples, have you ever done anything like that with a
 4 crude oil pipeline?

5 THE WITNESS: Only conversion from crude to
 6 natural gas but not abandonment.

7 COMMISSIONER KOLBECK: During that process was
 8 it on the federal side, or was it on the --

9 THE WITNESS: Federal side.

10 COMMISSIONER KOLBECK: It was on the federal
 11 side. Thank you.

12 MR. SMITH: Commissioner Hanson, any other
 13 follow up?

14 COMMISSIONER HANSON: Are you a mind reader?
 15 You do that well from time to time.

16 I did have a number of items highlighted in your
 17 testimony, Doctor. And I guess my curiosity compels me
 18 sometimes to ask questions that probably may not even be
 19 germane to what we're working on here.

20 In your testimony direct on item 17 you said
 21 that the pipeline right of way is in proximity to
 22 existing oil and gas wells. And apparently during
 23 construction through portions of your other testimony it
 24 does indicate that the project will -- in some way may
 25 have some impact on that process that I -- I'm concerned

1 a little bit with economic development up in that part of
2 the state.
3 And I don't know whether or not you're the right
4 person to ask the question of, but since it is in your
5 testimony, can you give us somewhat of an idea of just to
6 what extent this project would impact that economic
7 activity?

8 THE WITNESS: I don't think it would impact it
9 much at all. Because what Keystone would do is work with
10 the lessee or the landowner who is developing that
11 resource. And we would route the facilities to avoid
12 impact to the existing wells.

13 If they have flow lines from those wells, we
14 would have them help us identify where those are so that
15 during construction they could be marked and avoided.

16 But pipelines, you can look at a map of Texas,
17 cover the state of Texas. There's oil wells all over the
18 place and natural gas wells. So they're real good at
19 working with whoever has the rights to the minerals to
20 minimize the routing of the facilities as well as the
21 construction.

22 COMMISSIONER HANSON: Certainly. And on your
23 testimony, however, a portion of it related directly to
24 the supply of materials, construction materials and
25 things of this nature, sand and gravel, whatever, that

1 the construction of the pipeline would affect.

2 Do you see --

3 THE WITNESS: We haven't identified any yet.
4 The landowners have not identified any active sand and
5 gravel mines.

6 COMMISSIONER HANSON: That's just a potential.

7 THE WITNESS: That's correct. So we use the
8 geology maps to identify resources. Whether or not
9 they're under, you know, active mining, right now there's
10 none that we cross.

11 COMMISSIONER HANSON: Great. Thank you. Thank
12 you, Doctor. Thank you, Mr. Smith.

13 MR. SMITH: Any other questions, Commissioner
14 Kolbeck?

15 I have one. And again I'm back on the
16 paleontological thing. And I just -- in your testimony
17 you state, "On private lands Keystone will have
18 paleontological monitors in areas with significant
19 resources."

20 Can you please just elaborate a little on how
21 that process will work? And maybe you can address the
22 question I asked of Mr. Hicks about whether there will be
23 any kind of -- or whether it's possible to do any kind of
24 training of your field personnel to be able to rapidly
25 identify just in the chance that a significant resource

1 were encountered.

2 THE WITNESS: So the steps that are taken, the
3 South Dakota SHPO has recommended that we work with the
4 Museum of Geology and Mines and identify existing sites
5 as well as historical records. And the paleontologist
6 also works with geologists to identify formations that
7 may be exposed or near the surface.

8 And those areas would be marked on the
9 construction alignment drawings, and a paleontological
10 person, not an environmental inspector, but a person
11 who's trained in paleontology and paleontology surveys
12 would be assigned to those sections of the pipeline when
13 they get to grading and construction.

14 If they identify anything, they stop the work.
15 The landowners has the rights to those fossils. The
16 landowner has to decide what to do with them on private
17 property.

18 If it's not state property or federal property,
19 we have to develop a plan ahead of construction with the
20 State on how we will monitor and deal with any kind of
21 paleontological resources that are found.

22 MR. SMITH: Thank you. Would you be the person
23 to talk about noise, pump station noise, or --

24 THE WITNESS: Sure.

25 MR. SMITH: You heard my questions earlier.

1 THE WITNESS: Yes.

2 MR. SMITH: In terms of location within
3 allowable -- you know, I realize hydraulic tolerances of
4 the system. But could you address that, please.

5 THE WITNESS: I think in the Application we had
6 a table that provided the number of structures near pump
7 stations. At this time I don't know how many of those
8 are habitable homes or whether they're camps for hunting
9 or -- but I believe the nearest structure to a pump
10 station is almost 1,350 feet in distance.

11 And as everybody knows, noise reduces every time
12 you half the distance. So from 1,000 feet out to the --
13 or from the source to 1,000 feet you half the amount of
14 noise that's emanated from the facility.

15 But Keystone has already indicated in a data
16 response from staff that we would adhere to whatever
17 standard that the Commission imposes on the project as
18 far as noise standards.

19 MR. SMITH: Thank you. Any other Commissioner
20 questions?

21 Keystone?

22 MR. MOORE: No additional questions. Thank you.

23 MR. SMITH: Any follow-up cross-examination?

24 Thank you, Mr. Schmidt. I think you may step
25 down. And then I think at this point we'll take a

1 recess. Just to make it an even number, why don't we
2 take a recess until 10:30.

3 (A short recess is taken)

4 MR. SMITH: With that, we'll be back in session.

5 This is HP09-001, Application of Keystone XL Pipeline for
6 a construction permit.

7 Keystone, please present your next witness.

8 MR. TAYLOR: Thank you, Mr. Smith. Keystone
9 calls Meera Kothari.

10 (The witness is sworn by the court reporter)

11 DIRECT EXAMINATION

12 BY MR. TAYLOR:

13 Q. Now that you're sworn, would you state your name and
14 business address for the record, please.

15 A. **Meera Kothari, 450 First Street Southwest, Calgary.**

16 Q. You provided prefiled testimony and prefiled
17 rebuttal testimony in this matter?

18 A. **Yes.**

19 Q. You've reviewed that testimony in anticipation of
20 this hearing?

21 A. **Yes.**

22 Q. And if you were called on to give that testimony
23 today, would your oral testimony be the same as your
24 written testimony?

25 A. **Yes.**

1 In relationship to thickness alone, this is a
2 fairly obvious answer but I'm trying to get at other
3 things, should we as a Commission be looking at something
4 other than just thickness of a pipe?

5 THE WITNESS: Well, from a thickness standpoint
6 thicker pipe offers additional mechanical integrity from
7 a stress allowance perspective.

8 For instance, we use thicker pipe on horizontal
9 directional drills or pushing through on a road bore
10 crossing, but from an overall safety perspective thicker
11 pipe or thicker wall isn't in and of itself the only
12 consideration from a safety perspective.

13 So, you know, the issue of thin versus thick
14 using a .8 design factor thickness of pipe coupled with
15 all the specific conditions that the pipeline has or the
16 safety administration would put on the use of that in
17 itself would allow for an as safe or safer design of the
18 pipeline as if you were to use the standard thickness of
19 pipe under current regulations.

20 COMMISSIONER HANSON: The product itself, is it
21 the anticipation that the component, the makeup of the
22 substance that creates the pipe, is that the top of the
23 line, for lack of a better term, the best quality pipe
24 that one could expect to have?

25 THE WITNESS: Absolutely. TransCanada undergoes

1 Q. Will you tell the Commission, please, what your area
2 is -- what areas you're going to address in this hearing.

3 A. **I'm the project engineer for the Keystone Pipeline
4 and serving in a technical advisory capacity for the
5 Keystone XL Pipeline, and I'd be able to speak to
6 integrity management.**

7 MR. TAYLOR: Surrender the witness for
8 cross-examination.

9 MR. SMITH: Mr. Blackburn.

10 CROSS-EXAMINATION

11 BY MR. BLACKBURN:

12 Q. Are you the appropriate TransCanada witness to
13 discuss ruptures and leak from pipelines?

14 A. **Not specifically spills and leaks.**

15 MR. BLACKBURN: Thank you. No questions.

16 MR. SMITH: Commission staff.

17 MS. SEMMLER: No questions.

18 MR. SMITH: Commissioners. Commissioner Hanson.

19 COMMISSIONER HANSON: Mr. Smith, thank you.

20 Ms. Kothari, on your testimony you speak a
21 little bit about pipe thickness. And that was something
22 that we discussed at length at the Keystone hearings, and
23 subsequently it's been discussed at a number of other
24 locations across the state and continues to be an ongoing
25 discussion.

1 rigorous formal prequalification of all steel sources and
2 pipe mills that would produce the pipe for the project.
3 Prequalification, discussion with quality personnel at
4 those facilities, as well as providing a rigorous
5 specification that that pipe would have to be made to,
6 whether it's chemical component as you discussed the
7 makeup of that pipe, or the strength of that pipe.

8 COMMISSIONER HANSON: So speaking of the quality
9 of the pipe -- well, strike that. I'll ask some
10 questions pertaining to pump stations.

11 I'm interested in if there is a failure in some
12 portion of the pipe, I understand from your testimony
13 that there are seven remotely controlled valves.

14 THE WITNESS: That's right.

15 COMMISSIONER HANSON: In South Dakota. I should
16 add.

17 THE WITNESS: Yes.

18 COMMISSIONER HANSON: How quickly do you
19 anticipate being able to limit or to segregate a rupture
20 or a suspected problem on the pipeline?

21 THE WITNESS: Typically the valve closure time
22 is in and around 3 minutes, and that's what we've been
23 modeling as part of our assessments. There's a specific
24 sequence in terms of a shutdown procedure for a failure,
25 and another witness can speak to that specific sequence

1 of shutdown or operating procedures during the event of a
2 failure or any other incident.

3 COMMISSIONER HANSON: I have a few other
4 questions, but I don't know if I really need to go into
5 them, Mr. Smith, so I'll yield the floor. Thank you.

6 MR. SMITH: Commissioner Kolbeck.

7 COMMISSIONER KOLBECK: Yes, Ms. Kothari, when we
8 were -- I think it was in Scotland we talked about the
9 difference in pipe thicknesses in inches. I think it's
10 easier for me to do that.

11 Could you tell me what the difference between
12 X80 and X70 is in inches?

13 THE WITNESS: The project will use X70 pipe. So
14 that bearing aside the difference in steel grade, if we
15 were to be approved for the special permit, the line pipe
16 thickness would be 0.463 inches. The standard pipe under
17 current regulations or regulations would be 0.512 inches.
18 Therefore, a difference of 0.05 or one-twentieth of an
19 inch difference.

20 COMMISSIONER KOLBECK: Okay. On the pump
21 stations, does that have the same metal content as what's
22 put in the ground?

23 THE WITNESS: Yes. All pipe for the pipeline is
24 made to the API 5L specification. What would vary would
25 be the thickness. We are not intending to apply for a

1 special permit for the pump station facilities, the
2 above-ground piping.

3 COMMISSIONER KOLBECK: Okay. In question number
4 12 of your direct, it says you're responsible for the
5 PHMSA regulations governing pipeline design standards.

6 Could you tell us where that PHMSA process
7 stands with you?

8 THE WITNESS: For the special permit?

9 COMMISSIONER KOLBECK: Yes.

10 THE WITNESS: At this point in time we've
11 applied for the special permit. That Application was
12 filed last year in October with PHMSA.

13 They are currently reviewing the Application and
14 have posed questions back to TransCanada on specifics
15 within that Application, and we're in the process of
16 providing them with additional data and analysis for that
17 Application.

18 COMMISSIONER KOLBECK: But as of today it's not
19 approved; correct?

20 THE WITNESS: That's correct.

21 COMMISSIONER KOLBECK: With the operation and
22 maintenance, would you be the correct one to talk about
23 the SCADA system? Or I think from the other there was
24 someone else who spoke about --

25 THE WITNESS: Yes. There's another witness who

1 would be able to address SCADA.

2 COMMISSIONER KOLBECK: Okay. That's all I have
3 right now, Mr. Smith.

4 MR. SMITH: Did you have any follow-up questions
5 then, Commissioner Hanson?

6 COMMISSIONER HANSON: Did you have one?

7 MR. SMITH: Mr. Rislov.

8 COMMISSIONER HANSON: Mr. Rislov has one.

9 MR. RISLOV: I'm looking at rebuttal. I think
10 it's labeled Question 15. And that's not that important.

11 You've talked about it in other places within your
12 testimony. But you state, the pipeline safety factors
13 does not decrease the result to -- or 0.8 design factor
14 due to the manufacturing and design operational
15 requirements.

16 And I thought I read earlier and I think it's in
17 the answer of 12 that it provides a level of safety equal
18 to or greater than that which would be provided if the
19 pipeline were operating under existing regulations.

20 Are we talking about thickness at this point?

21 THE WITNESS: That's correct.

22 MR. RISLOV: Yet and if I go to 16 -- and this
23 is confusing to me. "Does special permit apply to all
24 areas of the pipeline?" And the answer is no, that
25 PHMSA --

1 Question 16 of her rebuttal, "Does the special
2 permit apply to all areas of the pipeline?" It's just
3 the answer there that it doesn't apply to high
4 consequence areas.

5 And I find it a little confusing if it's equal
6 to or better than, why wouldn't that go in high
7 consequence areas just as well? I mean, that doesn't
8 seem to make a lot of sense to me.

9 THE WITNESS: It's PHMSA that will determine the
10 applicability of which pipe goes where. So it's up to
11 the government to determine where that would be.

12 MR. RISLOV: Again, it seems strange that if
13 it's equal to or better that it would -- that they would
14 backtrack, so to speak, my words, and go to a
15 different -- go away from that special permit in those
16 high consequence areas.

17 And I understand PHMSA sets those standards, but
18 it's a curiosity to me. You've testified that it's equal
19 to or better if I understand correctly.

20 THE WITNESS: That's right. I think where we
21 can go with this is if we take the example of a populated
22 area, there are certain safeguards that we need to put on
23 our pipelines in terms of, you know, threats such as
24 mechanical damage and such. So, you know, there are
25 other design factors that we consider. We wouldn't use a

1 thin piece of pipe or a thinner wall pipe in terms of
2 doing a horizontal directional drill under a river
3 because the engineering stresses to conduct that wouldn't
4 allow for so.

5 So the permit is designed to be used in specific
6 areas where the design is as safe or safer than current.

7 MR. RISLOV: Well, let me maybe get more
8 specific. What makes the pipe -- the thinner wall pipe
9 safer in areas where let's say no one's at, for lack of a
10 better term, but yet apparently less safer in so-called
11 high consequence areas and when you're going through
12 horizontal directional drilling holes?

13 THE WITNESS: Well, as I mentioned before, there
14 are numerous conditions tied with the special permit.
15 And so those conditions coupled with the design of the
16 pipe materials would allow it to be as safe or safer.

17 MR. RISLOV: But could you be more specific?

18 THE WITNESS: Sure. So we look at, for
19 instance, depth of cover or specific inspection
20 techniques that are required, specific quality control
21 measures that are put in place, additional surveys during
22 integrity management during the operations of the
23 pipeline. So all these measures coupled with the design
24 of the steel itself would ensure that.

25 MR. RISLOV: And let me paraphrase, and if I get

1 it wrong, please correct me. If but what you're telling
2 me is you tend to inspect the thinner wall pipe more
3 often and thus it's safer than the thicker wall pipe? Am
4 I misstating what I just heard?

5 THE WITNESS: No. We do have additional
6 inspection requirements for the thinner wall pipe,
7 whether it be in the pipe mill or during the operational
8 phase of the pipeline.

9 MR. RISLOV: Well, I was thinking more the
10 operational phase. I have to admit I'm still -- you
11 know, with the testimony that it's safer, and there is
12 testimony that says that, it still puzzles me why we
13 would use two different pipes in different areas, a bit.

14 I understand your answer about the inspections.
15 I don't know if that necessarily answers my question.
16 But I think I probably got what I asked for. Thank you.

17 MR. SMITH: Commissioner Hanson, did you have
18 some additional questions?

19 COMMISSIONER HANSON: I do, Mr. Smith. And
20 thank you.

21 Could you help me with -- and I heard your
22 testimony that you said that you've reviewed your
23 testimony and that it would be substantially the same or
24 it would be the same today.

25 On question 27 you said that there have been no

1 leaks of this type, and you're referring to the FBE, the
2 fusion bonded epoxy. "There have been no leaks on this
3 type of pipe installed by TransCanada with the FBE
4 coating and cathodic protection system during that time."

5 And that time refers to system operation over
6 the past 29 years, I believe. Is that still accurate?

7 THE WITNESS: Yes. From a corrosion standpoint
8 that is accurate.

9 COMMISSIONER HANSON: I don't know -- when you
10 qualify it in that fashion by saying from a corrosion
11 standpoint --

12 THE WITNESS: So TransCanada did have an
13 incident earlier this year where the pipeline facility
14 was struck by lightning. And that pipeline was coated
15 with fusion bond epoxy.

16 But in the context of this in terms of applying
17 a protective layer of coating on to the pipeline to
18 prevent external corrosion or the pipe from degrading
19 itself, there have been no incidents.

20 COMMISSIONER HANSON: Okay. I appreciate the --
21 that's what I was alluding to and wanting to receive
22 information on. Thank you very much.

23 Thank you, Mr. Smith.

24 MR. SMITH: Thank you. Any other follow-up
25 questions, Commissioner Kolbeck? Do you have any?

1 I have a couple, Ms. Kothari. Maybe in a follow
2 up to Mr. Rislov's question.

3 With respect at least to horizontal directional
4 drilling is one of the reasons why the thicker wall pipe
5 is used is to prevent mechanical failures due to the pipe
6 stringing process? Is that part of it, the rigidity
7 issue?

8 THE WITNESS: That is correct.

9 MR. SMITH: Okay. One question I have, and
10 it's -- is in condition number 8 to the special permit
11 deals with an excavator weighing up to 65 tons. And then
12 in your testimony, paragraph or question 28 we talk about
13 51 tons.

14 Could you -- is that something that you could --
15 or have in front of you enough to be able to discuss at
16 all?

17 THE WITNESS: I do have the staff data request
18 114 that may be better able to explain.

19 MR. SMITH: Okay. Yeah. Is that something I
20 have in here somewhere? Of course, you don't know what I
21 have in here, do you?

22 THE WITNESS: No.

23 MR. TAYLOR: Are you looking for a copy of the
24 special permit?

25 MR. SMITH: I've got a copy of it. I mean, I've

1 got that here. I just don't know if Meera has it.
 2 MR. TAYLOR: Ms. Kothari, do you have a copy?
 3 THE WITNESS: I don't.
 4 MR. TAYLOR: Here. I'll get you one.
 5 (Attorney Taylor hands document to the witness)
 6 MR. SMITH: Yeah. I'm just looking at number 8.
 7 I think I know the reason for that difference, but I
 8 wanted to just make sure.
 9 MR. TAYLOR: For the record, Mr. Smith, you're
 10 looking at the 2007 special permit applicable to
 11 Keystone?
 12 MR. SMITH: Yeah. I'm looking at what was
 13 appended to William Walsh's testimony.
 14 MR. TAYLOR: Yes.
 15 MR. SMITH: And it's an April 30, 2007 cover
 16 letter from Jeffrey Wiess, associate administrator
 17 pipeline safety.
 18 THE WITNESS: Which question was it in?
 19 MR. SMITH: Yours? It was question 28 I think
 20 in -- let me see here. On your updated.
 21 (Witness examines document)
 22 THE WITNESS: Okay. So in the special permit
 23 this specific 65 ton refers to the actual weight of the
 24 excavator.
 25 MR. SMITH: That's the machine weight.

1 THE WITNESS: The machine. Whereas the 51 tons
 2 of force on question 28 is the actual force exerted by
 3 the excavator.
 4 MR. SMITH: Okay. Thank you. That's what I
 5 thought. Thank you very much.
 6 I don't have any other questions.
 7 Other Commissioner questions?
 8 Seeing none then, Keystone?
 9 REDIRECT EXAMINATION
 10 BY MR. TAYLOR:
 11 **Q.** Ms. Kothari, the thicker walled pipe that's used in
 12 high population areas has more puncture resistance, does
 13 it not, than the thinner walled pipe?
 14 **A. Yes.**
 15 **Q.** And the issue of where thicker walled or thinner
 16 walled pipe will be used is a political question decided
 17 by PHMSA, is it not?
 18 **A. It is up to PHMSA to decide that, yes.**
 19 **Q.** So when the special permit is issued and it requires
 20 the use of thicker walled pipe, for example, in high
 21 population areas, that's because of the increased
 22 likelihood of excavation and so forth in high population
 23 areas, is it not?
 24 **A. That's right. As I explained earlier, we need to**
 25 **have safeguards against the pipeline to prevent**

1 **mechanical damage. Areas of higher population typically**
 2 **increased activity, whether it's utility cable trenching**
 3 **or other type of work.**
 4 **Q.** And the reason that the thicker walled pipe is used
 5 for passage underneath highways or underneath railroads
 6 or in areas where the pipe is bored and pulled back
 7 through simply has to do with retaining the mechanical
 8 integrity of the pipe after these unusual operations,
 9 does it not?
 10 **A. Yes. It has to do with the constructability**
 11 **technique used or employed in that area.**
 12 MR. TAYLOR: Thank you. That's all the
 13 questions I have.
 14 MR. SMITH: Thank you. Are there any additional
 15 questions from Dakota Rural Action or staff?
 16 MR. BLACKBURN: Just one question.
 17 RECROSS-EXAMINATION
 18 BY MR. BLACKBURN:
 19 **Q.** The conditions that were imposed in the Keystone I
 20 special permit included a variety of things but allowed
 21 for thinner walled pipe.
 22 Would inclusion of all of those additional things
 23 plus a thicker walled pipe make the pipeline less subject
 24 to corrosion or less subject to damage than having a
 25 thinner walled pipe?

1 I'm not saying equal safety. I'm asking do thicker
 2 walled pipes -- do they provide a greater level of
 3 safety?
 4 **A. I'm sorry. Could you repeat your question?**
 5 **Q.** Do thicker walled pipes provide a greater level of
 6 safety?
 7 **A. No.**
 8 **Q.** So they don't provide a greater -- so, for example,
 9 this pipe was constructed to a .5 maximum operating
 10 pressure standard, that would not be a safer pipe than
 11 having it operate at .8?
 12 **A. No. As I mentioned before, wall thickness is not**
 13 **the only primary factor in terms of safety. The wall**
 14 **thickness has more to do with the mechanical integrity as**
 15 **we discussed earlier in terms of construction techniques**
 16 **or specific applications.**
 17 **Safety encompasses many aspects such as inspection,**
 18 **quality control, integrity management, construction**
 19 **specifications so that all those things together would**
 20 **give you the safety aspect.**
 21 **Q.** So pipe wall thickness is irrelevant to safety?
 22 **A. It's a component of safety.**
 23 **Q.** Right. So if a pipe wall is thicker, would the pipe
 24 be safer?
 25 **A. No.**

1 **Q.** You said that PHMSA was in the process of reviewing
2 the special permit. Are you aware that PHMSA is
3 conducting a National Environmental Policy Act review for
4 the special permit for Keystone XL?

5 **A. PHMSA is a participating agent in our national
6 environmental policy review, yes.**

7 **Q.** That's not what I was asking. Is the PHMSA special
8 permit then going to be included within the Department of
9 State Environmental Impact Statement as a component of
10 the review with the Environmental Impact Statement by the
11 Department of State?

12 MR. TAYLOR: If you know, Ms. Kothari.

13 **A. I do not.**

14 **Q.** What we have been told by PHMSA is that they are
15 going to perform an environmental assessment, do a
16 separate NEPA analysis for the special permit. Are you
17 aware of how PHMSA is planning to participate -- or
18 planning to comply with NEPA for the special permit?

19 **A. No. My dealings with PHMSA have been purely on a
20 technical basis.**

21 MR. BLACKBURN: Thank you.

22 MR. SMITH: Staff.

23 RE-CROSS-EXAMINATION

24 BY MS. SEMMLER:

25 **Q.** Just a follow-up question, Ms. Kothari. When you

1 say pipe thickness is just a component of strength,
2 certainly pipe material plays a large role in that.

3 And as with most technologies, the steel technology
4 and the strength of it continues to improve, I would
5 assume. Is that an accurate statement?

6 **A. Yes. That's an accurate statement.**

7 **Q.** So the type of steel being used is an important
8 component when determining strength; correct?

9 **A. That's correct. Line pipe steel is a different type
10 of makeup chemically and strengthwise than what's used
11 for other applications in different industries.**

12 **Q.** And the special permit, the waiver, the pipe
13 thickness waiver, based on all those considerations has
14 become very common practice with PHMSA in their natural
15 gas segment of their work, for example?

16 **A. That's right. PHMSA did pass a regulation allowing
17 for the thinner pipe for natural gas systems last year.**

18 **Q.** And PHMSA looks at changing regulations through a
19 rule-making process similar to any other government
20 agency; is that correct?

21 **A. That is correct.**

22 **Q.** So opposition to this sort of PHMSA regulatory
23 decisions could be handled through PHMSA, communications
24 with PHMSA and a requested rule making?

25 **A. Yes. There is a public comment period typically**

1 **when these types of rule making processes occur.**

2 MS. SEMMLER: Thank you.

3 MR. SMITH: Keystone, any follow up?

4 MR. TAYLOR: No further questions.

5 MR. SMITH: Okay. Thank you, Ms. Kothari. You
6 may be excused.

7 Mr. Koenecke.

8 MR. KOENECKE: Mr. Smith, Keystone would call
9 Donald M. Scott to the stand.

10 (The witness is sworn by the court reporter)

11 DIRECT EXAMINATION

12 BY MR. KOENECKE:

13 **Q.** Good morning, Mr. Scott.

14 **A. Morning.**

15 **Q.** Would you introduce yourself to the Commissioners
16 and attendees, please.

17 **A. My name is Donald M. Scott -- Malcolm Scott. My
18 business address is 450 First Street Southwest -- oh, I
19 thought it was on.**

20 MR. SMITH: Maybe start over again.

21 **A. My name is Donald Malcolm Scott. My business
22 address is 450 First Street Southwest, Calgary, Alberta.**

23 **Q.** Mr. Scott, are you an employee of Keystone or a
24 contractor?

25 **A. I'm a contractor.**

1 **Q.** What's your specific area of expertise?

2 **A. I have answered questions and have expertise in the
3 leak detection modeling simulation trainers and in SCADA
4 systems.**

5 **Q.** Mr. Scott, I've put before you a document we've
6 marked as Exhibit 10. Do you see that there to your
7 right?

8 **A. Yes.**

9 **Q.** Is that the written testimony you filed in this
10 proceeding?

11 **A. Yes, it is.**

12 **Q.** If I asked you all those questions here this
13 morning, would your answers be the same as they are?

14 **A. Yes, they would be.**

15 **Q.** Do you have any additions or corrections to that
16 testimony?

17 **A. No, I don't.**

18 MR. KOENECKE: I have nothing further at this
19 time, Mr. Smith.

20 MR. SMITH: Thank you. Dakota Rural Action.

21 CROSS-EXAMINATION

22 BY MR. BLACKBURN:

23 **Q.** Mr. Smith (sic), are you the appropriate witness to
24 ask about the extent of the results and impacts of leaks
25 and spills?

1 **A. The results and impacts of leaks and spills, no. I**
 2 **don't think so. I could talk a little bit about leaks**
 3 **and spills, but the results and impacts I don't think I**
 4 **could cover that.**
 5 **Q.** Are you aware of whether TransCanada's performed any
 6 studies that analyze what the spray zone would be for
 7 this pipeline should a major rupture occur, for example,
 8 a rupture that would result in a worst-case spill
 9 scenario or complete rupture of the pipeline? So we
 10 understand that the oil would be under pressure and would
 11 spray out. Are you aware if TransCanada has performed a
 12 study to determine how far the oil would spray or where
 13 the spray zone would be?
 14 **A. I don't think there's been any studies involved.**
 15 **Most of the pipe, of course is underground so spray is**
 16 **not normally an issue. Spray would only be an issue on**
 17 **above-ground sections.**
 18 **Q.** So in a --
 19 **A. And it wouldn't normally happen in a rupture. It**
 20 **would happen with a smaller leak, as far as I know.**
 21 **Q.** So in a rupture, for example, do you know what the
 22 worst-case spill scenario is for this pipeline?
 23 **A. I haven't done the calculations for that. Somebody**
 24 **else has done the calculations, and they can present that**
 25 **if you bring that question up later.**

1 **Q.** Uh-huh. And do you know what the Order of magnitude
 2 for the worst-case spill would be?
 3 **A. Order of magnitude, you'll have to -- could you**
 4 **flesh that out a little more?**
 5 **Q.** Thousands of barrels, the tens of thousands of
 6 barrels?
 7 **A. It's in the thousands of barrels range, yes, worst**
 8 **case.**
 9 **Q.** So in the worst-case spill scenario you're saying
 10 that oil would stay underground?
 11 **A. No. I'm not saying it would stay underground. I'm**
 12 **saying I don't think it would spray. It would leak**
 13 **underground, come up and bubble up, probably.**
 14 **Q.** Bubble up?
 15 **A. Well, rise to the surface and --**
 16 **Q.** Slowly?
 17 **A. Again, it's very theoretical, very hypothetical**
 18 **because it depends on what you classify as a rupture and**
 19 **what the pressure would be at that time, whether it's**
 20 **during the pumping operation or when the line is shut**
 21 **down and it's running out strictly due to gravity.**
 22 **Q.** Have you calculated the speed of emission of the oil
 23 under different pressures for this pipeline?
 24 **A. The speed of emission? Could you --**
 25 **Q.** In a rupture the oil would come out of the pipeline;

1 that's correct?
 2 **A. Yes.**
 3 **Q.** And the oil would come out at a rate of flow from
 4 that rupture depending on the size of the rupture and the
 5 pressure of the pipeline. That's correct?
 6 **A. That's correct, yes.**
 7 **Q.** Have you calculated the speed that the oil would
 8 flow out of the pipeline at different size holes or
 9 ruptures in the pipeline?
 10 **A. No.**
 11 **Q.** So you're not aware of how fast the oil would come
 12 out of the pipeline given different size holes in the
 13 pipeline?
 14 **A. No.**
 15 **Q.** So you don't know the force because you -- the force
 16 is mass times velocity; that's correct?
 17 **A. Yes.**
 18 **Q.** So you have not calculated the force at which the
 19 oil would come out of the pipeline either?
 20 **A. I can't answer your question.**
 21 MR. KOENECKE: Mr. Smith, we've gone a long ways
 22 down a line of questioning that I don't believe this
 23 witness was initially prepared to answer. His expertise
 24 is in SCADA system and pipeline operations.
 25 We have other witnesses to answer the kind of

1 questions that Mr. Blackburn's asking.
 2 MR. BLACKBURN: And just to let you know, not
 3 knowing exactly who's going to testify to what, I just
 4 wanted to know. If he doesn't have answers to those
 5 questions, that's a good thing to know.
 6 THE WITNESS: Yeah. I don't think I can answer
 7 your questions for what you're looking for.
 8 MR. BLACKBURN: Thank you.
 9 MR. SMITH: Is that all the questions you have,
 10 Mr. Blackburn?
 11 MR. BLACKBURN: Yes. Thank you.
 12 MR. SMITH: Okay. Ms. Semmler.
 13 MS. SEMMLER: We have no questions regarding the
 14 SCADA system.
 15 MR. SMITH: Commissioners, do you have
 16 questions?
 17 COMMISSIONER KOLBECK: Yes.
 18 Mr. Scott, according to your testimony, the
 19 SCADA system is the system that's going to monitor if the
 20 pipeline's constructed all the way from Hardisty to
 21 where?
 22 THE WITNESS: To end of the line.
 23 COMMISSIONER KOLBECK: All the way. Even if
 24 there's multiple ends of that line?
 25 THE WITNESS: Yes. Definitely.

1 COMMISSIONER KOLBECK: And how long does that
2 take to get a reading that something is wrong?

3 THE WITNESS: To gather all the information?
4 Right now we're looking at less than 10 seconds.

5 COMMISSIONER KOLBECK: And then after that
6 10 seconds is there someone monitoring this 24 hours a
7 day?

8 THE WITNESS: Yes, there is. There's
9 controllers that are monitoring 24 hours a day.

10 COMMISSIONER KOLBECK: Where?

11 THE WITNESS: In the Calgary Control Center.

12 MR. SMITH: Can you pull that mic in, Mr. Scott?
13 Just a little bit. Thank you.

14 COMMISSIONER KOLBECK: So what if something
15 happened at that center? Is there a backup?

16 THE WITNESS: There is a backup center which is
17 approximately 30 miles from the main control center. And
18 it's a full, complete replica of the primary control
19 center.

20 COMMISSIONER KOLBECK: If something happened, is
21 the SCADA system the only way to know, or is there
22 other -- is there other testing that is done on the line
23 other than the SCADA system to determine if there's oil
24 missing at the other end?

25 THE WITNESS: There -- there's a number of leak

1 detection systems in use. I think we've outlined the
2 four of them. And for the most part most of them are
3 immediate or almost realtime systems.

4 The last system we talk about is a volume
5 balance system which is done over a longer length of
6 time. So it becomes what we call nonrealtime. And I
7 think we've decided that the minimum window will be two
8 hours. So that will be done every two hours. There will
9 be an inventory run-up on the system.

10 And some of that information does come from
11 SCADA. And then there will be different time windows,
12 again, to take a look at the inventory of the system.

13 COMMISSIONER KOLBECK: As far as the reliability
14 aspect of it, do you have any numbers that say that our
15 SCADA system's -- 99.9 percent of the time it's up or
16 100 percent? Do you have any -- any information on how
17 often the SCADA system is down?

18 THE WITNESS: No, I don't. Based on past
19 experience, we used to talk about three 9s of .999
20 reliability. But that was before a lot people put in
21 backup systems.

22 And now there's usually a primary system for
23 communication. And communication is normally -- your
24 SCADA systems are just 100 percent reliable. But the
25 communication is where you may have an issue.

1 And most companies now have put in a backup
2 communication system so the reliability I'd say virtually
3 100 percent.

4 COMMISSIONER KOLBECK: Let's talk about that
5 communication system, sir.

6 Do you lease to fiber facilities or copper
7 facilities? How do you get back to Canada?

8 THE WITNESS: The primary system is a satellite
9 system. Backup systems are usually phone systems.

10 COMMISSIONER KOLBECK: And both of these systems
11 are in place at the same time, or is there some sort of
12 switch over?

13 THE WITNESS: One is a primary. One is a
14 backup. If one fails or is unable to perform it's
15 function, then the backup takes over.

16 COMMISSIONER KOLBECK: Okay. So it's
17 100 percent redundancy. It's not necessarily we can go
18 to this if something happens? They both work at the same
19 time all the time?

20 THE WITNESS: You can't have one fighting the
21 other. But, yes, one will be primary, one will be
22 secondary, and, yes, they'll take over in the case it's
23 lost.

24 COMMISSIONER KOLBECK: Okay. That's an
25 automatic process it takes over?

1 THE WITNESS: Yes.

2 COMMISSIONER KOLBECK: Have you ever -- if this
3 isn't something that you want to answer, that's fine.
4 But have you ever in your experience with a SCADA system
5 had a leak that lasted more than -- well, first of all,
6 have you ever had a leak?

7 THE WITNESS: I've heard of some.

8 COMMISSIONER KOLBECK: Okay. Have you ever
9 heard of one that lasted eight days or 10 days?

10 THE WITNESS: The problem is you don't
11 necessarily know when it initiates when it's a very small
12 leak lasting a long time. But I think I've heard of some
13 that have been very small leaks that have lasted for a
14 while, yeah.

15 COMMISSIONER KOLBECK: A while meaning weeks,
16 days, months?

17 THE WITNESS: Well, probably a few days maybe
18 seven, eight days, something like that.

19 COMMISSIONER KOLBECK: Is that something a SCADA
20 system would catch or something a different test --

21 THE WITNESS: Unlikely a SCADA system would
22 detect it. It's below the threshold of detectability.

23 COMMISSIONER KOLBECK: What's the threshold of
24 detectability?

25 THE WITNESS: Detectability for the realtime

1 system, which is the one I think you're probably thinking
 2 about, it's a window-based thing. So there's a short
 3 period of time where it will find larger leaks. As you
 4 wait a longer period of time it will find smaller leaks.
 5 So we used to look at -- in the industry we used
 6 to say we'll use one hour as kind of a benchmark.
 7 Although you'll do it in 5 minutes, typically 20 minutes,
 8 one hour, two hours. Some people do it 24 hours.
 9 So let's just use the one hour one. So
 10 typically the threshold on one hour is going to be around
 11 about 1 percent.
 12 COMMISSIONER KOLBECK: 1 percent of the total
 13 volume from Canada to --
 14 THE WITNESS: 1 percent of the flow rate in
 15 that.
 16 COMMISSIONER KOLBECK: 1 percent of the flow
 17 rate. Okay. So not necessarily 1 percent of everything
 18 that's in that pipeline at any given moment.
 19 THE WITNESS: No.
 20 COMMISSIONER KOLBECK: Okay. So we're
 21 talking -- so that would be a measure from what's going
 22 in to what's coming out, a 1 percent difference; is that
 23 correct?
 24 THE WITNESS: Yes.
 25 COMMISSIONER KOLBECK: Okay. And that's

1 immediately known -- well, I shouldn't say -- within an
 2 hour?
 3 THE WITNESS: Within an hour, yeah.
 4 COMMISSIONER KOLBECK: What's the likelihood of
 5 an event, any event, going on for days? Any event of
 6 loss of product going on for days and days?
 7 THE WITNESS: I couldn't speak about the
 8 likelihood of that. Yeah.
 9 COMMISSIONER KOLBECK: Okay. No problem.
 10 Have you ever heard of anything better than a
 11 SCADA system? If I wanted to make this the best, is the
 12 SCADA the ultimate use of technology today, or is there
 13 anything else out there that's available?
 14 THE WITNESS: No. I don't know of anything in a
 15 realtime basis which is better than a SCADA system.
 16 COMMISSIONER KOLBECK: Okay. Do you know of
 17 anything that would be better than satellite
 18 communications?
 19 THE WITNESS: Satellite communications right now
 20 is state of the art.
 21 COMMISSIONER KOLBECK: Okay. Would you rate
 22 satellite communications better than landline fiberoptic
 23 communications?
 24 THE WITNESS: Yes. I think so. Yeah. I would.
 25 Yeah. Fiberoptics if it's a dedicated fiberoptics, then

1 you're talking a different situation. But I only know of
 2 one pipeline that has a dedicated system.
 3 COMMISSIONER KOLBECK: That would probably be --
 4 in all reality that's not a likelihood.
 5 THE WITNESS: No.
 6 COMMISSIONER KOLBECK: Dedicated fiber, that's
 7 just probably not going to happen.
 8 THE WITNESS: No.
 9 COMMISSIONER KOLBECK: Who is the satellite
 10 companies that do this? Is it Newstar? Whose satellites
 11 are they?
 12 THE WITNESS: I don't have that in my
 13 information here.
 14 COMMISSIONER KOLBECK: Okay. Are they an
 15 established company around for years?
 16 THE WITNESS: Oh, yes. Definitely.
 17 COMMISSIONER KOLBECK: Okay. Because obviously
 18 you don't just jump on someone's satellite.
 19 THE WITNESS: We don't want to be a data site
 20 for somebody coming in --
 21 COMMISSIONER KOLBECK: You're not a bigger
 22 tester --
 23 THE WITNESS: Not recommended.
 24 COMMISSIONER KOLBECK: It's a well established
 25 company.

1 THE WITNESS: Yes.
 2 COMMISSIONER KOLBECK: That's all I have,
 3 Mr. Smith. Thank you.
 4 MR. SMITH: Other Commissioner questions?
 5 Mr. Rislov, do you have a question?
 6 MR. RISLOV: I was just curious. Have you ever
 7 sat in a room and monitored a SCADA system before?
 8 THE WITNESS: As an actual controller?
 9 MR. RISLOV: Yes.
 10 THE WITNESS: No. I haven't done that. I
 11 haven't been trained to do that. And it's a very
 12 specific job. It requires a lot of training.
 13 I've sat in the control center a number of times
 14 and watched what they do but not -- I wouldn't operate a
 15 pipeline, no.
 16 MR. RISLOV: Okay. Thank you.
 17 MR. SMITH: Other Commissioner questions?
 18 Mr. Scott, you're probably not the person but would you
 19 be a person who could answer any questions on any recent
 20 developments in remote sensing technology such as could
 21 be maybe used in connection with aerial reconnaissance,
 22 that kind of thing?
 23 THE WITNESS: A little bit. I've been involved
 24 in that, yes.
 25 MR. SMITH: Could you please go into that a

1 little bit maybe. I know we've done some looking here at
 2 the PUC at developments that have been occurring, you
 3 know, in Texas in the Houston port area, et cetera. And
 4 I know they've had some pretty good success with aerial
 5 surveys in the gas area. But I guess I don't know in
 6 terms of liquids, you know.

7 THE WITNESS: And it's quite -- it's fairly
 8 similar. The current -- well, we'll go back just a
 9 little bit.

10 The first type of remote sensing system that
 11 people tried to use was infrared. It had a bunch of
 12 issues. And then various people come up with systems for
 13 trying to sense products that would be coming out. For
 14 example, methane. That didn't work very well.

15 Right now there is a company, and TransCanada's
 16 looked at it. I wasn't involved in the actual
 17 investigation with these people, but they look at finding
 18 ethane coming -- because it's nonnaturally occurring.
 19 And they use a remote sensing system, aerial attached to
 20 a plane or helicopter and looked for ethane in the area.

21 MR. SMITH: And it has shown to be an effective
 22 mechanism for -- and, again, I think what I'm getting at
 23 here again with the SCADA when you're below that minimum
 24 detection threshold and inspections are going on -- I'm
 25 correct too that visual inspection is another means of

1 detection of leaks; is that --

2 THE WITNESS: Of course it is. Yes. It is --

3 MR. SMITH: At this point in time are those kind
 4 of remote sensing technologies at the stage where they
 5 would be a useful thing to use in connection with aerial
 6 reconnaissance?

7 THE WITNESS: I don't think so. I think they're
 8 coming along. We're taking a look at. It a lot of other
 9 companies are taking a look at it. And we'll see where
 10 it goes.

11 MR. SMITH: Okay. Thank you.

12 Any other follow-up questions, Commissioners?

13 COMMISSIONER KOLBECK: I just have one. If the
 14 pipeline was approved and constructed, would any -- what
 15 is the likelihood that the monitoring equipment that we
 16 would approve would change? When is the last time
 17 TransCanada changed how they monitored one of their
 18 pipelines?

19 THE WITNESS: I'm not clear on your question.

20 COMMISSIONER KOLBECK: I guess what I'm getting
 21 at is what is the likelihood the technology will change,
 22 and how fast does it change? In other words, if you
 23 monitor with one type of equipment today, how likely is
 24 it that that type of equipment will be used in five
 25 years?

1 THE WITNESS: Are you talking maybe the SCADA
 2 system here?

3 COMMISSIONER KOLBECK: The SCADA system, yes.

4 THE WITNESS: Typically with the software system
 5 they come up with upgrades, they come out with
 6 improvements, and at some point in the future the company
 7 takes a look at deciding whether they'll go with the new
 8 version because it offers some advantages. And that's
 9 five, 10 years.

10 COMMISSIONER KOLBECK: So software upgrades
 11 would be the majority of the change in a SCADA system;
 12 correct?

13 THE WITNESS: Yes.

14 COMMISSIONER KOLBECK: Is there a likelihood
 15 that the SCADA system would be abandoned and some other
 16 way would be used to monitor pipelines?

17 THE WITNESS: No. I don't -- I couldn't see a
 18 SCADA system being abandoned. It's possible that
 19 somebody comes out with a new SCADA system which is an
 20 improvement, and then you would switch over to the new
 21 people. That's -- I don't know of anything happening
 22 there right now.

23 COMMISSIONER KOLBECK: But in a sense if we
 24 approved a SCADA system to monitor a pipeline, it would
 25 in all likelihood always be a SCADA system, maybe

1 different software, maybe different people but that --

2 THE WITNESS: That's where the technology is
 3 going and staying, yes.

4 COMMISSIONER KOLBECK: Okay. So I can feel
 5 comfortable if we approve this that SCADA is the way it
 6 will probably be monitored through its lifetime?

7 Maybe different software, maybe different
 8 people, different vendors, but that --

9 THE WITNESS: That would be the techniques used,
 10 yes.

11 COMMISSIONER KOLBECK: Okay. Thank you.

12 MR. SMITH: Any follow-up questions,
 13 Commissioner Hanson?

14 COMMISSIONER HANSON: No. Thank you, Mr. Smith.

15 MR. SMITH: Okay. Mr. Koenecke.

16 MR. KOENECKE: Thank you, Mr. Smith.

17 REDIRECT EXAMINATION

18 BY MR. KOENECKE:

19 **Q.** Mr. Scott, I'm looking at your testimony, and the
 20 first question 8 describes several methods of -- you
 21 describe them as complimentary leak detection methods; is
 22 that correct?

23 **A. Yes.**

24 **Q.** Could you describe those for the Commissioners?

25 **A. Well, what we've -- well, what we've proposed or**

1 what we're going to is four different types of leak
2 detention systems. I have some here, I think a better
3 explanation.

4 And the first one is what we call SCADA monitoring.
5 This is what we talk about somebody sitting in front of
6 the console controlling the system, watching it 24 hours
7 a day.

8 There we are. There we are. I've got it. Just in
9 case I need additional technical detail.

10 So it's a 24-hour operation. The controllers watch
11 the system. They look for anomalies. If things aren't
12 quite right, they investigate. They make a decision on
13 what changes they have to make. That's our first type of
14 system, primary. It finds fairly large leaks, but it
15 finds -- fairly large leaks can be seen and quite
16 quickly.

17 The second type is what we call a volume balance
18 system. Really that is calculating the volume flow at
19 the various pump stations and in and out of the pipeline.
20 And we use meters in/meters out.

21 And we've also with the Keystone -- and it will be
22 the same with the KXL. We're putting in meters at every
23 pump station. So we've effectively broken the system up
24 into a bunch of small pipelines. And that again is
25 computerized, automated type of system.

1 What we've called our third system is the realtime
2 system. This is the one that will in five minutes or --
3 I think we're going to use 2 minutes, but again this is
4 somewhat flexible. We'll actually do an inventory
5 calculation of the pipeline on these sections, and we'll
6 find large leaks quickly and over time smaller leaks.
7 And that's our tal -- realtime transient model.

8 And the last system we talked about a little bit
9 earlier is an inventory system which will probably be at
10 a two-hour period we'll do a complete inventory of the
11 system, and we'll do it on a daily basis, weekly, and
12 probably monthly. And again take a look at the
13 inventory of the system and make sure there's nothing
14 missing.

15 Q. Mr. Scott, what role do direct observation methods
16 play in your operation of the pipeline as far as finding
17 leaks?

18 A. Of course, that's outside of a computerized-based
19 system. And it is a system where we use aerial patrol
20 approximately every two weeks on the line. And the
21 people who are doing the aerial patrol are trained in
22 what to look for along the line which could be indicators
23 of leaks or potential issues with the pipeline.

24 We also use any staff that are along the pipeline.
25 When they're going from a pump station to pump station to

1 do maintenance it's expected they'll take a look, see
2 what things look like see if there's any issues, if
3 there's any evidence of leaks. That's part of their
4 role. If they're traveling, they might as well make use
5 of their time.

6 And the third one is what we call third-party
7 reporting. And that's where somebody along the pipeline
8 may notice something, may smell something, or see
9 something. And we have toll-free numbers where they call
10 into the control center, and then we take action from
11 there.

12 MR. KOENECKE: I have nothing further,
13 Mr. Smith. Thank you.

14 MR. SMITH: Thank you. Are there any follow-up
15 questions from staff or Interveners?

16 MS. SEMMLER: I have one follow up.

17 RECROSS-EXAMINATION

18 BY MS. SEMMLER:

19 Q. While it certainly is the goal and priority of the
20 company to operate and construct a very safe pipeline,
21 the SCADA system is designed to comply with 49 CFR 195;
22 is that correct?

23 A. I'm not sure if 49.195 specifies that you have to
24 use a SCADA system. I can't recall anywhere in that that
25 it actually says you have to do that. I think it's just

1 an industry standard.

2 Q. Well, I'm also looking at the special permit. And
3 it appears as if there's several pages of some
4 requirements regarding what it look like. Is that
5 correct?

6 A. That's very definite. Special permit or any of the
7 permits -- you make commitments that you'll put a SCADA
8 system in.

9 Another example is 195 does not require a leak
10 detection system. It says if you have one, you're
11 supposed to meet certain requirement. But it doesn't
12 require you to have one.

13 But in the special permit, which is specific to the
14 pipeline, yes, we made a commitment, and we are required
15 to have a leak detection system.

16 Q. Part 195 does, however, require that the pipeline be
17 operated in a safe fashion, and this would be the
18 state-of-the-art way to operate in such a safe manner?

19 A. That's correct, yes.

20 MS. SEMMLER: Nothing further.

21 MR. SMITH: Do you have any follow-up,
22 Mr. Koenecke?

23 MR. KOENECKE: No, Mr. Smith. Thank you.

24 MR. SMITH: Okay. Thank you, Mr. Scott. You
25 may step down.

1 What's your pleasure, Mr. Koenecke? Do you want
2 to proceed with one additional witness before noon?

3 MR. KOENECKE: Yes, we would. Thank you. We'd
4 call John Hayes, please.

5 (The witness is sworn by the court reporter)

6 DIRECT EXAMINATION

7 BY MR. KOENECKE:

8 Q. Good morning, Mr. Hayes.

9 A. **Good morning, Mr. Koenecke.**

10 Q. Would you state your name and business address for
11 the record, please.

12 A. **John William Hayes, H-A-Y-E-S. Business address,
13 450 First Street Southwest, Calgary, Alberta.**

14 Q. Mr. Hayes, what's your role with the Keystone
15 Pipeline?

16 A. **My role is to testify on behalf of KXL on emergency
17 response and other operational matters.**

18 Q. Do you have a title?

19 A. **Yes. My title is operations manager.**

20 Q. Are you responsible for the creation of the
21 Keystone Emergency Response Plan?

22 A. **Yes, I am.**

23 Q. Did you prepare written testimony for this
24 proceeding?

25 A. **Yes, I did.**

1 Q. I put a copy of that in front of you marked as
2 Exhibit 11. Have you got that?

3 A. **Yes, I do.**

4 Q. Do you have any additions or corrections to that
5 testimony?

6 A. **Yes. There's one minor change that we should
7 probably address. And that is item number 9. And that
8 change would be on the answer that should be Table 6
9 instead of Table 4.**

10 Q. If I understood you correctly, in question 9 of your
11 testimony your answer where it references Table 4 should
12 be changed to read Table 6?

13 A. **That is correct.**

14 Q. Thank you. Any other additions or corrections?

15 A. **No.**

16 Q. If I asked you the questions in your updated direct
17 testimony marked as Exhibit 11, would your answers be the
18 same?

19 A. **Yes, they would.**

20 MR. KOENECKE: Nothing further at this time,
21 Mr. Smith. Thank you.

22 MR. SMITH: Thank you. Mr. Blackburn.

23 CROSS-EXAMINATION

24 BY MR. BLACKBURN:

25 Q. Mr. Hayes, does South Dakota Law require an

1 Emergency Response Plan?

2 A. **Yes, they do.**

3 Q. Does federal law require an Emergency Response Plan?

4 A. **Yes.**

5 Q. Assuming that TransCanada does not create a

6 Emergency Response Plan in one day, how far before the

7 start of the operation or construction does TransCanada

8 have a draft of the Emergency Response Plan for its

9 internal review?

10 A. **So, Mr. Blackburn, typically what I do is I allow
11 about 18 months through the whole process, meaning about
12 six months to actually prepare the plan. Because
13 80 percent of our base Keystone plan applies to KXL. And
14 then we have a six-month period where we do send that to
15 PHMSA, and I allow six months before operations where we
16 have the plan ready.**

17 Q. So just to be clear, you create a draft plan about
18 18 months before operation, and then it goes to PHMSA
19 for -- well, just to be clear, you start your process
20 18 months before you start operations?

21 A. **That's correct.**

22 Q. And then about six months after you start the
23 process of preparing the plan you have a draft plan that
24 is sent to PHMSA?

25 A. **That's correct.**

1 Q. And then PHMSA has about six months to review it?

2 A. **Yes.**

3 Q. And then you would have about -- when they get back

4 to you with comments or whatever else they're going to

5 send you, you would have another six months before

6 operations to incorporate whatever comments they had?

7 A. **Yes. And hopefully PHMSA, they typically don't take
8 that long, but that's the time lines that I like to work
9 with.**

10 Q. Given that time line, when do you expect to have a
11 Draft Emergency Response Plan available for the Keystone
12 XL Pipeline?

13 A. **Probably by July 1 of 2010.**

14 MR. BLACKBURN: That's all the questions I have.
15 Thank you.

16 THE WITNESS: Thank you.

17 MR. SMITH: Ms. Semmler.

18 MS. SEMMLER: No questions.

19 MR. SMITH: Thank you. Commissioners.

20 Questions of Mr. Hayes?

21 Commissioner Kolbeck.

22 COMMISSIONER KOLBECK: Yes. Mr. Hayes, you said
23 it is a South Dakota Law to have an environmental impact
24 study.

25 THE WITNESS: That's what my lawyers have

1 advised me. And it's the Emergency Response Plan.
 2 COMMISSIONER KOLBECK: I'm sorry.
 3 THE WITNESS: Yes.
 4 COMMISSIONER KOLBECK: Do you need both of
 5 those -- would you need a permit from the Public
 6 Utilities Commission and an Emergency Response Plan
 7 before you could send anything through the pipeline?
 8 THE WITNESS: We have to have a PHMSA-approved
 9 plan, and that's our regulatory body that we send the
 10 plan to.
 11 COMMISSIONER KOLBECK: Regardless -- two things
 12 have to happen; is that correct? Not just one. You'd
 13 have to get a permit from us, and you'd have to have that
 14 Emergency Response Plan filed; is that correct?
 15 THE WITNESS: That's my understanding. Correct.
 16 COMMISSIONER KOLBECK: Who do you file that
 17 with?
 18 THE WITNESS: File it with PHMSA.
 19 COMMISSIONER KOLBECK: Okay. With PHMSA.
 20 THE WITNESS: Yes.
 21 COMMISSIONER KOLBECK: For each state that you
 22 go through.
 23 THE WITNESS: It's one plan for the entire KXL
 24 project.
 25 COMMISSIONER KOLBECK: The entire plan.

1 THE WITNESS: Yes.
 2 COMMISSIONER KOLBECK: Okay. In your testimony
 3 you're in charge of abnormal operations. Could you
 4 clarify what an abnormal operation would be?
 5 THE WITNESS: My testimony is abnormal
 6 operations as they apply to emergency response. So my
 7 testimony is restricted to once the oil is out to the
 8 remediation phase.
 9 COMMISSIONER KOLBECK: Okay. And on our
 10 previous -- Mr. Scott, he had testified also. Do you
 11 know how long it takes from Mr. Scott's department to
 12 tell you that there's a problem until you respond?
 13 THE WITNESS: I think Mr. Scott characterized it
 14 pretty good. Every spill situation is extremely unique.
 15 And we do have the state-of-the-art leak detection
 16 technology that he described. And I believe
 17 Ms. Tillquist has some API stats that determine how fast
 18 leaks are typically detected.
 19 But in all cases our number one priority is
 20 public safety. And we usually detect leaks pretty quick,
 21 and we usually respond very quick as well. We have a
 22 six-hour response time.
 23 COMMISSIONER KOLBECK: Six-hour response time?
 24 TH WITNESS: Correct.
 25 COMMISSIONER KOLBECK: Could you elaborate on

1 that? Six hours from the time Mr. Scott tells you, or
 2 six hours from the time Mr. Scott finds out?
 3 THE WITNESS: Six hours from when the field
 4 verifier, our employee, six hours from when they get the
 5 call, which comes for our control center, until we get to
 6 the site. And it's typically a lot less than that.
 7 COMMISSIONER KOLBECK: And that's from anywhere
 8 along the pipeline or just South Dakota?
 9 THE WITNESS: That's anywhere along the
 10 pipeline.
 11 COMMISSIONER KOLBECK: Okay. Including Canada.
 12 THE WITNESS: Yes. Including Canada.
 13 COMMISSIONER KOLBECK: Okay. Are there any
 14 other restrictions in Canada than there are in the
 15 United States, or are there more in the United States
 16 than there are in Canada for dealing with the Emergency
 17 Response Plan?
 18 THE WITNESS: I wouldn't call them restrictions.
 19 When I built the plan what I was able to do is take the
 20 best of both countries and all the information that I
 21 had, and I built one plan. I don't call it either/or
 22 restrictive in either country. I feel that the process
 23 that we use to develop our plan takes into account both
 24 countries.
 25 COMMISSIONER KOLBECK: Okay. Do you plan to

1 have operations in South Dakota employ anybody in
 2 South Dakota on a full-time basis along the XL route?
 3 THE WITNESS: We haven't determined the exact
 4 lotions of field offices, et cetera. But given what I
 5 just said a few minutes ago, the six-hour response time,
 6 I can tell you the answer is yes.
 7 COMMISSIONER KOLBECK: Okay. What type of means
 8 would you use to respond to a -- if your plan was to kick
 9 in in a blizzard, how -- would you have to use land?
 10 Would you fly? What would you use?
 11 THE WITNESS: Well, again our number one
 12 priority is public safety and employee safety. And, you
 13 know, if it's not safe for them to respond, I have to be
 14 bluntly honest that we will not be able to respond.
 15 But that situation occurs extremely
 16 infrequently. In a blizzard situation what we typically
 17 use is our four-wheel drive vehicles that we have. Every
 18 employee will be assigned a vehicle, and they'll have
 19 obviously a four-wheel drive and correct tires, et
 20 cetera. And they will have an emergency response kit on
 21 their truck as well.
 22 If we need other means to get there, that's part
 23 of the database that we have for contractors. We keep a
 24 very active and current database in our response plan for
 25 contractors to help us out with that.

1 COMMISSIONER KOLBECK: What would institute --
 2 what's the trigger for the Emergency Response Plan? A
 3 quart, pint, a gallon, a barrel?
 4 THE WITNESS: Any type of emergency. It doesn't
 5 matter -- it's not a volume thing necessarily. We could
 6 have an odor complaint. We could have a report from our
 7 aircraft that they may see stained vegetation. There's
 8 several triggers. And obviously the control center is a
 9 big one for us.
 10 COMMISSIONER KOLBECK: Do you have -- did you on
 11 the existing pipeline, the Keystone Pipeline, do you have
 12 employees in Yankton?
 13 THE WITNESS: Yes, we do.
 14 COMMISSIONER KOLBECK: Would you -- when you say
 15 that you would have employees in South Dakota would they
 16 be in addition to or in a different location than the
 17 existing?
 18 THE WITNESS: Yes. Definitely a different
 19 location. The two employees in Yankton their primary
 20 responsibility is emergency response. And they've
 21 undertaken HAZWOPER training, et cetera. But their
 22 second role is technical, instrumentation, and
 23 mechanical, and we would do the exact same thing along
 24 the pipeline in South Dakota, strategically position
 25 equipment and people along the pipeline.

1 COMMISSIONER KOLBECK: Okay. So there's no
 2 thinning of resources for one pipeline to provide an
 3 advantage for --
 4 THE WITNESS: Not at all. No. Not at all.
 5 COMMISSIONER KOLBECK: Okay. Is there any type
 6 of industry standard for a lot of people along a certain
 7 mileage of a route?
 8 THE WITNESS: Not to the best of my knowledge.
 9 Again, we want to make sure we do have enough people,
 10 both employees and contractors, to respond. So again our
 11 employees are first. They secure the site, and then we
 12 call in extra resources as we need them.
 13 COMMISSIONER KOLBECK: And these resources could
 14 be local?
 15 THE WITNESS: Absolutely.
 16 COMMISSIONER KOLBECK: Okay. But would a
 17 local -- I spoke about emergency response people in
 18 local -- or EMTs. Would they be called on? Would their
 19 systems be taxed if you had a response or -- what is
 20 their role, I should ask you?
 21 THE WITNESS: Well, the role of public
 22 officials -- really what we count on is more so police
 23 and fire. And we educate them on pipeline safety as part
 24 of our integrated public awareness program.
 25 We really only ask them one thing, and that is

1 to secure the site to help protect the public.
 2 COMMISSIONER KOLBECK: So you're not going to
 3 ask a rancher from Buffalo to fight an oil fire?
 4 THE WITNESS: No.
 5 COMMISSIONER KOLBECK: But they may be called on
 6 to block off a road?
 7 THE WITNESS: Absolutely correct.
 8 COMMISSIONER KOLBECK: Okay. And they know this
 9 going in; correct?
 10 THE WITNESS: Yes. That's part of our public
 11 awareness program, to visit all first responders,
 12 emergency services, LEPCs, that's local emergency
 13 planning committees. I don't like to use acronyms
 14 because there's lots of them.
 15 But, yeah, that is a definite role that we see,
 16 to educate them in advance of operations. That's part of
 17 the six-month window after we're -- prior to operations I
 18 spoke to Mr. Blackburn about they go through and do that.
 19 COMMISSIONER KOLBECK: And just so I'm clear,
 20 you could not pump a product through the pipeline
 21 obviously without a permit from the PUC, but you could
 22 also not pump product through there without an Emergency
 23 Response Plan; is that right?
 24 THE WITNESS: That's correct.
 25 COMMISSIONER KOLBECK: Okay. So there's

1 actually two -- you need two sets of is it regulations or
 2 is this something that's -- I shouldn't say -- is it two
 3 state regulations, or is the Emergency Response Plan a
 4 federal regulation?
 5 THE WITNESS: I believe it's both. But again
 6 PHMSA's our regulator. But I think from a TransCanada
 7 perspective that's why I'm here is to make sure we
 8 don't -- we do have a plan, correct, and we're not going
 9 to pump oil before that plan is vetted and approved and
 10 in place well in advance of operations.
 11 COMMISSIONER KOLBECK: What would the
 12 ramifications of that be if there was some mixup and the
 13 Emergency Response Plan was not filed and product started
 14 to flow? Would there be legal ramifications?
 15 THE WITNESS: I don't know. I would have to
 16 defer to my legal attorneys over there. I'm not sure.
 17 But again we have such a rigid process on compliance to
 18 make sure those are done, I don't think that can happen.
 19 But I appreciate your question.
 20 COMMISSIONER KOLBECK: All right. Thank you.
 21 THE WITNESS: Thank you.
 22 MR. SMITH: Commissioner Hanson.
 23 COMMISSIONER HANSON: Mr. Smith, thank you.
 24 Looking at your testimony, you don't need to turn to it
 25 but you state that the fourth component of the emergency

1 response program involves establishing a system of
2 continued improvement and auditing of the program which,
3 of course, we appreciate and think is proper.

4 Does not PHMSA have a list of requirements that
5 your Emergency Response Plan has to meet or -- in looking
6 at your testimony it appears that you developed a plan
7 and then you submit it. Well, I'll stop with that and
8 let you answer the first question.

9 THE WITNESS: Sure. I'll answer them both.
10 That's fine. So with respect to PHMSA what we do is they
11 have an actual checklist of mandatory requirements we're
12 supposed to put in our plan.

13 And the process that I used is to take that
14 checklist to PHMSA personally and met with them and went
15 through every single item in our plan to make sure that
16 we were compliant and there were no gaps in what their
17 legal requirements were. And that happened on October 22
18 for Keystone base, and we received a letter January 22.

19 So as far as what we do to make sure there's a
20 check and balance in what we send to PHMSA, that is our
21 process we go through to make sure that's done. Same
22 process with National Energy Board in Canada.

23 As far as my testimony, when I say continual
24 improvement and change, PHMSA also has requirements when
25 we do change any significant component of our plan that

1 we have to file that with PHMSA. If you change something
2 very simple like a local phone number or maybe what else
3 can be simple? A waste contractor or something very
4 simple like that, then we change that on our own. But
5 any substantial changes we do have to file that with
6 PHMSA.

7 Do you want me to answer the continual
8 improvement one now, or do you want to --

9 COMMISSIONER HANSON: Sure. Go ahead.

10 THE WITNESS: So the continual improvement one
11 is an interesting one because as we go through and do our
12 training exercise, meaning HAZWOPER and water-based
13 response drills and ice drills and all of that stuff is
14 that the system we have in place is to go through with
15 staff and go through with regulators, public officials
16 that attend our exercises.

17 And what we look at are improvements in safety
18 on a spill site when we do a drill. So we go through a
19 very regimented incident command system and structure and
20 identify safety as a prime component. And then we go
21 into how good did we do and where can we improve on a
22 technical aspect to spill response on water drills.

23 And last thing we do is we look critically at
24 our equipment as well. Did something fail? Was it not
25 correct? And we document those changes in the spill --

1 exercise spill report, and we take those and roll them
2 out to the entire company. That's ongoing right now for
3 the Keystone base.

4 COMMISSIONER HANSON: Thank you. You remember
5 my questions better than I.

6 Last question. Since you do this on an ongoing
7 basis, may I assume correctly that you have incorporated
8 changes hopefully for the better -- obviously they would
9 have to be for the better -- that are not required by
10 PHMSA, and have you incorporated those in in this
11 particular plan that you're working on for us?

12 THE WITNESS: Yes. Correct. We did receive a
13 letter from Mr. Brian Walsh, and we incorporated those
14 changes that he suggested. There were four changes. And
15 they were put into the plan.

16 COMMISSIONER HANSON: Specifically what I'm
17 asking is have you developed on your own -- and perhaps
18 you just answered it and I didn't understand your answer.

19 Have you as a company developed and initiated
20 improvements to the plan that would never be required or
21 are not required by PHMSA?

22 THE WITNESS: Okay. Yes, we have. Several.
23 And the way our changes are when we do the spill drills
24 and training I group them by observation. I group them
25 by recommendation. And I group them by action.

1 And in the five drills we did this year with
2 Keystone base, two which were at Yankton, we did identify
3 things that were not required by PHMSA and more along the
4 safety end of things. And we've made those changes
5 already.

6 COMMISSIONER HANSON: And those then are then --
7 in incorporating them from your previous testimony I'm
8 assuming that you then present those to PHMSA, and they
9 still have to approve that as a change to your plan?

10 THE WITNESS: No. They weren't -- they didn't
11 meet the triggers of PHMSA. They were very, very small
12 things. I'll give you a real quick example.

13 When we have our safety boat on our response
14 trailers our company-owned trailers that's stored on the
15 roof of the trailer we made just a simple improvement to
16 put the boat inside the trailer instead of having to go
17 through extra time and extra safety measures to take the
18 boat off the top of the trailer.

19 So that's an example a nonPHMSA-improved thing
20 that we just did as a best operational practice.

21 COMMISSIONER HANSON: Okay. So your Emergency
22 Response Plan is an ongoing change as you had testified.
23 Appreciate that.

24 Thank you, Mr. Smith. Thank you.

25 MR. SMITH: Commissioner Kolbeck.

1 COMMISSIONER KOLBECK: I'm sorry. I just forgot
2 one thing. What would you classify the education level
3 of your employees who will be stationed in South Dakota?
4 Do they have to have a -- certain training? Do they have
5 an Associate of Applied Science or Bachelor of Science in
6 anything, or does most of their training come from PHMSA
7 or TransCanada?

8 THE WITNESS: I would say just based on my
9 experience and going back to Keystone base I was involved
10 with a little bit of that. Most of our staff that are
11 along the pipeline, not at an office, so there's a
12 difference there, are technical. So they would be what
13 we would call an electrician, and in Canada we call them
14 journeymen. And I know there's not the same type of
15 certification in the United States. Or a mechanical
16 technician, somebody that is a millwright, and those are
17 the people along our pipeline.

18 We would also have a couple of regional offices
19 that we would have extra people, more of an office
20 support and end staff.

21 COMMISSIONER KOLBECK: And you talked about a
22 trailer and boat and four wheel drives. Those people
23 are -- you would classify would be a trade, electrician?
24 Someone with a trade; is that correct?

25 THE WITNESS: Did I understand that correctly,

1 the people that haul the trailers to site?

2 COMMISSIONER KOLBECK: Well, no. I'm sorry.
3 You referred to trailers and boats and four-wheel drives.
4 Those individuals that are employed by TransCanada, their
5 educational requirements are more than a high school
6 diploma or less?

7 THE WITNESS: Typically more. Yeah.

8 COMMISSIONER KOLBECK: Okay. And then is there
9 more training required of them through your company?

10 THE WITNESS: Certainly. And I'll just speak to
11 the training that I'm responsible for, emergency
12 response. So they are required to have a 24-hour
13 HAZWOPER training, which includes several components.

14 It also includes the certification of Incident
15 Command System 100 and 200. And my goal is to make them
16 absolutely intimate with every part of that trailer and
17 boat equipment and make sure they know how to use it.

18 COMMISSIONER KOLBECK: Thank you for struggling
19 through that with me, my question.

20 THE WITNESS: My pleasure.

21 COMMISSIONER KOLBECK: In a coal plant you need
22 a basic amount of education, and the company will train
23 you on how to run a coal plant. Because obviously there
24 isn't any technical college out there that has a class on
25 how to run a crude oil pipeline is what I'm trying to get

1 at with it.

2 THE WITNESS: Well, I'm just speaking emergency
3 response. I know the people in Keystone base went
4 through almost two months of training which included I
5 had them for four solid days on my stuff. So they had
6 several other types of training as well.

7 COMMISSIONER KOLBECK: Thank you.

8 MR. SMITH: Mr. Rislov, a question?

9 MR. RISLOV: Yeah. I had a couple.

10 Have you ever participated in an actual spill I
11 don't want to use the word "cleanup" but, you know,
12 repair, if you will?

13 THE WITNESS: It's not something you want to be
14 real good at, but probably over 300.

15 MR. RISLOV: So you've done a lot in this area
16 as far as actual spills are concerned obviously.

17 THE WITNESS: I would say so.

18 MR. RISLOV: When people use the word
19 "equipment," I mean, I've heard four-wheel drives, boats,
20 trailers, but that could be half the people in Pierre
21 going fishing in the summer. And I was curious what type
22 of equipment is actually used to stop a leak, for lack of
23 a better phrase?

24 THE WITNESS: I'd rather be fishing with them as
25 well. Unfortunately, I'd probably be on site.

1 So there's lots of equipment. Most of the

2 spills just because of the strict geography of the
3 pipeline is on land. And for land-based spills what we
4 typically use is what we in the pipeline world call
5 yellow iron. So what that means is CATs, bulldozers,
6 graders, vacuum trucks, tanker trucks, those types of
7 things just to secure the oil, contain it on land.

8 That's the first thing. Typically we'll set up
9 contractual arrangements for that type of equipment
10 everywhere we can.

11 And then the second part of it is spill
12 equipment. That's the stuff that we have in our response
13 trailers, and we will strategically put those trailers
14 all along our pipeline. The 34-foot trailer has over 700
15 pieces of equipment in it.

16 MR. RISLOV: And I guess that follows my
17 question. I understand your yellow steel and how that
18 would be available perhaps more likely in eastern
19 South Dakota than western. But how far are your 70 or
20 whatever foot trailers from any particular point at any
21 one time?

22 THE WITNESS: So the 34-foot trailers and then
23 the 20-foot trailers I haven't gone out and actually
24 looked physically where we're going to situate those
25 trailers. We may need more. We may need to do something

1 a little different than Keystone base. But that has to
2 be determined.

3 What I can tell you is we're committed to owning
4 our own equipment and putting it within that six-hour
5 response window that I described.

6 MR. RISLOV: So that six-hour response window
7 would take into account the highways, the roads within
8 the area, the remoteness of the pipeline at certain times
9 I suppose?

10 THE WITNESS: Yes. And again we assumed a
11 40-mile-an-hour driving time.

12 MR. RISLOV: So would it be safe in South Dakota
13 there may be one trailer for the entirety of the state?

14 THE WITNESS: No. If I look at South Dakota, I
15 would probably think there would be at least two. And I
16 do want to say our equipment is just one source of
17 equipment. We also have a contractual arrangement with a
18 company that is a 1,000-pound drill spill response that
19 will guarantee us equipment within 12 hours as well.

20 MR. RISLOV: Will there be someone at every
21 spill who's had actual experience on pipeline spills,
22 would you suppose?

23 THE WITNESS: Well, maybe not at the outset.
24 The first person on site again will secure the site. But
25 what I mentioned to Commissioner Kolbeck is we have

1 trained them in spill response. They are -- for Keystone
2 base. They know what to do. I can't guarantee they'll
3 have experience in spill response.

4 MR. RISLOV: Thank you.

5 THE WITNESS: Okay.

6 MR. SMITH: Thanks. I just have -- I have one
7 question. You know, in the original Keystone order we
8 included a condition that -- where you would submit your
9 Emergency Response Plan to the Commission for its review
10 at or prior to the time when you submit it to PHMSA for
11 approval.

12 Is that a condition that you can live with in
13 this permit?

14 THE WITNESS: I believe that was an oversight.
15 It was submitted after. But I would have to defer to our
16 attorneys to answer that question.

17 MR. SMITH: Okay. All right. Thanks.

18 Additional questions? Just a minute here.
19 Maybe, Mr. Koenecke, do you want to follow up here?

20 MR. KOENECKE: I do have a couple, Mr. Smith.
21 And I will get an answer to you for your question as soon
22 as I possibly can.

23 REDIRECT EXAMINATION

24 BY MR. KOENECKE:

25 Q. Mr. Hayes, it's my understanding that while PHMSA

1 requires you to have an Emergency Response Plan, it
2 doesn't necessarily approve it; is that correct?

3 **A. They did approve our plan. They actually issued us
4 an approval letter.**

5 Q. And was that an unusual act in your experience with
6 PHMSA?

7 **A. In my experience that was definitely unusual. I did
8 not expect to get a full approval letter like that.**

9 Q. I also -- if I recall from your previous testimony,
10 did I understand that you visit all LEPCs and local
11 emergency responders?

12 **A. We visit them well in advance of operations, like I
13 mentioned previously, at least six months.**

14 Q. But I want to make sure you're not saying you're
15 going to visit them in person.

16 **A. No, I'm not going to visit them in person. I help
17 put the program in place, make sure the messaging is
18 correct.**

19 Q. So you'll be in contact with them I guess is perhaps
20 maybe a more appropriate way to say that?

21 **A. Well, what typically happens is that gets turned
22 over to people that are in the operating part of our
23 business. So they would take that program and roll it
24 out to local LEPCs.**

25 MR. KOENECKE: Very good. That's all I have.

1 MR. SMITH: Thank you. Follow-up questions,
2 Mr. Blackburn?

3 MR. BLACKBURN: Thank you.

4 RECROSS-EXAMINATION

5 BY MR. BLACKBURN:

6 Q. A number of things. You talked about securing
7 sites. And let me take a step back here. Something the
8 landowners are concerned about is just wanting to know
9 how far the oil could flow or spray from a major rupture
10 of the pipeline. And that comes from seeing pictures and
11 photos of other ruptures of pipelines where the oil's in
12 fact spraying significant distances.

13 Has TransCanada in terms of defining the -- as you
14 said, to secure the site you need to know how big the
15 site is. Have you defined or estimated how big the site
16 could be or how far away from the pipeline the site could
17 go?

18 **A. We have not done any studies, Mr. Blackburn. The
19 only thing I can draw on is two things. In the spills --
20 and Mr. Scott referenced small leaks versus ruptures. In
21 the spills that I've been involved in I've only had three
22 that I would call a spray. There's been no studies that
23 I know that support that.**

24 **What we do tell our public officials is stay as far
25 back as you can. If there's any irritant to your eyes,**

1 ears, nose, or throat, in any way, shape, or form, you're
2 too close. That's the message we'll get to them. Just
3 block the roads until we get there.

4 Q. The landowners are aware of, like I said, the spray
5 going places including the Bemidji spill back in '91.
6 TransCanada's testimony in Keystone I, I believe, said
7 120 meters.

8 The documents provided by TransCanada at this time
9 from the Federal Government show about a 200-meter spray
10 zone. That's the kind of thing they want to know.

11 I'm also aware that an independent consultant in
12 California did a study that estimated how far the oil --
13 they're trying to develop housing developments near an
14 oil pipeline, and they did a study to determine how far
15 the oil would spray from one of those pipelines.

16 But TransCanada hasn't done that kind of study to
17 your knowledge?

18 A. No, they have not.

19 Q. Okay. Who is Brian Wilson -- or Walsh.
20 Brian Walsh.

21 A. Mr. -- well, should I answer that? Mr. Walsh is
22 with the DENR. And he had submitted a written letter to
23 us. I don't know his exact job title. I'm sorry.

24 Q. That's fine. How many ERPs have you been involved
25 in preparing? Emergency Response Plans.

1 A. Yeah. I knew the acronym. Thank you.

2 Q. The court reporter.

3 A. Correct. Thank you. Directly responsible, five.
4 And if you look at my resume, involved in several others
5 for another company and overseeing that work and
6 approving it.

7 Q. And each of those was sent to PHMSA for its review?

8 A. No. That's not quite correct. Because of the
9 geographic diversity in my background, I've worked in the
10 northwest territories in Canada, South America, places
11 like that. So not always PHMSA.

12 Q. How many of them did you send to PHMSA for its
13 review?

14 A. Under my direct direction, two.

15 Q. Okay. Did PHMSA for each of those provide requested
16 changes to the plans?

17 A. For the -- for the Keystone base, no. Because we
18 cleared those up right at the meeting, the things we had
19 to change.

20 For the other company that I worked for previously,
21 I don't recall, it was so long ago, whether there was
22 changes from PHMSA.

23 Q. You also mentioned that a contractor would be
24 providing the spill response personnel. I assume that
25 would be for a major spill that you would seek a -- have

1 a contractor that would help TransCanada respond to that
2 spill.

3 Can you provide us the name of that contractor?

4 A. Yeah. Absolutely, Mr. Blackburn. There's actually
5 three sources of contractors, and although I can't name
6 what I call the yellow iron or yellow steel contractors,
7 they have to be determined, the second one is what we
8 call the National Response Corporation or NRC.

9 And they are what I characterize in sort of slang
10 terms is the 1,000-pound gorilla of spill response in the
11 United States. They have equipment scattered everywhere.
12 And you'd call those your spill equipment and blue collar
13 workers. Not to be discriminatory, but that's the labor
14 force we need on a spill.

15 The second contract we have in place is what we call
16 a spill management team, and that is with the O'Briens
17 Group out of Houston, Texas, and they have between 80 and
18 120 individuals on the ready, ready to go. And they are
19 what you call the white collar or the spill management
20 team that would occupy key roles under the incident
21 command system.

22 So we have one number that we would call, and we
23 could ask for three incident commanders, four planning
24 chiefs, five safety individuals, et cetera. And they're
25 under retainer right now for Keystone base and we'll

1 extend both of those contracts for KXL as well.

2 Q. Thank you. NRC is a company that would provide like
3 you said the 1,000-pound gorilla for spill response.

4 Do you know if they have equipment currently in
5 South Dakota?

6 A. I don't know yet.

7 Q. Do you have -- have you had any discussions about
8 whether they would have spill response equipment in
9 South Dakota?

10 A. I have had those discussions. And the way NRC works
11 is they set up contracts with independent contractors like
12 the contractors or to them in essence a subcontractor.
13 And the discussions that I've had with them, if we don't
14 have enough resources in place from local contractors
15 within our timing window, then they'll put equipment
16 there and we'll make lease arrangements for that
17 equipment.

18 Q. Does NRC provide only yellow steel kinds of
19 resources, or do they provide more specialized equipment
20 for spill cleanup?

21 A. No. NRC is not the yellow steel/yellow iron guys.
22 NRC is the spill response contractor. That's the people
23 who have actual spill equipment.

(Discussion off the record)

25 A. What NRC has is specialized oil spill response

1 **equipment. So they will have command post trailers,**
 2 **which are full communication trailers. They have boats**
 3 **of several different sizes and specialty functions. They**
 4 **also have oil spill boom, containment boom, B-O-O-M. And**
 5 **then they also have things like skimmers, oil spill**
 6 **response skimmers. And any type of auxiliary equipment**
 7 **you need to respond to a spill.**
 8 **Q.** When would you know where the equipment, such
 9 equipment, would be located -- whether such equipment
 10 would be located in South Dakota and where it would be
 11 located in South Dakota?
 12 **A. That would be the first six months that I mentioned**
 13 **to you that sort of started January 1, 2010 that we start**
 14 **to develop that list. Because that is the primary thing**
 15 **that we have to do that's different than Keystone base.**
 16 **Q.** So just to get this clear, sometime between January
 17 and June you would work out with NRC where the equipment
 18 would be located?
 19 **A. That's 100 percent correct.**
 20 **Q.** And would that information be provided to PHMSA for
 21 its consideration?
 22 **A. It's not for their consideration. It's their**
 23 **approval. We have to have that in place as what we call**
 24 **our OSRO, capitals, oil spill response organization, has**
 25 **to be identified in our plan.**

1 MR. BLACKBURN: Thank you.
 2 THE WITNESS: Thank you.
 3 MR. BLACKBURN: Thank you. That's all.
 4 THE WITNESS: Thank you.
 5 MR. SMITH: Ms. Semmler.
 6 MS. SEMMLER: No questions.
 7 MR. SMITH: Any follow up Commissioner
 8 questions?
 9 Keystone?
 10 Thank you, Mr. Hayes. You may step down.
 11 THE WITNESS: Sorry I went so fast.
 12 MR. SMITH: We got to keep Cheri on her toes.
 13 Okay. It's noon so we will be in recess. What do you
 14 think? You folks who have to -- what's that?
 15 Commissioner Kolbeck is directing 1:30. So we
 16 will be in recess until 1:30.
 17 (A lunch recess is taken)
 18 MR. SMITH: If we could, everyone, maybe take
 19 our seats. I think the clock on the wall anyway is
 20 showing 1:30.
 21 Okay. I'm going to call the hearing back in
 22 session. Are we good to go?
 23 Okay. Apparently we're back live on the
 24 internet here. I will call the hearing back in session
 25 in Docket HP09-001. That's TransCanada Keystone

1 Pipeline, LP and their Application for a construction
 2 permit to construct the Keystone XL Pipeline in western
 3 South Dakota.
 4 Prior to recess TransCanada, the Applicant, was
 5 in the progress of putting on its direct case. And at
 6 this point I will call on Mr. Koenecke or his co-counsel
 7 to call their next witness.
 8 MR. MOORE: Thank you, Mr. Smith. Keystone
 9 calls Heidi Tillquist to the stand.
 10 (The witness is sworn by the court reporter)
 11 DIRECT EXAMINATION
 12 BY MR. MOORE:
 13 **Q.** Can you introduce yourself, please.
 14 **A. My name is Heidi Tillquist.**
 15 **Q.** Where do you live?
 16 **A. I live in Fort Collins, Colorado.**
 17 **Q.** What's your business address?
 18 **A. 1601 Prospect Parkway.**
 19 **Q.** What is your role with the Keystone XL Pipeline
 20 Project?
 21 **A. I work as a contractor with AECOM for TransCanada.**
 22 **I've been doing pipeline risk assessment for them for the**
 23 **last several years.**
 24 MR. SMITH: Excuse me, Mr. Moore. I'm sorry.
 25 Could you please, Heidi, pull the mic a little closer to

1 you. Again these really require you to be close to pick
 2 it up. Thank you very much.
 3 **Q.** You said that you prefiled direct testimony in this
 4 case; correct?
 5 **A. Yes, I did.**
 6 **Q.** And you have that before you marked as Exhibit 12?
 7 **A. Yes.**
 8 **Q.** And are there any changes or corrections to the
 9 testimony before you that is marked as Exhibit 12?
 10 **A. No.**
 11 **Q.** If you were asked all the questions that are
 12 contained in that testimony today, would you give all the
 13 same answers?
 14 **A. Yes, I would.**
 15 **Q.** Ms. Tillquist, there was in paragraph 10 of your
 16 direct testimony, testimony about the chance of a spill
 17 occurring in South Dakota once in every 7,400 years for
 18 any particular one-mile segment of the pipeline. That
 19 figure is different from the figure that was contained in
 20 your initial testimony in this case before it was
 21 changed.
 22 Could you just explain to the Commission in general
 23 what occurred there?
 24 **A. Well, we calculated the risk of a spill based on the**
 25 **PHMSA database, which is basically an incidence database**

1 for all the hazardous liquid pipelines, and then we used
2 modification factors based on best professional judgment
3 of many of TransCanada's engineers.

4 When we first did the risk assessment we calculated
5 that value of 8,400 years. When we did a series of Q and
6 As both internally with AECOM TransCanada's -- some of
7 their contractors and actually the gentleman
8 Kent Muhlbauer that wrote the pipeline risk assessment
9 book, they all found it adequate, they were fine with
10 it.

11 But when I looked at the number, the 8,400 and how
12 it was derived, it's broken down into several factors,
13 corrosion, excavation damage, geological hazards,
14 hydraulic events, and materials. The corrosion value
15 that we had -- after we had taken the baseline PHMSA
16 database and modified it, it had dropped down in the
17 ranking compared to the way the original PHMSA database
18 would be.

19 So I -- to be true to the PHMSA database, which
20 again is historical data -- it's based on much older
21 pipe, but corrosion and excavation tend to be the top two
22 major causes of pipeline incidences. With this reranking
23 with these application factors it had dropped it down to
24 the point where I felt it wasn't being true to historical
25 data.

1 Now the engineers feel that they were extremely
2 conservative in their adjustment factors. In fact, they
3 feel that the adjustment factors are still probably off
4 by a factor of an order of magnitude of 2.

5 Nevertheless, the purpose of my work is to be
6 extremely conservative. So I adjusted the risk up so
7 greater chance of it occurring to hold true to historical
8 data to remain so that we were basically again
9 overestimating the risk of an event.

10 Q. Could you just explain for the Commissioners what
11 the PHMSA database is?

12 A. The PHMSA database is data collected by PHMSA. The
13 most recent database starts in 2002 to present. It
14 categorizes the -- if an operator has a spill of over
15 5 gallons or various other criteria, they have to report
16 it to PHMSA, and PHMSA collects a variety of data about
17 each of these spills.

18 So it's a pretty powerful database, and it allows us
19 to analyze a lot of information about pipelines and
20 pipeline incidences.

21 The thing that you need to note is that the majority
22 of pipeline -- over 60 percent of the pipeline is built
23 before the 1970s. So before we have FBE coating and
24 cathodic protection. A lot of the things we consider
25 standard practice now. The in-line inspections. Lots of

1 pipe hadn't had that done.

2 So the database tends to be, again, extremely
3 conservative when you try to apply it to a new pipeline
4 because so much of the pipe is old with old standards
5 compared to this new pipe that we're putting into the
6 ground.

7 Q. So is it fair to say that you adjust the historical
8 data based on current pipeline construction and
9 operations practices that would affect the likelihood of
10 a spill?

11 A. That's correct.

12 Q. And in doing the calculation that you did that
13 resulted in a spill once every 7,400 years for any
14 one-mile segment of the pipeline do you overestimate or
15 underestimate risk in your calculation?

16 A. The whole point of the risk assessment is to try to
17 overestimate the chance of an event happening. That
18 gives the decision-makers a good chance of -- you know,
19 they have some bounds. So if I say it's a spill is no
20 more than once in every 7,400 years, we don't expect it
21 to occur -- for any given mile we don't expect it to
22 occur at that frequency. We would actually expect it to
23 be much less. But it does provide a conservative
24 estimate.

25 Q. Also in paragraph 10 of your updated direct

1 testimony you indicated that the size of that spill is
2 likely to be three barrels or less.

3 What is the basis for that determination?

4 A. Again, going back to the PHMSA database, they have a
5 lot of data that's available to analyze. One of the
6 columns that they have is the amount of material lost in
7 a hazardous liquid spill.

8 We calculated statistics. Now I'll try to explain
9 this. The median spill size is three barrels. Now
10 there's different ways of explaining an average. There's
11 median and a mean.

12 The median is an average where 50 percent of the
13 spills will be smaller and 50 percent will be larger. So
14 the three barrel spill represents the median value. So
15 50 percent of the spills will be smaller than three
16 barrels, 50 percent will be larger.

17 Median -- sorry. The mean value is when we sum up
18 all the spills and then divide by the number of total
19 spills. That gives us a mean spill size of 296. The
20 reason that those numbers are so different is because the
21 data is skewed. There's many, many very small spills and
22 there's a couple of outlier points, and that pulls the
23 mean value to a greater value.

24 So we express a lot of times the median value
25 because that gives the person an idea of, you know, most

1 **of the time it's going to be this size.**
 2 **Q.** In looking at the PHMSA database were you able to
 3 obtain historical data about the size of spills not
 4 detected within the first two days of the occurrence of
 5 the spill?
 6 **A. Yes, we did. We looked at -- again they have a**
 7 **timed detection with the spill volume. The mean value is**
 8 **527. The median, so, again the 50 percent, is 15**
 9 **barrels. So spills even if they didn't detect it within**
 10 **the first 48 hours, most of them are 15 barrels or less.**
 11 **Q.** And were you able to determine from the historical
 12 data in the PHMSA database the percentage of spills
 13 detected within seven days?
 14 **A. Yes. The number of spills detected within seven**
 15 **days is 97 percent.**
 16 MR. MOORE: That's all the questions I have, and
 17 I'd tender the witness for cross-examination.
 18 MR. SMITH: Thank you. Mr. Blackburn.
 19 CROSS-EXAMINATION
 20 BY MR. BLACKBURN:
 21 **Q.** Ms. Tillquist, you've testified that there's a
 22 median and a mean spill. Do the regulations that -- I
 23 assume you're familiar with the regulations that
 24 govern -- that regulate spill emergency response
 25 planning; for example?

1 **A. I'm fairly familiar.**
 2 **Q.** Do those regulations regulate for the median spill?
 3 **A. If you're talking about spill -- 194, Part 194,**
 4 **talks about the maximum spill volume.**
 5 **Q.** All right.
 6 **A. That's what they plan for.**
 7 **Q.** And so the regulations also don't plan for the mean
 8 spill either.
 9 **A. No.**
 10 **Q.** So your testimony today here is, therefore, not
 11 directly relevant to how this body or any of the
 12 bodies -- or the Federal Government regulates actual
 13 spills or what the planning should be related to those
 14 spills?
 15 **A. No. I wouldn't agree with the way you stated that.**
 16 **The risk assessment that we do is a baseline assessment.**
 17 **We use it for NEPA planning purposes. We use it for**
 18 **design for placement of valves. But we also use it to**
 19 **begin the integrity management planning program. That is**
 20 **covered in the federal regulations.**
 21 **It gives us an idea of where we need to be concerned**
 22 **about, and it gives us an idea -- by looking at things**
 23 **like the mean and the median volumes, it gives us an idea**
 24 **of what to expect.**
 25 **However, again, when we go back to our response**

1 **plans and for our planning purposes we will use the**
 2 **maximum spill volume to ensure that we have sufficient**
 3 **personnel and equipment to cover that maximum spill**
 4 **volume.**
 5 **Q.** So your testimony here wouldn't have any effect on
 6 the quantity, quality, or availability of materials,
 7 equipment to respond to spills?
 8 **A. My testimony wouldn't have any --**
 9 **Q.** Would TransCanada adjust its spill response efforts
 10 based on an assessment of the median -- or the median or
 11 mean spill volume?
 12 **A. No. TransCanada will plan for the maximum spill**
 13 **volume.**
 14 MR. BLACKBURN: No further questions. Thank
 15 you.
 16 MR. SMITH: Ms. Semmler.
 17
 18
 19 CROSS-EXAMINATION
 20 BY MS. SEMMLER:
 21 **Q.** Excuse me. I have some questions about the impaired
 22 streams that will be affected by the pipeline. I think
 23 I've got the right witness. Or no.
 24 **A. It probably was not me.**
 25 **Q.** Okay.

1 **A. Sorry. I'm more dealing with the spills.**
 2 **Q.** Yep.
 3 MS. SEMMLER: We can clarify it in other ways.
 4 So no questions right now.
 5 MR. SMITH: Thank you, Ms. Semmler.
 6 Commissioners, do you have questions of Ms. Tillquist?
 7 Commissioner Hanson.
 8 CHAIRMAN HANSON: Thank you, Mr. Smith.
 9 Ms. Tillquist, good to see you again.
 10 THE WITNESS: Nice to see you.
 11 CHAIRMAN HANSON: Appreciate your past testimony
 12 before us on the Keystone line.
 13 A moment ago as Mr. Moore was asking you
 14 questions and you were explaining either my ears didn't
 15 hear right or you misspoke. Because your written
 16 testimony says one spill in every 7,400 years and I
 17 thought I heard you say as you were chatting you said --
 18 excuse me. Testifying. You said 8,400 years.
 19 THE WITNESS: My original testimony that I filed
 20 had one in 8,400 years. And then we did an updated
 21 revised testimony.
 22 CHAIRMAN HANSON: Oh, okay.
 23 THE WITNESS: So what you have as my exhibit has
 24 the no more than one in 7,400.
 25 CHAIRMAN HANSON: Okay. So as I was

1 multitasking -- I heard correctly. I just didn't hear
 2 the proper reference. I wanted to make certain I had the
 3 right --
 4 Now when we talk about once in every 7,400 years
 5 in any given mile, my son was a lot better with calculus
 6 than I and statistics and such, but how does that change
 7 when we're dealing with a couple hundred miles going
 8 through the State of South Dakota?
 9 What's the likelihood of a spill in South Dakota
 10 on a couple hundred miles?
 11 THE WITNESS: Well, you would take the frequency
 12 occurrence that we have generated, and you can convert
 13 it. So this is per mile. There are 313 miles, I
 14 believe, of pipe in South Dakota.
 15 If you did the same type of occurrence, you
 16 know, frequency calculation, you would come up with no
 17 more than one spill every 24 years for South Dakota.
 18 CHAIRMAN HANSON: So there's a chance of a spill
 19 in South Dakota once every 24 years?
 20 THE WITNESS: Again, that's based on a very
 21 conservative assessment that we did. We would not
 22 expect -- it's not -- TransCanada's expectation of that
 23 would be the occurrence frequency would be much less, but
 24 that is the value we calculated to give again
 25 decision-makers some basis of information. Kind of

1 worst-case scenario.
 2 CHAIRMAN HANSON: Sure. Understood. And
 3 understanding this is -- at least for me is one of the
 4 most important parts of the whole component is the health
 5 and safety. I think everything surrounds it -- economic
 6 development's important, et cetera -- but it seems like
 7 the pipeline itself from the standpoint of health and
 8 safety of the citizens all surrounds whether there's a
 9 likelihood of any sort of release.
 10 The ERP is going through a process of
 11 development at the present time. And I don't know if
 12 we're going to see that prior to the statutory
 13 requirement for us to make a decision. I would
 14 anticipate that we won't.
 15 However, if we don't, would it be wrong for us
 16 to rely upon the Keystone ERP as at least a barometer of
 17 what -- since you worked on that, I assume you can answer
 18 that question.
 19 THE WITNESS: I actually did not work on the
 20 ERP.
 21 CHAIRMAN HANSON: Okay.
 22 THE WITNESS: But my -- you know, as you heard
 23 Mr. Hayes testify, the majority of the ERP that Keystone
 24 XL will be based on, the majority is based on the
 25 Keystone template. So it would give you a good gauge.

1 CHAIRMAN HANSON: So would I be wrong to rely
 2 upon that as somewhat of a --
 3 THE WITNESS: My personal opinion?
 4 CHAIRMAN HANSON: Yes.
 5 THE WITNESS: I would say it would be fair to
 6 use that as a guide, yeah.
 7 CHAIRMAN HANSON: Thank you. In your testimony
 8 you also stated that approximately 1 percent of the
 9 pipeline incidents are attributed to ground motion.
 10 Surprisingly enough, we have had some earthquakes
 11 actually in South Dakota, albeit small, but what's the
 12 likelihood of a ground motion?
 13 And I also understand -- it's interesting. You
 14 drive down the interstate and you see hills in a variety
 15 of areas that have just fallen down and you can see the
 16 lines of where they have collapsed upon themselves.
 17 What's the potential of that happening?
 18 THE WITNESS: Well, I think you addressed the
 19 potential based on historical data. Again, including the
 20 older pipe, it's a small fraction of the events.
 21 We did account for ground motion as a hazard to
 22 the pipeline in our risk assessment. The interesting
 23 thing is that a lot of the area in South Dakota is
 24 classified by the -- by PHMSA. They do kind of a
 25 national map. So very, very broad, but a lot of

1 South Dakota, western South Dakota, was classified as
 2 having landslide potential.
 3 So we actually increased the risk in our risk
 4 assessment due to that. So, again, we -- trying to think
 5 of how to explain it. We tried to overestimate the
 6 number of spills we would see.
 7 Now in actuality again that was at a macro level
 8 that these maps were generated at. I was personally
 9 involved with the routing. And when we would route this
 10 pipeline, as you said there's a lot of places where the
 11 slopes are steep, and they tend to sluff off.
 12 We mainly tried to stay up on these plateaus,
 13 much more stability, and tried to avoid side slopes or
 14 steep slopes coming off the hillsides.
 15 I know that there was in some of the open houses
 16 some concerns of the people that had mentioned this
 17 particular area we think this slope is pretty unstable.
 18 I know Keystone had somebody out within like a day or
 19 two, and actually they engineered that whole site based
 20 on the information they got from the landowner.
 21 So it's something to consider. It's a risk.
 22 Modern pipe is a lot more robust than older pipe but it's
 23 still a hazard and we consider it very strongly in our
 24 assessments.
 25 CHAIRMAN HANSON: What's the survivability of

1 pipe in that type of a situation?

2 THE WITNESS: I think modern pipe has shown to
3 be very robust. I don't have any statistics to give you
4 on that. But I know like in earthquakes, I mean, we have
5 to actually plan for those types of movements. In
6 California they've got, you know, hundreds of miles of
7 pipeline, and they can actually adjust for those types of
8 things.

9 Sluffing and things certainly could affect a
10 pipe. If ground motion like that were to occur, Keystone
11 is required by federal regulations to actually go out and
12 inspect the area to see if there is any damage to the
13 pipeline. And that may consist of actually putting one
14 of these geometric pigs in the pipeline to see if there
15 was any defatation of the pipe, let alone any leaks or
16 anything.

17 So they'll be going out there and looking at
18 it to make sure the integrity of the pipe is still
19 intact.

20 CHAIRMAN HANSON: Thank you. In your testimony
21 you also state that ground water contamination would tend
22 to be localized within a few hundred feet of the spill
23 site.

24 You also state in another portion of your
25 testimony that the pipeline itself in working it would be

1 important to minimize the risk to public surface water
2 resources.

3 Do you have based upon your own personal
4 position what you would consider outside of the -- what
5 has been presented to us what you believe is the right
6 distance to have this pipeline from a public water source
7 such as someone's well on their farm or ranch or wells
8 for a community?

9 THE WITNESS: Well, there was a study done --
10 actually it was a series of five or six studies combined.
11 They looked at over 500 sites where they looked at BTEX,
12 which is the soluble components of concern in crude oil,
13 and the mobility in ground water.

14 And they found that in over 90 percent of the
15 cases -- you know, again, you have the spill occurs.
16 Over time the -- it's not the crude oil that moves but
17 it's the dissolved constituents that come out of the oil
18 and that can migrate with the ground water.

19 What they found was that the constituents
20 90 percent of the time were limited to about 300 feet
21 away from the actual source site.

22 What does that mean as far as, you know, what's
23 a safe distance? You know, I -- certainly -- you know,
24 it's hard to quantitate, but I would say that even if you
25 put a well that was right next to the pipeline and if a

1 spill occurred in that area and if it got into the ground
2 water and if it got to the concentration that was high
3 enough to cause problems, there is regulations that
4 require that, you know, TransCanada would have to provide
5 an alternative water source.

6 Again, because it's so localized, the effects,
7 we can also know which way the ground water's moving,
8 that Keystone may -- you know, as I said, they have to
9 provide an alternative water source. They may end up
10 drilling another well within a few hundred feet just next
11 to it but up stream the ground water movement and they
12 have an alternative water supply. So there is mechanisms
13 in place even if something were to occur.

14 CHAIRMAN HANSON: In your written testimony as
15 well as in your oral testimony today you've stated within
16 a few hundred feet. A few always means 300 to me -- 3.
17 Excuse me.

18 What does it mean to you.

19 THE WITNESS: If I didn't say it, what I meant
20 to say is 90 percent of the cases the spill was within
21 300 -- approximately 300 feet of the source oil.

22 CHAIRMAN HANSON: Would I be right or wrong to
23 change -- or to interpret, excuse me, in your testimony
24 on paragraph -- on 13, your answer to 13 when you said
25 ground water contamination would tend to be localized

1 within a few hundred feet of the spill, would I be wrong
2 to assume you meant 300?

3 THE WITNESS: That would work.

4 CHAIRMAN HANSON: Okay.

5 MR. KOENECKE: Is that a yes?

6 THE WITNESS: I'm sorry. That would be a yes.

7 CHAIRMAN HANSON: Thank you. We speak the same
8 language. It's not legalese. Thank you.

9 Also you state crude oil floats on the water's
10 surface. This is in your written testimony on 14.
11 "Crude oil floats on the water's surface providing the
12 opportunity for Keystone to detect, contain, and clean up
13 the crude oil before long-term environmental impacts
14 occur."

15 In your oral testimony today I'm sure you'll
16 agree you spoke of the dissolved contaminants. So as I
17 read that sentence, should I feel as safe about it as I
18 did the first time I read it?

19 THE WITNESS: First of all, let me go back and
20 find it because I was still trying to find it.

21 CHAIRMAN HANSON: If you look under 14.

22 THE WITNESS: Yep.

23 CHAIRMAN HANSON: About the fourth paragraph,
24 second sentence from the --

25 THE WITNESS: I got it. Okay. Okay. So what I

1 would say about crude oil floating on surface water --
2 CHAIRMAN HANSON: You're saying there's an
3 opportunity there.

4 THE WITNESS: Yes.

5 CHAIRMAN HANSON: How much of an opportunity?
6 Basically let me get a little more direct to what I'm
7 asking.

8 And that is how much time is there before these
9 dissolved contaminants -- isn't that fairly immediate
10 before they start to filter through?

11 THE WITNESS: That would depend on the
12 environmental conditions. What we assume for our risk
13 analysis is we basically took all the oil and basically
14 shook it up in the water system, and that's how we
15 evaluated our toxicity. That never happens.

16 In real life what you would have is things like
17 turbulence if you were on a windy day where it might stir
18 up -- you might increase the surface of the oil's contact
19 with water. So you might increase the ability of the
20 oil -- the dissolved constituents to get out.
21 Temperature is a factor.

22 There's a number of different factors, but it's
23 not an instantaneous thing by any means. And as a matter
24 of fact, most of the chemicals that have water
25 solubility, BTEX compounds that we talk about, most of

1 them have a greater affinity to the oil than they do to
2 the water itself.

3 So you have an oil spill spreading out on the
4 surface of the water, the biggest -- the weathering
5 process is the evaporation of these BTEX compounds. They
6 are highly volatile so they tend to evaporate faster than
7 they're going to dissolve into the water.

8 And the other thing I would add is that of the
9 69 compounds that they examined within crude oil, it was
10 only benzene that had the ability to solubilize into
11 water to a concentration that it would exceed the maximum
12 contaminant level. So it's a drinking water standard.

13 So it takes time. The evaporation's going to be
14 a bigger factor than the dissolving rate. So certainly
15 it does allow the emergency crews time to react.

16 CHAIRMAN HANSON: And ground water would be
17 subjected differently than surface water?

18 THE WITNESS: That's right. So ground water,
19 again, the spill's going to have to start penetrating
20 through the soil to however deep the ground water is. It
21 will pool on the surface of the ground water.

22 During the penetration phase and while it's
23 beginning to pool on the surface of the ground water, you
24 know, cleanup crews can be, you know, trying to excavate
25 and will remove this.

1 What you will find is that if oil is left over,
2 if it stays there for a length of time, that's when the
3 dissolved constituents can get out and start moving in
4 with the ground water. But they tend to move more slowly
5 than the ground water because of natural attenuation.

6 CHAIRMAN HANSON: In your testimony you spoke of
7 appropriate remedial measures. Would that include
8 monitoring wells? And I won't -- it's in the same
9 paragraph as what we were referring to before, but it's
10 towards the end. But it's referring to the event -- if
11 an event took place, that appropriate remedial actions
12 would take place.

13 Would that include paying for monitoring wells
14 so that if it were ground water to be able to ascertain
15 or draw the liquid out that's certainly downstream, have
16 monitoring wells so that any progression of the
17 contaminant would be found, discovered?

18 THE WITNESS: What would happen if a spill
19 occurred and there was -- we suspected that there was
20 ground water contamination -- well, the spill occurred,
21 the South Dakota DENR would be notified.

22 If the ground water contamination was suspected,
23 then a sampling would need to occur. So monitoring wells
24 would be likely installed. Again, this would be at
25 Keystone's cost. They're responsible for their cleanup.

1 Then based on what they were finding, what the
2 results of those were, they would work with the State
3 agency to determine what type of remediation process
4 would be appropriate. Sometimes remediation can -- you
5 know, when you dig up or do -- you know, things can cause
6 a lot more damage.

7 So they would work with people like Kim McIntosh
8 with the State to come up with what remediation process
9 is appropriate and the cleanup levels that they would be
10 held to.

11 CHAIRMAN HANSON: Thank you very much. Thank
12 you, Mr. Smith.

13 MR. SMITH: Commissioner Kolbeck, questions.

14 COMMISSIONER KOLBECK: Hi, Heidi.

15 On question I guess it would be number 8 of your
16 direct testimony it said that in your analysis of the
17 PHMSA pipeline the database indicated that fire occurred
18 on approximately 2 percent of the pipelines.

19 Is this crude oil, or does that include natural
20 gas and refined petroleum?

21 THE WITNESS: The PHMSA database is based on --
22 that I analyzed is based on hazardous liquids. So it
23 includes refined products, you know, things like diesel
24 and things like that. So it's more inclusive than just
25 crude oil.

1 COMMISSIONER KOLBECK: Would you classify
2 refined petroleum as more or less hazardous than crude
3 oil?

4 THE WITNESS: That's a difficult question to
5 ask. I would say there is -- refined products have a
6 greater chance for acute toxicity, greater chances for
7 exceedences of water quality standards, but they also will
8 have generally lower persistence in the environment.

9 So crude oil, again, has some specific compounds
10 so that's why cleanup -- emergency response and then
11 cleanup is important, particularly important for crude
12 oil.

13 COMMISSIONER KOLBECK: Okay. Well, and we know
14 it's important, but I guess I'm a little confused as to
15 does refined petroleum penetrate the ground more than a
16 crude oil?

17 THE WITNESS: Refined products tend to be --
18 have less viscosity. So, yes, they would penetrate soils
19 much more quickly.

20 COMMISSIONER KOLBECK: Okay. So how about
21 natural gas? Would natural gas be considered more
22 flammable than crude oil?

23 THE WITNESS: Yes.

24 COMMISSIONER KOLBECK: So the 2 percent that
25 number --

1 THE WITNESS: Let me just clarify. Natural gas
2 is not even in this database. There's a whole separate
3 database for natural gas. So this says natural gas
4 liquids like heptanes and things like that. But natural
5 gas methane is a separate database.

6 COMMISSIONER KOLBECK: Okay. So we've got --
7 we've got basically BTEX-based fuels in this 2 percent
8 or --

9 THE WITNESS: Yeah. That is included in there.
10 But there's also things like CO2 pipelines are actually
11 considered liquid pipelines. Ammonia can be transported.
12 I mean, there's just a litany of things. I would say the
13 vast majority of materials transported are petroleum
14 products. So --

15 COMMISSIONER KOLBECK: Okay. Of those products
16 that are in that study, do you know where the flash
17 point -- where the ignition point would be for crude oil
18 compared to the other ones?

19 THE WITNESS: I'd have to -- I'd have to look
20 that up. I'm certain we could provide that if you needed
21 that information.

22 COMMISSIONER KOLBECK: I'm just wondering, you
23 know, we've got a group of substances and we come up with
24 2 percent, I'm just wondering is crude oil the most
25 flammable of the 2 percent or the least flammable of the

1 2 percent.

2 THE WITNESS: I would suggest that the crude oil
3 that would be transported, knowing the BTEX content is --
4 it's close to 1 percent, 1 and a half percent. So, you
5 know, again, those are the highly volatile compounds that
6 would tend to quickly ignite given the low content
7 compared to, say, in gasoline which would be -- maybe
8 closer to -- and, I'm sorry, I'm going to have to guess
9 here but maybe 25 percent or something.

10 It would be much more flammable -- the refined
11 products would be more flammable. Crude oil would be
12 much less likely to catch on fire. You'd have a very
13 difficult time in some cases to get the crude oil
14 ignited.

15 COMMISSIONER KOLBECK: Okay. The potential
16 impacts on the sensitive species in your testimony, did
17 you find anything unusual in South Dakota, any species
18 that maybe you would highlight for us or think that we
19 should take into special consideration?

20 THE WITNESS: No. Again, I was brought in very
21 early on this process. And it's really unusual to be
22 brought in -- for somebody like me to be brought in
23 during routing.

24 But the benefits are is that we can route around
25 a lot of these high consequence areas, places where

1 ecologically sensitive animals might be.

2 So literally when we were flying the route and
3 drawing these maps we were literally overlaying these
4 high consequence areas, including these ecologically
5 sensitive areas, over the map so we could try to avoid to
6 the greatest extent possible impacts to those areas.

7 So the amount of high consequence areas that we
8 impact on this project it would be much lower than you
9 would see on a typical project just because TransCanada
10 got this risk assessment done early in the process.

11 COMMISSIONER KOLBECK: Okay. The vegetation
12 obviously in the area that you're going through I would
13 consider somewhat unique.

14 Would you agree with that or not?

15 THE WITNESS: I think every place is unique, but
16 it's not -- there are other places many of these same
17 types of environments can be found. But, I mean, you
18 know, like the sand hills, that's a fairly -- I wouldn't
19 say unique but it's -- it has its -- it would be unique
20 characteristics.

21 COMMISSIONER KOLBECK: Sure. And you've helped
22 permit over 5,000 miles of pipeline. So you're familiar
23 with the situation, and you're comfortable with going
24 through the sand hills in South Dakota?

25 THE WITNESS: Yeah. We've actually -- I've done

1 work -- doing the same types of risk assessments. We did
 2 work down, as an example, for a pipeline for Shell, and
 3 that went through some sand hill type areas around Jal,
 4 New Mexico. And they had some teeny species, some
 5 lizards associated with it.
 6 So we did -- the same methodology that's used in
 7 the risk assessments and the studies that I do for
 8 Keystone is exactly the same thing -- I usually work for
 9 the government side. So the same method is used for the
 10 BLM or the Forest Service. They looked at the analysis
 11 for that pipeline and they were -- they said, yeah, this
 12 is acceptable.
 13 COMMISSIONER KOLBECK: Okay. You mentioned that
 14 seven days detected is 97 percent. Could you explain
 15 that a little bit more?
 16 THE WITNESS: So in the PHMSA database they have
 17 a column where they report time to detection. Now it --
 18 well, so we took the data, we analyzed it, and we just
 19 said, okay, seven days. How many spills are detected?
 20 We did a percentile analysis. The number is 97 percent.
 21 COMMISSIONER KOLBECK: What happens to the other
 22 3 percent?
 23 THE WITNESS: Most spills -- of the remaining
 24 spills in the database, the longest time to detect a
 25 spill, I'll have to look at my little sheet here, was

1 78 days.
 2 What is interesting to note is that spill only
 3 consisted of 636 barrels. So it -- it doesn't
 4 necessarily equate that a longer time to detection
 5 equates with a huge release. In fact, this 78 days was
 6 probably a very small slow drip that occurred.
 7 COMMISSIONER KOLBECK: Sure. So has it been
 8 your experience that -- if there was a lot of oil leaking
 9 out of the pipeline, you're going to have a much quicker
 10 response time?
 11 THE WITNESS: Yes.
 12 COMMISSIONER KOLBECK: Okay. So this 638
 13 barrels over 78 days, that's -- that would not be
 14 detectable, or would a leak like that become larger and
 15 larger over time?
 16 THE WITNESS: It becomes -- well, so you have a
 17 pinhole leak, and so it's dripping really slowly. So as
 18 you can imagine, it starts contaminating a little area,
 19 and then it starts percolating up through the soils and
 20 along in the pipeline trench.
 21 We have aerial surveillance that flies by. So
 22 what they might have seen is they may have seen
 23 discoloration of the soil as the oil was coming up. What
 24 they might have seen if it was a heavily vegetated area
 25 is suddenly some vegetation starts yellowing.

1 There's a lot of keys. These folks that do the
 2 aerial surveillance are trained to look for certain
 3 things. So aerial surveillance could have picked it up.
 4 I don't know who picked it up. It could have been a
 5 landowner who was out -- maybe was on the range and they
 6 came out and smelled something and reported it. But that
 7 was the longest one that was in the database.
 8 COMMISSIONER KOLBECK: Okay. And that actually
 9 goes to the mean and median like you were saying. The
 10 days are long, but the barrels are low so that's why
 11 there's two different --
 12 THE WITNESS: Yeah. Yeah.
 13 COMMISSIONER KOLBECK: As far as the crude oil
 14 that goes through the pipeline, is there any difference
 15 in the Canadian crude oil compared to Texas crude oil?
 16 THE WITNESS: I'll give you a yes -- give you a
 17 mixed answer. Every crude oil is unique. However, the
 18 crude oil -- and that's just because of the geological
 19 formations that comes out of -- it's got hundreds of --
 20 well, literally thousands of compounds within each oil.
 21 However, these crude oils are very, very
 22 comparable to oils that we found in certain parts of
 23 California, Venezuela, Nigeria, Russia. So they're not
 24 unique.
 25 COMMISSIONER KOLBECK: But as far as the fusion

1 bond epoxy pipe and corrosion, in your opinion would one
 2 corrode faster than the other?
 3 If you're hauling Texas crude oil north or
 4 Canadian crude oil south, would those two pipelines,
 5 would one corrode faster than the other?
 6 THE WITNESS: I'm not sure if I have the
 7 expertise to answer that question for you.
 8 COMMISSIONER KOLBECK: Some of the landowners
 9 had questions I guess, and I'll just explain my question.
 10 Had thought that maybe Canadian oil was different than
 11 Texas oil or out of the Bakken formation in North Dakota.
 12 Do you know if it's similar to that oil? Do you
 13 know if it's similar to the Bakken formation?
 14 THE WITNESS: I do not know. Yeah. I don't
 15 know.
 16 COMMISSIONER KOLBECK: Okay. When you say that
 17 if there was a small pinhole leak, it would bubble up in
 18 the trench, is that the same behavior of a refined
 19 petroleum? Or would refined petroleum go to the bottom
 20 of the trench and down?
 21 THE WITNESS: Well, it's going to do a little
 22 bit of all. Typically what happens is with a spill it
 23 tends to stay in the pipeline trench because no matter
 24 how well they try to compact it, the pipeline trench is
 25 less consolidated than the surrounding materials. So it

1 will tend to spread laterally, and it will tend to spread
 2 vertically.
 3 But there also will be penetration out of trench
 4 into the sides and down through the soils. Those rates
 5 won't occur as fast because of the lack of consolidation.
 6 COMMISSIONER KOLBECK: How fast does this crude
 7 oil travel through the pipe?
 8 THE WITNESS: I'm not an expert in that, but
 9 I've heard it's about as fast as you can walk.
 10 COMMISSIONER KOLBECK: Okay. So it's not
 11 like --
 12 THE WITNESS: It's not racing.
 13 COMMISSIONER KOLBECK: Like natural gas
 14 particles -- that's a bad example. It probably doesn't
 15 move as fast as when you pump it into your car, refined
 16 petroleum in your car.
 17 THE WITNESS: Yeah. I would say that's probably
 18 correct.
 19 COMMISSIONER KOLBECK: I think that's it for me.
 20 Thank you.
 21 THE WITNESS: Thank you.
 22 MR. SMITH: Thank you. Any follow up from you,
 23 Commissioner Hanson? No?
 24 I might have had just a couple here. In terms
 25 of overall -- in terms of percent of the line -- is that

1 my microphone blowing up there? Maybe it wants me to be
 2 quiet.
 3 Would you characterize most of the area
 4 traversed by the pipeline as having ground water
 5 formations that are vulnerable in terms of your overall
 6 experience?
 7 THE WITNESS: I would suggest that most of the
 8 route is not sensitive to the ground water contamination.
 9 Certainly there are portions along alluvial areas and,
 10 you know, sandy areas, but for the most part the depth to
 11 water and the formations underlying the lithology would
 12 prevent a crude oil spill from reaching most of the
 13 ground water.
 14 MR. SMITH: I think that's all I have. I
 15 forgot. Mr. Moore, was that you who was conducting
 16 direct?
 17 MR. MOORE: It was. And I have no additional
 18 questions.
 19 MR. SMITH: Okay. In response to the
 20 Commissioner questions, is there any follow up from
 21 either Interveners or Ms. Semmler?
 22 MR. BLACKBURN: If I may, just a couple of quick
 23 questions.

24 RE-CROSS-EXAMINATION

25

1 BY MR. BLACKBURN:
 2 **Q.** Ms. Tillquist, are you an expert in emergency
 3 response planning?
 4 **A. I am not.**
 5 **Q.** And have you participated in any emergency
 6 responses?
 7 **A. Yes, I have.**
 8 **Q.** How many have you participated in?
 9 **A. Just one.**
 10 **Q.** Okay. Have you reviewed the Keystone system
 11 template for the Emergency Response Plan?
 12 **A. I have not.**
 13 **Q.** So, therefore, you wouldn't know whether it includes
 14 any site specific or state specific information in it
 15 about location of materials, location of personnel, or
 16 any other detailed information?
 17 **A. I can tell you that I've -- let me retract I guess**
 18 **what I had first answered. I have seen the document. I**
 19 **have, you know, flipped through it, but I didn't examine**
 20 **it, you know, in depth for the Keystone line. And there**
 21 **was state-specific information. But I didn't examine it**
 22 **at all in detail. I just literally said, oh, here's -- I**
 23 **didn't spend any time.**
 24 **Q.** And you referred to it as a template, not as a
 25 draft; right?

1 **A. I'm sorry. I was referring to the Keystone ERP that**
 2 **I looked at.**
 3 **Q.** Yes. And you referred to that as a template?
 4 **A. No. That they will use -- much of the information**
 5 **that's in the Keystone PHMSA-approved ERP, they'll use**
 6 **much of that same information for the Keystone XL plan.**
 7 **Q.** Okay.
 8 MR. BLACKBURN: Thank you. No further
 9 questions.
 10 MR. SMITH: Ms. Semmler.
 11 MS. SEMMLER: Nothing further.
 12 MR. SMITH: Do you have any response, responsive
 13 questions?
 14 MR. MOORE: Nothing else. Thank you.
 15 MR. SMITH: Thank you. I think that's it then,
 16 Ms. Tillquist. You're excused.
 17 Applicant -- how are you doing here, Cheri?
 18 Keystone call your next witness.
 19 MR. KOENECKE: The only witness we have left,
 20 Mr. Smith, is Secretary Oster for tomorrow morning at
 21 8:30.
 22 The only witness we have left in our direct case
 23 is Secretary Oster for tomorrow morning at 8:30.
 24 MR. SMITH: Okay.
 25 MS. SEMMLER: Mr. Smith, staff does have a few

1 housekeeping items we could possibly take care of if we
2 do have some extra time.

3 MR. SMITH: Okay. So at this point then I'm
4 understanding, Keystone, your case is going to rest until
5 tomorrow morning and we'll have the one witness and then
6 that's it for your direct case?

7 MR. KOENECKE: That's correct.

8 MR. SMITH: Okay. Sure.

9 Staff, fire away.

10 MS. SEMMLER: Well, I guess the easiest one to
11 start with would be staff did submit prefiled testimony
12 and some supplemental testimony if the parties would
13 stipulate to that as we did to TransCanada's prefiled
14 testimony. Staff would make that request.

15 Next would be because this has gone so much
16 faster than we anticipated, staff does need some time to
17 prepare for tomorrow, and we'd ask that the start time
18 tomorrow morning be moved back 9:30.

19 Finally, we have several witnesses that are
20 unable to be here until Thursday. And the parties have
21 all agreed that they could participate telephonically.
22 We'd ask that that be approved by the Commission as well.

23 MR. SMITH: Okay. I guess first I'll ask the
24 other parties if you have comments or concerns with any
25 of that.

1 MR. KOENECKE: We're certainly willing to
2 stipulate to the staff testimony. We just think it
3 probably should be in a list as we put ours together and
4 would do it at that time. That's probably the cleanest?
5 Is that what you're thinking, Ms. Semmler?

6 MS. SEMMLER: Yep. I can have -- have that list
7 together right away.

8 MR. KOENECKE: I don't know Secretary Oster's
9 availability at 9:30. I can check. I know he was
10 unavailable every other day this week. Otherwise, no
11 objection to starting at 9:30 that I'm aware of.

12 And, finally, we have no objection to examining
13 staff's witnesses by telephone, should that be necessary.

14 MR. SMITH: Okay. Mr. Blackburn.

15 MR. BLACKBURN: No objections.

16 MR. SMITH: Pending Mr. Koenecke checking with
17 your witness -- and I forgot -- Oster's availability at a
18 time other than 8:30, I guess.

19 What is the Commissioners' thoughts about 9:30?
20 I think staff -- I've sort of been ambushed here a little
21 bit. I don't want to use that in a negative way. But, I
22 mean, this hasn't gone like we all thought. To me it's
23 reasonable to give them at least some extra time to
24 prepare.

25 COMMISSIONER KOLBECK: No. I think that's very

1 reasonable.

2 CHAIRMAN HANSON: Absolutely. There was no way
3 for staff to anticipate this. So certainly no intent to
4 ambush or anything of that nature. It's from the
5 standpoint that things progressed rather quickly. And I
6 would say that that's due to the prefiled testimony and
7 the fact that we have covered this type of ground before.
8 And so to expedite it, it makes all the sense in the
9 world to give staff that opportunity. Yes.

10 MR. SMITH: Okay. Well, with that then I'm
11 going to -- on the record here so we're lawful about it
12 when we recess today we're going to recess until 9:30 in
13 the morning in lieu of the originally scheduled 8:30.
14 Unless we hear that the only time when Mr. Oster can be
15 available is at 8:30.

16 Because honestly if he could be available any
17 time tomorrow, right, Mr. Koenecke, that would suffice,
18 would it not?

19 MR. KOENECKE: Yes. That's exactly right. His
20 testimony isn't chronologically important to ours or
21 frankly to anybody else's of which I'm aware. And as
22 soon as I find out I'll telephone you and let the parties
23 know as well.

24 MR. SMITH: Okay. Subject to that caveat, we
25 will resume when we do recess here today at 9:30 a.m.

1 tomorrow morning.

2 Does that take care of your issues then,
3 Ms. Semmler then?

4 MS. SEMMLER: The final one was whether we could
5 take testimony from some out-of-state witnesses via
6 telephone. And I don't know that there will be any
7 cross, but in the event there is, we'd prefer to do it
8 via telephone so they aren't required to change travel
9 arrangements and it creates complications.

10 MR. SMITH: Right. I don't -- the parties seem
11 to be amenable to that, as I understand it, I mean, both
12 Mr. Blackburn and --

13 MR. BLACKBURN: That's correct.

14 MR. SMITH: I know in past on a few occasions in
15 general the Commission has not liked to do that just
16 because of difficulties we've had sometimes managing
17 examination over the phone honestly. But with the one
18 thing we have done in the past when we've done that is --
19 the other thing is by the witness being here in
20 South Dakota and of course taking an oath they are then
21 within the jurisdiction of the State of South Dakota and
22 that oath makes them come under our statutes related to
23 the taking of an oath, among them culpability for
24 perjury.

25 And we have asked witnesses in the past to

1 stipulate over the phone that they are in agreement that
2 they are in effect testifying within the jurisdiction of
3 the State of South Dakota and subject to all of our laws
4 related to the taking of an oath and the sanctions that
5 occur with respect thereto.

6 So, okay, Ms. Semmler, that we might want to
7 communicate that to them.

8 MS. SEMMLER: And I don't anticipate any issues
9 with that. That's acceptable.

10 MR. SMITH: Okay. Right. I mean, I would have
11 to say in most of these kind of cases the testimony
12 usually is opinion testimony and it tends more to be
13 being wrong or -- than lying in general anyway. I think
14 the risk of that is quite minimal.

15 Well, I don't know. In terms of today then,
16 Mr. Blackburn -- Mr. Blackburn and I had a brief
17 discussion prior to the commencement of the hearing
18 today, and do you want to bring up now your issues with
19 respect to your case, or do you want to commence a case
20 in chief?

21 And, as I understand it, basically that -- if
22 I'm getting it right and please jump in and correct me if
23 I'm wrong that what you really had were a couple of
24 exhibits that you wanted to try to have admitted either
25 on a judicial notice basis or maybe on a stipulated

1 basis.

2 Would you like to address that now or should we
3 take a quick break so you can organize your thoughts or
4 what do you think?

5 MR. BLACKBURN: It will be a list -- won't be
6 just a couple. We'll be looking at more exhibits than
7 that. What I'd like to do this afternoon is prepare that
8 list. I've got it partially prepared. I'll have a
9 chance to finish it.

10 Tomorrow I can share it with the parties, and
11 they can see whether it's acceptable or not. I believe
12 most of them, if not all of them, will be because they
13 are documents provided by TransCanada or available from
14 other jurisdictions or getting in the public domain. So
15 assuming that those are acceptable, we can probably
16 handle it fairly quickly tomorrow.

17 MR. SMITH: Okay. You were going to prepare a
18 list and then get together with counsel for the other two
19 counsel and --

20 MR. BLACKBURN: That's correct.

21 MR. SMITH: And see if you can work something
22 out? Okay.

23 MR. BLACKBURN: It's nearly done. I just had a
24 couple last things I need to check on before I distribute
25 it.

1 MR. SMITH: Sure. And I think that in order so
2 both Mr. Blackburn -- again we're way ahead of schedule
3 here -- and Ms. Semmler can get their presentations
4 ready, is there any objection to our just going into
5 recess now and you guys can get to work and we'll be
6 ready to proceed in the morning?

7 MR. KOENECKE: No objection.

8 MR. SMITH: Okay. Other parties?

9 MR. BLACKBURN: No objection.

10 MR. SMITH: Okay. Then it's about 2:30. We're
11 in recess then in Docket HP09-001. The hearing will come
12 back to order at 9:30 in the morning, barring the problem
13 with Witness Oster. Thank you, everyone.

14 (The hearing is in recess at 2:30 p.m.)
15
16
17
18
19
20
21
22
23
24
25

1 STATE OF SOUTH DAKOTA)
2 :SS CERTIFICATE
3 COUNTY OF SULLY)
4

5 I, CHERI MCCOMSEY WITTLER, a Registered
6 Professional Reporter, Certified Realtime Reporter and
7 Notary Public in and for the State of South Dakota:
8 DO HEREBY CERTIFY that as the duly-appointed
9 shorthand reporter, I took in shorthand the proceedings
10 had in the above-entitled matter on the 2nd day of
11 November, 2009, and that the attached is a true and
12 correct transcription of the proceedings so taken.

13 Dated at Onida, South Dakota this 23rd day of
14 November, 2009.
15
16
17

18 _____
19 Cheri McComsey Wittler,
20 Notary Public and
21 Registered Professional Reporter
22 Certified Realtime Reporter
23
24
25

	1601 [1] - 127:18 17 [5] - 2:21, 2:23, 8:6, 9:8, 52:20 18 [3] - 99:11, 99:18, 99:20 194 [2] - 134:3 195 [3] - 95:21, 96:9, 96:16 1970s [1] - 130:23 1:30 [3] - 126:15, 126:16, 126:20	2nd [2] - 3:4, 168:10	65 [2] - 68:11, 69:23 69 [1] - 146:9	162:9, 162:11, 162:19, 163:12, 163:25, 167:12 9s [1] - 82:19	1	
'30s [1] - 51:22 '40s [1] - 51:22 '91 [1] - 121:5		3	7	A		
0		3 [6] - 2:13, 2:20, 14:11, 60:22, 143:16, 153:22 30 [4] - 20:21, 20:23, 69:15, 81:17 300 [7] - 39:13, 115:14, 142:20, 143:16, 143:21, 144:2 313 [1] - 137:13 34-foot [2] - 116:14, 116:22	7 [2] - 2:15, 33:19 7,400 [6] - 128:17, 131:13, 131:20, 136:16, 136:24, 137:4 70 [2] - 2:8, 116:19 700 [1] - 116:14 71,73 [1] - 2:8 75 [1] - 2:8 7505 [1] - 23:25 76 [1] - 2:8 78 [3] - 154:1, 154:5, 154:13	a.m [3] - 3:5, 4:20, 163:25 abandoned [3] - 51:23, 91:15, 91:18 abandonment [5] - 48:23, 49:1, 49:8, 51:25, 52:6 ability [3] - 20:8, 145:19, 146:10 able [19] - 4:25, 17:13, 22:8, 35:19, 36:3, 38:2, 40:8, 49:24, 54:24, 58:5, 60:19, 63:1, 68:15, 68:18, 103:19, 104:14, 133:2, 133:11, 147:14 abnormal [3] - 102:3, 102:4, 102:5 above-entitled [2] - 3:2, 168:10 above-ground [2] - 62:2, 77:17 absolutely [8] - 34:16, 36:1, 59:25, 106:15, 107:7, 114:16, 123:4, 163:2 AC [1] - 2:12 acceptable [4] - 153:12, 165:9, 166:11, 166:15 access [4] - 18:2, 22:7, 22:8, 34:6 according [1] - 80:18 accordingly [1] - 17:9 account [3] - 103:23, 117:7, 139:21 accurate [4] - 67:6, 67:8, 74:5, 74:6 acquire [1] - 42:11 acquired [2] - 50:20, 50:22 acquisition [2] - 21:3, 25:16 acreage [3] - 15:5, 15:7, 18:8 acronym [1] - 122:1 acronyms [1] - 107:13 Act [1] - 73:3 act [3] - 4:18, 6:5, 119:5 ACT [1] - 1:6		
0.05 [1] - 61:18 0.463 [1] - 61:16 0.512 [1] - 61:17 0.8 [1] - 63:13	2	4	8			
1	2 [31] - 1:8, 2:12, 2:12, 2:13, 2:13, 2:14, 2:14, 2:15, 2:15, 2:16, 2:17, 2:17, 2:18, 2:19, 2:19, 2:20, 2:20, 2:21, 4:21, 12:12, 39:13, 94:3, 130:4, 148:18, 149:24, 150:7, 150:24, 150:25, 151:1 20 [2] - 19:13, 85:7 20-foot [1] - 116:23 200 [3] - 14:4, 44:18, 114:15 200-meter [1] - 121:9 2002 [1] - 130:13 2007 [2] - 69:10, 69:15 2009 [8] - 1:8, 3:4, 4:21, 5:6, 49:18, 49:22, 168:11, 168:14 2010 [5] - 49:18, 49:24, 50:1, 100:13, 125:13 2011 [4] - 26:9, 26:14, 26:18 2012 [2] - 26:19, 26:22 22 [2] - 109:17, 109:18 23 [1] - 2:7 23rd [1] - 168:13 24 [6] - 81:6, 81:9, 85:8, 93:6, 137:17, 137:19 24-hour [2] - 93:10, 114:12 25 [2] - 29:3, 151:9 26,27 [1] - 2:7 27 [1] - 66:25 28 [3] - 68:12, 69:19, 70:2 29 [1] - 67:6 296 [1] - 132:19 2:30 [2] - 167:10, 167:14	4 [5] - 2:13, 2:21, 45:4, 98:9, 98:11 40-mile-an-hour [1] - 117:11 400 [1] - 23:25 414 [1] - 4:22 43 [1] - 2:7 44 [1] - 2:7 450 [4] - 57:15, 75:18, 75:22, 97:13 48 [2] - 2:7, 133:10 49 [1] - 95:21 49-41B-22 [1] - 5:11 49.195 [1] - 95:23	8 [24] - 2:12, 2:12, 2:13, 2:13, 2:14, 2:14, 2:15, 2:15, 2:16, 2:17, 2:17, 2:18, 2:19, 2:19, 2:20, 2:20, 2:21, 59:14, 68:10, 69:6, 72:11, 92:20, 148:15 8,400 [4] - 129:5, 129:11, 136:18, 136:20 80 [3] - 37:19, 99:13, 123:17 8:30 [5] - 160:21, 160:23, 162:18, 163:13, 163:15			
1 [16] - 2:12, 2:19, 2:23, 8:6, 21:13, 85:11, 85:12, 85:14, 85:16, 85:17, 85:22, 100:13, 125:13, 139:8, 151:4 1,000 [2] - 56:12, 56:13 1,000-pound [3] - 117:18, 123:10, 124:3 1,350 [1] - 56:10 1-168 [1] - 1:9 10 [14] - 2:17, 19:13, 20:13, 20:21, 20:23, 31:1, 31:2, 76:6, 81:4, 81:6, 84:9, 91:9, 128:15, 131:25 100 [7] - 40:18, 82:16, 82:24, 83:3, 83:17, 114:15, 125:19 102 [1] - 21:12 106 [3] - 47:12, 47:21, 48:16 10:30 [1] - 57:2 11 [4] - 2:6, 2:17, 98:2, 98:17 114 [1] - 68:18 118 [1] - 2:9 12 [6] - 2:18, 62:4, 63:17, 117:19, 128:6, 128:9 120 [3] - 2:9, 121:7, 123:18 13 [4] - 2:6, 2:19, 143:24 1300 [2] - 14:4, 44:18 14 [3] - 2:19, 144:10, 144:21 15 [6] - 2:6, 2:20, 5:6, 63:10, 133:8, 133:10 16 [3] - 2:20, 63:22, 64:1	2 [31] - 1:8, 2:12, 2:12, 2:13, 2:13, 2:14, 2:14, 2:15, 2:15, 2:16, 2:17, 2:17, 2:18, 2:19, 2:19, 2:20, 2:20, 2:21, 4:21, 12:12, 39:13, 94:3, 130:4, 148:18, 149:24, 150:7, 150:24, 150:25, 151:1 20 [2] - 19:13, 85:7 20-foot [1] - 116:23 200 [3] - 14:4, 44:18, 114:15 200-meter [1] - 121:9 2002 [1] - 130:13 2007 [2] - 69:10, 69:15 2009 [8] - 1:8, 3:4, 4:21, 5:6, 49:18, 49:22, 168:11, 168:14 2010 [5] - 49:18, 49:24, 50:1, 100:13, 125:13 2011 [4] - 26:9, 26:14, 26:18 2012 [2] - 26:19, 26:22 22 [2] - 109:17, 109:18 23 [1] - 2:7 23rd [1] - 168:13 24 [6] - 81:6, 81:9, 85:8, 93:6, 137:17, 137:19 24-hour [2] - 93:10, 114:12 25 [2] - 29:3, 151:9 26,27 [1] - 2:7 27 [1] - 66:25 28 [3] - 68:12, 69:19, 70:2 29 [1] - 67:6 296 [1] - 132:19 2:30 [2] - 167:10, 167:14	5	9			
		5 [5] - 2:14, 45:15, 72:9, 85:7, 130:15 5,000 [1] - 152:22 50 [5] - 132:12, 132:13, 132:15, 132:16, 133:8 500 [2] - 3:3, 142:11 51 [2] - 68:13, 70:1 527 [1] - 133:8 56 [1] - 11:25 57 [1] - 2:8 58 [1] - 2:8 5L [1] - 61:24	9 [22] - 2:12, 2:12, 2:13, 2:13, 2:14, 2:14, 2:15, 2:15, 2:16, 2:17, 2:17, 2:18, 2:19, 2:19, 2:20, 2:20, 2:21, 3:5, 4:20, 98:7, 98:10 90 [3] - 142:14, 142:20, 143:20 92 [1] - 2:8 93 [1] - 47:15 95 [2] - 2:8, 37:19 97 [4] - 2:9, 133:15, 153:14, 153:20 98 [1] - 2:9 99.9 [1] - 82:15 999 [1] - 82:19 9:30 [7] - 161:18,			
		6				
		6 [3] - 2:14, 98:8, 98:12 60 [1] - 130:22 636 [1] - 154:3 638 [1] - 154:12				

<p>Action [4] - 1:23, 7:11, 71:15, 76:20</p> <p>action [2] - 95:10, 111:25</p> <p>actions [1] - 147:11</p> <p>active [3] - 54:4, 54:9, 104:24</p> <p>activities [3] - 25:19, 25:20, 31:15</p> <p>activity [2] - 53:7, 71:2</p> <p>actual [13] - 20:14, 28:7, 69:23, 70:2, 88:8, 89:16, 109:11, 115:10, 115:16, 117:21, 124:23, 134:12, 142:21</p> <p>actuality [1] - 140:7</p> <p>acute [1] - 149:6</p> <p>add [3] - 42:8, 60:16, 146:8</p> <p>adding [1] - 42:16</p> <p>addition [1] - 105:16</p> <p>additional [21] - 15:4, 15:7, 15:18, 18:4, 33:22, 38:11, 38:20, 42:16, 48:5, 56:22, 59:6, 62:16, 65:21, 66:5, 66:18, 71:14, 71:22, 93:9, 97:2, 118:18, 158:17</p> <p>additions [5] - 12:16, 45:7, 76:15, 98:4, 98:14</p> <p>address [24] - 11:22, 14:1, 14:2, 14:3, 16:25, 23:23, 23:24, 34:14, 44:16, 46:4, 47:9, 54:21, 56:4, 57:14, 58:2, 63:1, 75:18, 75:22, 97:10, 97:12, 98:7, 127:17, 166:2</p> <p>addressed [1] - 139:18</p> <p>addresses [1] - 35:11</p> <p>adequate [1] - 129:9</p> <p>adhere [1] - 56:16</p> <p>adheres [1] - 51:8</p> <p>adjust [3] - 131:7, 135:9, 141:7</p> <p>adjusted [1] - 130:6</p> <p>adjustment [2] - 130:2, 130:3</p> <p>administration [3] - 24:13, 25:15, 59:16</p> <p>administrator [1] - 69:16</p> <p>admit [1] - 66:10</p> <p>admitted [2] - 9:8, 165:24</p>	<p>adopted [1] - 24:14</p> <p>advance [4] - 45:14, 107:16, 108:10, 119:12</p> <p>advantage [2] - 39:3, 106:3</p> <p>advantages [1] - 91:8</p> <p>advised [1] - 101:1</p> <p>advisory [1] - 58:4</p> <p>AECOM [2] - 127:21, 129:6</p> <p>aerial [9] - 88:21, 89:4, 89:19, 90:5, 94:19, 94:21, 154:21, 155:2, 155:3</p> <p>affect [3] - 54:1, 131:9, 141:9</p> <p>affected [2] - 5:23, 135:22</p> <p>affinity [1] - 146:1</p> <p>afternoon [1] - 166:7</p> <p>agencies [1] - 49:4</p> <p>agency [2] - 74:20, 148:3</p> <p>agent [1] - 73:5</p> <p>ago [6] - 7:6, 29:4, 34:12, 104:5, 122:21, 136:13</p> <p>agree [3] - 134:15, 144:16, 152:14</p> <p>agreeable [2] - 17:18, 21:5</p> <p>agreed [1] - 161:21</p> <p>agreement [1] - 165:1</p> <p>agrees [1] - 33:9</p> <p>agricultural [1] - 30:6</p> <p>ahead [3] - 55:19, 110:9, 167:2</p> <p>aid [1] - 36:3</p> <p>air [1] - 34:7</p> <p>aircraft [1] - 105:7</p> <p>albeit [1] - 139:11</p> <p>Alberta [3] - 11:25, 75:22, 97:13</p> <p>alignment [1] - 55:9</p> <p>allow [7] - 37:8, 59:17, 65:4, 65:16, 99:10, 99:15, 146:15</p> <p>allowable [1] - 56:3</p> <p>allowance [1] - 59:7</p> <p>allowed [1] - 71:20</p> <p>allowing [1] - 74:16</p> <p>allows [1] - 130:18</p> <p>alluding [1] - 67:21</p> <p>alluvial [1] - 158:9</p> <p>almost [7] - 37:10, 41:17, 42:17, 42:18, 56:10, 82:3, 115:4</p> <p>alone [3] - 46:21, 59:1, 141:15</p>	<p>ALSO [1] - 2:1</p> <p>alternative [3] - 143:5, 143:9, 143:12</p> <p>ambush [1] - 163:4</p> <p>ambushed [1] - 162:20</p> <p>amenable [1] - 164:11</p> <p>America [1] - 122:10</p> <p>ammonia [1] - 150:11</p> <p>amount [4] - 56:13, 114:22, 132:6, 152:7</p> <p>analysis [6] - 62:16, 73:16, 145:13, 148:16, 153:10, 153:20</p> <p>analysts [1] - 7:23</p> <p>analyze [3] - 77:6, 130:19, 132:5</p> <p>analyzed [2] - 148:22, 153:18</p> <p>AND [1] - 1:5</p> <p>animals [1] - 152:1</p> <p>Anissa [2] - 1:17, 11:1</p> <p>Anissa's [1] - 10:20</p> <p>anomalies [1] - 93:11</p> <p>answer [27] - 30:22, 41:12, 59:2, 63:17, 63:24, 64:3, 66:14, 79:20, 79:23, 79:25, 80:6, 84:3, 88:19, 98:8, 98:11, 104:6, 109:8, 109:9, 110:7, 111:18, 118:16, 118:21, 121:21, 138:17, 143:24, 155:17, 156:7</p> <p>answered [4] - 34:9, 76:2, 111:18, 159:18</p> <p>answers [10] - 12:20, 14:17, 25:3, 45:11, 45:19, 66:15, 76:13, 80:4, 98:17, 128:13</p> <p>anticipate [8] - 10:14, 37:6, 37:7, 38:19, 60:19, 138:14, 163:3, 165:8</p> <p>anticipated [2] - 49:17, 161:16</p> <p>anticipation [2] - 57:19, 59:21</p> <p>anyway [2] - 126:19, 165:13</p> <p>apart [1] - 17:6</p> <p>API [2] - 61:24, 102:17</p> <p>appealed [1] - 6:2</p> <p>appear [4] - 7:19, 9:19, 9:20, 10:3</p> <p>APPEARANCES [1] - 1:18</p> <p>appearances [2] -</p>	<p>6:17, 7:10</p> <p>appearing [7] - 1:19, 1:19, 1:20, 1:21, 1:22, 7:22, 9:14</p> <p>appended [1] - 69:13</p> <p>apples [2] - 52:2, 52:3</p> <p>applicability [1] - 64:10</p> <p>applicable [2] - 5:14, 69:10</p> <p>Applicant [12] - 1:19, 1:20, 1:21, 1:22, 2:23, 5:10, 6:18, 6:24, 11:16, 44:10, 127:4, 160:17</p> <p>APPLICANT [2] - 2:5, 2:11</p> <p>Application [16] - 2:12, 4:16, 8:7, 15:3, 21:12, 24:21, 27:9, 28:12, 33:20, 56:5, 57:5, 62:11, 62:13, 62:15, 62:17, 127:1</p> <p>APPLICATION [1] - 1:4</p> <p>application [1] - 129:23</p> <p>applications [2] - 72:16, 74:11</p> <p>applied [3] - 26:17, 62:11, 113:5</p> <p>applies [1] - 99:13</p> <p>apply [8] - 46:6, 46:15, 61:25, 63:23, 64:2, 64:3, 102:6, 131:3</p> <p>applying [1] - 67:16</p> <p>appointed [1] - 168:8</p> <p>appreciate [5] - 67:20, 108:19, 109:3, 112:23, 136:11</p> <p>approach [1] - 18:12</p> <p>appropriate [8] - 7:3, 58:12, 76:23, 119:20, 147:7, 147:11, 148:4, 148:9</p> <p>approval [4] - 118:11, 119:4, 119:8, 125:23</p> <p>approve [5] - 90:16, 92:5, 112:9, 119:2, 119:3</p> <p>approved [8] - 61:15, 62:19, 90:14, 91:24, 101:8, 108:9, 160:5, 161:22</p> <p>approving [1] - 122:6</p> <p>April [1] - 69:15</p> <p>area [26] - 5:18, 15:18, 18:9, 33:1, 35:5, 38:9, 40:21, 42:4, 46:1, 58:1, 64:22,</p>	<p>71:11, 76:1, 89:3, 89:5, 89:20, 115:15, 117:8, 139:23, 140:17, 141:12, 143:1, 152:12, 154:18, 154:24, 158:3</p> <p>areas [35] - 29:23, 30:11, 30:13, 30:14, 30:19, 31:1, 32:21, 39:12, 43:23, 54:18, 55:8, 58:2, 63:24, 64:2, 64:4, 64:7, 64:16, 65:6, 65:9, 65:11, 66:13, 70:12, 70:21, 70:23, 71:1, 71:6, 139:15, 151:25, 152:4, 152:5, 152:6, 152:7, 153:3, 158:9, 158:10</p> <p>arrangement [1] - 117:17</p> <p>arrangements [3] - 116:9, 124:16, 164:9</p> <p>art [3] - 86:20, 96:18, 102:15</p> <p>ascertain [1] - 147:14</p> <p>aside [1] - 61:14</p> <p>aspect [5] - 21:23, 40:23, 72:20, 82:14, 110:22</p> <p>aspects [2] - 31:7, 72:17</p> <p>assessment [12] - 73:15, 127:22, 129:4, 129:8, 131:16, 134:16, 135:10, 137:21, 139:22, 140:4, 152:10</p> <p>assessments [4] - 60:23, 140:24, 153:1, 153:7</p> <p>assign [1] - 35:4</p> <p>assigned [2] - 55:12, 104:18</p> <p>assistance [1] - 44:1</p> <p>associate [2] - 69:16, 113:5</p> <p>associated [3] - 27:16, 45:25, 153:5</p> <p>assume [8] - 18:21, 74:5, 111:7, 122:24, 133:23, 138:17, 144:2, 145:12</p> <p>assumed [1] - 117:10</p> <p>assuming [3] - 99:5, 112:8, 166:15</p> <p>attached [2] - 89:19, 168:11</p>
---	--	---	--	---

attempting [2] - 21:25, 42:3
attend [1] - 110:16
attendeess [1] - 75:16
attention [1] - 39:15
attenuation [1] - 147:5
attorney [2] - 5:25, 69:5
attorneys [2] - 108:16, 118:16
attributed [1] - 139:9
auditing [1] - 109:2
authorities [2] - 40:20, 41:2
automated [1] - 93:25
automatic [1] - 83:25
auxiliary [1] - 125:6
availability [4] - 39:12, 135:6, 162:9, 162:17
available [11] - 15:23, 28:15, 36:2, 36:11, 86:13, 100:11, 116:18, 132:5, 163:15, 163:16, 166:13
Avenue [1] - 3:3
average [2] - 132:10, 132:12
avoid [4] - 47:20, 53:11, 140:13, 152:5
avoided [1] - 53:15
aware [18] - 27:23, 28:3, 36:19, 36:20, 41:10, 41:12, 48:24, 49:3, 49:9, 73:2, 73:17, 77:5, 77:11, 79:11, 121:4, 121:11, 162:11, 163:21
awareness [4] - 36:23, 41:7, 106:24, 107:11

B

B-O-O-M [1] - 125:4
Bachelor [1] - 113:5
background [2] - 37:13, 122:9
backhoe's [1] - 19:17
backtrack [1] - 64:14
backup [7] - 81:15, 81:16, 82:21, 83:1, 83:9, 83:14, 83:15
bad [1] - 157:14
Bakken [2] - 156:11, 156:13
balance [3] - 82:5, 93:17, 109:20
barometer [1] - 138:16

barrel [2] - 105:3, 132:14
barrels [11] - 78:5, 78:6, 78:7, 132:2, 132:9, 132:16, 133:9, 133:10, 154:3, 154:13, 155:10
barring [1] - 167:12
base [11] - 99:13, 109:18, 111:3, 112:2, 113:9, 115:3, 117:1, 118:2, 122:17, 123:25, 125:15
based [25] - 15:16, 23:2, 46:6, 74:13, 82:18, 85:2, 94:18, 110:12, 113:8, 116:3, 128:24, 129:2, 129:20, 131:8, 135:10, 137:20, 138:24, 139:19, 140:19, 142:3, 148:1, 148:21, 148:22, 150:7
baseline [2] - 129:15, 134:16
basic [1] - 114:22
basis [9] - 73:20, 86:15, 94:11, 104:2, 111:7, 132:3, 137:25, 165:25, 166:1
bearing [1] - 61:14
become [4] - 6:11, 17:17, 74:14, 154:14
becomes [2] - 82:6, 154:16
BEFORE [1] - 1:11
begging [1] - 44:24
begin [7] - 4:15, 6:16, 6:17, 7:9, 10:8, 26:24, 134:19
beginning [1] - 146:23
behalf [6] - 1:19, 1:19, 1:20, 1:21, 1:22, 97:16
behavior [1] - 156:18
behind [1] - 7:2
below [2] - 84:22, 89:23
Bemidji [1] - 121:5
benchmark [1] - 85:6
benefits [1] - 151:24
benzene [1] - 146:10
berms [1] - 38:2
best [11] - 10:23, 11:9, 31:7, 33:5, 35:9,

59:23, 86:11, 103:20, 106:8, 112:20, 129:2
better [21] - 5:2, 16:13, 31:19, 34:9, 49:20, 59:23, 64:6, 64:13, 64:19, 65:10, 68:18, 86:10, 86:15, 86:17, 86:22, 93:2, 111:5, 111:8, 111:9, 115:23, 137:5
between [6] - 16:20, 29:14, 42:4, 61:11, 123:17, 125:16
bid [1] - 46:10
bidder [1] - 46:14
bids [4] - 27:19, 46:13, 46:20, 47:6
big [3] - 105:9, 120:14, 120:15
bigger [2] - 87:21, 146:14
biggest [1] - 146:4
bill [1] - 1:21
Binder [2] - 1:15, 7:23
bit [15] - 24:24, 30:10, 53:1, 58:21, 66:13, 77:2, 81:13, 88:23, 89:1, 89:9, 94:8, 113:10, 153:15, 156:22, 162:21
Blackburn [22] - 1:22, 7:12, 7:14, 10:3, 12:25, 14:22, 26:1, 48:8, 58:9, 80:10, 98:22, 99:10, 107:18, 120:2, 120:18, 123:4, 133:18, 162:14, 164:12, 165:16, 167:2
BLACKBURN [39] - 7:13, 8:21, 9:11, 9:14, 10:6, 13:1, 13:4, 14:23, 23:1, 26:3, 27:3, 48:10, 49:10, 58:11, 58:15, 71:16, 71:18, 73:21, 76:22, 80:2, 80:8, 80:11, 98:24, 100:14, 120:3, 120:5, 126:1, 126:3, 133:20, 135:14, 158:22, 159:1, 160:8, 162:15, 164:13, 166:5, 166:20, 166:23, 167:9
Blackburn's [2] - 51:17, 80:1

blade [1] - 33:9
blizzard [2] - 104:9, 104:16
BLM [1] - 153:10
block [2] - 107:6, 121:3
blowing [1] - 158:1
blue [1] - 123:12
bluntly [2] - 22:2, 104:14
Board [1] - 109:22
boat [5] - 112:13, 112:16, 112:18, 113:22, 114:17
boats [3] - 114:3, 115:19, 125:2
Bob [2] - 1:16, 7:24
bodies [2] - 5:23, 134:12
body [3] - 34:5, 101:9, 134:11
bond [2] - 67:15, 156:1
bonded [1] - 67:2
book [1] - 129:9
boom [2] - 125:4
border [1] - 24:10
bore [3] - 32:20, 59:9
bored [1] - 71:6
bottom [1] - 156:19
boulevard [2] - 14:4, 44:18
bounds [1] - 131:19
break [3] - 10:14, 26:21, 166:3
breaks [1] - 10:14
Brett [3] - 1:19, 6:23, 8:4
Brian [3] - 111:13, 121:19, 121:20
brief [2] - 23:12, 165:16
briefly [1] - 23:8
bring [3] - 46:19, 77:25, 165:18
broad [1] - 139:25
broken [2] - 93:23, 129:12
brought [3] - 151:20, 151:22
bruises [1] - 34:25
BTEX [5] - 142:11, 145:25, 146:5, 150:7, 151:3
BTEX-based [1] - 150:7
bubble [3] - 78:13, 78:14, 156:17
Buffalo [2] - 40:1, 107:3

Building [1] - 3:3
buildings [1] - 21:13
built [6] - 18:12, 46:22, 51:22, 103:19, 103:21, 130:22
bulldozers [1] - 116:5
bunch [2] - 89:11, 93:24
bundled [1] - 23:5
bundles [1] - 21:9
burden [3] - 5:10, 5:11, 51:14
business [7] - 57:14, 75:18, 75:21, 97:10, 97:12, 119:23, 127:17
buttes [2] - 30:18, 31:11
BY [27] - 1:4, 11:19, 13:18, 15:2, 23:21, 26:3, 27:7, 43:13, 44:15, 48:10, 57:12, 58:11, 70:10, 71:18, 73:24, 75:12, 76:22, 92:18, 95:18, 97:7, 98:24, 118:24, 120:5, 127:12, 133:20, 135:20, 159:1
bypass [1] - 30:18

C

cable [1] - 71:2
Caitlin [1] - 9:15
calculated [7] - 78:22, 79:7, 79:18, 128:24, 129:4, 132:8, 137:24
calculating [1] - 93:18
calculation [4] - 94:5, 131:12, 131:15, 137:16
calculations [2] - 77:23, 77:24
calculus [1] - 137:5
Calgary [5] - 11:25, 57:15, 75:22, 81:11, 97:13
California [3] - 121:12, 141:6, 155:23
camp [14] - 16:3, 27:14, 27:22, 28:3, 28:8, 34:23, 35:13, 35:21, 37:8, 38:14, 46:6, 46:10, 46:14
camps [9] - 27:9, 27:12, 27:20, 34:19,

<p>45:25, 46:11, 50:15, 50:25, 56:8</p> <p>Canada [9] - 83:7, 85:13, 103:11, 103:12, 103:14, 103:16, 109:22, 113:13, 122:10</p> <p>Canadian [4] - 24:10, 155:15, 156:4, 156:10</p> <p>capacity [2] - 12:2, 58:4</p> <p>capitals [1] - 125:24</p> <p>Capitol [3] - 3:2, 3:3, 4:22</p> <p>car [2] - 157:15, 157:16</p> <p>care [4] - 41:2, 43:16, 161:1, 164:2</p> <p>carry [1] - 51:14</p> <p>case [21] - 7:18, 10:17, 11:14, 37:19, 45:4, 77:8, 77:22, 78:2, 78:8, 78:9, 83:22, 93:9, 127:5, 128:4, 128:20, 138:1, 160:22, 161:4, 161:6, 165:19</p> <p>cases [7] - 21:14, 36:16, 102:19, 142:15, 143:20, 151:13, 165:11</p> <p>catch [2] - 84:20, 151:12</p> <p>categorizes [1] - 130:14</p> <p>catholic [2] - 67:4, 130:24</p> <p>CATs [1] - 116:5</p> <p>causes [1] - 129:22</p> <p>caveat [2] - 29:11, 163:24</p> <p>center [9] - 81:11, 81:15, 81:16, 81:17, 81:19, 88:13, 95:10, 103:5, 105:8</p> <p>certain [13] - 10:21, 16:10, 18:17, 30:19, 64:22, 96:11, 106:6, 113:4, 117:8, 137:2, 150:20, 155:2, 155:22</p> <p>certainly [16] - 29:17, 30:11, 31:23, 32:19, 34:20, 53:22, 74:2, 95:19, 114:10, 141:9, 142:23, 146:14, 147:15, 158:9, 162:1, 163:3</p> <p>CERTIFICATE [1] -</p>	<p>168:2</p> <p>certification [2] - 113:15, 114:14</p> <p>Certified [2] - 168:6, 168:19</p> <p>CERTIFY [1] - 168:8</p> <p>cetera [8] - 15:17, 18:3, 89:3, 104:4, 104:20, 105:21, 123:24, 138:6</p> <p>CFR [1] - 95:21</p> <p>chair [1] - 28:24</p> <p>chairman [2] - 6:15, 23:1</p> <p>CHAIRMAN [25] - 1:11, 136:8, 136:11, 136:22, 136:25, 137:18, 138:2, 138:21, 139:1, 139:4, 139:7, 140:25, 141:20, 143:14, 143:22, 144:4, 144:7, 144:21, 144:23, 145:2, 145:5, 146:16, 147:6, 148:11, 163:2</p> <p>challenge [2] - 39:7, 39:8</p> <p>challenges [11] - 10:21, 16:15, 29:19, 29:22, 29:25, 30:10, 38:16, 38:23, 50:3, 50:6</p> <p>challenging [2] - 30:4, 30:8</p> <p>chance [9] - 35:15, 54:25, 128:16, 130:7, 131:17, 131:18, 137:18, 149:6, 166:9</p> <p>chances [1] - 149:6</p> <p>change [20] - 15:8, 19:25, 20:1, 43:1, 90:16, 90:21, 90:22, 91:11, 98:6, 98:8, 109:24, 109:25, 110:1, 110:4, 112:9, 112:22, 122:19, 137:6, 143:23, 164:8</p> <p>changed [5] - 19:24, 43:3, 90:17, 98:12, 128:21</p> <p>changes [15] - 14:13, 15:22, 30:20, 45:7, 93:13, 110:5, 110:25, 111:8, 111:14, 111:23, 112:4, 122:16, 122:22, 128:8</p>	<p>changing [1] - 74:18</p> <p>characteristics [1] - 152:20</p> <p>characterize [2] - 123:9, 158:3</p> <p>characterized [1] - 102:13</p> <p>charge [1] - 102:3</p> <p>chart [1] - 21:11</p> <p>chatting [1] - 136:17</p> <p>check [3] - 109:20, 162:9, 166:24</p> <p>checking [1] - 162:16</p> <p>checklist [2] - 109:11, 109:14</p> <p>chemical [1] - 60:6</p> <p>chemically [1] - 74:10</p> <p>chemicals [1] - 145:24</p> <p>CHERI [1] - 168:5</p> <p>Cheri [5] - 1:25, 10:13, 126:12, 160:17, 168:18</p> <p>chief [1] - 165:20</p> <p>chiefs [1] - 123:24</p> <p>children [1] - 37:8</p> <p>choice [3] - 28:18, 33:1, 33:7</p> <p>chosen [1] - 46:14</p> <p>chronologically [1] - 163:20</p> <p>Circuit [1] - 6:3</p> <p>citizens [1] - 138:8</p> <p>City [5] - 24:1, 24:9, 24:11, 25:14, 27:1</p> <p>clarification [1] - 14:25</p> <p>clarify [3] - 102:4, 136:3, 150:1</p> <p>clarifying [1] - 19:11</p> <p>class [1] - 114:24</p> <p>classified [2] - 139:24, 140:1</p> <p>classify [4] - 78:18, 113:2, 113:23, 149:1</p> <p>clean [2] - 31:15, 144:12</p> <p>cleanest [1] - 162:4</p> <p>cleanup [7] - 115:11, 124:20, 146:24, 147:25, 148:9, 149:10, 149:11</p> <p>clear [6] - 4:9, 90:19, 99:17, 99:19, 107:19, 125:16</p> <p>cleared [1] - 122:18</p> <p>clearly [1] - 10:12</p> <p>cliff [6] - 30:14, 31:23, 31:24, 32:2, 32:16, 32:24</p> <p>cliffs [1] - 31:6</p>	<p>clock [1] - 126:19</p> <p>close [5] - 4:8, 39:15, 121:2, 128:1, 151:4</p> <p>closer [3] - 24:24, 127:25, 151:8</p> <p>closure [1] - 60:21</p> <p>CMRP [1] - 25:23</p> <p>co [5] - 1:19, 1:20, 1:21, 9:15, 127:6</p> <p>co-counsel [5] - 1:19, 1:20, 1:21, 9:15, 127:6</p> <p>CO2 [1] - 150:10</p> <p>coal [2] - 114:21, 114:23</p> <p>coated [1] - 67:14</p> <p>coating [3] - 67:4, 67:17, 130:23</p> <p>colds [1] - 34:25</p> <p>collapsed [1] - 139:16</p> <p>collar [2] - 123:12, 123:19</p> <p>collected [1] - 130:12</p> <p>collects [1] - 130:16</p> <p>college [1] - 114:24</p> <p>Collier [2] - 9:15, 9:20</p> <p>Collins [1] - 127:16</p> <p>Colorado [1] - 127:16</p> <p>column [1] - 153:17</p> <p>columns [1] - 132:6</p> <p>combined [1] - 142:10</p> <p>comfortable [2] - 92:5, 152:23</p> <p>coming [8] - 15:17, 85:22, 87:20, 89:13, 89:18, 90:8, 140:14, 154:23</p> <p>command [4] - 110:19, 114:15, 123:21, 125:1</p> <p>commanders [1] - 123:23</p> <p>commence [2] - 8:3, 165:19</p> <p>commencement [1] - 165:17</p> <p>commencing [1] - 3:4</p> <p>comment [2] - 34:11, 74:25</p> <p>comments [3] - 100:4, 100:6, 161:24</p> <p>COMMISSION [3] - 1:1, 1:11, 1:13</p> <p>Commission [15] - 6:9, 7:3, 10:8, 24:4, 24:7, 25:10, 56:17, 58:1, 58:16, 59:3, 101:6, 118:9, 128:22, 161:22, 164:15</p>	<p>Commission's [6] - 4 5:5, 6:2, 6:5, 6:7, 7:9, 9:19</p> <p>COMMISSIONER [180] - 1:12, 4:1, 10:4, 10:11, 13:10, 13:11, 16:9, 16:19, 18:14, 19:5, 19:9, 19:21, 20:19, 20:25, 21:7, 22:18, 28:24, 29:17, 30:9, 31:22, 32:1, 32:15, 33:14, 33:17, 33:25, 34:10, 35:23, 36:5, 36:18, 37:3, 37:11, 38:7, 38:11, 38:19, 39:9, 39:21, 49:15, 49:23, 50:2, 50:11, 50:14, 51:9, 51:13, 51:17, 52:2, 52:7, 52:10, 52:14, 53:22, 54:6, 54:11, 58:19, 59:20, 60:8, 60:15, 60:18, 61:3, 61:7, 61:20, 62:3, 62:9, 62:18, 62:21, 63:2, 63:6, 63:8, 66:19, 67:9, 67:20, 80:17, 80:23, 81:1, 81:5, 81:10, 81:14, 81:20, 82:13, 83:4, 83:10, 83:16, 83:24, 84:2, 84:8, 84:15, 84:19, 84:23, 85:12, 85:16, 85:20, 85:25, 86:4, 86:9, 86:16, 86:21, 87:3, 87:6, 87:9, 87:14, 87:17, 87:21, 87:24, 88:2, 90:13, 90:20, 91:3, 91:10, 91:14, 91:23, 92:4, 92:11, 92:14, 100:22, 101:2, 101:4, 101:11, 101:16, 101:19, 101:21, 101:25, 102:2, 102:9, 102:23, 102:25, 103:7, 103:11, 103:13, 103:25, 104:7, 105:1, 105:10, 105:14, 106:1, 106:5, 106:13, 106:16, 107:2, 107:5, 107:8, 107:19, 107:25, 108:11, 108:20, 108:23, 110:9, 111:4, 111:16, 112:6, 112:21, 113:1, 113:21, 114:2, 114:8,</p>
---	---	--	--	---

<p>114:18, 114:21, 115:7, 148:14, 149:1, 149:13, 149:20, 149:24, 150:6, 150:15, 150:22, 151:15, 152:11, 152:21, 153:13, 153:21, 154:7, 154:12, 155:8, 155:13, 155:25, 156:8, 156:16, 157:6, 157:10, 157:13, 157:19, 162:25</p> <p>Commissioner [36] - 4:24, 10:9, 16:7, 16:8, 19:7, 19:10, 22:15, 22:16, 28:23, 33:16, 41:24, 43:8, 50:13, 52:12, 54:13, 56:19, 58:18, 61:6, 63:5, 66:17, 67:25, 70:7, 88:4, 88:17, 92:13, 100:21, 108:22, 112:25, 117:25, 126:7, 126:15, 136:7, 148:13, 157:23, 158:20</p> <p>Commissioners [15] - 6:22, 8:15, 10:1, 13:8, 13:19, 23:17, 49:14, 58:18, 75:15, 80:15, 90:12, 92:24, 100:19, 130:10, 136:6</p> <p>Commissioners' [1] - 162:19</p> <p>commitment [1] - 96:14</p> <p>commitments [1] - 96:7</p> <p>committed [1] - 117:3</p> <p>committees [1] - 107:13</p> <p>common [1] - 74:14</p> <p>commonly [1] - 50:4</p> <p>communicate [1] - 165:7</p> <p>communication [7] - 7:15, 82:23, 82:25, 83:2, 83:5, 125:2</p> <p>communications [5] - 74:23, 86:18, 86:19, 86:22, 86:23</p> <p>community [1] - 142:8</p> <p>compact [1] - 156:24</p> <p>companies [3] - 83:1, 87:10, 90:9</p> <p>company [14] - 87:15,</p>	<p>87:25, 89:15, 91:6, 95:20, 111:2, 111:19, 112:14, 114:9, 114:22, 117:18, 122:5, 122:20, 124:2</p> <p>company's [1] - 43:25</p> <p>company-owned [1] - 112:14</p> <p>comparable [1] - 155:22</p> <p>compared [5] - 129:17, 131:5, 150:18, 151:7, 155:15</p> <p>compels [1] - 52:17</p> <p>complaint [1] - 105:6</p> <p>complaints [1] - 42:21</p> <p>complement [1] - 7:1</p> <p>complete [5] - 8:12, 23:10, 77:9, 81:18, 94:10</p> <p>completed [3] - 31:14, 31:15, 41:17</p> <p>compliance [1] - 108:17</p> <p>compliant [1] - 109:16</p> <p>complications [1] - 164:9</p> <p>complimentary [1] - 92:21</p> <p>comply [3] - 5:13, 73:18, 95:21</p> <p>component [11] - 6:20, 59:21, 60:6, 72:22, 73:9, 74:1, 74:8, 108:25, 109:25, 110:20, 138:4</p> <p>components [2] - 114:13, 142:12</p> <p>compounds [6] - 145:25, 146:5, 146:9, 149:9, 151:5, 155:20</p> <p>computerized [2] - 93:25, 94:18</p> <p>computerized-based [1] - 94:18</p> <p>conceivably [1] - 43:24</p> <p>concentration [2] - 143:2, 146:11</p> <p>concept [1] - 46:24</p> <p>concern [2] - 34:12, 142:12</p> <p>concerned [7] - 16:20, 22:10, 32:19, 52:25, 115:16, 120:8, 134:21</p>	<p>concerns [9] - 34:14, 34:15, 38:12, 39:10, 39:19, 39:25, 42:20, 140:16, 161:24</p> <p>condition [4] - 5:16, 68:10, 118:8, 118:12</p> <p>conditions [5] - 59:15, 65:14, 65:15, 71:19, 145:12</p> <p>conduct [5] - 6:6, 6:14, 15:11, 47:23, 65:3</p> <p>conducting [2] - 73:3, 158:15</p> <p>configuration [1] - 20:15</p> <p>confirm [1] - 26:4</p> <p>confronted [2] - 16:15, 29:19</p> <p>confused [1] - 149:14</p> <p>confusing [2] - 63:23, 64:5</p> <p>connection [2] - 88:21, 90:5</p> <p>consent [2] - 9:20, 10:2</p> <p>consequence [7] - 64:4, 64:7, 64:16, 65:11, 151:25, 152:4, 152:7</p> <p>conservative [5] - 130:2, 130:6, 131:3, 131:23, 137:21</p> <p>consider [7] - 8:14, 64:25, 130:24, 140:21, 140:23, 142:4, 152:13</p> <p>consideration [6] - 5:22, 31:6, 59:12, 125:21, 125:22, 151:19</p> <p>considerations [1] - 74:13</p> <p>considered [3] - 26:19, 149:21, 150:11</p> <p>consist [1] - 141:13</p> <p>consisted [1] - 154:3</p> <p>console [1] - 93:6</p> <p>consolidated [1] - 156:25</p> <p>consolidation [1] - 157:5</p> <p>constituents [4] - 142:17, 142:19, 145:20, 147:3</p> <p>construct [6] - 4:18, 5:8, 42:9, 42:15, 95:20, 127:2</p> <p>CONSTRUCT [1] - 1:6</p>	<p>constructability [2] - 16:24, 71:10</p> <p>constructed [4] - 20:16, 72:9, 80:20, 90:14</p> <p>constructing [2] - 20:6, 30:1</p> <p>Construction [1] - 25:23</p> <p>construction [41] - 16:3, 20:2, 20:4, 20:9, 24:12, 24:13, 25:13, 25:15, 25:17, 25:19, 25:20, 26:7, 26:9, 26:12, 26:22, 26:24, 27:8, 29:12, 30:15, 35:16, 37:18, 39:1, 39:4, 42:21, 46:10, 50:23, 52:23, 53:15, 53:21, 53:24, 54:1, 55:9, 55:13, 55:19, 57:6, 72:15, 72:18, 99:7, 127:1, 131:8</p> <p>consultant [3] - 13:22, 31:4, 121:11</p> <p>consultants [1] - 44:18</p> <p>contact [5] - 35:6, 35:18, 37:4, 119:19, 145:18</p> <p>contacting [1] - 17:18</p> <p>contacts [1] - 43:18</p> <p>contain [5] - 27:13, 27:21, 38:2, 116:7, 144:12</p> <p>contained [7] - 12:21, 14:17, 24:21, 45:11, 45:18, 128:12, 128:19</p> <p>containment [1] - 125:4</p> <p>contaminant [2] - 146:12, 147:17</p> <p>contaminants [2] - 144:16, 145:9</p> <p>contaminating [1] - 154:18</p> <p>contamination [5] - 141:21, 143:25, 147:20, 147:22, 158:8</p> <p>contemplated [2] - 26:13, 52:1</p> <p>content [3] - 61:21, 151:3, 151:6</p> <p>context [1] - 67:16</p> <p>continual [3] - 109:23, 110:7, 110:10</p> <p>continued [1] - 109:2</p>	<p>continues [2] - 58:24, 74:4</p> <p>contour [1] - 32:23</p> <p>contours [3] - 31:16, 31:17, 31:20</p> <p>contract [4] - 37:19, 38:6, 39:5, 123:15</p> <p>contractor [15] - 27:16, 35:16, 36:14, 38:6, 43:18, 51:4, 51:7, 75:24, 75:25, 110:3, 122:23, 123:1, 123:3, 124:22, 127:21</p> <p>contractors [15] - 35:4, 36:24, 39:4, 43:15, 44:5, 47:11, 50:16, 104:23, 104:25, 106:10, 123:5, 123:6, 124:12, 124:14, 129:7</p> <p>contracts [3] - 124:1, 124:11</p> <p>contractual [2] - 116:9, 117:17</p> <p>control [11] - 37:24, 49:22, 65:20, 72:18, 81:11, 81:17, 81:18, 88:13, 95:10, 103:5, 105:8</p> <p>controlled [1] - 60:13</p> <p>controller [1] - 88:8</p> <p>controllers [2] - 81:9, 93:10</p> <p>controlling [1] - 93:6</p> <p>conversion [1] - 52:5</p> <p>CONVERSION [1] - 1:5</p> <p>Conversion [1] - 4:18</p> <p>convert [1] - 137:12</p> <p>cookie [2] - 18:11, 42:18</p> <p>coordinate [1] - 43:20</p> <p>copper [1] - 83:6</p> <p>copy [8] - 8:6, 8:12, 12:9, 68:23, 68:25, 69:2, 98:1</p> <p>corporation [1] - 123:8</p> <p>correct [63] - 14:11, 14:12, 15:24, 21:1, 21:2, 24:16, 24:17, 44:2, 44:3, 46:15, 48:17, 48:18, 50:15, 54:7, 62:19, 62:20, 62:22, 63:21, 66:1, 68:8, 74:8, 74:9, 74:20, 74:21, 79:1, 79:5, 79:6, 79:16,</p>
--	--	--	---	--

<p>85:23, 89:25, 91:12, 92:22, 95:22, 96:5, 96:19, 98:13, 99:21, 99:25, 101:12, 101:14, 101:15, 102:24, 104:19, 107:7, 107:9, 107:24, 108:8, 110:25, 111:12, 113:24, 119:2, 119:18, 122:3, 122:8, 125:19, 128:4, 131:11, 157:18, 161:7, 164:13, 165:22, 166:20, 168:12</p> <p>corrections [6] - 12:16, 14:13, 76:15, 98:4, 98:14, 128:8</p> <p>correctly [5] - 64:19, 98:10, 111:7, 113:25, 137:1</p> <p>corresponding [1] - 9:5</p> <p>corridor [1] - 20:11</p> <p>corrode [2] - 156:2, 156:5</p> <p>corrosion [8] - 67:7, 67:10, 67:18, 71:24, 129:13, 129:14, 129:21, 156:1</p> <p>cost [1] - 147:25</p> <p>counsel [9] - 1:19, 1:20, 1:21, 6:5, 9:15, 10:3, 127:6, 166:18, 166:19</p> <p>counsel's [1] - 6:9</p> <p>count [1] - 106:22</p> <p>countries [2] - 103:20, 103:24</p> <p>country [1] - 103:22</p> <p>County [1] - 48:2</p> <p>COUNTY [1] - 168:3</p> <p>couple [12] - 68:1, 113:18, 115:9, 118:20, 132:22, 137:7, 137:10, 157:24, 158:22, 165:23, 166:6, 166:24</p> <p>coupled [3] - 59:14, 65:15, 65:23</p> <p>course [8] - 8:10, 17:22, 68:20, 77:15, 90:2, 94:18, 109:3, 164:20</p> <p>court [10] - 10:13, 11:17, 13:16, 23:19, 44:13, 57:10, 75:10, 97:5, 122:2, 127:10</p>	<p>Court [2] - 6:3, 6:4</p> <p>cover [5] - 53:17, 65:19, 69:15, 77:4, 135:3</p> <p>covered [2] - 134:20, 163:7</p> <p>create [2] - 99:5, 99:17</p> <p>creates [2] - 59:22, 164:9</p> <p>creation [1] - 97:20</p> <p>crescent [1] - 11:25</p> <p>crews [2] - 146:15, 146:24</p> <p>criteria [1] - 130:15</p> <p>critically [1] - 110:23</p> <p>cross [11] - 6:1, 12:24, 25:6, 29:14, 48:7, 50:6, 54:10, 56:23, 58:8, 133:17, 164:7</p> <p>CROSS [10] - 2:5, 15:1, 26:2, 27:6, 48:9, 58:10, 76:21, 98:23, 133:19, 135:19</p> <p>CROSS-</p> <p>EXAMINATION [9] - 15:1, 26:2, 27:6, 48:9, 58:10, 76:21, 98:23, 133:19, 135:19</p> <p>cross-examination [7] - 6:1, 12:24, 25:6, 48:7, 56:23, 58:8, 133:17</p> <p>crosses [1] - 29:20</p> <p>crossing [3] - 30:12, 31:1, 59:10</p> <p>crossings [1] - 34:5</p> <p>CRR [1] - 1:25</p> <p>crude [34] - 5:9, 49:7, 52:4, 52:5, 114:25, 142:12, 142:16, 144:9, 144:11, 144:13, 145:1, 146:9, 148:19, 148:25, 149:2, 149:9, 149:11, 149:16, 149:22, 150:17, 150:24, 151:2, 151:11, 151:13, 155:13, 155:15, 155:17, 155:18, 155:21, 156:3, 156:4, 157:6, 158:12</p> <p>culpability [1] - 164:23</p> <p>cultural [6] - 17:24, 40:2, 41:15, 41:22, 47:12, 48:16</p>	<p>culture [1] - 35:10</p> <p>curiosity [2] - 52:17, 64:18</p> <p>curious [3] - 32:19, 88:6, 115:21</p> <p>current [6] - 59:19, 61:17, 65:6, 89:8, 104:24, 131:8</p> <p>cut [3] - 31:12, 32:7, 32:11</p> <p>cuts [2] - 32:13, 34:25</p> <p>cutter [2] - 18:11, 42:18</p> <p style="text-align: center;">D</p> <p>daily [1] - 94:11</p> <p>Dakota [56] - 1:22, 3:2, 3:3, 4:17, 4:22, 5:9, 7:11, 28:13, 29:20, 46:12, 46:17, 47:14, 47:18, 47:24, 48:22, 50:8, 51:1, 55:3, 60:15, 71:15, 76:20, 98:25, 100:23, 103:8, 104:1, 104:2, 105:15, 105:24, 113:3, 116:19, 117:12, 117:14, 124:5, 124:9, 125:10, 125:11, 127:3, 128:17, 137:8, 137:9, 137:14, 137:17, 137:19, 139:11, 139:23, 140:1, 147:21, 151:17, 152:24, 156:11, 164:20, 164:21, 165:3, 168:7, 168:13</p> <p>DAKOTA [3] - 1:2, 1:5, 168:1</p> <p>damage [6] - 64:24, 71:1, 71:24, 129:13, 141:12, 148:6</p> <p>Data [4] - 2:19, 2:20, 2:20, 2:21</p> <p>data [18] - 8:8, 21:20, 56:15, 62:16, 68:17, 87:19, 129:20, 129:25, 130:8, 130:12, 130:16, 131:8, 132:5, 132:21, 133:3, 133:12, 139:19, 153:18</p> <p>database [23] - 104:23, 104:24, 128:25, 129:16, 129:17, 129:19,</p>	<p>130:11, 130:12, 130:13, 130:18, 131:2, 132:4, 133:2, 133:12, 148:17, 148:21, 150:2, 150:3, 150:5, 153:16, 153:24, 155:7</p> <p>date [4] - 4:20, 20:3, 26:8, 26:19</p> <p>Dated [1] - 168:13</p> <p>dates [1] - 49:20</p> <p>day-to-day [1] - 35:20</p> <p>days [18] - 84:9, 84:16, 84:17, 84:18, 86:5, 86:6, 115:5, 133:4, 133:13, 133:15, 153:14, 153:19, 154:1, 154:5, 154:13, 155:10</p> <p>deal [2] - 22:5, 55:20</p> <p>dealing [5] - 21:4, 42:22, 103:16, 136:1, 137:7</p> <p>dealings [1] - 73:19</p> <p>deals [1] - 68:11</p> <p>dealt [1] - 21:16</p> <p>decide [3] - 36:14, 55:16, 70:18</p> <p>decided [2] - 70:16, 82:7</p> <p>deciding [1] - 91:7</p> <p>decision [5] - 6:2, 93:12, 131:18, 137:25, 138:13</p> <p>decision-makers [2] - 131:18, 137:25</p> <p>decisions [2] - 34:17, 74:23</p> <p>deconstruct [1] - 32:2</p> <p>decrease [1] - 63:13</p> <p>dedicated [3] - 86:25, 87:2, 87:6</p> <p>deep [1] - 146:20</p> <p>defamation [1] - 141:15</p> <p>defer [4] - 19:3, 28:20, 108:16, 118:15</p> <p>defined [1] - 120:15</p> <p>defining [1] - 120:13</p> <p>definite [2] - 96:6, 107:15</p> <p>definitely [4] - 80:25, 87:16, 105:18, 119:7</p> <p>degrading [1] - 67:18</p> <p>degree [1] - 18:15</p> <p>delay [1] - 4:12</p> <p>demands [1] - 47:1</p> <p>demographics [1] -</p>	<p>38:8</p> <p>DENR [4] - 27:23, 37:14, 121:22, 147:21</p> <p>department [1] - 102:11</p> <p>Department [4] - 47:13, 47:17, 73:8, 73:11</p> <p>depth [3] - 65:19, 158:10, 159:20</p> <p>derived [1] - 129:12</p> <p>describe [5] - 23:6, 23:7, 46:3, 92:21, 92:24</p> <p>described [3] - 43:14, 102:16, 117:5</p> <p>describes [1] - 92:20</p> <p>design [11] - 46:25, 59:14, 59:17, 62:5, 63:13, 63:14, 64:25, 65:6, 65:15, 65:23, 134:18</p> <p>designed [5] - 42:17, 46:8, 46:22, 65:5, 95:21</p> <p>desk [2] - 8:13, 29:4</p> <p>desks [1] - 11:3</p> <p>desktop [1] - 17:8</p> <p>detail [4] - 15:21, 40:15, 93:9, 159:22</p> <p>detailed [3] - 15:15, 19:2, 159:16</p> <p>details [2] - 27:24, 28:15</p> <p>detect [5] - 84:22, 102:20, 133:9, 144:12, 153:24</p> <p>detectability [3] - 84:22, 84:24, 84:25</p> <p>detectable [1] - 154:14</p> <p>detected [6] - 102:18, 133:4, 133:13, 133:14, 153:14, 153:19</p> <p>detection [11] - 76:3, 82:1, 89:24, 90:1, 92:21, 96:10, 96:15, 102:15, 133:7, 153:17, 154:4</p> <p>detention [1] - 93:2</p> <p>determination [1] - 132:3</p> <p>determine [9] - 47:19, 64:9, 64:11, 77:12, 81:23, 102:17, 121:14, 133:11, 148:3</p> <p>determined [3] -</p>
--	---	--	--	---

<p>104:3, 117:2, 123:7 determining [1] - 74:8 develop [6] - 35:17, 36:25, 55:19, 103:23, 121:13, 125:14 developed [4] - 27:25, 109:6, 111:17, 111:19 developing [2] - 39:5, 53:10 development [3] - 5:21, 53:1, 138:11 development's [1] - 138:6 developments [3] - 88:20, 89:2, 121:13 diesel [1] - 148:23 difference [10] - 43:1, 61:9, 61:11, 61:14, 61:18, 61:19, 69:7, 85:22, 113:12, 155:14 different [37] - 18:22, 23:5, 30:3, 31:7, 42:14, 49:3, 49:4, 64:15, 66:13, 74:9, 74:11, 78:23, 79:8, 79:12, 82:11, 84:20, 87:1, 92:1, 92:7, 92:8, 93:1, 105:16, 105:18, 117:1, 125:3, 125:15, 128:19, 132:10, 132:20, 145:22, 155:11, 156:10 differently [1] - 146:17 difficult [2] - 149:4, 151:13 difficulties [1] - 164:16 dig [1] - 148:5 diploma [1] - 114:6 direct [20] - 7:3, 7:4, 8:7, 11:14, 14:10, 45:3, 52:20, 62:4, 94:15, 98:16, 122:14, 127:5, 128:3, 128:16, 131:25, 145:6, 148:16, 158:16, 160:22, 161:6 Direct [2] - 2:14, 2:19 DIRECT [9] - 2:5, 11:18, 13:17, 23:20, 44:14, 57:11, 75:11, 97:6, 127:11 directing [1] - 126:15 direction [2] - 7:9, 122:14</p>	<p>directional [5] - 30:24, 59:9, 65:2, 65:12, 68:3 directly [3] - 53:23, 122:3, 134:11 director [2] - 7:15, 14:8 dirt [1] - 32:7 disciplinary [1] - 9:12 discoloration [1] - 154:23 discovered [1] - 147:17 discriminatory [1] - 123:13 discuss [3] - 40:13, 58:13, 68:15 discussed [4] - 58:22, 58:23, 60:6, 72:15 Discussion [1] - 124:24 discussion [3] - 58:25, 60:3, 165:17 discussions [4] - 27:19, 124:7, 124:10, 124:13 dissolve [1] - 146:7 dissolved [5] - 142:17, 144:16, 145:9, 145:20, 147:3 dissolving [1] - 146:14 distance [10] - 16:20, 17:8, 18:15, 18:18, 20:22, 42:4, 56:10, 56:12, 142:6, 142:23 distances [1] - 120:12 distribute [1] - 166:24 disturbance [2] - 30:25, 31:10 diversity [1] - 122:9 divide [1] - 132:18 DO [1] - 168:8 Docket [3] - 4:15, 126:25, 167:11 doctor [5] - 35:21, 50:12, 52:17, 54:12 Doctor [1] - 49:16 document [6] - 27:20, 69:5, 69:21, 76:5, 110:25, 159:18 documents [5] - 8:10, 8:13, 8:14, 121:8, 166:13 domain [1] - 166:14 Donald [5] - 2:8, 2:17, 75:9, 75:17, 75:21 done [32] - 4:9, 10:5, 17:4, 17:11, 17:21, 33:3, 46:5, 47:4,</p>	<p>47:9, 47:11, 47:15, 48:1, 52:3, 77:23, 77:24, 81:22, 82:5, 82:8, 88:10, 89:1, 108:18, 109:21, 115:15, 120:18, 121:16, 131:1, 142:9, 152:10, 152:25, 164:18, 166:23 DOS [1] - 45:1 doubt [1] - 30:4 down [22] - 9:5, 13:13, 17:17, 19:12, 19:14, 31:13, 40:17, 44:7, 56:25, 78:21, 79:22, 82:17, 96:25, 126:10, 129:12, 129:16, 129:23, 139:14, 139:15, 153:2, 156:20, 157:4 downstream [2] - 17:14, 147:15 Dr [2] - 45:21, 48:6 DRA [1] - 8:21 Draft [1] - 49:16 draft [5] - 99:8, 99:17, 99:23, 100:11, 159:25 draw [2] - 120:19, 147:15 drawing [1] - 152:3 drawings [1] - 55:9 drill [4] - 31:2, 65:2, 110:18, 117:18 drilling [4] - 30:25, 65:12, 68:4, 143:10 drills [6] - 59:9, 110:13, 110:22, 111:23, 112:1 drinking [1] - 146:12 drip [1] - 154:6 dripping [1] - 154:17 drive [3] - 104:17, 104:19, 139:14 drives [3] - 113:22, 114:3, 115:19 driving [1] - 117:11 dropped [2] - 129:16, 129:23 due [10] - 5:21, 37:9, 37:25, 39:12, 42:12, 63:14, 68:5, 78:21, 140:4, 163:6 duly [1] - 168:8 duly-appointed [1] - 168:8 during [18] - 8:10, 8:16, 20:2, 20:9, 21:2, 25:19, 36:24,</p>	<p>52:7, 52:22, 53:15, 61:1, 65:21, 65:22, 66:7, 67:4, 78:20, 146:22, 151:23 Dusty [1] - 4:25 duties [1] - 29:10</p> <p style="text-align: center;">E</p> <p>early [6] - 39:5, 49:17, 49:18, 49:24, 151:21, 152:10 ears [2] - 121:1, 136:14 earthquakes [2] - 139:10, 141:4 easier [1] - 61:10 easiest [1] - 161:10 East [2] - 3:3, 38:14 eastern [1] - 116:18 ecologically [2] - 152:1, 152:4 economic [4] - 5:16, 53:1, 53:6, 138:5 edge [1] - 32:8 educate [2] - 106:23, 107:16 education [2] - 113:2, 114:22 educational [1] - 114:5 Edward [1] - 11:24 effect [3] - 37:9, 135:5, 165:2 effective [1] - 89:21 effectively [1] - 93:23 effects [1] - 143:6 efficiency [1] - 8:17 efforts [1] - 135:9 eight [2] - 84:9, 84:18 EIS [3] - 49:17, 49:18, 50:3 either [9] - 17:14, 26:22, 40:9, 79:19, 103:22, 134:8, 136:14, 158:21, 165:24 either/or [1] - 103:21 elaborate [2] - 54:20, 102:25 electrician [2] - 113:13, 113:23 element [2] - 40:14, 41:20 eligibility [1] - 47:19 eligible [1] - 47:20 elongate [1] - 18:7 emanated [1] - 56:14 Emergency [18] -</p>	<p>97:21, 99:1, 99:3, 99:6, 99:8, 101:1, 101:6, 101:14, 103:16, 105:2, 107:22, 108:3, 108:13, 109:5, 112:21, 118:9, 119:1, 159:11 emergency [27] - 34:12, 36:6, 39:11, 43:15, 43:19, 43:24, 43:25, 44:4, 97:16, 100:11, 102:6, 104:20, 105:4, 105:20, 106:17, 107:12, 108:25, 114:11, 115:2, 119:11, 121:25, 133:24, 146:15, 149:10, 159:2, 159:5 emission [2] - 78:22, 78:24 emissions [1] - 46:23 employ [1] - 104:1 employed [5] - 12:1, 12:3, 24:2, 71:11, 114:4 employee [4] - 75:23, 103:4, 104:12, 104:18 employees [7] - 36:22, 105:12, 105:15, 105:19, 106:10, 106:11, 113:3 empty [1] - 42:2 EMTs [1] - 106:18 encompasses [1] - 72:17 encounter [1] - 33:8 encountered [2] - 41:9, 55:1 end [6] - 80:22, 81:24, 112:4, 113:20, 143:9, 147:10 ends [1] - 80:24 ENERGY [1] - 1:5 Energy [2] - 4:17, 109:22 engineer [1] - 58:3 engineered [1] - 140:19 engineering [5] - 15:15, 15:20, 19:3, 29:14, 65:3 Engineering [2] - 13:22, 44:17 engineers [2] - 129:3, 130:1 ensure [2] - 65:24, 135:2</p>
--	---	--	--	---

<p>entails [1] - 37:13 entire [4] - 21:5, 101:23, 101:25, 111:2 entirety [1] - 117:13 entitled [2] - 3:2, 168:10 entry [2] - 31:4, 31:8 environment [4] - 5:16, 43:3, 51:20, 149:8 Environmental [3] - 73:3, 73:9, 73:10 environmental [17] - 14:9, 17:23, 26:16, 26:23, 37:12, 37:22, 38:5, 40:5, 40:12, 44:22, 44:25, 55:10, 73:6, 73:15, 100:23, 144:13, 145:12 environments [1] - 152:17 epoxy [3] - 67:2, 67:15, 156:1 equal [5] - 63:17, 64:5, 64:13, 64:18, 72:1 equally [1] - 42:17 equate [1] - 154:4 equates [1] - 154:5 equipment [40] - 15:19, 18:5, 27:22, 31:21, 32:9, 32:10, 32:14, 33:12, 90:15, 90:23, 90:24, 105:25, 110:24, 114:17, 115:19, 115:22, 116:1, 116:9, 116:12, 116:15, 117:4, 117:16, 117:17, 117:19, 123:11, 123:12, 124:4, 124:8, 124:15, 124:17, 124:19, 124:23, 125:1, 125:6, 125:8, 125:9, 125:17, 135:3, 135:7 erosion [1] - 37:24 ERP [6] - 138:10, 138:16, 138:20, 138:23, 160:1, 160:5 ERPs [1] - 121:24 essence [2] - 32:20, 124:12 established [2] - 87:15, 87:24 establishing [1] - 109:1 estimate [1] - 131:24 estimated [2] -</p>	<p>120:15, 121:12 et [8] - 15:17, 18:3, 89:3, 104:4, 104:19, 105:21, 123:24, 138:6 ethane [2] - 89:18, 89:20 evaluate [1] - 43:19 evaluated [1] - 145:15 evaporate [1] - 146:6 evaporation [1] - 146:5 evaporation's [1] - 146:13 event [9] - 61:1, 86:5, 130:9, 131:17, 147:10, 147:11, 164:7 events [2] - 129:14, 139:20 everywhere [2] - 116:10, 123:11 evidence [3] - 8:3, 23:5, 95:3 evidentiary [1] - 6:8 exact [4] - 18:23, 104:3, 105:23, 121:23 exactly [3] - 80:3, 153:8, 163:19 examination [8] - 6:1, 12:24, 25:6, 48:7, 56:23, 58:8, 133:17, 164:17 EXAMINATION [26] - 11:18, 13:17, 15:1, 23:20, 26:2, 27:6, 43:12, 44:14, 48:9, 57:11, 58:10, 70:9, 71:17, 73:23, 75:11, 76:21, 92:17, 95:17, 97:6, 98:23, 118:23, 120:4, 127:11, 133:19, 135:19, 158:24 examine [2] - 159:19, 159:21 examined [1] - 146:9 Examiner [1] - 6:6 examines [1] - 69:21 examining [1] - 162:12 example [14] - 44:1, 64:21, 70:20, 72:8, 74:15, 77:7, 77:21, 89:14, 96:9, 112:12, 112:19, 133:25, 153:2, 157:14 excavate [2] - 32:2, 146:24</p>	<p>excavation [4] - 30:15, 70:22, 129:13, 129:21 excavator [3] - 68:11, 69:24, 70:3 excedences [1] - 149:7 exceed [1] - 146:11 exception [1] - 7:5 excuse [5] - 127:24, 135:21, 136:18, 143:17, 143:23 excused [3] - 22:24, 75:6, 160:16 exercise [3] - 17:8, 110:12, 111:1 exercises [1] - 110:16 exerted [1] - 70:2 Exhibit [9] - 12:12, 14:11, 45:4, 45:15, 76:6, 98:2, 98:17, 128:6, 128:9 exhibit [3] - 8:6, 23:7, 136:23 exhibits [4] - 24:20, 25:11, 165:24, 166:6 EXHIBITS [1] - 2:11 Exhibits [3] - 2:23, 8:6, 9:7 exist [1] - 51:25 existing [7] - 20:10, 52:22, 53:12, 55:4, 63:19, 105:11, 105:17 exit [2] - 31:4, 31:8 expect [10] - 46:24, 48:14, 59:24, 100:10, 119:8, 131:20, 131:21, 131:22, 134:24, 137:22 expectation [1] - 137:22 expected [3] - 5:17, 49:19, 95:1 expedite [1] - 163:8 experience [12] - 29:3, 29:18, 38:13, 82:19, 84:4, 113:9, 117:21, 118:3, 119:5, 119:7, 154:8, 158:6 experienced [1] - 29:23 expert [4] - 7:24, 40:8, 157:8, 159:2 expertise [4] - 76:1, 76:2, 79:23, 156:7 explain [8] - 40:10, 68:18, 128:22, 130:10, 132:8,</p>	<p>140:5, 153:14, 156:9 explained [1] - 70:24 explaining [2] - 132:10, 136:14 explanation [2] - 23:13, 93:3 exposed [1] - 55:7 express [1] - 132:24 expressed [2] - 32:18, 40:1 extend [1] - 124:1 extent [5] - 18:20, 20:10, 53:6, 76:24, 152:6 external [1] - 67:18 extra [7] - 39:15, 106:12, 112:17, 113:19, 161:2, 162:23 extremely [5] - 102:14, 104:15, 130:1, 130:6, 131:2 eyes [1] - 120:25</p> <p style="text-align: center;">F</p> <p>facilities [14] - 4:18, 15:16, 35:6, 36:10, 36:17, 45:24, 49:2, 51:5, 53:11, 53:20, 60:4, 62:1, 83:6, 83:7 FACILITY [1] - 1:5 facility [11] - 5:13, 5:14, 5:18, 5:20, 15:25, 34:24, 35:12, 35:22, 47:1, 56:14, 67:13 facing [1] - 38:16 fact [6] - 32:1, 120:12, 130:2, 145:24, 154:5, 163:7 factor [6] - 59:14, 63:13, 72:13, 130:4, 145:21, 146:14 factors [10] - 20:5, 26:15, 63:12, 64:25, 129:2, 129:12, 129:23, 130:2, 130:3, 145:22 fail [1] - 110:24 fails [1] - 83:14 failure [3] - 60:11, 60:24, 61:2 failures [1] - 68:5 fair [2] - 131:7, 139:5 fairly [9] - 42:25, 59:2, 89:7, 93:14, 93:15, 134:1, 145:9,</p>	<p>152:18, 166:16 fall [1] - 49:18 fallen [1] - 139:15 Falls [1] - 7:1 familiar [6] - 30:12, 30:13, 48:11, 133:23, 134:1, 152:22 far [26] - 20:1, 21:19, 21:21, 22:3, 28:18, 46:4, 46:5, 50:9, 56:18, 77:12, 77:20, 82:13, 94:16, 99:6, 109:19, 109:23, 115:16, 116:19, 120:9, 120:16, 120:24, 121:12, 121:14, 142:22, 155:13, 155:25 farm [1] - 142:7 fashion [2] - 67:10, 96:17 fast [8] - 79:11, 90:22, 102:17, 126:11, 157:5, 157:6, 157:9, 157:15 faster [4] - 146:6, 156:2, 156:5, 161:16 FBE [3] - 67:1, 67:3, 130:23 federal [15] - 45:1, 48:1, 48:17, 49:4, 49:8, 50:22, 51:2, 52:8, 52:9, 52:10, 55:18, 99:3, 108:4, 134:20, 141:11 Federal [3] - 48:25, 121:9, 134:12 feet [16] - 19:13, 20:13, 20:21, 20:23, 40:18, 56:10, 56:12, 56:13, 141:22, 142:20, 143:10, 143:16, 143:21, 144:1 felt [1] - 129:24 FERC [2] - 49:5 few [11] - 37:7, 61:3, 84:17, 104:5, 141:22, 143:10, 143:16, 144:1, 160:25, 164:14 fiber [2] - 83:6, 87:6 fiberoptic [1] - 86:22 fiberoptics [2] - 86:25 field [5] - 15:11, 40:13, 54:24, 103:3, 104:4 fight [1] - 107:3 fighting [1] - 83:20 figure [2] - 128:19</p>
--	--	--	--	--

file [4] - 101:16, 101:18, 110:1, 110:5
filed [8] - 15:3, 24:15, 45:14, 62:12, 76:9, 101:14, 108:13, 136:19
filter [1] - 145:10
Final [1] - 49:18
final [3] - 6:2, 6:11, 164:4
finalized [1] - 19:24
finally [3] - 5:20, 161:19, 162:12
fine [6] - 10:4, 14:3, 84:3, 109:10, 121:24, 129:9
finish [1] - 166:9
fire [5] - 106:23, 107:3, 148:17, 151:12, 161:9
firm [1] - 47:22
First [1] - 75:22
first [32] - 5:13, 19:14, 19:22, 28:18, 30:22, 30:23, 33:1, 33:6, 35:7, 35:10, 49:25, 57:15, 75:18, 84:5, 89:10, 92:20, 93:4, 93:13, 97:13, 106:11, 107:11, 109:8, 116:8, 117:24, 125:12, 129:4, 133:4, 133:10, 144:18, 144:19, 159:18, 161:23
fishing [2] - 115:21, 115:24
fit [1] - 15:24
fits [1] - 18:6
five [7] - 90:24, 91:9, 94:2, 112:1, 122:3, 123:24, 142:10
fixed [2] - 17:15, 19:1
flammable [5] - 149:22, 150:25, 151:10, 151:11
flash [1] - 150:16
flavor [1] - 16:12
flesh [1] - 78:4
flexibility [1] - 17:13
flexible [1] - 94:4
flies [1] - 154:21
flipped [1] - 159:19
floating [1] - 145:1
floats [2] - 144:9, 144:11
floor [1] - 61:5
Florida [3] - 13:25, 14:5, 44:19

flow [8] - 53:13, 79:3, 79:8, 85:14, 85:16, 93:18, 108:14, 120:9
fly [1] - 104:10
flying [1] - 152:2
fold [1] - 5:12
folks [3] - 11:9, 126:14, 155:1
follow [24] - 16:6, 21:8, 22:17, 22:23, 32:23, 41:25, 43:8, 52:13, 56:23, 63:4, 67:24, 68:1, 73:25, 75:3, 90:12, 92:12, 95:14, 95:16, 96:21, 118:19, 120:1, 126:7, 157:22, 158:20
follow-up [12] - 16:6, 21:8, 22:17, 56:23, 63:4, 67:24, 73:25, 90:12, 92:12, 95:14, 96:21, 120:1
follows [1] - 116:16
foot [1] - 116:20
footprint [1] - 20:10
FOR [1] - 1:4
force [6] - 70:2, 79:15, 79:18, 123:14
foreman [1] - 36:22
forest [1] - 153:10
forgot [3] - 113:1, 158:15, 162:17
form [1] - 121:1
formal [1] - 60:1
formation [2] - 156:11, 156:13
formations [4] - 55:6, 155:19, 158:5, 158:11
Fort [1] - 127:16
forth [2] - 43:19, 70:22
fortunately [2] - 38:23, 38:25
forward [1] - 46:20
fossils [1] - 55:15
four [12] - 5:12, 8:8, 82:2, 93:1, 104:17, 104:19, 111:14, 113:22, 114:3, 115:5, 115:19, 123:23
four-fold [1] - 5:12
four-wheel [4] - 104:17, 104:19, 114:3, 115:19
fourth [2] - 108:25, 144:23
fraction [1] - 139:20
frame [1] - 40:20

frankly [1] - 163:21
free [1] - 95:9
frequency [4] - 131:22, 137:11, 137:16, 137:23
front [5] - 12:9, 31:9, 68:15, 93:5, 98:1
frost [1] - 26:16
fuel [3] - 37:25, 38:1, 38:2
fuels [1] - 150:7
full [6] - 23:22, 26:12, 81:18, 104:2, 119:8, 125:2
full-time [1] - 104:2
Fuller [2] - 2:1, 7:14
function [3] - 17:17, 24:12, 83:15
functions [1] - 125:3
funerary [1] - 40:9
fusion [3] - 67:2, 67:15, 155:25
future [1] - 91:6

G

Gale [6] - 2:6, 2:13, 13:15, 13:21, 14:21, 22:25
gallon [1] - 105:3
gallons [1] - 130:15
gaps [1] - 109:16
GARY [1] - 1:12
Gary [1] - 4:24
gas [16] - 49:6, 51:21, 52:6, 52:22, 53:18, 74:15, 74:17, 89:5, 148:20, 149:21, 150:1, 150:3, 150:5, 157:13
gasoline [1] - 151:7
gather [1] - 81:3
gauge [1] - 138:25
general [9] - 26:8, 29:23, 47:9, 48:12, 48:13, 50:23, 128:22, 164:15, 165:13
generally [3] - 21:13, 46:3, 149:8
generated [2] - 137:12, 140:8
gentleman [1] - 129:7
geographic [1] - 122:9
geography [1] - 116:2
geological [2] - 129:13, 155:18
geologists [1] - 55:6
geology [2] - 47:25,

54:8
Geology [1] - 55:4
geometric [1] - 141:14
germane [1] - 52:19
given [13] - 5:8, 5:22, 17:3, 17:4, 17:8, 40:20, 79:12, 85:18, 100:10, 104:4, 131:21, 137:5, 151:6
glad [1] - 22:18
goal [2] - 95:19, 114:15
goodness [1] - 42:2
gorilla [2] - 123:10, 124:3
govern [1] - 133:24
governing [2] - 5:22, 62:5
Government [3] - 48:25, 121:9, 134:12
government [4] - 5:23, 64:11, 74:19, 153:9
grade [1] - 61:14
graders [1] - 116:6
grading [1] - 55:13
Grambiher [1] - 1:17
GRAMBIHLER [2] - 11:4, 11:6
gravel [2] - 53:25, 54:5
gravity [1] - 78:21
great [1] - 54:11
greater [9] - 63:18, 72:2, 72:5, 72:8, 130:7, 132:23, 146:1, 149:6
greatest [1] - 152:6
greatly [1] - 8:17
green [1] - 4:11
Greg [1] - 1:14
ground [36] - 18:3, 19:17, 20:4, 32:12, 33:4, 33:11, 61:22, 62:2, 77:17, 131:6, 139:9, 139:12, 139:21, 141:10, 141:21, 142:13, 142:18, 143:1, 143:7, 143:11, 143:25, 146:16, 146:18, 146:20, 146:21, 146:23, 147:4, 147:5, 147:14, 147:20, 147:22, 149:15, 158:4, 158:8, 158:13, 163:7
group [5] - 111:24, 111:25, 123:17, 150:23
guarantee [2] -

117:19, 118:2
guess [19] - 13:7, 19:19, 22:2, 28:14, 41:3, 42:24, 52:17, 89:5, 90:20, 116:16, 119:19, 148:15, 149:14, 151:8, 156:9, 159:17, 161:10, 161:23, 162:18
guide [1] - 139:6
guys [2] - 124:21, 167:5

H

H-A-Y-E-S [1] - 97:12
H1N1 [1] - 4:25
habitable [1] - 56:8
hac [1] - 9:14
half [8] - 10:15, 20:21, 38:25, 49:25, 56:12, 56:13, 115:20, 151:4
half-mile [1] - 20:21
handle [6] - 25:19, 25:20, 35:19, 36:7, 40:16, 166:16
handled [2] - 51:2, 74:23
handling [1] - 27:10
hands [1] - 69:5
Hanson [12] - 4:24, 16:8, 19:10, 22:16, 52:12, 58:18, 63:5, 66:17, 92:13, 108:22, 136:7, 157:23
HANSON [64] - 1:12, 13:11, 16:9, 16:19, 18:14, 19:5, 22:18, 28:24, 29:17, 30:9, 31:22, 32:1, 32:15, 33:14, 49:15, 49:23, 50:2, 50:11, 52:14, 53:22, 54:6, 54:11, 58:19, 59:20, 60:8, 60:15, 60:18, 61:3, 63:6, 63:8, 66:19, 67:9, 67:20, 92:14, 108:23, 110:9, 111:4, 111:16, 112:6, 112:21, 136:8, 136:11, 136:22, 136:25, 137:18, 138:2, 138:21, 139:1, 139:4, 139:7, 140:25, 141:20, 143:14, 143:22, 144:4, 144:7,

144:21, 144:23,
145:2, 145:5,
146:16, 147:6,
148:11, 163:2
hard [2] - 32:24,
142:24
Harding [1] - 48:2
Hardisty [2] - 26:25,
80:20
haul [1] - 114:1
hauling [1] - 156:3
Hayes [12] - 2:9, 2:17,
97:4, 97:8, 97:12,
97:14, 98:25,
100:20, 100:22,
118:25, 126:10,
138:23
hazard [2] - 139:21,
140:23
hazardous [4] - 129:1,
132:7, 148:22, 149:2
hazards [1] - 129:13
HAZWOPER [3] -
105:21, 110:12,
114:13
head [2] - 33:24, 49:9
health [3] - 5:19,
138:4, 138:7
hear [5] - 39:19,
42:20, 136:15,
137:1, 163:14
heard [14] - 8:3, 21:14,
55:25, 66:4, 66:21,
84:7, 84:9, 84:12,
86:10, 115:19,
136:17, 137:1,
138:22, 157:9
Hearing [2] - 5:6, 6:6
hearing [23] - 4:4,
4:12, 4:15, 4:21, 5:1,
5:4, 5:5, 5:7, 6:6,
6:10, 6:14, 7:20,
8:16, 8:17, 10:9,
12:20, 57:20, 58:2,
126:21, 126:24,
165:17, 167:11,
167:14
hearings [3] - 32:17,
39:18, 58:22
heavily [1] - 154:24
Heidi [6] - 2:9, 2:18,
127:9, 127:14,
127:25, 148:14
held [2] - 3:1, 148:10
helicopter [1] - 89:20
help [7] - 35:16, 53:14,
66:21, 104:25,
107:1, 119:16, 123:1
helped [1] - 152:21
heptanes [1] - 150:4

HEREBY [1] - 168:8
hi [1] - 148:14
Hicks [16] - 2:7, 2:14,
2:15, 7:6, 16:24,
23:18, 23:22, 23:24,
24:14, 24:23, 25:9,
29:1, 33:18, 43:14,
45:23, 54:22
high [12] - 64:3, 64:6,
64:16, 65:11, 70:12,
70:20, 70:22, 114:5,
143:2, 151:25,
152:4, 152:7
higher [1] - 71:1
highlight [1] - 151:18
highlighted [1] - 52:16
highly [2] - 146:6,
151:5
highways [2] - 71:5,
117:7
hill [6] - 32:8, 32:11,
32:14, 33:8, 33:10,
153:3
hills [5] - 31:18, 33:12,
139:14, 152:18,
152:24
hillsides [1] - 140:14
hired [2] - 47:11, 48:3
historical [8] - 55:5,
129:20, 129:24,
130:7, 131:7, 133:3,
133:11, 139:19
hit [2] - 41:1, 41:6
hits [1] - 41:4
hold [1] - 130:7
holes [3] - 65:12, 79:8,
79:12
home [1] - 14:2
homes [1] - 56:8
honest [1] - 104:14
honestly [2] - 163:16,
164:17
hopefully [5] - 5:2,
39:4, 51:9, 100:7,
111:8
horizontal [5] - 30:24,
59:8, 65:2, 65:12,
68:3
horizontally [1] - 31:2
hospitals [1] - 34:13
hour [13] - 10:15, 85:6,
85:8, 85:9, 85:10,
86:2, 86:3, 94:10,
102:22, 102:23,
104:5, 117:4, 117:6
hours [14] - 36:13,
81:6, 81:9, 82:8,
85:8, 93:6, 103:1,
103:2, 103:3, 103:4,
117:19, 133:10

housekeeping [3] -
4:5, 9:12, 161:1
houses [1] - 140:15
housing [2] - 30:2,
121:13
Houston [2] - 89:3,
123:17
HP09-001 [6] - 1:5,
4:4, 4:15, 57:5,
126:25, 167:11
huge [2] - 43:1, 154:5
hundred [6] - 137:7,
137:10, 141:22,
143:10, 143:16,
144:1
hundreds [2] - 141:6,
155:19
hunting [1] - 56:8
hydraulic [3] - 17:2,
56:3, 129:14
hydraulics [2] - 17:4,
17:12
hydrostatic [1] - 34:7
hypothetical [1] -
78:17

I

ice [1] - 110:13
idea [11] - 17:12,
23:11, 23:14, 29:18,
36:25, 49:23, 53:5,
132:25, 134:21,
134:22, 134:23
identified [5] - 31:1,
46:5, 54:3, 54:4,
125:25
identify [14] - 31:4,
35:5, 36:1, 40:8,
40:25, 41:16, 53:14,
54:8, 54:25, 55:4,
55:6, 55:14, 110:20,
112:2
identifying [4] - 28:4,
28:6, 41:14, 47:25
ignite [1] - 151:6
ignited [1] - 151:14
ignition [1] - 150:17
imagine [2] - 33:23,
154:18
immediate [2] - 82:3,
145:9
immediately [3] -
35:17, 40:17, 86:1
impact [6] - 52:25,
53:6, 53:8, 53:12,
100:23, 152:8
Impact [2] - 73:9,
73:10

impacts [6] - 76:24,
77:1, 77:3, 144:13,
151:16, 152:6
impair [1] - 5:19
impaired [1] - 135:21
important [10] - 22:8,
63:10, 74:7, 138:4,
138:6, 142:1,
149:11, 149:14,
163:20
imposed [1] - 71:19
imposes [1] - 56:17
improve [3] - 8:17,
74:4, 110:21
improved [1] - 112:19
improvement [6] -
91:20, 109:2,
109:24, 110:8,
110:10, 112:15
improvements [3] -
91:6, 110:17, 111:20
IN [1] - 1:4
in-line [1] - 130:25
in/meters [1] - 93:20
inch [1] - 61:19
inches [4] - 61:9,
61:12, 61:16, 61:17
incidence [1] - 128:25
incidences [2] -
129:22, 130:20
incident [7] - 35:25,
61:2, 67:13, 110:19,
114:14, 123:20,
123:23
incidents [2] - 67:19,
139:9
include [6] - 27:14,
27:15, 44:23, 147:7,
147:13, 148:19
included [6] - 50:25,
71:20, 73:8, 115:4,
118:8, 150:9
includes [5] - 25:15,
114:13, 114:14,
148:23, 159:13
including [8] - 25:23,
26:16, 27:13,
103:11, 103:12,
121:5, 139:19, 152:4
inclusion [1] - 71:22
inclusive [2] - 27:12,
148:24
incorporate [1] -
100:6
incorporated [4] -
13:22, 111:7,
111:10, 111:13
incorporating [1] -
112:7
increase [2] - 145:18,

145:19
increased [3] - 70:21,
71:2, 140:3
independent [2] -
121:11, 124:11
independently [1] -
18:10
indicate [2] - 27:10,
52:24
indicated [6] - 15:4,
18:20, 28:11, 56:15,
132:1, 148:17
indicators [1] - 94:22
individuals [3] -
114:4, 123:18,
123:24
industrial [1] - 43:4
industries [1] - 74:11
industry [4] - 35:9,
85:5, 96:1, 106:6
influx [1] - 37:6
information [22] -
15:10, 16:12, 16:13,
21:22, 46:7, 46:11,
67:22, 81:3, 82:10,
82:16, 87:13,
103:20, 125:20,
130:19, 137:25,
140:20, 150:21,
159:14, 159:16,
159:21, 160:4, 160:6
information's [1] -
15:22
infrared [1] - 89:11
infrequently [1] -
104:16
inhabitants [3] - 5:17,
5:19
initial [2] - 17:3,
128:20
initiated [1] - 111:19
initiates [1] - 84:11
injuries [5] - 34:24,
35:2, 35:20, 36:24,
43:16
injury [6] - 5:15, 35:7,
35:15, 35:18, 35:25,
36:4
inside [1] - 112:16
inspect [2] - 66:2,
141:12
inspection [5] - 37:12,
65:19, 66:6, 72:17,
89:25
inspections [3] -
66:14, 89:24, 130:25
inspector [2] - 40:5,
55:10
inspectors [2] - 37:16,
37:22

<p>install [1] - 27:22 installation [1] - 28:8 installations [1] - 42:18 installed [2] - 67:3, 147:24 instance [5] - 32:16, 46:20, 50:23, 59:8, 65:19 instantaneous [1] - 145:23 instead [2] - 98:9, 112:16 institute [1] - 105:1 institution [1] - 34:18 instrumentation [1] - 105:22 intact [1] - 141:19 integrated [1] - 106:24 integrity [8] - 58:6, 59:6, 65:22, 71:8, 72:14, 72:18, 134:19, 141:18 intending [1] - 61:25 intent [1] - 163:3 interested [1] - 60:11 interesting [4] - 110:11, 139:13, 139:22, 154:2 interfere [1] - 5:20 internal [1] - 99:9 internally [2] - 36:7, 129:6 internet [3] - 4:2, 4:3, 126:24 interpret [1] - 143:23 interstate [2] - 49:6, 139:14 Intervener [2] - 7:18, 8:11 Interveners [4] - 7:11, 7:18, 95:15, 158:21 intimate [1] - 114:16 introduce [6] - 6:19, 7:2, 7:25, 13:19, 75:15, 127:13 introduction [1] - 8:3 inventory [6] - 82:9, 82:12, 94:4, 94:9, 94:10, 94:13 investigate [1] - 93:12 investigation [1] - 89:17 involved [13] - 15:9, 27:18, 37:24, 42:23, 43:18, 77:14, 88:23, 89:16, 113:9, 120:21, 121:24, 122:4, 140:9 involves [4] - 25:16,</p>	<p>25:17, 25:18, 109:1 iron [3] - 116:5, 123:6, 124:21 irrelevant [1] - 72:21 irrevocably [2] - 29:5, 29:8 irritant [1] - 120:25 issue [13] - 5:7, 9:12, 42:8, 42:22, 46:4, 46:18, 50:9, 59:13, 68:7, 70:15, 77:16, 82:25 issued [3] - 5:6, 70:19, 119:3 issues [11] - 16:3, 16:24, 21:14, 38:5, 39:19, 89:12, 94:23, 95:2, 164:2, 165:8, 165:18 item [3] - 52:20, 98:7, 109:15 items [3] - 34:2, 52:16, 161:1 itself [10] - 20:13, 29:24, 59:11, 59:17, 59:20, 65:24, 67:19, 138:7, 141:25, 146:2</p>	<p>jurisdictions [2] - 49:5, 166:14 Justice [2] - 2:1, 7:15</p> <p style="text-align: center;">K</p> <p>Kansas [1] - 24:1 Kara [2] - 1:14, 7:21 keep [6] - 10:16, 23:14, 52:2, 104:23, 126:12 Kelly [1] - 7:14 kelly [1] - 2:1 Kent [1] - 129:8 kept [1] - 29:4 key [1] - 123:20 keys [1] - 155:1 KEYSTONE [2] - 1:4, 1:6 Keystone [64] - 4:16, 4:19, 5:7, 5:9, 7:1, 12:5, 14:7, 44:20, 53:9, 54:17, 56:15, 56:21, 57:5, 57:7, 57:8, 58:3, 58:5, 58:22, 69:11, 70:8, 71:19, 73:4, 75:3, 75:8, 75:23, 93:21, 97:14, 97:21, 99:13, 100:11, 105:11, 109:18, 111:3, 112:2, 113:9, 115:3, 117:1, 118:1, 118:7, 121:6, 122:17, 123:25, 125:15, 126:9, 126:25, 127:2, 127:8, 127:19, 136:12, 138:16, 138:23, 138:25, 140:18, 141:10, 143:8, 144:12, 153:8, 159:10, 159:20, 160:1, 160:5, 160:6, 160:18, 161:4 Keystone's [1] - 147:25 kick [1] - 104:8 Kim [1] - 148:7 kind [26] - 10:16, 16:25, 17:3, 17:11, 17:12, 17:14, 17:24, 23:14, 33:25, 40:10, 46:19, 46:24, 47:2, 48:19, 54:23, 55:20, 79:25, 85:6, 88:22, 90:3, 121:10, 121:16, 137:25, 139:24, 165:11</p>	<p>kinds [1] - 124:18 kit [1] - 104:20 Knadle [2] - 1:16, 7:24 knowing [3] - 32:24, 80:3, 151:3 knowledge [2] - 106:8, 121:17 known [1] - 86:1 knows [2] - 42:2, 56:11 Koenecke [16] - 1:19, 6:18, 6:23, 8:4, 11:13, 11:21, 44:10, 75:7, 92:15, 96:22, 97:1, 97:9, 118:19, 127:6, 162:16, 163:17 KOENECKE [29] - 6:21, 8:4, 9:4, 9:10, 9:23, 11:15, 11:19, 12:23, 75:8, 75:12, 76:18, 79:21, 92:16, 92:18, 95:12, 96:23, 97:3, 97:7, 98:20, 118:20, 118:24, 119:25, 144:5, 160:19, 161:7, 162:1, 162:8, 163:19, 167:7 Koenecke's [1] - 8:20 KOLBECK [141] - 1:11, 4:1, 10:4, 10:11, 13:10, 19:9, 19:21, 20:19, 20:25, 21:7, 33:17, 33:25, 34:10, 35:23, 36:5, 36:18, 37:3, 37:11, 38:7, 38:11, 38:19, 39:9, 39:21, 50:14, 51:9, 51:13, 51:17, 52:2, 52:7, 52:10, 61:7, 61:20, 62:3, 62:9, 62:18, 62:21, 63:2, 80:17, 80:23, 81:1, 81:5, 81:10, 81:14, 81:20, 82:13, 83:4, 83:10, 83:16, 83:24, 84:2, 84:8, 84:15, 84:19, 84:23, 85:12, 85:16, 85:20, 85:25, 86:4, 86:9, 86:16, 86:21, 87:3, 87:6, 87:9, 87:14, 87:17, 87:21, 87:24, 88:2, 90:13, 90:20, 91:3, 91:10, 91:14, 91:23, 92:4, 92:11, 100:22, 101:2, 101:4, 101:11, 101:16, 101:19,</p>	<p>101:21, 101:25, 102:2, 102:9, 102:23, 102:25, 103:7, 103:11, 103:13, 103:25, 104:7, 105:1, 105:10, 105:14, 106:1, 106:5, 106:13, 106:16, 107:2, 107:5, 107:8, 107:19, 107:25, 108:11, 108:20, 113:1, 113:21, 114:2, 114:8, 114:18, 114:21, 115:7, 148:14, 149:1, 149:13, 149:20, 149:24, 150:6, 150:15, 150:22, 151:15, 152:11, 152:21, 153:13, 153:21, 154:7, 154:12, 155:8, 155:13, 155:25, 156:8, 156:16, 157:6, 157:10, 157:13, 157:19, 162:25 Kolbeck [15] - 4:3, 4:23, 10:9, 10:10, 19:7, 33:16, 50:13, 54:14, 61:6, 67:25, 100:21, 112:25, 117:25, 126:15, 148:13 Kothari [13] - 2:8, 2:15, 2:16, 57:9, 57:15, 58:20, 61:7, 68:1, 69:2, 70:11, 73:12, 73:25, 75:5 KXL [5] - 93:22, 97:16, 99:13, 101:23, 124:1</p>
	<p style="text-align: center;">J</p> <p>Jal [1] - 153:3 James [3] - 1:19, 1:20, 6:25 January [3] - 109:18, 125:13, 125:16 Jeffrey [1] - 69:16 job [8] - 35:2, 35:14, 36:13, 36:22, 37:1, 38:4, 88:12, 121:23 John [8] - 1:13, 2:9, 2:17, 6:5, 7:5, 24:15, 97:4, 97:12 Johnson [1] - 4:25 Jon [4] - 2:7, 2:13, 44:12, 44:17 Jones [7] - 2:6, 2:12, 11:16, 11:20, 11:24, 13:5, 13:8 journeymen [1] - 113:14 judgment [1] - 129:2 judicial [1] - 165:25 July [1] - 100:13 jump [2] - 87:18, 165:22 June [2] - 26:22, 125:17 jurisdiction [2] - 164:21, 165:2</p>			
				<p style="text-align: center;">L</p> <p>labeled [1] - 63:10 labor [1] - 123:13 lack [5] - 31:19, 59:23, 65:9, 115:22, 157:5 land [13] - 17:17, 17:20, 25:16, 30:6, 30:20, 31:16, 32:23, 42:10, 48:1, 104:9, 116:3, 116:7 land-based [1] - 116:3 landline [1] - 86:22 landowner [8] - 17:19, 21:4, 33:9, 40:19, 53:10, 55:16, 140:20, 155:5</p>

<p>landowner's [1] - 21:1 landowners [11] - 15:11, 17:18, 17:22, 22:11, 33:5, 48:3, 54:4, 55:15, 120:8, 121:4, 156:8 lands [2] - 48:21, 54:17 landslide [1] - 140:2 language [1] - 144:8 large [9] - 23:4, 27:15, 30:20, 37:6, 47:19, 74:2, 93:14, 93:15, 94:6 larger [6] - 35:25, 85:3, 132:13, 132:16, 154:14, 154:15 last [11] - 38:7, 42:1, 62:12, 74:17, 82:4, 90:16, 94:8, 110:23, 111:6, 127:23, 166:24 lasted [3] - 84:5, 84:9, 84:13 lasting [1] - 84:12 late [1] - 49:17 laterally [1] - 157:1 Law [2] - 98:25, 100:23 law [2] - 48:19, 99:3 lawful [1] - 163:11 laws [3] - 5:14, 26:16, 165:3 lawyer [1] - 6:23 lawyers [2] - 10:25, 100:25 lay [2] - 10:17, 18:5 layer [1] - 67:17 layout [2] - 15:16, 16:21 lead [2] - 44:22, 47:13 leak [17] - 58:13, 76:3, 77:20, 78:12, 81:25, 84:5, 84:6, 84:12, 92:21, 93:1, 96:9, 96:15, 102:15, 115:22, 154:14, 154:17, 156:17 leaking [1] - 154:8 leaks [21] - 58:14, 67:1, 67:2, 76:24, 77:1, 77:2, 84:13, 85:3, 85:4, 90:1, 93:14, 93:15, 94:6, 94:17, 94:23, 95:3, 102:18, 102:20, 120:20, 141:15 lease [2] - 83:6, 124:16</p>	<p>least [12] - 6:20, 23:12, 30:25, 37:18, 40:6, 68:3, 117:15, 119:13, 138:3, 138:16, 150:25, 162:23 left [3] - 147:1, 160:19, 160:22 legal [4] - 6:20, 108:14, 108:16, 109:17 legalese [1] - 144:8 length [4] - 37:20, 58:22, 82:5, 147:2 LEPCs [3] - 107:12, 119:10, 119:24 less [15] - 18:25, 65:10, 71:23, 71:24, 81:4, 103:6, 114:6, 131:23, 132:2, 133:10, 137:23, 149:2, 149:18, 151:12, 156:25 lessee [1] - 53:10 letter [6] - 69:16, 109:18, 111:13, 119:4, 119:8, 121:22 level [16] - 31:23, 32:5, 32:6, 32:9, 32:12, 33:11, 41:7, 63:17, 72:2, 72:5, 113:2, 140:7, 146:12 leveling [2] - 31:19 levels [1] - 148:9 lieu [1] - 163:13 life [1] - 145:16 lifetime [1] - 92:6 light [1] - 4:11 lightening [1] - 67:14 likelihood [12] - 70:22, 86:4, 86:8, 87:4, 90:15, 90:21, 91:14, 91:25, 131:9, 137:9, 138:9, 139:12 likely [5] - 90:23, 116:18, 132:2, 147:24, 151:12 likewise [1] - 16:10 limelight [1] - 13:12 limit [1] - 60:19 limitations [1] - 22:5 limited [1] - 142:20 limits [1] - 20:14 line [15] - 59:23, 61:15, 74:9, 78:20, 79:22, 80:22, 80:24, 81:22, 94:20, 94:22, 100:10, 130:25, 136:12, 157:25, 159:20</p>	<p>lines [3] - 53:13, 100:8, 139:16 liquid [4] - 129:1, 132:7, 147:15, 150:11 liquids [3] - 89:6, 148:22, 150:4 list [9] - 8:6, 29:7, 109:4, 125:14, 162:3, 162:6, 166:5, 166:8, 166:18 listed [2] - 33:18, 34:3 listing [1] - 47:21 lists [1] - 21:12 litany [1] - 150:12 literally [4] - 152:2, 152:3, 155:20, 159:22 lithology [1] - 158:11 live [8] - 13:24, 13:25, 22:13, 43:4, 118:12, 126:23, 127:15, 127:16 living [1] - 27:15 lizards [1] - 153:5 local [14] - 5:23, 10:3, 36:6, 36:17, 43:19, 43:24, 106:14, 106:17, 106:18, 107:12, 110:2, 119:10, 119:24, 124:14 localized [3] - 141:22, 143:6, 143:25 locate [1] - 22:1 located [6] - 18:1, 22:11, 125:9, 125:10, 125:11, 125:18 location [15] - 4:21, 15:13, 15:16, 16:16, 17:15, 18:13, 22:12, 36:3, 36:12, 43:1, 56:2, 105:16, 105:19, 159:15 locations [5] - 19:1, 21:20, 22:7, 42:1, 58:24 logistics [1] - 10:22 long-term [1] - 144:13 longest [2] - 153:24, 155:7 look [27] - 18:2, 18:11, 29:1, 29:7, 37:24, 53:16, 65:18, 82:12, 85:5, 89:17, 90:8, 90:9, 91:7, 93:11, 94:12, 94:22, 95:1, 95:2, 96:4, 110:17, 110:23, 117:14,</p>	<p>122:4, 144:21, 150:19, 153:25, 155:2 looked [9] - 89:16, 89:20, 116:24, 129:11, 133:6, 142:11, 153:10, 160:2 looking [25] - 17:2, 22:7, 22:10, 27:17, 33:4, 38:4, 39:13, 41:5, 59:3, 63:9, 68:23, 69:6, 69:10, 69:12, 80:7, 81:4, 89:1, 92:19, 96:2, 108:24, 109:5, 133:2, 134:22, 141:17, 166:6 looks [2] - 29:8, 74:18 loss [1] - 86:6 lost [2] - 83:23, 132:6 lotions [1] - 104:4 loudly [1] - 10:12 low [2] - 151:6, 155:10 lower [2] - 149:8, 152:8 LP [4] - 1:4, 4:17, 5:8, 127:1 lucky [1] - 39:14 lunch [1] - 126:17 lying [1] - 165:13</p> <p style="text-align: center;">M</p> <p>machine [2] - 69:25, 70:1 macro [1] - 140:7 magnitude [3] - 78:1, 78:3, 130:4 main [2] - 29:25, 81:17 maintain [1] - 18:18 maintenance [2] - 62:22, 95:1 major [5] - 50:22, 77:7, 120:9, 122:25, 129:22 majority [6] - 35:1, 91:11, 130:21, 138:23, 138:24, 150:13 makers [2] - 131:18, 137:25 makeup [3] - 59:21, 60:7, 74:10 Malcolm [2] - 75:17, 75:21 management [9] - 24:12, 25:14, 29:12, 58:6, 65:22, 72:18,</p>	<p>123:16, 123:19, 134:19 manager [3] - 14:9, 24:9, 97:19 managing [1] - 164:16 mandatory [1] - 109:11 manner [1] - 96:18 manufacturing [1] - 63:14 map [3] - 53:16, 139:25, 152:5 maps [3] - 54:8, 140:8, 152:3 marked [13] - 2:23, 9:3, 12:12, 14:11, 45:4, 45:15, 53:15, 55:8, 76:6, 98:1, 98:17, 128:6, 128:9 mass [1] - 79:16 material [2] - 74:2, 132:6 materials [8] - 53:24, 65:16, 129:14, 135:6, 150:13, 156:25, 159:15 MATTER [1] - 1:4 matter [8] - 3:2, 4:16, 9:12, 57:17, 105:5, 145:23, 156:23, 168:10 matters [4] - 6:9, 8:2, 10:8, 97:17 maximum [6] - 72:9, 134:4, 135:2, 135:3, 135:12, 146:11 MCCOMSEY [1] - 168:5 McComsey [2] - 1:25, 168:18 McIntosh [1] - 148:7 mean [30] - 17:1, 20:2, 20:12, 20:23, 21:2, 21:13, 40:5, 41:4, 42:2, 64:7, 68:25, 115:19, 132:11, 132:17, 132:19, 132:23, 133:7, 133:22, 134:7, 134:23, 135:11, 141:4, 142:22, 143:18, 150:12, 152:17, 155:9, 162:22, 164:11, 165:10 meaning [3] - 84:15, 99:11, 110:12 means [7] - 32:11, 89:25, 104:7, 104:22, 116:5,</p>
---	--	---	--	---

<p>143:16, 145:23 meant [4] - 32:4, 32:12, 143:19, 144:2 measure [1] - 85:21 measures [4] - 65:21, 65:23, 112:17, 147:7 mechanical [8] - 59:6, 64:24, 68:5, 71:1, 71:7, 72:14, 105:23, 113:15 mechanism [1] - 89:22 mechanisms [1] - 143:12 Medevac [2] - 35:12, 36:13 median [13] - 132:9, 132:11, 132:12, 132:14, 132:17, 132:24, 133:8, 133:22, 134:2, 134:23, 135:10, 155:9 medical [9] - 34:13, 34:23, 35:6, 35:12, 36:6, 37:1, 39:11, 44:4 medically [1] - 39:15 Meera [6] - 2:8, 2:15, 2:16, 57:9, 57:15, 69:1 meet [7] - 46:12, 46:16, 47:1, 47:5, 96:11, 109:5, 112:11 meeting [1] - 122:18 meetings [2] - 32:17, 34:18 memorized [1] - 48:15 mention [2] - 10:11, 43:17 mentioned [12] - 19:14, 20:12, 20:23, 37:5, 65:13, 72:12, 117:25, 119:13, 122:23, 125:12, 140:16, 153:13 message [1] - 121:2 messaging [1] - 119:17 met [1] - 109:14 metal [1] - 61:21 meters [3] - 93:20, 93:22, 121:7 methane [2] - 89:14, 150:5 method [1] - 153:9 methodology [1] - 153:6 methods [4] - 30:16, 92:20, 92:21, 94:15</p>	<p>metropolitan [2] - 14:4, 44:18 Mexico [1] - 153:4 mic [4] - 11:11, 24:24, 81:12, 127:25 microphone [6] - 4:7, 4:8, 4:9, 4:11, 4:14, 158:1 mics [2] - 11:2, 24:24 Middle [1] - 38:14 might [15] - 17:13, 21:8, 31:9, 32:6, 39:24, 49:24, 95:4, 145:17, 145:18, 145:19, 152:1, 154:22, 154:24, 157:24, 165:6 migrate [1] - 142:18 mile [9] - 18:25, 19:14, 20:21, 21:13, 128:18, 131:14, 131:21, 137:5, 137:13 mileage [1] - 106:7 miles [8] - 17:6, 37:19, 81:17, 137:7, 137:10, 137:13, 141:6, 152:22 mill [1] - 66:7 mills [1] - 60:2 millwright [1] - 113:16 mind [2] - 10:16, 52:14 minerals [1] - 53:19 mines [1] - 54:5 Mines [1] - 55:4 minimal [1] - 165:14 minimize [5] - 31:10, 31:18, 46:22, 53:20, 142:1 minimum [2] - 82:7, 89:23 mining [1] - 54:9 minor [5] - 34:24, 35:1, 35:7, 43:1, 98:6 minute [1] - 118:18 minutes [6] - 60:22, 85:7, 94:2, 94:3, 104:5 missing [2] - 81:24, 94:14 Missouri [1] - 24:1 misspoke [1] - 136:15 misstating [1] - 66:4 mitigate [1] - 34:15 Mitigation [1] - 25:23 mixed [1] - 155:17 mixup [1] - 108:12 mobility [1] - 142:13</p>	<p>model [1] - 94:7 modeling [2] - 60:23, 76:3 modern [2] - 140:22, 141:2 modification [1] - 129:2 modifications [2] - 20:17, 20:20 modified [1] - 129:16 moment [3] - 13:12, 85:18, 136:13 monitor [8] - 37:23, 38:1, 38:5, 55:20, 80:19, 90:23, 91:16, 91:24 monitored [3] - 88:7, 90:17, 92:6 monitoring [8] - 81:6, 81:9, 90:15, 93:4, 147:8, 147:13, 147:16, 147:23 monitors [2] - 41:21, 54:18 Montana [2] - 46:12, 50:7 month [2] - 99:14, 107:17 monthly [1] - 94:12 months [13] - 34:12, 84:16, 99:11, 99:12, 99:15, 99:18, 99:20, 99:22, 100:1, 100:5, 115:4, 119:13, 125:12 MOORE [13] - 13:15, 13:18, 14:20, 22:23, 44:12, 44:15, 48:5, 56:22, 127:8, 127:12, 133:16, 158:17, 160:14 Moore [6] - 1:19, 6:25, 22:22, 127:24, 136:13, 158:15 morning [23] - 4:1, 5:4, 6:16, 6:22, 8:5, 8:11, 11:20, 11:21, 12:19, 75:13, 75:14, 76:13, 97:8, 97:9, 160:20, 160:23, 161:5, 161:18, 163:13, 164:1, 167:6, 167:12 most [26] - 15:12, 35:19, 36:7, 36:16, 74:3, 77:15, 82:2, 83:1, 113:6, 113:10, 116:1, 130:13, 132:25, 133:10, 138:4, 145:24,</p>	<p>145:25, 150:24, 153:23, 158:3, 158:7, 158:10, 158:12, 165:11, 166:12 mostly [1] - 15:9 Motion [1] - 8:20 motion [4] - 139:9, 139:12, 139:21, 141:10 movable [1] - 11:2 move [13] - 17:13, 17:22, 18:4, 18:25, 19:13, 19:17, 19:18, 20:8, 20:13, 20:15, 32:7, 147:4, 157:15 moved [1] - 161:18 movement [1] - 143:11 movements [1] - 141:5 moves [1] - 142:16 moving [2] - 143:7, 147:3 MR [254] - 6:15, 6:21, 7:10, 7:13, 7:17, 8:1, 8:4, 8:19, 8:21, 8:23, 9:1, 9:4, 9:7, 9:10, 9:11, 9:13, 9:14, 9:21, 9:23, 9:24, 10:1, 10:5, 10:6, 10:7, 10:19, 11:5, 11:8, 11:15, 11:19, 12:23, 12:25, 13:1, 13:3, 13:4, 13:5, 13:7, 13:12, 13:15, 13:18, 14:20, 14:22, 14:23, 14:24, 16:6, 19:7, 21:8, 21:24, 22:14, 22:22, 22:23, 22:24, 23:1, 23:11, 23:17, 23:21, 24:23, 25:5, 25:7, 25:22, 25:25, 26:1, 26:3, 27:3, 27:5, 28:21, 28:23, 33:16, 39:23, 41:3, 41:18, 41:24, 42:19, 43:10, 43:13, 44:6, 44:7, 44:12, 44:15, 48:5, 48:8, 48:10, 49:10, 49:12, 49:14, 50:13, 52:12, 54:13, 55:22, 55:25, 56:2, 56:19, 56:22, 56:23, 57:4, 57:8, 57:12, 58:7, 58:9, 58:11, 58:15, 58:16, 58:18, 61:6, 63:4, 63:7, 63:9, 63:22, 64:12, 65:7, 65:17,</p>	<p>65:25, 66:9, 66:17, 13 67:24, 68:9, 68:19, 68:23, 68:25, 69:2, 69:4, 69:6, 69:9, 69:12, 69:14, 69:15, 69:19, 69:25, 70:4, 70:10, 71:12, 71:14, 71:16, 71:18, 73:12, 73:21, 73:22, 75:3, 75:4, 75:5, 75:8, 75:12, 75:20, 76:18, 76:20, 76:22, 79:21, 80:2, 80:8, 80:9, 80:11, 80:12, 80:15, 81:12, 88:4, 88:6, 88:9, 88:16, 88:17, 88:25, 89:21, 90:3, 90:11, 92:12, 92:15, 92:16, 92:18, 95:12, 95:14, 96:21, 96:23, 96:24, 97:3, 97:7, 98:20, 98:22, 98:24, 100:14, 100:17, 100:19, 108:22, 112:25, 115:8, 115:9, 115:15, 115:18, 116:16, 117:6, 117:12, 117:20, 118:4, 118:6, 118:17, 118:20, 118:24, 119:25, 120:1, 120:3, 120:5, 126:1, 126:3, 126:5, 126:7, 126:12, 126:18, 127:8, 127:12, 127:24, 133:16, 133:18, 133:20, 135:14, 135:16, 136:5, 144:5, 148:13, 157:22, 158:14, 158:17, 158:19, 158:22, 159:1, 160:8, 160:10, 160:12, 160:14, 160:15, 160:19, 160:24, 161:3, 161:7, 161:8, 161:23, 162:1, 162:8, 162:14, 162:15, 162:16, 163:10, 163:19, 163:24, 164:10, 164:13, 164:14, 165:10, 166:5, 166:17, 166:20, 166:21, 166:23, 167:1, 167:7, 167:8, 167:9, 167:10 MS [29] - 7:21, 8:24, 9:25, 11:4, 11:6,</p>
---	---	---	---	--

13:6, 14:25, 15:2, 27:7, 28:9, 28:22, 49:13, 58:17, 73:24, 75:2, 80:13, 95:16, 95:18, 96:20, 100:18, 126:6, 135:20, 136:3, 160:11, 160:25, 161:10, 162:6, 164:4, 165:8
Muhlbauer [1] - 129:8
multiple [1] - 80:24
multitasking [1] - 137:1
Museum [1] - 55:4
museum [1] - 47:24
must [1] - 4:8

N

name [18] - 4:3, 6:23, 7:13, 11:22, 11:24, 13:21, 23:7, 23:22, 23:24, 44:16, 44:17, 57:13, 75:17, 75:21, 97:10, 123:3, 123:5, 127:14
Nathan [2] - 1:16, 7:23
National [2] - 73:3, 109:22
national [3] - 73:5, 123:8, 139:25
natural [15] - 49:6, 51:21, 52:6, 53:18, 74:14, 74:17, 147:5, 148:19, 149:21, 150:1, 150:3, 150:4, 157:13
nature [6] - 16:22, 35:1, 35:18, 37:22, 53:25, 163:4
near [5] - 17:10, 18:1, 55:7, 56:6, 121:13
nearest [2] - 22:3, 56:9
nearly [1] - 166:23
Nebraska [1] - 24:11
necessarily [9] - 20:3, 20:24, 66:15, 83:17, 84:11, 85:17, 105:5, 119:2, 154:4
necessary [5] - 10:2, 15:10, 16:3, 28:11, 162:13
need [36] - 10:25, 11:3, 15:7, 17:5, 18:4, 19:2, 20:14, 28:5, 33:21, 34:1, 34:3, 35:6, 42:10,

42:12, 61:4, 64:22, 70:24, 93:9, 101:4, 101:5, 104:22, 106:12, 108:1, 108:24, 114:21, 116:25, 120:14, 123:14, 125:7, 130:21, 134:21, 147:23, 161:16, 166:24
needed [2] - 15:18, 150:20
needs [3] - 9:5, 15:19, 16:1
negative [1] - 162:21
NEPA [3] - 73:16, 73:18, 134:17
never [2] - 111:20, 145:15
nevertheless [1] - 130:5
New [1] - 153:4
new [6] - 10:21, 91:7, 91:19, 91:20, 131:3, 131:5
newstar [1] - 87:10
next [7] - 44:11, 57:7, 127:7, 142:25, 143:10, 160:18, 161:15
nice [2] - 29:6, 136:10
nicks [1] - 35:20
Nigeria [1] - 155:23
nil [1] - 37:10
noise [10] - 21:15, 21:19, 21:23, 42:21, 43:5, 55:23, 56:11, 56:14, 56:18
none [4] - 10:9, 28:22, 54:10, 70:8
nonnaturally [1] - 89:18
nonPHMSA [1] - 112:19
nonPHMSA-improved [1] - 112:19
nonrealtime [1] - 82:6
noon [2] - 97:2, 126:13
normally [5] - 9:15, 23:11, 77:16, 77:19, 82:23
north [1] - 156:3
North [1] - 156:11
northern [2] - 26:9, 26:25
northwest [2] - 23:25, 122:10
nose [1] - 121:1

Notary [2] - 168:7, 168:18
note [5] - 4:5, 4:13, 7:11, 130:21, 154:2
nothing [11] - 20:3, 20:17, 21:1, 50:8, 76:18, 94:13, 95:12, 96:20, 98:20, 160:11, 160:14
notice [2] - 95:8, 165:25
Notice [1] - 5:6
noticed [1] - 5:5
notified [1] - 147:21
notify [2] - 40:19
November [5] - 1:8, 3:4, 4:21, 168:11, 168:14
NPDS [1] - 51:2
NRC [8] - 123:8, 124:2, 124:10, 124:18, 124:21, 124:22, 124:25, 125:17
number [33] - 21:12, 26:15, 29:21, 30:2, 33:19, 34:4, 37:21, 39:7, 41:5, 47:1, 52:16, 56:6, 57:1, 58:23, 62:3, 68:10, 69:6, 81:25, 88:13, 98:7, 102:19, 104:11, 110:2, 120:6, 123:22, 129:11, 132:18, 133:14, 140:6, 145:22, 148:15, 149:25, 153:20
numbers [5] - 9:4, 23:4, 82:14, 95:9, 132:20
numerous [1] - 65:14

O

O'Briens [1] - 123:16
o'clock [1] - 3:5
oath [5] - 9:17, 164:20, 164:22, 164:23, 165:4
objection [8] - 9:22, 9:23, 10:2, 162:11, 162:12, 167:4, 167:7, 167:9
objections [1] - 162:15
objects [1] - 40:9
observation [2] - 94:15, 111:24

obtain [1] - 133:3
obtaining [1] - 30:1
obvious [1] - 59:2
obviously [9] - 18:17, 87:17, 104:19, 105:8, 107:21, 111:8, 114:23, 115:16, 152:12
occasions [1] - 164:14
occupied [1] - 22:3
occupy [1] - 123:20
occur [11] - 51:19, 75:1, 77:7, 131:21, 131:22, 141:10, 143:13, 144:14, 147:23, 157:5, 165:5
occurred [7] - 15:22, 128:23, 143:1, 147:19, 147:20, 148:17, 154:6
occurrence [4] - 133:4, 137:12, 137:15, 137:23
occurring [4] - 89:2, 89:18, 128:17, 130:7
occurs [2] - 104:15, 142:15
October [3] - 5:6, 62:12, 109:17
odor [1] - 105:6
OF [6] - 1:2, 1:4, 3:1, 168:1, 168:3
offered [3] - 7:4, 25:11, 25:12
offers [2] - 59:6, 91:8
office [3] - 9:17, 113:11, 113:19
offices [2] - 104:4, 113:18
officials [3] - 106:22, 110:15, 120:24
offshore [2] - 46:20, 46:23
often [2] - 66:3, 82:17
oil [70] - 5:9, 46:20, 49:7, 52:4, 52:22, 53:17, 77:10, 77:12, 78:10, 78:22, 78:25, 79:3, 79:7, 79:11, 79:19, 81:23, 102:7, 107:3, 108:9, 114:25, 116:7, 120:9, 121:12, 121:14, 121:15, 124:25, 125:4, 125:5, 125:24, 142:12, 142:16, 142:17, 143:21, 144:9, 144:11,

144:13, 145:1, 145:13, 145:20, 146:1, 146:3, 146:9, 147:1, 148:19, 148:25, 149:3, 149:9, 149:12, 149:16, 149:22, 150:17, 150:24, 151:2, 151:11, 151:13, 154:8, 154:23, 155:13, 155:15, 155:17, 155:18, 155:20, 156:3, 156:4, 156:10, 156:11, 156:12, 157:7, 158:12
oil's [2] - 120:11, 145:18
oils [2] - 155:21, 155:22
old [2] - 131:4
older [3] - 129:20, 139:20, 140:22
Oman [1] - 38:14
on-shore [1] - 49:1
on-site [1] - 40:4
once [11] - 17:11, 17:21, 31:14, 35:4, 46:13, 102:7, 128:17, 131:13, 131:20, 137:4, 137:19
one [102] - 7:20, 9:11, 10:15, 10:19, 15:12, 18:10, 18:12, 18:22, 18:24, 19:10, 21:8, 21:17, 29:24, 29:25, 34:16, 34:17, 34:21, 35:9, 37:5, 37:11, 37:18, 38:7, 39:7, 39:25, 41:5, 41:25, 42:8, 43:10, 45:21, 49:9, 54:15, 59:24, 61:18, 62:22, 63:6, 63:8, 68:4, 68:9, 69:4, 71:16, 83:13, 83:14, 83:20, 83:21, 84:9, 85:1, 85:6, 85:8, 85:9, 85:10, 87:2, 90:13, 90:17, 90:23, 93:4, 94:2, 95:6, 95:16, 96:10, 96:12, 97:2, 98:6, 99:6, 101:12, 101:23, 102:19, 103:21, 104:11, 105:9, 106:2, 106:25, 110:8, 110:10, 110:11,

<p>113:2, 116:21, 117:13, 117:16, 118:6, 121:15, 123:7, 123:22, 128:18, 131:14, 132:5, 136:16, 136:20, 136:24, 137:17, 138:3, 141:13, 155:7, 156:1, 156:5, 159:9, 161:5, 161:10, 164:4, 164:17</p> <p>one's [1] - 65:9</p> <p>one-mile [2] - 128:18, 131:14</p> <p>one-twentieth [1] - 61:18</p> <p>ones [2] - 51:22, 150:18</p> <p>ongoing [4] - 58:24, 111:2, 111:6, 112:22</p> <p>Onida [1] - 168:13</p> <p>open [2] - 39:19, 140:15</p> <p>opening [1] - 32:3</p> <p>operate [4] - 72:11, 88:14, 95:20, 96:18</p> <p>operated [1] - 96:17</p> <p>operating [4] - 61:1, 63:19, 72:9, 119:22</p> <p>operation [8] - 62:21, 67:5, 78:20, 93:10, 94:16, 99:7, 99:18, 102:4</p> <p>operational [5] - 63:14, 66:7, 66:10, 97:17, 112:20</p> <p>operations [16] - 31:13, 65:22, 71:8, 79:24, 97:19, 99:15, 99:20, 100:6, 102:3, 102:6, 104:1, 107:16, 107:17, 108:10, 119:12, 131:9</p> <p>operator [1] - 130:14</p> <p>operators [1] - 41:8</p> <p>opinion [3] - 139:3, 156:1, 165:12</p> <p>opportunity [4] - 144:12, 145:3, 145:5, 163:9</p> <p>opposition [1] - 74:22</p> <p>oral [3] - 57:23, 143:15, 144:15</p> <p>order [7] - 5:6, 9:18, 78:3, 118:7, 130:4, 167:1, 167:12</p> <p>Order [1] - 78:1</p> <p>orderly [1] - 5:21</p>	<p>organization [1] - 125:24</p> <p>organize [1] - 166:3</p> <p>original [4] - 31:16, 118:7, 129:17, 136:19</p> <p>originally [1] - 163:13</p> <p>OSRO [1] - 125:24</p> <p>Oster [5] - 2:19, 160:20, 160:23, 163:14, 167:13</p> <p>Oster's [2] - 162:8, 162:17</p> <p>otherwise [3] - 7:3, 9:18, 162:10</p> <p>out-of-state [1] - 164:5</p> <p>outlier [1] - 132:22</p> <p>outline [1] - 44:3</p> <p>outlined [1] - 82:1</p> <p>outset [1] - 117:23</p> <p>outside [2] - 94:18, 142:4</p> <p>overall [7] - 15:9, 16:25, 26:6, 44:25, 59:10, 157:25, 158:5</p> <p>overestimate [3] - 131:14, 131:17, 140:5</p> <p>overestimating [1] - 130:9</p> <p>overlying [1] - 152:3</p> <p>overrule [1] - 6:9</p> <p>overruled [1] - 6:11</p> <p>oversee [2] - 50:19, 51:5</p> <p>overseeing [1] - 122:5</p> <p>oversight [2] - 6:7, 118:14</p> <p>own [9] - 24:16, 35:19, 36:15, 43:25, 48:3, 110:4, 111:17, 117:4, 142:3</p> <p>owned [1] - 112:14</p> <p>owning [1] - 117:3</p>	<p>paleontologists [1] - 48:3</p> <p>paleontology [2] - 55:11</p> <p>paper [1] - 9:5</p> <p>paperwork [1] - 9:17</p> <p>paragraph [6] - 68:12, 128:15, 131:25, 143:24, 144:23, 147:9</p> <p>paramedical [1] - 44:1</p> <p>paraphrase [1] - 65:25</p> <p>parkway [2] - 23:25, 127:18</p> <p>Part [2] - 96:16, 134:3</p> <p>part [19] - 15:12, 25:16, 30:23, 34:19, 35:19, 38:13, 53:1, 60:23, 68:6, 82:2, 95:3, 104:22, 106:23, 107:10, 107:16, 114:16, 116:11, 119:22, 158:10</p> <p>partially [1] - 166:8</p> <p>participate [3] - 39:18, 73:17, 161:21</p> <p>participated [3] - 115:10, 159:5, 159:8</p> <p>participating [1] - 73:5</p> <p>particles [1] - 157:14</p> <p>particular [11] - 16:14, 17:16, 17:20, 17:24, 18:25, 24:25, 32:22, 111:11, 116:20, 128:18, 140:17</p> <p>particularly [5] - 16:20, 32:22, 40:1, 51:22, 149:11</p> <p>parties [19] - 5:24, 6:2, 6:3, 6:17, 7:7, 7:18, 8:2, 8:14, 8:16, 9:9, 9:22, 44:8, 161:12, 161:20, 161:24, 163:22, 164:10, 166:10, 167:8</p> <p>parties' [1] - 8:19</p> <p>parts [2] - 138:4, 155:22</p> <p>party [1] - 95:6</p> <p>pass [2] - 12:24, 74:16</p> <p>passable [1] - 33:12</p> <p>passage [2] - 31:20, 71:5</p> <p>past [8] - 23:12, 30:17, 67:6, 82:18, 136:11, 164:14, 164:18, 164:25</p> <p>patrol [2] - 94:19,</p>	<p>94:21</p> <p>Paul [2] - 1:22, 7:13</p> <p>pay [1] - 39:15</p> <p>paying [1] - 147:13</p> <p>pending [1] - 162:16</p> <p>penetrate [2] - 149:15, 149:18</p> <p>penetrating [1] - 146:19</p> <p>penetration [2] - 146:22, 157:3</p> <p>people [34] - 6:19, 19:21, 32:17, 33:4, 36:15, 39:13, 39:14, 40:13, 40:25, 47:1, 82:20, 85:8, 89:11, 89:12, 89:17, 91:21, 92:1, 92:8, 94:21, 105:25, 106:6, 106:9, 106:17, 113:17, 113:19, 113:22, 114:1, 115:3, 115:18, 115:20, 119:22, 124:22, 140:16, 148:7</p> <p>people's [1] - 21:15</p> <p>per [4] - 9:8, 36:12, 37:17, 137:13</p> <p>percent [38] - 47:15, 82:15, 82:16, 82:24, 83:3, 83:17, 85:11, 85:12, 85:14, 85:16, 85:17, 85:22, 99:13, 125:19, 130:22, 132:12, 132:13, 132:15, 132:16, 133:8, 133:15, 139:8, 142:14, 142:20, 143:20, 148:18, 149:24, 150:7, 150:24, 150:25, 151:1, 151:4, 151:9, 153:14, 153:20, 153:22, 157:25</p> <p>percentage [1] - 133:12</p> <p>percentile [1] - 153:20</p> <p>percolating [1] - 154:19</p> <p>perform [2] - 73:15, 83:14</p> <p>performed [2] - 77:5, 77:11</p> <p>perhaps [8] - 11:10, 16:11, 16:24, 23:3, 23:6, 111:17, 116:18, 119:19</p> <p>period [5] - 74:25,</p>	<p>85:3, 85:4, 94:10, 15 99:14</p> <p>perjury [1] - 164:24</p> <p>permission [2] - 21:1, 47:15</p> <p>permit [44] - 4:17, 5:8, 33:21, 33:22, 34:2, 37:14, 48:15, 48:20, 48:22, 48:25, 50:24, 51:2, 51:10, 57:6, 61:15, 62:1, 62:8, 62:11, 63:23, 64:2, 64:15, 65:5, 65:14, 68:10, 68:24, 69:10, 69:22, 70:19, 71:20, 73:2, 73:4, 73:8, 73:16, 73:18, 74:12, 96:2, 96:6, 96:13, 101:5, 101:13, 107:21, 118:13, 127:2, 152:22</p> <p>PERMIT [1] - 1:5</p> <p>permits [18] - 16:2, 28:5, 28:6, 28:13, 34:3, 34:4, 34:5, 34:7, 46:15, 48:11, 50:15, 50:17, 50:18, 50:20, 50:22, 51:4, 51:6, 96:7</p> <p>permitting [8] - 28:2, 28:19, 29:14, 34:8, 44:23, 45:22, 45:23, 51:14</p> <p>persistence [1] - 149:8</p> <p>person [19] - 16:2, 23:8, 23:9, 28:1, 28:8, 39:24, 40:10, 40:13, 42:25, 53:4, 55:10, 55:22, 88:18, 88:19, 117:24, 119:15, 119:16, 132:25</p> <p>personal [2] - 139:3, 142:3</p> <p>personally [2] - 109:14, 140:8</p> <p>personnel [6] - 34:21, 54:24, 60:3, 122:24, 135:3, 159:15</p> <p>persons [1] - 5:25</p> <p>perspective [9] - 15:20, 16:25, 17:7, 17:16, 19:3, 59:7, 59:10, 59:12, 108:7</p> <p>pertaining [1] - 60:10</p> <p>petroleum [7] - 148:20, 149:2, 149:15, 150:13, 156:19, 157:16</p>
	P			
	<p>p.m [1] - 167:14</p> <p>page [1] - 21:12</p> <p>Pages [1] - 1:9</p> <p>pages [1] - 96:3</p> <p>paleontological [10] - 40:2, 40:9, 47:7, 47:22, 47:23, 48:15, 54:16, 54:18, 55:9, 55:21</p> <p>paleontologist [1] - 55:5</p>			

<p>phase [4] - 66:8, 66:10, 102:8, 146:22</p> <p>Phillips [2] - 7:5, 24:15</p> <p>PHMSA [68] - 62:5, 62:6, 62:12, 63:25, 64:9, 64:17, 70:17, 70:18, 73:1, 73:2, 73:5, 73:7, 73:14, 73:17, 73:19, 74:14, 74:16, 74:18, 74:22, 74:23, 74:24, 99:15, 99:18, 99:24, 100:1, 100:7, 101:8, 101:18, 101:19, 109:4, 109:10, 109:14, 109:20, 109:24, 110:1, 110:6, 111:10, 111:21, 112:3, 112:8, 112:11, 113:6, 118:10, 118:25, 119:6, 122:7, 122:11, 122:12, 122:15, 122:22, 125:20, 128:25, 129:15, 129:17, 129:19, 130:11, 130:12, 130:16, 132:4, 133:2, 133:12, 139:24, 148:17, 148:21, 153:16, 160:5</p> <p>PHMSA's [1] - 108:6</p> <p>PHMSA-approved [2] - 101:8, 160:5</p> <p>phone [4] - 83:9, 110:2, 164:17, 165:1</p> <p>photos [1] - 120:11</p> <p>phrase [1] - 115:23</p> <p>physical [2] - 22:4, 22:5</p> <p>physically [1] - 116:24</p> <p>pick [1] - 128:1</p> <p>picked [2] - 155:3, 155:4</p> <p>pictures [1] - 120:10</p> <p>piece [1] - 65:1</p> <p>pieces [2] - 29:12, 116:15</p> <p>Pierre [4] - 3:3, 4:22, 6:24, 115:20</p> <p>pigs [1] - 141:14</p> <p>pinhole [2] - 154:17, 156:17</p> <p>pint [1] - 105:3</p> <p>pipe [72] - 19:18, 58:21, 59:4, 59:6, 59:8, 59:11, 59:14,</p>	<p>59:19, 59:22, 59:23, 60:2, 60:5, 60:7, 60:9, 60:12, 61:9, 61:13, 61:15, 61:16, 61:23, 64:10, 65:1, 65:8, 65:16, 66:2, 66:3, 66:6, 66:7, 67:3, 67:18, 68:4, 68:5, 70:11, 70:13, 70:16, 70:20, 71:4, 71:6, 71:8, 71:21, 71:23, 71:25, 72:9, 72:10, 72:21, 72:23, 74:1, 74:2, 74:9, 74:12, 74:17, 77:15, 129:21, 131:1, 131:4, 131:5, 137:14, 139:20, 140:22, 141:1, 141:2, 141:10, 141:15, 141:18, 156:1, 157:7</p> <p>PIPELINE [1] - 1:4</p> <p>Pipeline [12] - 4:17, 5:8, 14:7, 57:5, 58:3, 58:5, 97:15, 100:12, 105:11, 127:1, 127:2, 127:19</p> <p>pipeline [118] - 5:9, 15:17, 15:25, 19:22, 20:3, 20:6, 20:8, 24:10, 25:14, 26:5, 26:8, 30:1, 31:13, 33:6, 33:7, 34:12, 44:20, 50:24, 51:18, 51:19, 52:4, 52:21, 54:1, 55:12, 59:15, 59:18, 60:20, 61:23, 62:5, 63:12, 63:19, 63:24, 64:2, 65:23, 66:8, 67:13, 67:14, 67:17, 69:17, 70:25, 71:23, 77:7, 77:9, 77:22, 78:23, 78:25, 79:5, 79:8, 79:9, 79:12, 79:13, 79:19, 79:24, 85:18, 87:2, 88:15, 90:14, 91:24, 93:19, 94:5, 94:16, 94:23, 94:24, 95:7, 95:20, 96:14, 96:16, 101:7, 103:8, 103:10, 105:11, 105:24, 105:25, 106:2, 106:23, 107:20, 113:11, 113:17, 114:25, 116:3, 116:4, 116:14, 117:8, 117:21, 120:10, 120:16, 121:14,</p>	<p>127:22, 128:18, 129:8, 129:22, 130:20, 130:22, 131:3, 131:8, 131:14, 135:22, 138:7, 139:9, 139:22, 140:10, 141:7, 141:13, 141:14, 141:25, 142:6, 142:25, 148:17, 152:22, 153:2, 153:11, 154:9, 154:20, 155:14, 156:23, 156:24, 158:4</p> <p>pipeline's [3] - 17:25, 20:4, 80:20</p> <p>Pipelines [4] - 12:3, 12:4, 12:5, 13:23</p> <p>pipelines [20] - 48:23, 49:1, 49:6, 49:7, 49:8, 51:21, 53:16, 58:13, 64:23, 90:18, 91:16, 93:24, 120:11, 121:15, 129:1, 130:19, 148:18, 150:10, 150:11, 156:4</p> <p>pipes [3] - 66:13, 72:2, 72:5</p> <p>pipng [1] - 62:2</p> <p>place [21] - 15:15, 15:19, 17:9, 17:19, 33:5, 35:24, 51:23, 53:18, 65:21, 83:11, 108:10, 110:14, 119:17, 123:15, 124:14, 125:23, 143:13, 147:11, 147:12, 152:15</p> <p>placed [1] - 15:14</p> <p>placement [2] - 42:7, 134:18</p> <p>places [6] - 63:11, 121:5, 122:10, 140:10, 151:25, 152:16</p> <p>Plains [2] - 2:1, 7:15</p> <p>Plan [19] - 25:24, 97:21, 99:1, 99:3, 99:6, 99:8, 101:1, 101:6, 101:14, 103:17, 105:2, 107:23, 108:3, 108:13, 109:5, 112:22, 118:9, 119:1, 159:11</p> <p>plan [49] - 27:11, 28:17, 31:9, 34:15, 35:11, 35:17, 35:24,</p>	<p>36:9, 36:12, 36:25, 38:23, 39:2, 41:20, 44:4, 55:19, 99:12, 99:13, 99:16, 99:17, 99:23, 100:11, 101:9, 101:10, 101:23, 101:25, 103:19, 103:21, 103:23, 103:25, 104:8, 104:24, 108:8, 108:9, 109:6, 109:12, 109:15, 109:25, 111:11, 111:15, 111:20, 112:9, 119:3, 125:25, 134:6, 134:7, 135:12, 141:5, 160:6</p> <p>plane [1] - 89:20</p> <p>planning [10] - 73:17, 73:18, 107:13, 123:23, 133:25, 134:13, 134:17, 134:19, 135:1, 159:3</p> <p>plans [4] - 39:6, 121:25, 122:16, 135:1</p> <p>plant [4] - 27:13, 46:22, 114:21, 114:23</p> <p>plants [1] - 27:17</p> <p>plateaus [1] - 140:12</p> <p>platforms [2] - 46:21, 46:23</p> <p>play [1] - 94:16</p> <p>plays [1] - 74:2</p> <p>pleasure [2] - 97:1, 114:20</p> <p>plenty [1] - 9:6</p> <p>plus [1] - 71:23</p> <p>point [16] - 9:17, 19:1, 19:25, 46:9, 56:25, 62:10, 63:20, 90:3, 91:6, 116:20, 127:6, 129:24, 131:16, 150:17, 161:3</p> <p>points [3] - 31:4, 31:8, 132:22</p> <p>police [1] - 106:22</p> <p>Policy [1] - 73:3</p> <p>policy [2] - 43:25, 73:6</p> <p>political [1] - 70:16</p> <p>pool [2] - 146:21, 146:23</p> <p>populated [3] - 38:9, 39:12, 64:21</p> <p>population [6] - 38:8, 38:18, 70:12, 70:21, 70:22, 71:1</p> <p>port [1] - 89:3</p>	<p>portion [6] - 24:10, 25:14, 33:20, 53:23, 60:12, 141:24</p> <p>portions [4] - 33:10, 44:22, 52:23, 158:9</p> <p>pose [1] - 5:15</p> <p>posed [2] - 25:2, 62:14</p> <p>position [5] - 12:4, 26:4, 29:5, 105:24, 142:4</p> <p>possible [5] - 11:2, 11:9, 54:23, 91:18, 152:6</p> <p>possibly [4] - 17:10, 49:25, 118:22, 161:1</p> <p>post [1] - 125:1</p> <p>potential [9] - 31:8, 41:16, 47:25, 54:6, 94:23, 139:17, 139:19, 140:2, 151:15</p> <p>potentially [1] - 47:20</p> <p>powerful [1] - 130:18</p> <p>practice [3] - 74:14, 112:20, 130:25</p> <p>practices [1] - 131:9</p> <p>precautions [1] - 37:9</p> <p>prefer [1] - 164:7</p> <p>prefiled [11] - 14:10, 25:3, 45:3, 45:8, 45:11, 57:16, 128:3, 161:11, 161:13, 163:6</p> <p>preliminary [5] - 6:10, 6:11, 8:2, 10:7, 27:19</p> <p>prepare [6] - 97:23, 99:12, 161:17, 162:24, 166:7, 166:17</p> <p>prepared [2] - 79:23, 166:8</p> <p>preparing [2] - 99:23, 121:25</p> <p>prequalification [2] - 60:1, 60:3</p> <p>present [12] - 5:24, 6:23, 7:4, 7:8, 8:11, 10:21, 41:22, 57:7, 77:24, 112:8, 130:13, 138:11</p> <p>PRESENT [1] - 2:1</p> <p>presentations [1] - 167:3</p> <p>presented [1] - 142:5</p> <p>president [2] - 12:5, 13:21</p> <p>presiding [1] - 5:4</p> <p>pressure [5] - 18:19,</p>
--	---	---	--	--

<p>72:10, 77:10, 78:19, 79:5 pressures [1] - 78:23 pretty [9] - 13:13, 19:1, 19:12, 44:25, 89:4, 102:14, 102:20, 130:18, 140:17 prevent [4] - 67:18, 68:5, 70:25, 158:12 previous [4] - 21:14, 102:10, 112:7, 119:9 previously [2] - 119:13, 122:20 primary [9] - 72:13, 81:18, 82:22, 83:8, 83:13, 83:21, 93:14, 105:19, 125:14 prime [1] - 110:20 priority [3] - 95:19, 102:19, 104:12 private [3] - 48:2, 54:17, 55:16 pro [1] - 9:14 problem [8] - 10:24, 20:24, 34:10, 60:20, 84:10, 86:9, 102:12, 167:12 problems [4] - 31:8, 38:20, 38:22, 143:3 procedural [1] - 6:8 procedure [1] - 60:24 procedures [1] - 61:1 proceed [4] - 9:13, 11:13, 97:2, 167:6 proceeding [4] - 6:24, 12:7, 76:10, 97:24 PROCEEDINGS [1] - 3:1 Proceedings [1] - 1:8 proceedings [3] - 8:10, 168:9, 168:12 process [40] - 8:18, 17:22, 21:3, 27:20, 27:23, 28:2, 28:4, 28:20, 31:3, 41:16, 45:1, 48:12, 48:22, 48:25, 49:5, 49:8, 50:3, 52:7, 52:25, 54:21, 62:6, 62:15, 68:6, 73:1, 74:19, 83:25, 99:11, 99:19, 99:23, 103:22, 108:17, 109:13, 109:21, 109:22, 138:10, 146:5, 148:3, 148:8, 151:21, 152:10 processes [5] - 45:1, 45:2, 46:6, 48:15,</p>	<p>75:1 produce [1] - 60:2 product [5] - 59:20, 86:6, 107:20, 107:22, 108:13 products [7] - 89:13, 148:23, 149:5, 149:17, 150:14, 150:15, 151:11 Professional [2] - 168:6, 168:19 professional [1] - 129:2 program [8] - 51:3, 106:24, 107:11, 109:1, 109:2, 119:17, 119:23, 134:19 progress [1] - 127:5 progressed [1] - 163:5 progression [1] - 147:16 Project [3] - 4:19, 14:7, 127:20 project [24] - 14:8, 14:9, 24:5, 24:10, 25:16, 29:20, 29:24, 31:14, 33:13, 37:17, 39:8, 44:21, 44:23, 45:22, 50:4, 52:24, 53:6, 56:17, 58:3, 60:2, 61:13, 101:24, 152:8, 152:9 PROJECT [1] - 1:6 projects [2] - 50:4, 50:7 prompted [1] - 34:18 proof [2] - 5:11 proper [6] - 15:5, 16:2, 18:19, 40:20, 109:3, 137:2 properties [2] - 16:16, 47:15 property [7] - 21:6, 22:12, 32:18, 48:2, 55:17, 55:18 propose [1] - 46:19 proposed [4] - 5:13, 14:6, 26:5, 92:25 prospect [1] - 127:18 protect [1] - 107:1 protection [2] - 67:4, 130:24 protective [1] - 67:17 provide [19] - 6:7, 10:2, 12:6, 40:11, 43:25, 46:9, 72:2, 72:5, 72:8, 106:2, 122:15, 123:3, 124:2, 124:18,</p>	<p>124:19, 131:23, 143:4, 143:9, 150:20 provided [11] - 8:5, 8:9, 21:21, 47:4, 47:17, 56:6, 57:16, 63:18, 121:8, 125:20, 166:13 providers [1] - 43:21 provides [1] - 63:17 providing [5] - 21:20, 60:4, 62:16, 122:24, 144:11 provision [1] - 43:15 proximity [3] - 35:13, 52:21 public [16] - 32:17, 34:11, 34:18, 39:20, 74:25, 102:20, 104:12, 106:21, 106:24, 107:1, 107:10, 110:15, 120:24, 142:1, 142:6, 166:14 PUBLIC [2] - 1:1, 1:11 Public [3] - 101:5, 168:7, 168:18 PUC [2] - 89:2, 107:21 pull [3] - 24:23, 81:12, 127:25 pulled [1] - 71:6 pulls [1] - 132:22 pump [43] - 15:3, 15:10, 15:12, 16:17, 16:18, 16:20, 17:2, 17:5, 17:9, 17:14, 17:19, 18:1, 18:9, 18:16, 18:18, 19:16, 20:12, 20:13, 21:3, 21:6, 21:11, 21:15, 21:23, 22:3, 22:7, 22:8, 41:25, 42:1, 42:16, 55:23, 56:6, 56:9, 60:10, 61:20, 62:1, 93:19, 93:23, 94:25, 107:20, 107:22, 108:9, 157:15 pumping [1] - 78:20 puncture [1] - 70:12 purchase [2] - 20:14, 21:6 purchasing [1] - 21:3 purely [1] - 73:19 purpose [2] - 11:12, 130:5 purposes [2] - 134:17, 135:1 pursuant [1] - 5:5 pushed [1] - 17:17 pushing [1] - 59:9</p>	<p>put [21] - 20:4, 22:2, 31:16, 35:10, 59:16, 61:22, 64:22, 65:21, 76:5, 82:20, 83:1, 96:7, 98:1, 109:12, 111:15, 112:16, 116:13, 119:17, 124:15, 142:25, 162:3 putting [6] - 19:18, 93:22, 117:4, 127:5, 131:5, 141:13 puzzles [1] - 66:12</p>	<p>quick [6] - 14:25, 102:20, 102:21, 112:12, 158:22, 166:3 quicker [1] - 154:9 quickly [7] - 60:18, 93:16, 94:6, 149:19, 151:6, 163:5, 166:16 quiet [1] - 158:2 quite [5] - 89:7, 93:12, 93:15, 122:8, 165:14</p>	
R					
Q					
<p>qualify [1] - 67:10 quality [7] - 59:23, 60:3, 60:8, 65:20, 72:18, 135:6, 149:7 quantitate [1] - 142:24 quantity [1] - 135:6 quart [1] - 105:3 quarters [1] - 27:15 query [1] - 42:24 questioning [1] - 79:22 questions [87] - 12:19, 12:23, 13:4, 13:5, 13:6, 13:8, 14:16, 14:20, 14:23, 16:7, 19:8, 19:10, 21:18, 22:15, 22:17, 22:20, 25:2, 27:4, 28:9, 28:21, 28:23, 39:22, 41:24, 44:8, 44:24, 45:10, 45:17, 45:22, 47:7, 48:5, 49:11, 49:13, 52:18, 54:13, 55:25, 56:20, 56:22, 58:15, 58:17, 60:10, 61:4, 62:14, 63:4, 66:18, 67:25, 70:6, 70:7, 71:13, 71:15, 75:4, 76:2, 76:12, 80:1, 80:5, 80:7, 80:9, 80:13, 80:16, 88:4, 88:17, 88:19, 90:12, 92:12, 95:15, 98:16, 100:14, 100:18, 100:20, 111:5, 118:18, 120:1, 126:6, 126:8, 128:11, 133:16, 135:14, 135:21, 136:4, 136:6, 136:14, 148:13, 156:9, 158:18, 158:20, 158:23, 160:9, 160:13</p>					<p>racing [1] - 157:12 railroads [1] - 71:5 ramifications [2] - 108:12, 108:14 ranch [1] - 142:7 rancher [1] - 107:3 range [3] - 18:24, 78:7, 155:5 ranking [1] - 129:17 rapidly [1] - 54:24 rate [5] - 79:3, 85:14, 85:17, 86:21, 146:14 rates [1] - 157:4 rather [2] - 115:24, 163:5 reaching [1] - 158:12 react [1] - 146:15 read [4] - 63:16, 98:12, 144:17, 144:18 reader [1] - 52:14 reading [2] - 40:6, 81:2 ready [6] - 7:8, 99:16, 123:18, 167:4, 167:6 real [5] - 42:15, 53:18, 112:12, 115:14, 145:16 reality [1] - 87:4 realize [1] - 56:3 really [9] - 15:21, 61:4, 93:18, 106:22, 106:25, 128:1, 151:21, 154:17, 165:23 realtime [5] - 82:3, 84:25, 86:15, 94:1, 94:7 Realtime [2] - 168:6, 168:19 reason [6] - 24:24, 34:19, 42:16, 69:7, 71:4, 132:20 reasonable [3] - 9:21, 162:23, 163:1</p>

<p>reasons [2] - 34:20, 68:4</p> <p>rebuild [1] - 31:23</p> <p>Rebuttal [3] - 2:14, 2:15, 2:16</p> <p>rebuttal [6] - 8:7, 45:14, 45:18, 57:17, 63:9, 64:1</p> <p>receive [2] - 67:21, 111:12</p> <p>received [1] - 109:18</p> <p>recent [2] - 88:19, 130:13</p> <p>recently [1] - 15:3</p> <p>receptor [1] - 21:21</p> <p>recess [13] - 57:1, 57:2, 57:3, 126:13, 126:16, 126:17, 127:4, 163:12, 163:25, 167:5, 167:11, 167:14</p> <p>Reclamation [1] - 25:24</p> <p>recommendation [1] - 111:25</p> <p>recommended [3] - 6:8, 55:3, 87:23</p> <p>reconnaissance [2] - 88:21, 90:6</p> <p>record [11] - 8:15, 11:22, 22:19, 23:23, 24:18, 35:9, 57:14, 69:9, 97:11, 124:24, 163:11</p> <p>records [1] - 55:5</p> <p>RECROSS [6] - 2:5, 71:17, 73:23, 95:17, 120:4, 158:24</p> <p>RECROSS-EXAMINATION [5] - 71:17, 73:23, 95:17, 120:4, 158:24</p> <p>rectangular [1] - 42:11</p> <p>REDIRECT [5] - 2:5, 43:12, 70:9, 92:17, 118:23</p> <p>reduces [1] - 56:11</p> <p>redundancy [1] - 83:17</p> <p>reference [2] - 23:9, 137:2</p> <p>referenced [1] - 120:20</p> <p>references [1] - 98:11</p> <p>referred [3] - 114:3, 159:24, 160:3</p> <p>referring [4] - 67:1, 147:9, 147:10, 160:1</p> <p>refers [2] - 67:5, 69:23</p> <p>refined [10] - 148:20,</p>	<p>148:23, 149:2, 149:5, 149:15, 149:17, 151:10, 156:18, 156:19, 157:15</p> <p>regard [1] - 50:14</p> <p>regarding [3] - 28:10, 80:13, 96:4</p> <p>regardless [1] - 101:11</p> <p>regimented [1] - 110:19</p> <p>regimes [1] - 49:3</p> <p>region [1] - 5:21</p> <p>regional [1] - 113:18</p> <p>Registered [2] - 168:5, 168:19</p> <p>regulate [2] - 133:24, 134:2</p> <p>regulated [1] - 49:5</p> <p>regulates [1] - 134:12</p> <p>regulation [2] - 74:16, 108:4</p> <p>regulations [17] - 28:3, 51:25, 59:19, 61:17, 62:5, 63:19, 74:18, 108:1, 108:3, 133:22, 133:23, 134:2, 134:7, 134:20, 141:11, 143:3</p> <p>regulator [1] - 108:6</p> <p>regulators [2] - 50:9, 110:15</p> <p>regulatory [9] - 14:9, 44:22, 44:25, 46:6, 46:11, 47:5, 49:3, 74:22, 101:9</p> <p>relate [1] - 38:15</p> <p>related [10] - 21:18, 21:23, 25:20, 48:23, 49:1, 49:8, 53:23, 134:13, 164:22, 165:4</p> <p>relates [3] - 22:11, 45:1, 45:22</p> <p>relationship [1] - 59:1</p> <p>release [2] - 138:9, 154:5</p> <p>released [3] - 40:22, 49:17, 49:19</p> <p>relevant [1] - 134:11</p> <p>reliability [3] - 82:13, 82:20, 83:2</p> <p>reliable [1] - 82:24</p> <p>rely [2] - 138:16, 139:1</p> <p>remain [1] - 130:8</p> <p>remaining [1] - 153:23</p> <p>remedial [2] - 147:7, 147:11</p>	<p>remediation [5] - 51:18, 102:8, 148:3, 148:4, 148:8</p> <p>remember [3] - 21:10, 40:6, 111:4</p> <p>reminds [1] - 29:3</p> <p>remote [4] - 88:20, 89:10, 89:19, 90:4</p> <p>remotely [1] - 60:13</p> <p>remoteness [3] - 29:24, 39:6, 117:8</p> <p>remove [2] - 33:10, 146:25</p> <p>removed [1] - 51:19</p> <p>repair [1] - 115:12</p> <p>repeat [2] - 4:13, 72:4</p> <p>replica [1] - 81:18</p> <p>report [4] - 105:6, 111:1, 130:15, 153:17</p> <p>reported [1] - 155:6</p> <p>Reported [1] - 1:25</p> <p>reporter [11] - 10:13, 11:17, 13:16, 23:19, 44:13, 57:10, 75:10, 97:5, 122:2, 127:10, 168:9</p> <p>Reporter [4] - 168:6, 168:19, 168:19</p> <p>reporting [1] - 95:7</p> <p>represented [1] - 5:25</p> <p>representing [1] - 6:24</p> <p>represents [1] - 132:14</p> <p>request [2] - 68:17, 161:14</p> <p>Request [4] - 2:19, 2:20, 2:20, 2:21</p> <p>requested [2] - 74:24, 122:15</p> <p>requests [1] - 8:8</p> <p>require [12] - 15:4, 18:8, 30:15, 43:14, 43:18, 96:9, 96:12, 96:16, 98:25, 99:3, 128:1, 143:4</p> <p>required [16] - 28:13, 48:11, 48:16, 50:24, 51:1, 51:10, 65:20, 96:14, 111:9, 111:20, 111:21, 112:3, 114:9, 114:12, 141:11, 164:8</p> <p>requirement [3] - 48:17, 96:11, 138:13</p> <p>requirements [8] - 63:15, 66:6, 96:4, 109:4, 109:11,</p>	<p>109:17, 109:24, 114:5</p> <p>requires [6] - 9:15, 35:16, 48:19, 70:19, 88:12, 119:1</p> <p>reranking [1] - 129:22</p> <p>reroute [2] - 33:1, 33:7</p> <p>reserve [2] - 21:24, 28:14</p> <p>reside [1] - 11:24</p> <p>residence [1] - 22:4</p> <p>residences [1] - 42:4</p> <p>resistance [1] - 70:12</p> <p>resource [3] - 47:12, 53:11, 54:25</p> <p>resources [16] - 40:3, 40:9, 41:15, 41:22, 47:8, 47:24, 48:16, 54:8, 54:19, 55:21, 106:2, 106:12, 106:13, 124:14, 124:19, 142:2</p> <p>respect [7] - 14:6, 45:23, 47:8, 68:3, 109:10, 165:5, 165:19</p> <p>respond [9] - 102:12, 102:21, 104:8, 104:13, 104:14, 106:10, 123:1, 125:7, 135:7</p> <p>responders [2] - 107:11, 119:11</p> <p>response [42] - 56:16, 97:17, 100:11, 102:6, 102:22, 102:23, 104:5, 104:20, 104:24, 105:20, 106:17, 106:19, 109:1, 110:13, 110:22, 112:13, 114:12, 115:3, 116:12, 117:5, 117:6, 117:18, 118:1, 118:3, 121:25, 122:24, 123:8, 123:10, 124:3, 124:8, 124:22, 124:25, 125:6, 125:24, 133:24, 134:25, 135:9, 149:10, 154:10, 158:19, 159:3, 160:12</p> <p>Response [18] - 97:21, 99:1, 99:3, 99:6, 99:8, 101:1, 101:6, 101:14, 103:17, 105:2,</p>	<p>107:23, 108:3, 108:13, 109:5, 112:22, 118:9, 119:1, 159:11</p> <p>responses [2] - 8:19, 159:6</p> <p>responsibilities [1] - 45:21</p> <p>responsibility [4] - 29:13, 46:1, 47:10, 105:20</p> <p>responsible [13] - 16:16, 24:20, 29:2, 29:6, 29:9, 29:12, 33:20, 50:21, 62:4, 97:20, 114:11, 122:3, 147:25</p> <p>responsive [2] - 24:15, 160:12</p> <p>rest [2] - 41:2, 161:4</p> <p>restricted [1] - 102:7</p> <p>restrictions [2] - 103:14, 103:18</p> <p>restrictive [1] - 103:22</p> <p>result [2] - 63:13, 77:8</p> <p>resulted [1] - 131:13</p> <p>results [5] - 47:17, 76:24, 77:1, 77:3, 148:2</p> <p>resume [2] - 122:4, 163:25</p> <p>retainer [1] - 123:25</p> <p>retaining [1] - 71:7</p> <p>retract [1] - 159:17</p> <p>review [9] - 51:6, 73:3, 73:6, 73:10, 99:9, 100:1, 118:9, 122:7, 122:13</p> <p>reviewed [3] - 57:19, 66:22, 159:10</p> <p>reviewing [2] - 62:13, 73:1</p> <p>revised [1] - 136:21</p> <p>Richard [4] - 2:6, 2:13, 13:15, 13:21</p> <p>rights [2] - 53:19, 55:15</p> <p>rigid [1] - 108:17</p> <p>rigidity [1] - 68:6</p> <p>rigorous [2] - 60:1, 60:4</p> <p>rise [1] - 78:15</p> <p>risk [20] - 31:18, 127:22, 128:24, 129:4, 129:8, 130:6, 130:9, 131:15, 131:16, 134:16, 139:22, 140:3, 140:21, 142:1, 145:12, 152:10,</p>
---	---	---	---	---

<p>153:1, 153:7, 165:14 Rislov [5] - 1:14, 63:7, 63:8, 88:5, 115:8 RISLOV [18] - 63:9, 63:22, 64:12, 65:7, 65:17, 65:25, 66:9, 88:6, 88:9, 88:16, 115:9, 115:15, 115:18, 116:16, 117:6, 117:12, 117:20, 118:4 Rislov's [1] - 68:2 river [2] - 30:11, 65:2 rivers [3] - 30:12, 30:23, 31:2 road [6] - 18:2, 18:7, 34:5, 34:6, 59:9, 107:6 roads [4] - 15:17, 17:10, 117:7, 121:3 Robert [4] - 2:6, 2:12, 11:16, 11:24 robust [2] - 140:22, 141:3 role [13] - 14:6, 24:5, 44:20, 74:2, 94:15, 95:4, 97:14, 97:16, 105:22, 106:20, 106:21, 107:15, 127:19 roles [1] - 123:20 roll [2] - 111:1, 119:23 roof [1] - 112:15 room [4] - 4:22, 10:20, 24:25, 88:7 rooms [1] - 10:21 route [8] - 33:6, 53:11, 104:2, 106:7, 140:9, 151:24, 152:2, 158:8 routing [4] - 42:8, 53:20, 140:9, 151:23 RPR [1] - 1:25 rule [4] - 9:1, 74:19, 74:24, 75:1 rule-making [1] - 74:19 rules [1] - 5:14 ruling [1] - 9:7 rulings [4] - 6:8, 6:10, 6:11, 6:12 run [5] - 17:4, 17:12, 82:9, 114:23, 114:25 run-up [1] - 82:9 running [1] - 78:21 rupture [11] - 60:19, 77:7, 77:8, 77:9, 77:19, 77:21, 78:18, 78:25, 79:4, 120:9 ruptures [4] - 58:13, 79:9, 120:11, 120:20</p>	<p>Rural [4] - 1:22, 7:11, 71:15, 76:20 rural [1] - 43:23 Russia [1] - 155:23</p> <p style="text-align: center;">S</p> <p>safe [13] - 31:12, 31:20, 32:9, 59:17, 65:6, 65:16, 95:20, 96:17, 96:18, 104:13, 117:12, 142:23, 144:17 safeguards [2] - 64:22, 70:25 safer [9] - 59:17, 65:6, 65:9, 65:10, 65:16, 66:3, 66:11, 72:10, 72:24 safety [31] - 5:19, 34:21, 35:9, 35:10, 37:9, 59:10, 59:12, 59:16, 63:12, 63:17, 69:17, 72:1, 72:3, 72:6, 72:13, 72:17, 72:20, 72:21, 72:22, 102:20, 104:12, 106:23, 110:17, 110:20, 112:4, 112:13, 112:17, 123:24, 138:5, 138:8 sampling [1] - 147:23 sanctions [1] - 165:4 sand [5] - 53:25, 54:4, 152:18, 152:24, 153:3 sandy [1] - 158:10 sat [2] - 88:7, 88:13 satellite [6] - 83:8, 86:17, 86:19, 86:22, 87:9, 87:18 satellites [1] - 87:10 saw [1] - 41:18 SCADA [33] - 62:23, 63:1, 76:3, 79:24, 80:14, 80:19, 81:21, 81:23, 82:11, 82:15, 82:17, 82:24, 84:4, 84:19, 84:21, 86:11, 86:12, 86:15, 88:7, 89:23, 91:1, 91:3, 91:11, 91:15, 91:18, 91:19, 91:24, 91:25, 92:5, 93:4, 95:21, 95:24, 96:7 scattered [1] - 123:11 scenario [4] - 77:9, 77:22, 78:9, 138:1 schedule [3] - 26:5,</p>	<p>26:6, 167:2 scheduled [2] - 9:16, 163:13 Schmidt [9] - 2:7, 2:13, 2:14, 39:24, 44:12, 44:17, 45:21, 48:6, 56:24 school [1] - 114:5 schools [2] - 37:4, 37:10 science [1] - 113:5 Science [1] - 113:5 scope [2] - 23:13, 24:7 Scotland [1] - 61:8 Scott [20] - 2:8, 2:17, 75:9, 75:13, 75:17, 75:21, 75:23, 76:5, 80:18, 81:12, 88:18, 92:19, 94:15, 96:24, 102:10, 102:13, 103:1, 103:2, 120:20 Scott's [1] - 102:11 seated [1] - 7:2 seats [1] - 126:19 second [10] - 5:14, 11:11, 26:20, 26:21, 93:17, 105:22, 116:11, 123:7, 123:15, 144:24 secondary [1] - 83:22 secondly [2] - 33:8, 34:22 seconds [2] - 81:4, 81:6 secretary [1] - 160:20 Secretary [2] - 160:23, 162:8 section [1] - 19:15 Section [1] - 48:16 sections [3] - 55:12, 77:17, 94:5 secure [5] - 106:11, 107:1, 116:7, 117:24, 120:14 securing [1] - 120:6 see [26] - 10:20, 33:5, 46:19, 49:24, 50:10, 54:2, 69:20, 76:6, 90:9, 91:17, 95:1, 95:2, 95:8, 105:7, 107:15, 136:9, 136:10, 138:12, 139:14, 139:15, 140:6, 141:12, 141:14, 152:9, 166:11, 166:21 seeing [3] - 7:20, 70:8, 120:10 seek [1] - 122:25 seem [2] - 64:8,</p>	<p>164:10 segment [5] - 26:10, 26:25, 74:15, 128:18, 131:14 segregate [1] - 60:19 Semmler [13] - 1:14, 7:21, 80:12, 100:17, 126:5, 135:16, 136:5, 158:21, 160:10, 162:5, 164:3, 165:6, 167:3 SEMMLER [27] - 7:21, 8:24, 9:25, 13:6, 14:25, 15:2, 27:7, 28:9, 28:22, 49:13, 58:17, 73:24, 75:2, 80:13, 95:16, 95:18, 96:20, 100:18, 126:6, 135:20, 136:3, 160:11, 160:25, 161:10, 162:6, 164:4, 165:8 send [8] - 9:18, 17:11, 99:14, 100:5, 101:7, 101:9, 109:20, 122:12 sense [4] - 64:8, 89:13, 91:23, 163:8 sensing [4] - 88:20, 89:10, 89:19, 90:4 sensitive [5] - 24:25, 151:16, 152:1, 152:5, 158:8 sent [2] - 99:24, 122:7 sentence [2] - 144:17, 144:24 separate [3] - 73:16, 150:2, 150:5 sequence [2] - 60:24, 60:25 series [2] - 129:5, 142:10 serious [2] - 5:15, 39:10 service [5] - 35:12, 36:15, 43:20, 51:23, 153:10 services [9] - 34:13, 36:2, 37:2, 43:16, 43:19, 43:20, 43:24, 43:25, 107:12 serving [1] - 58:4 session [3] - 57:4, 126:22, 126:24 sessions [2] - 36:21, 39:19 set [5] - 11:1, 20:3, 46:16, 116:8, 124:11 sets [2] - 64:17, 108:1 seven [6] - 60:13,</p>	<p>84:18, 133:13, 133:14, 153:14, 153:19 several [11] - 92:20, 96:3, 105:8, 111:22, 114:13, 115:6, 122:4, 125:3, 127:23, 129:12, 161:19 sewer [1] - 34:1 shall [1] - 5:8 shape [1] - 121:1 share [3] - 29:1, 29:13, 166:10 shared [1] - 29:10 sheet [3] - 4:7, 9:5, 153:25 shell [1] - 153:2 shook [1] - 145:14 shore [1] - 49:1 short [3] - 13:13, 57:3, 85:2 shorthand [2] - 168:9 show [1] - 121:9 showing [1] - 126:20 shown [2] - 89:21, 141:2 shows [1] - 29:2 SHPO [4] - 40:7, 47:14, 47:18, 55:3 shut [2] - 40:17, 78:20 shutdown [2] - 60:24, 61:1 sic [1] - 76:23 sick [1] - 5:1 side [10] - 11:7, 32:7, 32:13, 34:8, 52:8, 52:9, 52:11, 140:13, 153:9 sides [1] - 157:4 sign [1] - 29:4 significant [7] - 20:17, 30:14, 50:3, 54:18, 54:25, 109:25, 120:12 similar [4] - 74:19, 89:8, 156:12, 156:13 simple [4] - 110:2, 110:3, 110:4, 112:15 simply [1] - 71:7 simulation [1] - 76:3 single [1] - 109:15 Sioux [1] - 7:1 site [29] - 15:13, 17:25, 18:12, 19:13, 21:5, 22:6, 28:18, 36:13, 38:4, 40:4, 40:18, 47:20, 87:19, 103:6, 106:11, 107:1, 110:18,</p>	<p>19</p>
---	---	--	---	---	-----------

<p>114:1, 115:25, 117:24, 120:14, 120:15, 120:16, 140:19, 141:23, 142:21, 159:14</p> <p>sites [7] - 21:4, 41:17, 47:19, 47:25, 55:4, 120:7, 142:11</p> <p>siting [5] - 5:17, 15:9, 16:15, 18:16, 21:19</p> <p>sitting [1] - 93:5</p> <p>situate [1] - 116:24</p> <p>situation [8] - 20:7, 51:10, 87:1, 102:14, 104:15, 104:16, 141:1, 152:23</p> <p>six [19] - 99:12, 99:14, 99:15, 99:22, 100:1, 100:5, 102:22, 102:23, 103:1, 103:2, 103:3, 103:4, 104:5, 107:17, 117:4, 117:6, 119:13, 125:12, 142:10</p> <p>six-hour [5] - 102:22, 102:23, 104:5, 117:4, 117:6</p> <p>six-month [2] - 99:14, 107:17</p> <p>size [8] - 79:4, 79:8, 79:12, 132:1, 132:9, 132:19, 133:1, 133:3</p> <p>sizes [2] - 27:21, 125:3</p> <p>skewed [1] - 132:21</p> <p>skimmers [2] - 125:5, 125:6</p> <p>slang [1] - 123:9</p> <p>slide [1] - 11:6</p> <p>slight [2] - 20:17, 20:20</p> <p>slightly [1] - 20:15</p> <p>slope [3] - 31:12, 32:6, 140:17</p> <p>slopes [4] - 31:11, 140:11, 140:13, 140:14</p> <p>slow [1] - 154:6</p> <p>slowly [3] - 78:16, 147:4, 154:17</p> <p>sluff [1] - 140:11</p> <p>sluffing [1] - 141:9</p> <p>small [12] - 35:20, 37:25, 84:11, 84:13, 93:24, 112:11, 120:20, 132:21, 139:11, 139:20, 154:6, 156:17</p> <p>smaller [6] - 19:15,</p>	<p>77:20, 85:4, 94:6, 132:13, 132:15</p> <p>smell [1] - 95:8</p> <p>smelled [1] - 155:6</p> <p>Smith [43] - 1:13, 6:5, 6:13, 6:21, 8:4, 9:11, 11:15, 16:9, 19:6, 22:21, 23:2, 23:17, 25:9, 28:25, 33:15, 43:10, 49:15, 54:12, 57:8, 58:19, 61:5, 63:3, 66:19, 67:23, 69:9, 75:8, 76:19, 76:23, 79:21, 88:3, 92:14, 92:16, 95:13, 96:23, 98:21, 108:23, 112:24, 118:20, 127:8, 136:8, 148:12, 160:20, 160:25</p> <p>SMITH [136] - 6:15, 7:10, 7:17, 8:1, 8:19, 8:23, 9:1, 9:7, 9:13, 9:21, 9:24, 10:1, 10:5, 10:7, 10:19, 11:5, 11:8, 12:25, 13:3, 13:5, 13:7, 13:12, 14:22, 14:24, 16:6, 19:7, 21:8, 21:24, 22:14, 22:22, 22:24, 23:11, 24:23, 25:7, 25:22, 26:1, 27:5, 28:21, 28:23, 33:16, 39:23, 41:3, 41:18, 41:24, 42:19, 44:7, 48:8, 49:12, 49:14, 50:13, 52:12, 54:13, 55:22, 55:25, 56:2, 56:19, 56:23, 57:4, 58:9, 58:16, 58:18, 61:6, 63:4, 63:7, 66:17, 67:24, 68:9, 68:19, 68:25, 69:6, 69:12, 69:15, 69:19, 69:25, 70:4, 71:14, 73:22, 75:3, 75:5, 75:20, 76:20, 80:9, 80:12, 80:15, 81:12, 88:4, 88:17, 88:25, 89:21, 90:3, 90:11, 92:12, 92:15, 95:14, 96:21, 96:24, 98:22, 100:17, 100:19, 108:22, 112:25, 115:8, 118:6, 118:17, 120:1, 126:5, 126:7, 126:12, 126:18, 127:24, 133:18, 135:16, 136:5, 148:13, 157:22,</p>	<p>158:14, 158:19, 160:10, 160:12, 160:15, 160:24, 161:3, 161:8, 161:23, 162:14, 162:16, 163:10, 163:24, 164:10, 164:14, 165:10, 166:17, 166:21, 167:1, 167:8, 167:10</p> <p>so-called [1] - 65:10</p> <p>social [1] - 5:16</p> <p>software [4] - 91:4, 91:10, 92:1, 92:7</p> <p>soil [2] - 146:20, 154:23</p> <p>soils [4] - 25:18, 149:18, 154:19, 157:4</p> <p>Solem [2] - 1:16, 7:23</p> <p>solid [1] - 115:5</p> <p>solubility [1] - 145:25</p> <p>solubilize [1] - 146:10</p> <p>soluble [1] - 142:12</p> <p>someone [6] - 34:9, 40:7, 62:24, 81:6, 113:24, 117:20</p> <p>sometime [1] - 125:16</p> <p>sometimes [8] - 15:18, 18:7, 31:12, 42:12, 42:25, 52:18, 148:4, 164:16</p> <p>somewhat [6] - 16:14, 17:15, 53:5, 94:4, 139:2, 152:13</p> <p>somewhere [2] - 40:5, 68:20</p> <p>son [1] - 137:5</p> <p>soon [3] - 5:1, 118:21, 163:22</p> <p>sorry [14] - 13:9, 37:3, 72:4, 101:2, 113:1, 114:2, 121:23, 126:11, 127:24, 132:17, 136:1, 144:6, 151:8, 160:1</p> <p>sort [6] - 74:22, 83:11, 123:9, 125:13, 138:9, 162:20</p> <p>sorts [2] - 30:5</p> <p>sounds [2] - 9:21, 15:21</p> <p>source [7] - 56:13, 117:16, 142:6, 142:21, 143:5, 143:9, 143:21</p> <p>sources [2] - 60:1, 123:5</p> <p>South [52] - 3:2, 3:3, 4:17, 4:22, 5:9,</p>	<p>28:13, 29:20, 46:12, 46:17, 47:14, 47:18, 47:24, 48:22, 50:8, 51:1, 55:3, 60:15, 98:25, 100:23, 103:8, 104:1, 104:2, 105:15, 105:24, 113:3, 116:19, 117:12, 117:14, 122:10, 124:5, 124:9, 125:10, 125:11, 127:3, 128:17, 137:8, 137:9, 137:14, 137:17, 137:19, 139:11, 139:23, 140:1, 147:21, 151:17, 152:24, 164:20, 164:21, 165:3, 168:7, 168:13</p> <p>south [1] - 156:4</p> <p>SOUTH [3] - 1:2, 1:5, 168:1</p> <p>southwest [3] - 57:15, 75:18, 97:13</p> <p>Southwest [1] - 75:22</p> <p>space [4] - 18:4, 42:2, 42:12, 42:16</p> <p>spacing [1] - 17:1</p> <p>sparse [1] - 38:18</p> <p>sparsely [2] - 38:9, 39:12</p> <p>sparsity [1] - 38:20</p> <p>speaking [4] - 4:10, 39:10, 60:8, 115:2</p> <p>special [25] - 4:13, 61:15, 62:1, 62:8, 62:11, 63:23, 64:1, 64:15, 65:14, 68:10, 68:24, 69:10, 69:22, 70:19, 71:20, 73:2, 73:4, 73:7, 73:16, 73:18, 74:12, 96:2, 96:6, 96:13, 151:19</p> <p>specialized [2] - 124:19, 124:25</p> <p>specializes [1] - 47:22</p> <p>specialty [1] - 125:3</p> <p>species [3] - 151:16, 151:17, 153:4</p> <p>specific [26] - 15:13, 18:13, 19:13, 20:20, 20:22, 21:18, 21:21, 27:8, 50:6, 59:15, 60:23, 60:25, 65:5, 65:8, 65:17, 65:19, 65:20, 69:23, 72:16, 76:1, 88:12, 96:13, 149:9, 159:14, 159:21</p>	<p>specifically [8] - 20 18:23, 19:19, 22:6, 28:10, 28:12, 32:24, 58:14, 111:16</p> <p>specification [2] - 60:5, 61:24</p> <p>specifications [2] - 27:21, 72:19</p> <p>specifics [1] - 62:14</p> <p>specifies [1] - 95:23</p> <p>speed [3] - 78:22, 78:24, 79:7</p> <p>spend [1] - 159:23</p> <p>spill [76] - 13:1, 77:8, 77:22, 78:2, 78:9, 102:14, 110:18, 110:22, 110:25, 111:1, 111:23, 115:10, 116:11, 117:18, 117:21, 118:1, 118:3, 121:5, 122:24, 122:25, 123:2, 123:10, 123:12, 123:14, 123:16, 123:19, 124:3, 124:8, 124:20, 124:22, 124:23, 124:25, 125:4, 125:5, 125:7, 125:24, 128:16, 128:24, 130:14, 131:10, 131:13, 131:19, 132:1, 132:7, 132:9, 132:14, 132:19, 133:5, 133:7, 133:22, 133:24, 134:2, 134:3, 134:4, 134:8, 135:2, 135:3, 135:9, 135:11, 135:12, 136:16, 137:9, 137:17, 137:18, 141:22, 142:15, 143:1, 143:20, 144:1, 146:3, 147:18, 147:20, 153:25, 154:2, 156:22, 158:12</p> <p>spill's [1] - 146:19</p> <p>spills [30] - 37:25, 38:3, 58:14, 76:25, 77:1, 77:3, 115:16, 116:2, 116:3, 117:21, 120:19, 120:21, 130:17, 132:13, 132:15, 132:18, 132:19, 132:21, 133:3, 133:9, 133:12,</p>
--	--	---	---	--

<p>133:14, 134:13, 134:14, 135:7, 136:1, 140:6, 153:19, 153:23, 153:24</p> <p>Spittstoesser [2] - 1:15, 7:23</p> <p>spray [12] - 77:6, 77:11, 77:12, 77:13, 77:15, 77:16, 78:12, 120:9, 120:22, 121:4, 121:9, 121:15</p> <p>spraying [1] - 120:12</p> <p>spread [7] - 37:17, 37:18, 37:21, 37:23, 157:1</p> <p>spreading [1] - 146:3</p> <p>spreads [1] - 35:4</p> <p>springs [1] - 23:25</p> <p>square [1] - 42:11</p> <p>SS [1] - 168:2</p> <p>stability [1] - 140:13</p> <p>Stacy [2] - 1:15, 7:23</p> <p>staff [33] - 7:20, 7:22, 8:9, 8:10, 8:23, 8:24, 9:24, 13:5, 14:24, 27:5, 28:9, 28:21, 49:12, 56:16, 58:16, 68:17, 71:15, 73:22, 94:24, 95:15, 110:15, 113:10, 113:20, 160:25, 161:9, 161:11, 161:14, 161:16, 162:2, 162:20, 163:3, 163:9</p> <p>STAFF [1] - 1:13</p> <p>staff's [2] - 34:1, 162:13</p> <p>stage [1] - 90:4</p> <p>stained [1] - 105:7</p> <p>stand [7] - 11:10, 11:11, 11:16, 44:12, 46:21, 75:9, 127:9</p> <p>stand-alone [1] - 46:21</p> <p>standard [9] - 18:11, 56:17, 59:18, 61:16, 72:10, 96:1, 106:6, 130:25, 146:12</p> <p>standards [8] - 46:11, 46:16, 47:5, 56:18, 62:5, 64:17, 131:4, 149:7</p> <p>standpoint [9] - 17:2, 25:18, 32:13, 42:6, 59:5, 67:7, 67:11, 138:7, 163:5</p> <p>stands [2] - 51:16, 62:7</p>	<p>start [23] - 4:5, 17:1, 17:15, 18:2, 26:7, 26:9, 26:12, 26:14, 26:19, 26:20, 26:21, 38:25, 75:20, 99:7, 99:19, 99:20, 99:22, 125:13, 145:10, 146:19, 147:3, 161:11, 161:17</p> <p>started [3] - 4:4, 108:13, 125:13</p> <p>starting [1] - 162:11</p> <p>starts [5] - 17:1, 130:13, 154:18, 154:19, 154:25</p> <p>STATE [2] - 1:2, 168:1</p> <p>State [18] - 3:2, 4:22, 6:3, 28:13, 46:12, 46:16, 47:13, 47:18, 48:22, 51:1, 73:9, 73:11, 137:8, 148:8, 164:21, 165:3, 168:7</p> <p>state [34] - 11:22, 23:22, 44:16, 45:2, 47:14, 48:1, 48:19, 48:21, 49:16, 51:2, 51:24, 53:2, 53:17, 54:17, 55:18, 55:20, 57:13, 58:24, 63:12, 86:20, 96:18, 97:10, 101:21, 102:15, 108:3, 108:25, 117:13, 141:21, 141:24, 144:9, 148:2, 159:14, 159:21, 164:5</p> <p>state-of-the-art [2] - 96:18, 102:15</p> <p>state-specific [1] - 159:21</p> <p>Statement [2] - 73:9, 73:10</p> <p>statement [2] - 74:5, 74:6</p> <p>states [2] - 50:6, 50:8</p> <p>States [4] - 103:15, 113:15, 123:11</p> <p>station [20] - 17:14, 18:1, 18:8, 18:9, 18:16, 18:18, 19:16, 20:12, 20:13, 21:6, 21:11, 22:7, 22:9, 42:1, 55:23, 56:10, 62:1, 93:23, 94:25</p> <p>stationed [1] - 113:3</p> <p>stations [20] - 15:4, 15:10, 15:13, 16:17, 16:18, 16:21, 17:3, 17:5, 17:9, 17:19, 21:4, 21:15, 21:23,</p>	<p>22:3, 41:25, 42:17, 56:7, 60:10, 61:21, 93:19</p> <p>statistics [3] - 132:8, 137:6, 141:3</p> <p>stats [1] - 102:17</p> <p>statutes [1] - 164:22</p> <p>statutory [1] - 138:12</p> <p>stay [6] - 20:9, 78:10, 78:11, 120:24, 140:12, 156:23</p> <p>staying [1] - 92:3</p> <p>stays [1] - 147:2</p> <p>steel [9] - 60:1, 61:14, 65:24, 74:3, 74:7, 74:9, 116:17, 123:6, 124:18</p> <p>steel/yellow [1] - 124:21</p> <p>Steele [4] - 24:9, 24:11, 25:14, 27:1</p> <p>steep [2] - 140:11, 140:14</p> <p>step [6] - 13:13, 44:7, 56:24, 96:25, 120:7, 126:10</p> <p>steps [2] - 46:3, 55:2</p> <p>Steve [9] - 2:7, 2:14, 2:15, 4:3, 4:23, 7:6, 16:24, 23:18, 23:24</p> <p>STEVE [1] - 1:11</p> <p>still [13] - 19:13, 19:17, 19:18, 20:8, 27:25, 66:10, 66:12, 67:6, 112:9, 130:3, 140:23, 141:18, 144:20</p> <p>stipulate [5] - 8:21, 8:25, 161:13, 162:2, 165:1</p> <p>stipulated [1] - 165:25</p> <p>stipulating [1] - 8:14</p> <p>stipulation [1] - 9:8</p> <p>stir [1] - 145:17</p> <p>stone [1] - 50:24</p> <p>stop [4] - 41:1, 55:14, 109:7, 115:22</p> <p>storage [1] - 38:1</p> <p>stored [1] - 112:14</p> <p>strange [1] - 64:12</p> <p>Strata [1] - 11:25</p> <p>strategically [2] - 105:24, 116:13</p> <p>stream [1] - 143:11</p> <p>streams [3] - 31:1, 47:3, 135:22</p> <p>Street [1] - 75:22</p> <p>street [3] - 57:15, 75:18, 97:13</p> <p>strength [4] - 60:7,</p>	<p>74:1, 74:4, 74:8</p> <p>strengthwise [1] - 74:10</p> <p>stress [1] - 59:7</p> <p>stresses [1] - 65:3</p> <p>strict [1] - 116:2</p> <p>strictly [1] - 78:21</p> <p>strike [2] - 40:16, 60:9</p> <p>strikes [1] - 40:8</p> <p>stringing [1] - 68:6</p> <p>strongly [1] - 140:23</p> <p>struck [1] - 67:14</p> <p>structure [4] - 15:25, 30:20, 56:9, 110:19</p> <p>structures [1] - 56:6</p> <p>struggling [1] - 114:18</p> <p>students [1] - 37:6</p> <p>studies [6] - 77:6, 77:14, 120:18, 120:22, 142:10, 153:7</p> <p>study [7] - 77:12, 100:24, 121:12, 121:14, 121:16, 142:9, 150:16</p> <p>studying [2] - 22:16, 22:19</p> <p>stuff [3] - 110:13, 115:5, 116:12</p> <p>subcontractor [1] - 124:12</p> <p>subject [8] - 6:1, 6:6, 20:5, 20:17, 71:23, 71:24, 163:24, 165:3</p> <p>subjected [1] - 146:17</p> <p>submit [4] - 109:7, 118:8, 118:10, 161:11</p> <p>submitted [6] - 8:9, 14:10, 45:3, 51:7, 118:15, 121:22</p> <p>subsequently [1] - 58:23</p> <p>substance [1] - 59:22</p> <p>substances [1] - 150:23</p> <p>substantial [1] - 110:5</p> <p>substantially [2] - 5:18, 66:23</p> <p>substituted [1] - 7:6</p> <p>success [1] - 89:4</p> <p>successful [1] - 46:13</p> <p>suddenly [1] - 154:25</p> <p>suffice [1] - 163:17</p> <p>sufficient [1] - 135:2</p> <p>suggest [2] - 151:2, 158:7</p> <p>suggested [1] - 111:14</p>	<p>suggestion [3] - 8:20, 21 23:2, 40:6</p> <p>suitable [1] - 22:12</p> <p>suite [3] - 14:4, 23:25, 44:18</p> <p>SULLY [1] - 168:3</p> <p>sum [1] - 132:17</p> <p>summary [2] - 25:8, 25:10</p> <p>summer [2] - 49:17, 115:21</p> <p>superintendents [1] - 36:22</p> <p>supplemental [1] - 161:12</p> <p>supplies [1] - 30:1</p> <p>supply [2] - 53:24, 143:12</p> <p>support [2] - 113:20, 120:23</p> <p>suppose [2] - 117:9, 117:22</p> <p>supported [2] - 96:11, 109:12</p> <p>Supreme [1] - 6:4</p> <p>surface [13] - 32:5, 32:6, 55:7, 78:15, 142:1, 144:10, 144:11, 145:1, 145:18, 146:4, 146:17, 146:21, 146:23</p> <p>surprise [1] - 7:7</p> <p>surprisingly [1] - 139:10</p> <p>surrender [3] - 25:5, 25:25, 58:7</p> <p>surrounding [2] - 28:3, 156:25</p> <p>surrounds [2] - 138:5, 138:8</p> <p>surveillance [3] - 154:21, 155:2, 155:3</p> <p>survey [6] - 17:22, 17:23, 20:11, 44:24, 47:8, 47:16</p> <p>surveying [1] - 41:15</p> <p>surveys [13] - 17:24, 33:3, 44:25, 47:12, 47:14, 47:23, 47:25, 48:1, 48:4, 55:11, 65:21, 89:5</p> <p>survivability [1] - 140:25</p> <p>suspected [3] - 60:20, 147:19, 147:22</p> <p>switch [2] - 83:12, 91:20</p> <p>sworn [10] - 6:1, 11:17, 13:16, 23:19,</p>
--	---	---	--	--

44:13, 57:10, 57:13, 75:10, 97:5, 127:10
system [65] - 56:4, 62:23, 67:4, 67:5, 79:24, 80:14, 80:19, 81:21, 81:23, 82:4, 82:5, 82:9, 82:12, 82:17, 82:22, 83:2, 83:5, 83:8, 83:9, 84:4, 84:20, 84:21, 85:1, 86:11, 86:15, 87:2, 88:7, 89:10, 89:19, 91:2, 91:3, 91:4, 91:11, 91:15, 91:18, 91:19, 91:24, 91:25, 93:6, 93:11, 93:14, 93:18, 93:23, 93:25, 94:1, 94:2, 94:8, 94:9, 94:11, 94:13, 94:19, 95:21, 95:24, 96:8, 96:10, 96:15, 109:1, 110:14, 110:19, 114:15, 123:21, 145:14, 159:10
system's [1] - 82:15
systems [12] - 74:17, 76:4, 82:1, 82:3, 82:21, 82:24, 83:9, 83:10, 89:12, 93:2, 106:19

T

Table [3] - 98:9, 98:11, 98:12
table [2] - 56:6, 98:8
tal [1] - 94:7
talks [1] - 134:4
Tallahassee [3] - 13:25, 14:4, 44:19
tanker [1] - 116:6
tanks [1] - 38:1
targeting [1] - 26:18
tax [2] - 43:23, 43:24
taxed [1] - 106:19
TAYLOR [19] - 23:17, 23:21, 25:5, 25:25, 43:10, 43:13, 44:6, 57:8, 57:12, 58:7, 68:23, 69:2, 69:4, 69:9, 69:14, 70:10, 71:12, 73:12, 75:4
Taylor [6] - 1:21, 6:25, 23:18, 25:8, 43:9, 69:5
TC [1] - 9:3
TC-1 [2] - 9:4, 9:8
team [4] - 6:19, 44:10,

123:16, 123:20
technical [7] - 58:4, 73:20, 93:9, 105:22, 110:22, 113:12, 114:24
technically [1] - 9:19
technician [1] - 113:16
technicians [2] - 36:6, 39:11
technique [1] - 71:11
techniques [5] - 25:17, 30:25, 65:20, 72:15, 92:9
technologies [2] - 74:3, 90:4
technology [6] - 74:3, 86:12, 88:20, 90:21, 92:2, 102:16
teeny [1] - 153:4
telephone [4] - 162:13, 163:22, 164:6, 164:8
telephonically [1] - 161:21
temperature [1] - 145:21
template [4] - 138:25, 159:11, 159:24, 160:3
temporarily [1] - 33:2
tend [11] - 66:2, 129:21, 140:11, 141:21, 143:25, 146:6, 147:4, 149:17, 151:6, 157:1
tender [2] - 48:6, 133:17
tends [3] - 131:2, 156:23, 165:12
tens [1] - 78:5
tentative [1] - 26:15
term [4] - 31:19, 59:23, 65:10, 144:13
terms [25] - 10:21, 10:22, 19:2, 20:10, 21:11, 21:20, 40:4, 41:4, 41:25, 43:2, 43:4, 56:2, 60:24, 64:23, 65:1, 67:16, 72:13, 72:15, 89:6, 120:13, 123:10, 157:24, 157:25, 158:5, 165:15
terrain [5] - 16:22, 18:3, 30:10, 31:6, 42:15
terrains [2] - 30:3, 30:5
territories [1] - 122:10

test [1] - 84:20
tester [1] - 87:22
testified [4] - 64:18, 102:10, 112:22, 133:21
testify [5] - 7:25, 26:4, 80:3, 97:16, 138:23
testifying [4] - 5:25, 23:8, 136:18, 165:2
testimonial [1] - 10:22
testimonies [1] - 8:8
testimony [97] - 7:5, 10:17, 12:6, 12:14, 12:17, 14:10, 14:14, 14:17, 21:10, 24:8, 24:14, 24:15, 24:18, 25:3, 25:11, 25:13, 29:13, 33:18, 38:24, 45:3, 45:8, 45:11, 45:14, 45:18, 49:16, 52:17, 52:20, 52:23, 53:5, 53:23, 54:16, 57:16, 57:17, 57:19, 57:22, 57:23, 57:24, 58:20, 60:12, 63:12, 66:11, 66:12, 66:22, 66:23, 68:12, 69:13, 76:9, 76:16, 80:18, 92:19, 97:23, 98:5, 98:11, 98:17, 102:2, 102:5, 102:7, 108:24, 109:6, 109:23, 112:7, 119:9, 121:6, 128:3, 128:9, 128:12, 128:16, 128:20, 132:1, 134:10, 135:5, 135:8, 136:11, 136:16, 136:19, 136:21, 139:7, 141:20, 141:25, 143:14, 143:15, 143:23, 144:10, 144:15, 147:6, 148:16, 151:16, 161:11, 161:12, 161:14, 162:2, 163:6, 163:20, 164:5, 165:11, 165:12
Testimony [7] - 2:12, 2:13, 2:13, 2:16, 2:17, 2:17, 2:18
testing [2] - 34:7, 81:22
Texas [7] - 53:16, 53:17, 89:3, 123:17, 155:15, 156:3, 156:11
TH [1] - 102:24

THE [226] - 1:1, 1:2, 1:4, 1:5, 1:6, 1:11, 13:14, 16:18, 16:23, 18:22, 19:19, 20:2, 20:22, 21:2, 21:18, 22:6, 29:10, 29:21, 30:22, 31:25, 32:4, 32:22, 33:24, 34:4, 34:16, 36:1, 36:8, 36:20, 37:7, 37:16, 38:10, 38:13, 38:21, 39:17, 40:15, 41:10, 41:21, 42:6, 49:21, 49:25, 50:5, 50:19, 51:12, 51:15, 51:21, 52:5, 52:9, 53:8, 54:3, 54:7, 55:2, 55:24, 56:1, 56:5, 59:5, 59:25, 60:14, 60:17, 60:21, 61:13, 61:23, 62:8, 62:10, 62:20, 62:25, 63:21, 64:9, 64:20, 65:13, 65:18, 66:5, 67:7, 67:12, 68:8, 68:17, 68:22, 69:3, 69:18, 69:22, 70:1, 80:6, 80:22, 80:25, 81:3, 81:8, 81:11, 81:16, 81:25, 82:18, 83:8, 83:13, 83:20, 84:1, 84:7, 84:10, 84:17, 84:21, 84:25, 85:14, 85:19, 85:24, 86:3, 86:7, 86:14, 86:19, 86:24, 87:5, 87:8, 87:12, 87:16, 87:19, 87:23, 88:1, 88:8, 88:10, 88:23, 89:7, 90:2, 90:7, 90:19, 91:1, 91:4, 91:13, 91:17, 92:2, 92:9, 100:16, 100:25, 101:3, 101:8, 101:15, 101:18, 101:20, 101:23, 102:1, 102:13, 103:3, 103:9, 103:12, 103:18, 104:3, 104:11, 105:4, 105:13, 105:18, 106:4, 106:8, 106:15, 107:4, 107:7, 107:10, 107:24, 108:5, 108:15, 108:21, 109:9, 110:10, 111:12, 111:22, 112:10, 113:8, 113:25, 114:7, 114:10,

114:20, 115:2, 115:13, 115:17, 115:24, 116:22, 117:10, 117:14, 117:23, 118:5, 118:14, 126:2, 126:4, 126:11, 136:10, 136:19, 136:23, 137:11, 137:20, 138:19, 138:22, 139:3, 139:5, 139:18, 141:2, 142:9, 143:19, 144:3, 144:6, 144:19, 144:22, 144:25, 145:4, 145:11, 146:18, 147:18, 148:21, 149:4, 149:17, 149:23, 150:1, 150:9, 150:19, 151:2, 151:20, 152:15, 152:25, 153:16, 153:23, 154:11, 154:16, 155:12, 155:16, 156:6, 156:14, 156:21, 157:8, 157:12, 157:17, 157:21, 158:7
themselves [5] - 27:12, 28:8, 30:24, 51:5, 139:16
theoretical [1] - 78:17
thereabout [1] - 35:13
thereby [1] - 9:7
therefore [3] - 61:18, 134:10, 159:13
therein [1] - 12:21
thereto [1] - 165:5
they've [4] - 43:3, 89:4, 105:20, 141:6
thick [1] - 59:13
thicker [14] - 59:6, 59:8, 59:10, 59:11, 66:3, 68:4, 70:11, 70:15, 70:20, 71:4, 71:23, 72:1, 72:5, 72:23
thickness [14] - 58:21, 59:1, 59:4, 59:5, 59:14, 59:18, 61:16, 61:25, 63:20, 72:12, 72:14, 72:21, 74:1, 74:13
thicknesses [1] - 61:9
thin [2] - 59:13, 65:1
thinking [3] - 66:9, 85:1, 162:5

<p>thinner [9] - 65:1, 65:8, 66:2, 66:6, 70:13, 70:15, 71:21, 71:25, 74:17</p> <p>thinning [1] - 106:2</p> <p>third [4] - 5:18, 94:1, 95:6</p> <p>third-party [1] - 95:6</p> <p>thoughts [2] - 162:19, 166:3</p> <p>thousands [4] - 78:5, 78:7, 155:20</p> <p>threat [1] - 5:15</p> <p>threats [1] - 64:23</p> <p>three [9] - 39:14, 82:19, 120:21, 123:5, 123:23, 132:2, 132:9, 132:14, 132:15</p> <p>threshold [4] - 84:22, 84:23, 85:10, 89:24</p> <p>throat [1] - 121:1</p> <p>throughout [1] - 6:10</p> <p>Thursday [1] - 161:20</p> <p>tied [1] - 65:14</p> <p>Tiffany [1] - 23:25</p> <p>Tillquist [12] - 2:9, 2:18, 39:24, 102:17, 127:9, 127:14, 128:15, 133:21, 136:6, 136:9, 159:2, 160:16</p> <p>Tim [2] - 1:15, 7:23</p> <p>timed [1] - 133:7</p> <p>timing [1] - 124:15</p> <p>tipping [1] - 32:14</p> <p>tires [1] - 104:19</p> <p>title [4] - 24:5, 97:18, 97:19, 121:23</p> <p>TO [1] - 1:6</p> <p>today [22] - 5:1, 5:2, 7:16, 7:19, 10:17, 14:18, 38:24, 45:12, 45:19, 57:23, 62:18, 66:24, 86:12, 90:23, 128:12, 134:10, 143:15, 144:15, 163:12, 163:25, 165:15, 165:18</p> <p>toes [1] - 126:12</p> <p>together [6] - 29:15, 30:7, 72:19, 162:3, 162:7, 166:18</p> <p>tolerances [2] - 21:25, 56:3</p> <p>toll [1] - 95:9</p> <p>toll-free [1] - 95:9</p> <p>Tom [1] - 2:19</p> <p>tomorrow [10] - 5:3, 160:20, 160:23,</p>	<p>161:5, 161:17, 161:18, 163:17, 164:1, 166:10, 166:16</p> <p>ton [1] - 69:23</p> <p>tons [3] - 68:11, 68:13, 70:1</p> <p>took [5] - 34:11, 145:13, 147:11, 153:18, 168:9</p> <p>top [6] - 32:7, 33:24, 49:9, 59:22, 112:18, 129:21</p> <p>topographic [1] - 17:23</p> <p>total [2] - 85:12, 132:18</p> <p>totally [2] - 29:5, 29:8</p> <p>toward [1] - 17:22</p> <p>towards [1] - 147:10</p> <p>towns [1] - 39:13</p> <p>toxicity [2] - 145:15, 149:6</p> <p>track [1] - 23:15</p> <p>tract [1] - 17:20</p> <p>trade [2] - 113:23, 113:24</p> <p>trailer [7] - 112:15, 112:16, 112:18, 113:22, 114:16, 116:14, 117:13</p> <p>trailers [13] - 112:14, 114:1, 114:3, 115:20, 116:13, 116:20, 116:22, 116:23, 116:25, 125:1, 125:2</p> <p>train [1] - 114:22</p> <p>trained [6] - 39:15, 55:11, 88:11, 94:21, 118:1, 155:2</p> <p>trainers [1] - 76:3</p> <p>training [22] - 36:21, 36:23, 40:11, 40:12, 40:23, 40:24, 41:4, 41:7, 41:11, 41:12, 54:24, 88:12, 105:21, 110:12, 111:24, 113:4, 113:6, 114:9, 114:11, 114:13, 115:4, 115:6</p> <p>TRANSCANADA [1] - 1:4</p> <p>TransCanada [44] - 4:16, 5:7, 12:3, 12:4, 13:23, 23:3, 23:6, 23:18, 24:3, 26:13, 26:19, 27:23, 28:7, 35:8, 36:7, 50:17,</p>	<p>50:19, 50:21, 51:6, 51:11, 58:12, 59:25, 62:14, 67:3, 67:12, 77:11, 90:17, 99:5, 99:7, 108:6, 113:7, 114:4, 120:13, 121:8, 121:16, 123:1, 126:25, 127:4, 127:21, 135:9, 135:12, 143:4, 152:9, 166:13</p> <p>TransCanada's [7] - 77:5, 89:15, 121:6, 129:3, 129:6, 137:22, 161:13</p> <p>TRANSCRIPT [1] - 3:1</p> <p>Transcript [1] - 1:8</p> <p>transcription [1] - 168:12</p> <p>transient [1] - 94:7</p> <p>transmission [1] - 4:18</p> <p>TRANSMISSION [1] - 1:5</p> <p>transport [2] - 36:15, 44:1</p> <p>transported [3] - 150:11, 150:13, 151:3</p> <p>travel [3] - 31:13, 157:7, 164:8</p> <p>traveling [1] - 95:4</p> <p>traversed [1] - 158:4</p> <p>treat [1] - 34:25</p> <p>treated [1] - 18:10</p> <p>treatment [8] - 27:11, 27:13, 27:24, 28:10, 45:24, 46:18, 46:22, 46:25</p> <p>trench [6] - 154:20, 156:18, 156:20, 156:23, 156:24, 157:3</p> <p>trenchers [1] - 40:12</p> <p>trenching [2] - 41:8, 71:2</p> <p>trial [1] - 9:16</p> <p>tribes [1] - 41:21</p> <p>tried [4] - 89:11, 140:5, 140:12, 140:13</p> <p>trigger [1] - 105:2</p> <p>triggers [2] - 105:8, 112:11</p> <p>trouble [1] - 51:11</p> <p>Trow [2] - 13:22, 44:17</p> <p>Trow's [1] - 14:8</p> <p>truck [1] - 104:21</p> <p>trucks [2] - 116:6</p>	<p>true [4] - 129:19, 129:24, 130:7, 168:11</p> <p>try [10] - 17:9, 30:18, 31:18, 47:19, 131:3, 131:16, 132:8, 152:5, 156:24, 165:24</p> <p>trying [12] - 17:18, 31:9, 39:3, 41:16, 46:9, 59:2, 89:13, 114:25, 121:13, 140:4, 144:20, 146:24</p> <p>tunnel [1] - 32:20</p> <p>turbulence [1] - 145:17</p> <p>turn [4] - 4:7, 4:10, 6:13, 108:24</p> <p>turned [2] - 4:2, 119:21</p> <p>twentieth [1] - 61:18</p> <p>two [24] - 36:13, 39:14, 66:13, 82:7, 82:8, 85:8, 94:10, 94:20, 101:11, 105:19, 108:1, 108:2, 112:2, 115:4, 117:15, 120:19, 122:14, 129:21, 133:4, 140:19, 155:11, 156:4, 166:18</p> <p>two-hour [1] - 94:10</p> <p>type [32] - 18:12, 27:17, 30:11, 40:23, 40:24, 41:10, 41:12, 42:18, 51:24, 67:1, 67:3, 71:3, 74:7, 74:9, 89:10, 90:23, 90:24, 93:13, 93:17, 93:25, 104:7, 105:4, 106:5, 113:14, 115:21, 116:9, 125:6, 137:15, 141:1, 148:3, 153:3, 163:7</p> <p>types [10] - 27:21, 30:5, 75:1, 93:1, 115:6, 116:6, 141:5, 141:7, 152:17, 153:1</p> <p>typical [1] - 152:9</p> <p>typically [18] - 37:19, 46:21, 60:21, 71:1, 74:25, 85:7, 85:10, 91:4, 99:10, 100:7, 102:18, 103:6, 104:16, 114:7, 116:4, 116:8, 119:21, 156:22</p>	<p style="text-align: right;">U 23</p> <p>U.S [3] - 24:9, 25:14, 38:17</p> <p>ultimate [1] - 86:12</p> <p>ultimately [3] - 51:12, 51:13, 51:14</p> <p>unable [2] - 83:14, 161:20</p> <p>unavailable [1] - 162:10</p> <p>uncommon [1] - 30:7</p> <p>UNDER [1] - 1:5</p> <p>under [21] - 4:17, 5:11, 39:4, 47:12, 47:21, 48:16, 49:3, 51:2, 51:9, 54:9, 59:19, 61:16, 63:19, 65:2, 77:10, 78:23, 122:14, 123:20, 123:25, 144:21, 164:22</p> <p>underestimate [1] - 131:15</p> <p>undergoes [1] - 59:25</p> <p>undergoing [1] - 28:1</p> <p>underground [4] - 77:15, 78:10, 78:11, 78:13</p> <p>underlying [1] - 158:11</p> <p>underneath [2] - 71:5</p> <p>understood [2] - 98:10, 138:2</p> <p>undertaken [1] - 105:21</p> <p>unduly [1] - 5:20</p> <p>unforeseen [1] - 20:6</p> <p>unfortunate [1] - 35:25</p> <p>unfortunately [1] - 115:25</p> <p>unique [11] - 29:19, 30:15, 38:12, 38:17, 102:14, 152:13, 152:15, 152:19, 155:17, 155:24</p> <p>United [4] - 103:15, 113:15, 123:11</p> <p>units [2] - 5:23, 46:19</p> <p>unless [3] - 7:3, 10:1, 163:14</p> <p>unlikely [2] - 51:10, 84:21</p> <p>unstable [1] - 140:17</p> <p>unusual [6] - 30:4, 71:8, 119:5, 119:7, 151:17, 151:21</p> <p>up [73] - 4:14, 8:13,</p>
---	---	--	--	--

<p>10:25, 11:1, 16:6, 19:24, 21:8, 22:17, 22:23, 31:9, 31:13, 31:15, 32:8, 32:14, 41:25, 42:20, 43:8, 50:16, 50:17, 52:13, 53:1, 56:23, 63:4, 64:10, 67:24, 68:2, 68:11, 70:18, 73:25, 75:3, 77:25, 78:13, 78:14, 82:9, 82:15, 89:12, 90:12, 91:5, 92:12, 93:23, 95:14, 95:16, 96:21, 116:8, 118:19, 120:1, 122:18, 124:11, 126:7, 128:2, 130:6, 132:17, 137:16, 140:12, 143:9, 143:11, 144:12, 145:14, 145:18, 148:5, 148:8, 150:20, 150:23, 154:19, 154:23, 155:3, 155:4, 156:17, 157:22, 158:1, 158:20, 165:18</p> <p>update [1] - 15:3 updated [5] - 8:7, 69:20, 98:16, 131:25, 136:20 upgrades [2] - 91:5, 91:10 upstream [1] - 17:14 usable [1] - 42:13 useful [1] - 90:5 UTILITIES [2] - 1:1, 1:11 Utilities [1] - 101:6 utility [1] - 71:2 utilize [1] - 11:11 utilized [1] - 36:6</p>	<p>71:20, 130:16, 139:14 various [3] - 89:12, 93:19, 130:15 vary [1] - 61:24 vast [1] - 150:13 vegetated [1] - 154:24 vegetation [3] - 105:7, 152:11, 154:25 vehicle [1] - 104:18 vehicles [1] - 104:17 velocity [1] - 79:16 vendor [1] - 28:8 vendors [3] - 46:10, 46:14, 92:8 Venezuela [1] - 155:23 verifier [1] - 103:4 version [1] - 91:8 versus [2] - 59:13, 120:20 vertically [1] - 157:2 vetted [1] - 108:9 via [2] - 164:5, 164:8 VICE [1] - 1:11 vice [3] - 9:14, 12:5, 13:21 views [1] - 5:22 virtually [1] - 83:2 viscosity [1] - 149:18 visit [5] - 107:11, 119:10, 119:12, 119:15, 119:16 visual [1] - 89:25 volatile [2] - 146:6, 151:5 volume [11] - 82:4, 85:13, 93:17, 93:18, 105:5, 133:7, 134:4, 135:2, 135:4, 135:11, 135:13 Volume [1] - 1:9 volumes [1] - 134:23 vulnerable [1] - 158:5</p>	<p>walled [11] - 70:11, 70:13, 70:15, 70:16, 70:20, 71:4, 71:21, 71:23, 71:25, 72:2, 72:5 Walsh [4] - 111:13, 121:19, 121:20, 121:21 Walsh's [1] - 69:13 wants [1] - 158:1 waste [11] - 27:10, 27:11, 27:13, 27:23, 28:10, 45:24, 46:18, 46:21, 46:25, 47:2, 110:3 watch [1] - 93:10 watched [1] - 88:14 watching [1] - 93:6 water [53] - 13:1, 27:10, 27:11, 27:13, 27:24, 28:10, 34:1, 34:5, 45:24, 46:18, 46:21, 46:25, 47:2, 47:3, 50:24, 110:12, 110:22, 141:21, 142:1, 142:6, 142:13, 142:18, 143:2, 143:5, 143:9, 143:11, 143:12, 143:25, 145:1, 145:14, 145:19, 145:24, 146:2, 146:4, 146:7, 146:11, 146:12, 146:16, 146:17, 146:18, 146:20, 146:21, 146:23, 147:4, 147:5, 147:14, 147:20, 147:22, 149:7, 158:4, 158:8, 158:11, 158:13 water's [3] - 143:7, 144:9, 144:11 water-based [1] - 110:12 ways [4] - 23:5, 79:21, 132:10, 136:3 weathering [1] - 146:4 week [3] - 8:18, 9:16, 162:10 weekly [1] - 94:11 weeks [2] - 84:15, 94:20 weighing [1] - 68:11 weight [2] - 69:23, 69:25 welcome [1] - 4:2 welfare [1] - 5:19 wells [10] - 52:22,</p>	<p>53:12, 53:13, 53:17, 53:18, 142:7, 147:8, 147:13, 147:16, 147:23 western [3] - 116:19, 127:2, 140:1 wheel [5] - 104:17, 104:19, 113:22, 114:3, 115:19 whereas [1] - 70:1 white [1] - 123:19 White [1] - 1:20 whole [6] - 21:5, 99:11, 131:16, 138:4, 140:19, 150:2 Wiess [1] - 69:16 William [4] - 6:25, 23:18, 69:13, 97:12 willing [4] - 8:21, 8:24, 17:19, 162:1 Wilson [1] - 121:19 window [9] - 26:7, 26:12, 26:14, 82:7, 85:2, 107:17, 117:5, 117:6, 124:15 window-based [1] - 85:2 windows [3] - 26:16, 26:24, 82:11 windy [1] - 145:17 wintertime [1] - 26:21 wish [2] - 7:18, 8:2 withdrawal [1] - 34:7 WITNESS [222] - 13:14, 16:18, 16:23, 18:22, 19:19, 20:2, 20:22, 21:2, 21:18, 22:6, 29:10, 29:21, 30:22, 31:25, 32:4, 32:22, 33:24, 34:4, 34:16, 36:1, 36:8, 36:20, 37:7, 37:16, 38:10, 38:13, 38:21, 39:17, 40:15, 41:10, 41:21, 42:6, 49:21, 49:25, 50:5, 50:19, 51:12, 51:15, 51:21, 52:5, 52:9, 53:8, 54:3, 54:7, 55:2, 55:24, 56:1, 56:5, 59:5, 59:25, 60:14, 60:17, 60:21, 61:13, 61:23, 62:8, 62:10, 62:20, 62:25, 63:21, 64:9, 64:20, 65:13, 65:18, 66:5, 67:7, 67:12, 68:8, 68:17, 68:22, 69:3, 69:18, 69:22, 70:1, 80:6, 80:22, 80:25, 81:3,</p>	<p>81:8, 81:11, 81:16, 24 81:25, 82:18, 83:8, 83:13, 83:20, 84:1, 84:7, 84:10, 84:17, 84:21, 84:25, 85:14, 85:19, 85:24, 86:3, 86:7, 86:14, 86:19, 86:24, 87:5, 87:8, 87:12, 87:16, 87:19, 87:23, 88:1, 88:8, 88:10, 88:23, 89:7, 90:2, 90:7, 90:19, 91:1, 91:4, 91:13, 91:17, 92:2, 92:9, 100:16, 100:25, 101:3, 101:8, 101:15, 101:18, 101:20, 101:23, 102:1, 102:5, 102:13, 102:24, 103:3, 103:9, 103:12, 103:18, 104:3, 104:11, 105:4, 105:13, 105:18, 106:4, 106:8, 106:15, 106:21, 107:4, 107:7, 107:10, 107:24, 108:5, 108:15, 108:21, 109:9, 110:10, 111:12, 111:22, 112:10, 113:8, 113:25, 114:7, 114:10, 114:20, 115:2, 115:13, 115:17, 115:24, 116:22, 117:10, 117:14, 117:23, 118:5, 118:14, 126:2, 126:4, 126:11, 136:10, 136:19, 136:23, 137:11, 137:20, 138:19, 138:22, 139:3, 139:5, 139:18, 141:2, 142:9, 143:19, 144:3, 144:6, 144:19, 144:22, 144:25, 145:4, 145:11, 146:18, 147:18, 148:21, 149:4, 149:17, 149:23, 150:1, 150:9, 150:19, 151:2, 151:20, 152:15, 152:25, 153:16, 153:23, 154:11, 154:16, 155:12, 155:16,</p>
V				
<p>vacuum [1] - 116:6 valley [1] - 30:11 value [9] - 129:5, 129:14, 132:14, 132:17, 132:23, 132:24, 133:7, 137:24 valve [1] - 60:21 valves [2] - 60:13, 134:18 variance [4] - 18:15, 18:20, 18:21, 18:23 variety [4] - 20:5,</p>	W	<p>w/Exh [1] - 2:12 wait [2] - 16:5, 85:4 waiting [1] - 47:6 waiver [2] - 74:12, 74:13 walk [2] - 10:25, 157:9 walked [1] - 10:20 wall [12] - 59:11, 65:1, 65:8, 66:2, 66:3, 66:6, 68:4, 72:12, 72:13, 72:21, 72:23, 126:19</p>		

<p>156:6, 156:14, 156:21, 157:8, 157:12, 157:17, 157:21, 158:7</p> <p>Witness ^[1] - 69:21</p> <p>witness ^[40] - 8:13, 11:10, 11:11, 11:17, 12:24, 13:16, 15:5, 16:11, 16:12, 19:4, 21:19, 23:19, 25:5, 25:25, 28:14, 44:11, 44:13, 57:7, 57:10, 58:7, 58:12, 60:25, 62:25, 69:5, 75:10, 76:23, 79:23, 97:2, 97:5, 127:7, 127:10, 133:17, 135:23, 160:18, 160:19, 160:22, 161:5, 162:17, 164:19, 167:13</p> <p>witnesses ^[11] - 4:6, 7:1, 7:24, 8:8, 21:17, 23:4, 79:25, 161:19, 162:13, 164:5, 164:25</p> <p>WITNESSES ^[1] - 2:5</p> <p>WITTLER ^[1] - 168:5</p> <p>Wittler ^[2] - 1:25, 168:18</p> <p>wondering ^[3] - 30:20, 150:22, 150:24</p> <p>word ^[2] - 115:11, 115:18</p> <p>words ^[2] - 64:14, 90:22</p> <p>workers ^[1] - 123:13</p> <p>works ^[2] - 55:6, 124:10</p> <p>world ^[2] - 116:4, 163:9</p> <p>worst ^[6] - 77:8, 77:22, 78:2, 78:7, 78:9, 138:1</p> <p>worst-case ^[5] - 77:8, 77:22, 78:2, 78:9, 138:1</p> <p>written ^[9] - 8:12, 12:6, 57:24, 76:9, 97:23, 121:22, 136:15, 143:14, 144:10</p> <p>wrote ^[1] - 129:8</p>	<p>14:7, 44:20, 57:5, 58:5, 73:4, 100:12, 104:2, 127:2, 127:19, 138:24, 160:6</p>
Y	
<p>Yankton ^[3] - 105:12, 105:19, 112:2</p> <p>yard ^[2] - 27:16, 38:2</p> <p>year ^[7] - 26:20, 26:22, 38:25, 62:12, 67:13, 74:17, 112:1</p> <p>years ^[17] - 29:3, 29:4, 67:6, 87:15, 90:25, 91:9, 127:23, 128:17, 129:5, 131:13, 131:20, 136:16, 136:18, 136:20, 137:4, 137:17, 137:19</p> <p>yellow ^[6] - 116:5, 116:17, 123:6, 124:18, 124:21</p> <p>yellowing ^[1] - 154:25</p> <p>yield ^[1] - 61:5</p> <p>yourself ^[4] - 4:13, 13:19, 75:15, 127:13</p>	
Z	
<p>zone ^[3] - 77:6, 77:13, 121:10</p>	
X	
<p>X70 ^[2] - 61:12, 61:13</p> <p>X80 ^[1] - 61:12</p> <p>XL ^[13] - 1:6, 4:19,</p>	