

BEFORE THE STATE CORPORATION COMMISSION  
OF THE STATE OF KANSAS

1  
2  
3 In the Matter of the Application of )  
Quail Oil & Gas, LC, to authorize ) Docket No.  
4 injection of saltwater into the ) 17-CONS-3484  
Arbuckle formation at the Sly 2-6 SWD ) -CUIC  
5 well located Section 6, Township 17S, ) License No.  
Range 6E in Morris County, Kansas. ) 33185  
6  
7  
8  
9

10 T R A N S C R I P T

11 O F

12 EVIDENTIARY HEARING

13  
14 held on the 16th day of August, 2017, beginning at  
15 9:00 o'clock AM at the Kansas Corporation Commission,  
16 1500 Southwest Arrowhead Road, Topeka, Shawnee County,  
17 Kansas, before Chairman Pat Apple, Commissioner Shari  
18 Feist Albrecht and Commissioner Jay Scott Emler.  
19  
20  
21  
22  
23  
24  
25

APPEARANCES

1  
2  
3 On Behalf of Quail Oil & Gas, LC:

4 Mr. Robert J. Vincze  
5 DEPEW GILLEN RATHBUN & MCINTEER  
6 Attorneys at Law  
7 8301 East 21st Street North  
8 Suite 450  
9 Wichita, Kansas 67206

10 On Behalf of the Protestants:

11 Mr. Robert V. Eye  
12 ROBERT V. EYE LAW OFFICE, LLC  
13 Attorneys at Law  
14 4840 Bob Billings Parkway  
15 Lawrence, Kansas 66049

16 On Behalf of Commission Staff:

17 Mr. Jonathan R. Myers  
18 Litigation Counsel  
19 KANSAS CORPORATION COMMISSION  
20 1500 Southwest Arrowhead Road  
21 Topeka, Kansas 66604  
22  
23  
24  
25

I N D E X

1		
2		
3	OPENING STATEMENTS	
3	By Mr. Vincze-----	10
4	By Mr. Eye-----	13
4	By Mr. Myers-----	16
5		
6	WITNESSES	
6	On Behalf of Applicant	
7	WRAY VALENTINE	
8	Direct Examination by Mr. Vincze-----	17
8	Cross Examination by Mr. Eye-----	19
9	Cross Examination by Mr. Myers-----	27
9	Commission Questions-----	29
10	Redirect Examination by Mr. Vincze-----	69
10	Recross Examination by Mr. Eye-----	73
11	Recross Examination by Mr. Myers-----	75
11	Commission Questions-----	77
12	LEE SHOBE	
13	Direct Examination by Mr. Vincze-----	35
13	Cross Examination by Mr. Eye-----	39
14	Cross Examination by Mr. Myers-----	44
14	Commission Questions-----	46
15	On Behalf of Protestants	
16	JAMES ABER	
16	Direct Examination by Mr. Eye-----	50
17	Commission Questions-----	52
17		
18	CINDY HOEDEL	
18	Direct Examination by Mr. Eye-----	53
19	On Behalf of Commission Staff	
20	RENE STUCKY	
20	Direct Examination by Mr. Myers-----	56
21	Cross Examination by Mr. Eye-----	59
21	Commission Questions-----	65
22		
23		
24		
25		

Closing Statements

By Mr. Eye-----79  
By Mr. Vincze-----83

E X H I B I T S

<u>Exhibit No.</u>	<u>Offered</u>	<u>Received</u>
--------------------	----------------	-----------------

NONE		
------	--	--

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

1 COMMISSIONER FEIST ALBRECHT: Welcome  
2 to the Kansas Corporation Commission. I call to order  
3 the hearing in the matter of the Application of Quail  
4 Oil & Gas, LC, to authorize injection of saltwater  
5 into the Arbuckle formation at the Sly 2-6 saltwater  
6 disposal well located in Section 6, Township 17 South,  
7 Range 6E in Morris County, Kansas, Docket No.  
8 17-CONS-3484-CUIC, License No. 33185. May I have the  
9 appearances of counsel, please.

10 MR. VINCZE: Robert Vincze for Quail Oil  
11 Company.

12 MR. EYE: Good morning. For the  
13 Protestants, Robert Eye.

14 MR. MYERS: Jon Myers on behalf of  
15 Commission Staff and the public.

16 COMMISSIONER FEIST ALBRECHT: Does Staff  
17 have a recommendation regarding notice?

18 MR. MYERS: Yes. Staff has examined  
19 notice and believe it would be appropriate to hear  
20 this matter at this time and place.

21 COMMISSIONER FEIST ALBRECHT: Are there  
22 any objections to the finding the Commission has  
23 jurisdiction to hear this matter at this time and  
24 place? Hearing none, the Commission will so find.  
25 Are there any preliminary matters that the parties

1 wish to take up?

2 MR. EYE: I do have some.

3 COMMISSIONER FEIST ALBRECHT: Please  
4 proceed.

5 MR. EYE: Thank you. I would like to  
6 move that the Commission take administrative notice of  
7 two orders and some testimony. The two orders come  
8 from the same docket and that's 15-CONS-770-CMSC, and  
9 the first order is from March of 2015, March 19, 2015,  
10 and I will circulate that. May I approach?

11 COMMISSIONER FEIST ALBRECHT: You may.

12 MR. EYE: I would also ask the  
13 Commission to take administrative notice of the order  
14 in the same docket that was entered on the record on  
15 August 9, 2016. I will circulate that order.

16 COMMISSIONER FEIST ALBRECHT: Thank you.

17 MR. EYE: And I would ask the Commission  
18 to take administrative notice of testimony from Rex  
19 Buchanan who was at the time the Interim Director of  
20 the Kansas Geological Survey. This is testimony that  
21 he provided to the House Standing Committee on Energy  
22 and Environment on January 20th, 2016, and I will  
23 circulate that. Thank you.

24 COMMISSIONER FEIST ALBRECHT: Does that  
25 conclude your preliminary matters?

1 MR. EYE: It does.

2 COMMISSIONER FEIST ALBRECHT: Are there  
3 any objections to the Commission taking administrative  
4 notice of either of the orders in Docket No.  
5 15-CONS-770-CMSC or to the testimony Rex Buchanan  
6 offered to the House Standing Committee on Energy and  
7 Environment on January 20, 2016?

8 MR. VINCZE: Honorable Commissioners, I  
9 have no objection to the admission or having that on  
10 the administrative record the first and second orders  
11 because they are part of what we are doing. They are  
12 here and present. I do object to the testimony of Rex  
13 Buchanan, Interim Director, and I think that falls in  
14 the same category as comments that were not properly  
15 submitted within 30 days of the Application date so  
16 that they would be barred, but they could be part of  
17 the collateral record just as are other testimony from  
18 legislators on both sides of this issue.

19 COMMISSIONER FEIST ALBRECHT: Does Staff  
20 wish to be heard?

21 MR. MYERS: Well, Staff is not entirely  
22 sure of the relevance to this particular Application  
23 of the saltwater injection orders but doesn't really  
24 have any objection to them being added into the  
25 record. As for the testimony, I am still reviewing

1 it. Staff would share Mr. Vincze's comments.

2 MR. EYE: May I be heard?

3 COMMISSIONER FEIST ALBRECHT: Yes.

4 MR. EYE: The testimony in question was  
5 pulled off the Commission's website. One of the  
6 requirements for administrative notice is that  
7 something be easily verifiable. And when I noticed  
8 that this was part of the KCC's website and  
9 presentation it seemed to me that it had already been  
10 thoroughly vetted by the Commission before it had been  
11 posted on its website. The purpose of the testimony  
12 is to further strengthen the relationship in the  
13 administrative and regulatory sense of the presence of  
14 UI wells and induced seismicity that was really the  
15 underlying purpose of the two orders that I just asked  
16 administrative notice be taken and this dovetails with  
17 that, this being the testimony from Mr. Buchanan, so I  
18 think that it's to the point -- to the extent that  
19 the Commission is able to draw the relationship  
20 between induced seismicity and UI wells, this  
21 testimony is consistent with that conclusion. Thank  
22 you.

23 MR. VINCZE: May I?

24 COMMISSIONER FEIST ALBRECHT: You may.

25 MR. VINCZE: I must object just based on



1 the fact that they had the opportunity to submit this  
2 kind of information with their direct prefiled  
3 testimony, with their rebuttal testimony and they had  
4 an opportunity for the Protestants to put this  
5 information in the formal record within 30 days after  
6 the Application was filed, and they did not do so. We  
7 can move for a voluminous amount of information that  
8 has been submitted to the Commissioners regarding this  
9 Application that has been put in a different category  
10 that will not be part of the formal administrative  
11 record for this case, and I think it's proper for  
12 that. The distinction I made to the first and second  
13 orders is it's something that's prescient, and if you  
14 were in a court of law you would take judicial notice  
15 of those orders because that is part of your  
16 regulatory scheme relating to induced seismicity, one  
17 of the issues in this case, but I must object to the  
18 testimony. Thank you.

19 (THEREUPON, the Commission  
20 confers off the record.)

21 COMMISSIONER FEIST ALBRECHT: The  
22 Commission will take administrative notice of both of  
23 the orders in Docket No. 15-CONS-770-CMSC. We will  
24 also take administrative notice of the testimony that  
25 has been presented, Rex Buchanan's testimony that was

1 presented to the House Standing Committee on Energy  
2 and Environment on January 20th of 2016. With regard  
3 to the latter piece of testimony, Mr. Buchanan isn't  
4 here. This testimony was offered in a legislative  
5 proceeding. It is not subject to any cross  
6 examination here. It will be given the weight that  
7 the Commission deems appropriate. With that, are  
8 there any other preliminary matters?

9 MR. MYERS: None from Staff.

10 COMMISSIONER FEIST ALBRECHT: You may  
11 call your first witness. Oh, opening statements. I'm  
12 sorry. Are there opening statements?

13 MR. VINCZE: Yes.

14 COMMISSIONER FEIST ALBRECHT: I  
15 apologize. You may proceed.

16 MR. VINCZE: Robert Vincze representing  
17 Quail Oil & Gas, LC. Honorable Commissioners,  
18 distinguished elected officials, Commission Staff,  
19 citizens, I respectfully request approval of the  
20 Application of Quail Oil & Gas, LC, to authorize  
21 injection of saltwater into the Arbuckle formation as  
22 a Sly 2-6 saltwater disposal well. Regarding the  
23 Application of Quail Oil, as shown by the facts set  
24 forth in the prefiled testimony, there is no, quote,  
25 immediate danger to the public health, safety or

1 welfare requiring immediate state action, end quote,  
2 pursuant to Kansas statute 77-536(a). In if addition,  
3 the facts do not show, quote, that damage may result  
4 if immediate remedial action is not taken, end quote  
5 pursuant to Kansas statute 55-162(b). The maximum  
6 injection rate of 5,000 barrels per day in the subject  
7 Sly 2-6 saltwater disposal well application is  
8 markedly below the maximum saltwater injection rate of  
9 16,000 barrels per well per day within the 2016  
10 specified area but outside the 2015 specified area  
11 under the second order reducing saltwater injection  
12 rates, KCC Docket 15-CONS-770-CMSC which you just  
13 placed on the record. It's also below the maximum  
14 saltwater injection rate of 8,000 barrels per well per  
15 day specified in the first order reducing saltwater  
16 injection rates entered on March 19, 2015. Under the  
17 second order at a maximum injection rate of 5,000  
18 barrels per day into the Arbuckle formation, the Sly  
19 2-6 is not a large volume injection well. Moreover,  
20 as stipulated by Quail, the maximum injection pressure  
21 of 500 psi for the Sly 2-6 saltwater disposal well  
22 complies with the maximum injection pressure specified  
23 in the first order reducing saltwater injection rates,  
24 even though the Sly 2-6 well is not located in the  
25 2015 specified areas, basically Sumner and Harper

1 Counties or the 2016 specified area. Of course,  
2 Morris County is not included in such areas.  
3 Furthermore, the March 31st, 2017, Report and  
4 Recommendation of Staff recommended, quote, keeping  
5 the current boundaries of the 2016 specified areas,  
6 end quote. The Sly 2-6 saltwater disposal well is not  
7 located in such areas and Staff did not recommend  
8 enlarging such areas. The Applicant has made proper  
9 notice of the Application and of this hearing. The  
10 Application should be approved based on the permitting  
11 factors in Kansas Regulation 82-3-403. One, the  
12 maximum injection rate is 500 psi as would apply if  
13 the saltwater disposal well was located in the  
14 specified areas, even though it is not. Two, the  
15 Arbuckle formation has good permeability which makes  
16 it an ideal formation to dispose of water in a vacuum.  
17 Our geologist has testified to that fact. Three, the  
18 chlorides in the saltwater that need to be disposed  
19 are approximately 5,000 ppm, very low for produced  
20 saltwater. Four, fluids introduced into the proposed  
21 injection zone will be confined to that zone as the  
22 testimony of Lee Shobe on behalf of Quail shows. The  
23 depth of any fresh or usable water within a quarter  
24 mile of the proposed injection well is 120 feet from  
25 the surface. Usable water formations may exist at

1 approximately 200 feet below ground surface.  
2 Saltwater will be injected at a depth of 2,710 to  
3 2,730 feet. There is more than a thousand feet of  
4 impermeable rock between the Lansing formation and the  
5 top of the Arbuckle formation. Five, injection will  
6 not affect correlative rights of others in the Camp  
7 Creek field or any other producing wells within a  
8 quarter mile radius of the proposed Sly 2-6 saltwater  
9 disposal well. The only wells within such radius are  
10 those by Quail, the Sly 1-6 and Sager 1-6. Lastly,  
11 approval of the Application for the Sly 2-6 saltwater  
12 disposal well will prevent waste by disposing of  
13 produced water from the Sager 1-6, Sly 1-6 oil wells  
14 at a lower expense than having to haul water by truck  
15 from these wells. Having a disposal well will make  
16 these oil wells more economic and will extend their  
17 production. Thank you for your consideration.

18 COMMISSIONER FEIST ALBRECHT: Thank you.  
19 Mr. Eye.

20 MR. EYE: Thank you. May it please the  
21 Commission, oil and gas development in Kansas and  
22 elsewhere has entered a phase that requires a  
23 consideration of the effects of UI wells, underground  
24 injection wells, on seismic vulnerable -- seismically  
25 vulnerable areas. The Commission's orders in

1 15-CONS-770-CMSC of March 19, 2015, and August 9,  
2 2016, have been admitted into evidence related to the  
3 UI wells in Sumner and Harper Counties, but that  
4 recognized a relationship between UI wells and induced  
5 seismicity. The Protestants in this docket ask that  
6 this relationship be again recognized related to the  
7 UI application from Quail. However, rather than wait  
8 for the induced earthquakes to occur, these  
9 Protestants urge that the Commission apply the  
10 statutory authority it has under K.S.A. 77-536  
11 Subsection (b) to prevent earthquakes caused by this  
12 UI well and avoid the attendant harms. Protestants  
13 make this plea based on the analysis of the pertinent  
14 geology in the area around the proposed UI well. The  
15 geological characteristics of this area are dominated  
16 by a series of faults including the Humboldt Fault  
17 that is related to the largest earthquake in Kansas  
18 history that occurred in the Manhattan-Wamego area in  
19 1867. The entire area of this proposed UI well is  
20 riddled with faults as discussed in greater detail by  
21 Dr. James Aber in his testimony on behalf of the  
22 Protestants. In this docket, only Dr. Aber,  
23 Protestants' expert, has characterized the relative  
24 substrata for purposes of determining its seismic  
25 suitability for a UI well. Dr. Aber's conclusion that

1 the area is bounded by faults characterized by faults  
2 combined with the recognized propensity of UI fluids  
3 to lubricate these faults and cause movement and  
4 earthquakes make the proposed UI site particularly  
5 unsuitable because of this geological vulnerability to  
6 induced seismicity. There is no evidence in this  
7 docket that proves otherwise. The frequency of  
8 earthquakes in Kansas has significantly increased  
9 since around 2013, and while these earthquakes have  
10 been generally North Central Oklahoma, South Central  
11 Kansas, effects are, of course, felt in other areas.  
12 The relationship between UI wells and increased  
13 seismicity has been established and recognized by this  
14 Commission in the orders that we mentioned earlier and  
15 by the Kansas Geological Survey and the United States  
16 Geological Survey through their scientific work on  
17 this issue. This awareness of the relationship  
18 between UI wells and induced seismicity compels a  
19 detailed examination of the geological characteristics  
20 that the proposed UI well will encounter. The rapid  
21 increase in earthquakes in North Central Oklahoma and  
22 South Central Kansas and a regulatory response thereto  
23 no longer allow an assumption that all substrata are  
24 suitable for UI wells. Certainly the nature and  
25 extent of faults in the area of this proposed well

1 suggests a cautious regulatory approach. As Dr. Aber  
2 explains in his testimony, the injected fluids have  
3 the effect of lubricating the faults and reduce the  
4 stress required to induce movement of faults that  
5 cause earthquakes. This docket is about the  
6 proverbial admonition about prevention is -- an ounce  
7 of prevention is worth a pound of cure. Accordingly,  
8 the Protestants urge this Commission to invoke its  
9 powers under 77-536(b) and find that the proposed use  
10 of the well presents -- represents an imminent threat  
11 to the public and find that damage may result from  
12 induced seismicity and prohibit use of this well. The  
13 evidence in this docket justifies this proposed  
14 regulatory response. Thank you.

15 COMMISSIONER FEIST ALBRECHT: Commission  
16 Staff?

17 MR. MYERS: Briefly. Commissioners,  
18 this Application complies with all Commission  
19 regulations -- it complies with all Commission  
20 regulations and based upon what is currently present  
21 in the record, Staff recommends approval of this  
22 Application. Thank you.

23 COMMISSIONER FEIST ALBRECHT: Thank you.  
24 So that completes opening statements. Now, I believe  
25 it is time for you to call your first witness.



1 MR. VINCZE: I call Wray Valentine on  
2 behalf of Quail Oil & Gas, LC.

3 **WRAY VALENTINE**

4 called as a witness on behalf of the Applicant,  
5 having been duly sworn on his oath by the reporter,  
6 testifies as follows:

7 **DIRECT EXAMINATION**

8 BY MR. VINCZE:

9 Q. Mr. Valentine, could you state your full  
10 name for the record?

11 A. Wray Lee Valentine.

12 Q. And what is your current position?

13 A. I am the manager at Quail Oil & Gas.

14 Q. And how many -- if you could, summarize  
15 your work experience just briefly.

16 A. I've worked in oil fields all my life. My  
17 father was an oil field worker, worked during high  
18 school, served the company that he had and went to  
19 Oklahoma State, got a degree in petroleum energy,  
20 worked for Schlumberger for about 5 years and then I  
21 came back to Kansas and worked for a drilling company  
22 called Cheyenne Drilling until 2005, and then in 2006  
23 I went out on my own and started buying and exploring  
24 for oil and gas for Quail Oil & Gas.

25 Q. Is the prefiled testimony that you submitted

1 and that you have a copy of before you and has also  
2 been submitted to the court reporter, is that a true  
3 and accurate representation of your testimony?

4 **A.** Yes, sir.

5 **Q.** You also submitted prefiled rebuttal  
6 testimony on behalf of Quail Oil that has also been  
7 submitted to the Commission and to the court reporter  
8 and you have a copy of that before you. Is that still  
9 true and correct to the best of your knowledge?

10 **A.** Yes, sir.

11 **MR. VINCZE:** I have no further  
12 questions.

13 **COMMISSIONER FEIST ALBRECHT:** Do you  
14 wish to have the testimony spread upon the record in  
15 this matter?

16 **MR. VINCZE:** Yes, I do.

17 **COMMISSIONER FEIST ALBRECHT:** Is there  
18 any objection to the admission into this record to  
19 either -- of either the prefiled testimony or the  
20 rebuttal testimony of Mr. Wray Valentine? Hearing  
21 none, it will be so admitted.

22 **MR. VINCZE:** Thank you.

23 **COMMISSIONER FEIST ALBRECHT:** Are you  
24 tendering the witness now for cross examination?

25 **MR. VINCZE:** Yes.

1 COMMISSIONER FEIST ALBRECHT: Mr. Eye.

2 CROSS EXAMINATION

3 BY MR. EYE:

4 Q. Mr. Valentine, are you -- have you read the  
5 testimony of James Aber?

6 A. Yes, sir.

7 Q. Now, he identifies a well -- identifies a  
8 proposed well as being located over a buried basement  
9 uplift known as the Nemaha Ridge. You don't call that  
10 out -- that geologic feature out in your testimony,  
11 do you?

12 A. No, sir. I am not a geologist.

13 Q. Dr. Aber also identifies the Humboldt Fault  
14 zone. You don't call that out either, do you?

15 A. No, sir.

16 Q. Dr. Aber describes the fault zones that are  
17 present in the substrata under the UI well that you  
18 are proposing to use. You didn't identify any of  
19 those fault zones, did you?

20 A. No, sir.

21 Q. Dr. Aber describes the relationship between  
22 the Nemaha Ridge and Humboldt Fault zones. Do you  
23 remember that testimony?

24 A. Yes, sir.

25 Q. Your testimony does not discuss that

1 relationship, correct?

2 **A.** Yes. It does not.

3 **Q.** Do you agree that the largest earthquake in  
4 history in Kansas took place along the Humboldt Fault  
5 zone as discussed by Dr. Aber?

6 **A.** I am not familiar with that.

7 **Q.** Dr. Aber identifies and discusses the  
8 Bourbon Arch faults that cross cut the Nemaha and  
9 Humboldt ridge that are in the area of the proposed  
10 UI. Your testimony does not consider the presence or  
11 geological significance of the relationship between  
12 the Bourbon Arch faults?

13 **MR. VINCZE:** I object to the form of the  
14 question. I think if you are referring to the  
15 specific testimony of Dr. Aber, then perhaps you would  
16 allow my witness to look at that or point him in that  
17 direction. Otherwise, you are making, you know,  
18 statements from the record he doesn't have an  
19 opportunity to review and admitting something that's  
20 in the record that has not yet been admitted formally  
21 in the record.

22 **MR. EYE:** Two points. One, the witness  
23 admitted that he had read Dr. Aber's testimony. Two,  
24 this is cross examination and the function of cross  
25 examination is to get the witness to agree or disagree

1 with the points that are being offered and I think  
2 that's exactly what I'm doing here.

3 COMMISSIONER FEIST ALBRECHT: I will  
4 allow you to proceed.

5 MR. EYE: Thank you.

6 Q. (BY MR. EYE) Your testimony does not  
7 consider the geological -- the presence or geological  
8 significance of the relationship between the Bourbon  
9 Arch faults that cross cut the Nemaha-Humboldt ridge  
10 and the proposed UI well, correct?

11 A. Correct.

12 Q. Now, you don't have a basis that's been  
13 articulated in your testimony to contest Dr. Aber's  
14 findings that the area of the proposed UI well is  
15 riddled with faults, correct?

16 A. Correct.

17 Q. Nor do you have a basis to contest that  
18 these faults offset basement rock and project upward  
19 through sedimentary layers, correct?

20 A. The testimony that was or the information  
21 that was given by the doctor is very general and it is  
22 hard to relate what he was specifying to the area we  
23 are at because he was talking about tens of miles  
24 instead of a smaller area.

25 Q. My question was whether you have any basis

1 to contest Dr. Aber's testimony that these faults  
2 offset basement rock and project upward through  
3 sedimentary layers.

4 **A.** I do not. I am not an expert in that.

5 **Q.** Now, this well is in the area of Diamond  
6 Creek, correct?

7 **A.** Correct.

8 **Q.** Dr. Aber finds that some faults were  
9 disposed at the surface in the area of the Diamond  
10 Creek near the UI site, correct?

11 **A.** I don't recall that.

12 **Q.** Well, on the assumption that he does make  
13 that assertion, you don't have a basis to contest  
14 that, do you?

15 **A.** I do not.

16 **Q.** Dr. Aber finds that basement rock faults are  
17 tectonic scars that may be reactivated by human  
18 activities or tectonic stress and cause faults to slip  
19 with corresponding seismic activity. Do you have a  
20 basis to contend that assertion by Dr. Aber?

21 **A.** No. Again, I am not a geologist.

22 **Q.** The United States Geological Survey has  
23 reported that recent increases in earthquakes since  
24 around 2013 is primarily attributed to disposal of  
25 waste water. Do you have a basis to disagree with

1 that?

2 **A.** In what area?

3 **Q.** In the area of South Central Kansas and  
4 North Central Oklahoma.

5 **A.** But not pertaining to our area.

6 **Q.** My question is: The United States  
7 Geological Survey has reported that recent  
8 increases -- recent increase in earthquakes since  
9 about 2013 is primarily attributed to disposal of  
10 waste water. Do you have a basis to contest that?

11 **A.** Again, for what area?

12 **Q.** For any area.

13 **A.** I don't at the time.

14 **Q.** Do you have a basis to disagree with Dr.  
15 Aber about the relationship between waste water fluids  
16 and geologic faults that they effectively lubricate  
17 faults and can cause earthquakes? Do you have a basis  
18 to contest that?

19 **A.** It is a very general statement and it  
20 depends on the formation that the fluid is being put  
21 into.

22 **Q.** Do you have a basis to contest Dr. Aber's  
23 assertion?

24 **A.** In that generalized way, yes.

25 **Q.** And what is it?

1           **A.** It depends upon the formation that the fluid  
2 is being put into.

3           **Q.** But do you agree that these fluids can  
4 lubricate faults?

5           **A.** In certain instances, yes.

6           **Q.** The United States Geological Survey has  
7 found that earthquakes may be triggered as much as 10  
8 miles or more from the location of a UI well. Do you  
9 have a basis to contest that finding by the USGS?

10          **A.** No, sir.

11          **Q.** Do you agree that prior to 2013 there was  
12 very little discernible seismic activity in North  
13 Central Oklahoma?

14          **A.** I didn't keep track of that before then.

15          **Q.** Same question for South Central Kansas.

16          **A.** I didn't keep track of earthquakes in that  
17 time period there.

18          **Q.** Have you followed the trend of increasing  
19 earthquakes in North Central Oklahoma or South Central  
20 Kansas?

21          **A.** To some extent.

22          **Q.** Now, the United States Geological Survey has  
23 reported that recent increases in earthquakes since  
24 about 2013 primarily are attributable to disposal of  
25 waste water. Did you discuss that in your testimony?



1           **A.** No, sir.

2           **Q.** So you don't have a basis to disagree with  
3 the USGS' finding in that regard, correct?

4           **A.** I have done some research on where  
5 earthquakes have been and in the area that we are,  
6 there have been no earthquakes and there have been  
7 injections for a very long period of time.

8           **Q.** Now, you are talking about the Morris County  
9 area, correct?

10          **A.** Yes, sir.

11          **Q.** Is it the case that most of the wells in  
12 that area are gravity fed injection wells?

13          **A.** I don't know that answer. Our well will be  
14 on a vacuum.

15          **Q.** Is it Quail's assertion that the Arbuckle  
16 formation is, generally speaking, a suitable geologic  
17 formation in which to inject waste water fluids?

18          **A.** Yes, sir.

19          **Q.** It's the case that the Arbuckle formation is  
20 also present in Harper and Sumner Counties, correct?

21          **A.** Yes, but it's a lot thicker in that area and  
22 most of the fluids that were injected in those areas  
23 were injected into the lower parts of the Arbuckle  
24 formation and under extremely high volumes.

25          **Q.** Have you made a study of the fault

1 structures that are associated with the Arbuckle  
2 formation in the area of Harper and Sumner Counties?

3 **A.** No, sir.

4 **Q.** Now, when you say that there have been no  
5 earthquakes in Morris County, are you differentiating  
6 large earthquakes from microearthquakes?

7 **A.** I looked at the USGS website and went back  
8 to 1950 and put in earthquakes with greater magnitude  
9 than 2.0 and there have been no earthquakes.

10 **Q.** So my question would be -- well, so you  
11 didn't consider earthquakes below a 2.0 magnitude,  
12 correct?

13 **A.** In fact, I tried to put in lower than that.  
14 If I remember right, they wouldn't take it, so I don't  
15 know if they didn't -- if the USGS did just not put  
16 them into their records or not. I do not know that.

17 **Q.** And you have made no independent  
18 determination whether there has been an increase in  
19 microearthquakes since the use of UI wells in Morris  
20 County, correct?

21 **A.** From the USGS website there was none.

22 **Q.** And you have not done any independent  
23 analysis of that question, correct?

24 **A.** I don't have the kind of equipment to do  
25 that.

1           **Q.** So I think is it fair to say that there's no  
2 comparison between the faults that underlie the  
3 Arbuckle formation in Harper and Sumner Counties and  
4 the faults that underlie the proposed UI well in  
5 Morris County as presented by Quail, correct?

6           **A.** I am not a geologist so I can't answer that  
7 question.

8           **MR. EYE:** That concludes our cross  
9 examination. Thank you.

10           **COMMISSIONER FEIST ALBRECHT:** Staff, any  
11 questions?

12           **MR. MYERS:** Yes, if I may.  
13 Commissioner, should I stand at the podium or is it  
14 permissible to remain seated?

15           **COMMISSIONER FEIST ALBRECHT:** I think I  
16 would prefer if you would take the lectern, please.

17           **MR. MYERS:** Certainly.

18                           **CROSS EXAMINATION**

19           **BY MR. MYERS:**

20           **Q.** Good morning, Mr. Valentine.

21           **A.** Good morning.

22           **Q.** The reason you have applied for this  
23 injection well is to inject fluids that are produced  
24 in Sager 1-6 and Sly 1-6. Is that correct?

25           **A.** Yes, sir.

1 Q. And are those wells currently producing?

2 A. No, sir.

3 Q. Do you know what they are capable of  
4 producing in terms of barrels of oil per day?

5 A. They both together could produce probably 10  
6 to 15 barrels of oil per day.

7 Q. And how many barrels of saltwater do you  
8 anticipate that production would result in?

9 A. Approximately 300 barrels per day.

10 Q. Let me ask you this: Why is your  
11 Application for 5,000 barrels per day if the wells are  
12 only capable of 300 barrels per day?

13 A. If these wells are economical, we may extend  
14 the field and do more drilling and ultimately have  
15 more water production.

16 Q. You said that that's the case if these wells  
17 are economical. Are you saying you do not know  
18 whether these wells are economic at this present time?

19 A. They were not economical hauling the  
20 saltwater, the produced water off, but with the  
21 disposable, they should be economical depending upon  
22 oil prices.

23 Q. Right. Let's turn to that for just a  
24 moment. You said it was not economical to haul water.  
25 If these wells were producing presently, do you have

1 an estimate on the cost, the amount it would cost to  
2 haul the water?

3 A. It would be -- with wells producing, it  
4 would cost about \$250 a day to haul the water.

5 Q. Turning back to the amount of fluid and the  
6 pressure that you requested in this Application, your  
7 request is for 500 psi of pressure going into this  
8 well. How much do you think is truly necessary in  
9 order to inject 300 barrels of saltwater per day?

10 A. The wells -- disposable well would be on a  
11 vacuum most certainly when we first start and it  
12 probably would be for many years.

13 Q. So you don't anticipate needing 500 psi for  
14 some time?

15 A. No, sir.

16 Q. Do you have any time frame on at what point  
17 you would start injecting anything more than a vacuum?

18 A. I do not.

19 MR. MYERS: Nothing further from Staff.

20 COMMISSIONER FEIST ALBRECHT:

21 Commissioners?

22 COMMISSIONER EMLER: No questions.

23 CHAIRMAN APPLE: So there is an option  
24 to haul the water?

25 MR. VALENTINE: It is uneconomical to

1 hall the water at these current oil prices.

2 CHAIRMAN APPLE: But you do have  
3 someplace to dispose of it? If it was economical, you  
4 could haul the water somewhere? Where would you  
5 dispose of it I guess is what I'm asking.

6 MR. VALENTINE: We use contract  
7 companies and I don't know where they dispose of the  
8 water at for sure, if they have their own disposal or  
9 a commercial disposal in the area. At some point it's  
10 going to another disposal well, though.

11 CHAIRMAN APPLE: Thank you.

12 COMMISSIONER FEIST ALBRECHT: How  
13 recently were your two producers drilled?

14 MR. VALENTINE: If memory serves me, the  
15 Sager in 2014 or '15 and Sly in 2016.

16 COMMISSIONER FEIST ALBRECHT: Did they  
17 produce at all?

18 MR. VALENTINE: For a period of time.  
19 The Sly 1-6 has never produced.

20 COMMISSIONER FEIST ALBRECHT: So the  
21 Application seeks to inject at a pressure of 500  
22 pounds per square inch gauge which if the Commission  
23 were to grant that would authorize that from Day 1 of  
24 the permit being issued and effective, but if I  
25 understand what you just said, you intend to operate

1       them at vacuum initially and perhaps for some period  
2       of time. Is there a reason why the Application didn't  
3       pursue gravity initially and then wait until such time  
4       as you need pressure to add pressure?

5               MR. VALENTINE: I asked the KCC what is  
6       the maximum pressure I could ask for and that was the  
7       maximum so that is what I asked for. You know  
8       eventually that you will need some pressure, so --

9               COMMISSIONER FEIST ALBRECHT: And you  
10       know that because?

11              MR. VALENTINE: At some point, you  
12       will -- the formation will not take water very well  
13       depending upon damage or if it gets to a certain level  
14       it will need some help to overcome the formation  
15       pressure.

16              COMMISSIONER FEIST ALBRECHT: I have a  
17       question related to a response you made to Mr. Eye's  
18       cross examination. It may be more appropriate for  
19       your geologist witness. If it is, just let me know  
20       and I will save that question for later, but in a  
21       discussion about the Arbuckle, I believe you indicated  
22       that for Harper and Sumner Counties, the wells -- the  
23       injection wells that are injecting into that area are  
24       injecting at the lower part of the Arbuckle and with  
25       high volume. How is what you are proposing to do at

1 the Sly 2-6 different?

2 MR. VALENTINE: We only perforated the  
3 top 20 foot of the Arbuckle formation and that's the  
4 only area we are going to be disposing into and we  
5 only drilled, if memory serves me, about 50 or 70 foot  
6 into the Arbuckle.

7 COMMISSIONER FEIST ALBRECHT: Do you  
8 know what the extent or the depth -- the width of the  
9 Arbuckle section is? I mean, if you've drilled 70  
10 feet into it, I mean, what's the full extent of that  
11 if you had chosen to drill all the way through it?

12 MR. VALENTINE: I am not sure on that.

13 COMMISSIONER FEIST ALBRECHT: Okay, so  
14 the depth into which you drilled into the Arbuckle  
15 does not come close to drilling all the way through  
16 the Arbuckle?

17 MR. VALENTINE: Not to my knowledge.

18 COMMISSIONER FEIST ALBRECHT: So that's  
19 probably something I will save that question for your  
20 geologist. Thank you.

21 COMMISSIONER EMLER: FM I may.

22 COMMISSIONER FEIST ALBRECHT: Yes.

23 COMMISSIONER EMLER: Your response I  
24 think to Commissioner Apple was that the wells were  
25 not currently economical because of the price of oil,



1 so, therefore, it wasn't economical to haul water and  
2 have others dispose of it somewhere. If the price of  
3 oil rises, when do these wells become economical?

4 MR. VALENTINE: I haven't done that  
5 math. I'm not for sure.

6 COMMISSIONER EMLER: All right.  
7 Assuming then the price of oil does rise and you  
8 determine that the wells are economical, would you  
9 then begin pumping them even though you had to truck  
10 water -- I'm sorry -- haul water?

11 MR. VALENTINE: It would depend if they  
12 were still there at that time. If I can't get the  
13 disposal well, I may end up having to close the wells  
14 because there are lease obligations I have to take  
15 care of.

16 COMMISSIONER EMLER: Well, again,  
17 assuming -- leave those factors out. Assuming that  
18 the wells become economical to pump based on price and  
19 you could begin pumping them, you would begin  
20 producing water and hauling it. Is that correct?

21 MR. VALENTINE: I would, yes.

22 COMMISSIONER EMLER: And this water  
23 would be hauled to some disposal well somewhere?

24 MR. VALENTINE: Yes, sir.

25 COMMISSIONER EMLER: So the water that

1 would be coming from Morris County would be dumped in  
2 McPherson County?

3 MR. VALENTINE: Probably Morris County.

4 COMMISSIONER EMLER: But somewhere in  
5 the region?

6 MR. VALENTINE: Yes, sir.

7 COMMISSIONER EMLER: So effectively if  
8 the wells were economical, there's no benefit to you  
9 hauling the water off other than increased cost to  
10 you?

11 MR. VALENTINE: Correct.

12 COMMISSIONER EMLER: Thank you.

13 COMMISSIONER FEIST ALBRECHT: You may  
14 inquire based on Commissioner questions.

15 MR. VINCZE: We have nothing further for  
16 this witness.

17 COMMISSIONER FEIST ALBRECHT: Mr. Eye,  
18 do you have any further questions or examination?

19 MR. EYE: I do not.

20 COMMISSIONER FEIST ALBRECHT: Staff.

21 MR. MYERS: Neither does Staff.

22 COMMISSIONER FEIST ALBRECHT: Thank you  
23 very much. Thank you for your testimony.

24 MR. VINCZE: May it please the  
25 Commission, I would like to call Lee Shobe on behalf

1 of Quail Oil.

2 LEE SHOBE

3 called as a witness on behalf of the Applicant,  
4 having been duly sworn on his oath by the reporter,  
5 testifies as follows:

6 DIRECT EXAMINATION

7 BY MR. VINCZE:

8 Q. Mr. Shobe, could you please state your full  
9 name for the record?

10 A. Lee Butler Shobe.

11 Q. And what is your occupation?

12 A. I'm a petroleum geologist.

13 Q. Could you summarize your educational  
14 background for us?

15 A. I received a bachelor's degree from the  
16 University of Tennessee, have worked in oil and gas  
17 exploration and development for approximately 35  
18 years.

19 Q. And is that experience primarily in oil and  
20 gas exploration in Kansas, Oklahoma and the  
21 mid-continent?

22 A. Yes.

23 Q. And you are familiar with the Application  
24 filed by Quail Oil & Gas?

25 A. I am.

1           **Q.** Have you mapped faults in the Morris County  
2 area including the Diamond Creek and Humboldt faults?

3           **A.** Yes, I've mapped the area extensively from  
4 Morris County all the way down to Harper and Sumner  
5 Counties.

6           **Q.** Is the density or distribution of faults in  
7 the Morris County area greater or less than areas in  
8 Harper and Sumner Counties, Kansas?

9           MR. EYE: I object. These are questions  
10 that are appropriately for direct examination that  
11 apparently were not included in the prefiled direct  
12 that is attributable to Mr. Shobe.

13           MR. MYERS: Staff would join.

14           COMMISSIONER FEIST ALBRECHT: Do you  
15 care to respond?

16           MR. VINCZE: I will withdraw the  
17 question.

18           COMMISSIONER FEIST ALBRECHT: Thank you.

19           **Q.** (BY MR. VINCZE) Mr. Shobe, did you submit  
20 the prefiled testimony and prefiled rebuttal testimony  
21 in this case?

22           **A.** Yes, I did.

23           **Q.** And that testimony has been submitted to the  
24 Commission and to the court reporter. Did you review  
25 geologic information related to Morris County?

1           **A.**    Yes, I did.

2           **Q.**    And what did that information show?

3                   MR. EYE:  Objection.  This is another  
4                   question that is appropriate for prefiled direct that  
5                   apparently was not included.  I would object to its  
6                   presentation now.

7                   MR. MYERS:  Join.

8                   MR. VINCZE:  I direct the Commission to  
9                   the prefiled testimony of Lee Shobe, Page 3, Line 3.  
10                  Have you reviewed publicly available information on  
11                  the United States Geological Survey National  
12                  Earthquake Information Center website?

13                  MR. EYE:  Then I object on the basis it  
14                  is already in the record in his prefiled direct  
15                  testimony and it is now repetitious.

16                  MR. VINCZE:  I would direct the witness  
17                  to answer the question.

18                  MR. EYE:  It's been asked and answered  
19                  in his prefiled direct.  I object.

20                  COMMISSIONER FEIST ALBRECHT:  I believe  
21                  the question -- I think the record would reflect that  
22                  the question you asked prior to referring to the page  
23                  was a little bit different than the one that you've  
24                  asked, so if you are asking the question that's here,  
25                  I will sustain the objection.  If you are asking

1 something different than what appears at Page 3, I  
2 will entertain that question subject, of course, to  
3 whatever objection may arise.

4 MR. VINCZE: I am just asking the  
5 witness if he's reviewed publicly available  
6 information on the USGS website.

7 MR. VALENTINE: Yes, I have.

8 Q. (BY MR. VINCZE) And also in your prefiled  
9 direct testimony you reviewed the Staff's 2016  
10 proposed area of reduction map?

11 MR. MYERS: Staff would object. These  
12 questions have been asked and answered, and to the  
13 extent they have not, they had the opportunity to have  
14 them asked and answered in the prefiled testimony.

15 MR. EYE: Join the objection.

16 COMMISSIONER FEIST ALBRECHT: I will  
17 sustain the objection.

18 MR. VINCZE: That's fine.

19 Q. (BY MR. VINCZE) Mr. Shobe, is the direct  
20 prefiled testimony and the prefiled rebuttal testimony  
21 that you submitted in this record true and accurate to  
22 the best of your knowledge?

23 A. Yes, it is.

24 MR. VINCZE: I move for admission of the  
25 prefiled direct and prefiled rebuttal testimony of Lee

1 Shobe.

2 COMMISSIONER FEIST ALBRECHT: Is there  
3 any objection? Hearing none, it will be admitted.

4 Mr. Eye.

5 MR. VINCZE: Tender the witness for  
6 cross.

7 COMMISSIONER FEIST ALBRECHT: Thank you.

8 **CROSS EXAMINATION**

9 BY MR. EYE:

10 Q. Mr. Shobe, have you read -- I'm sorry.  
11 Have you read and reviewed Dr. Aber's testimony?

12 A. I have.

13 Q. Dr. Aber identifies the proposed UI well as  
14 being located over a buried basement uplift known as  
15 the Nemaha Ridge. You don't call that particular  
16 geological characteristic out in your testimony, do  
17 you?

18 A. No, I do not.

19 Q. Dr. Aber identifies the Humboldt Fault zone  
20 in the area. Your prefiled direct doesn't call this  
21 geological feature out, does it?

22 A. No, I do not.

23 Q. Dr. Aber describes specific zones that are  
24 present in the substrata under the UI, proposed UI  
25 well in this case. You didn't identify those fault

1 zones, did you?

2 **A.** Not in my testimony.

3 **Q.** Dr. Aber describes the relationship between  
4 the Nemaha Ridge and the Humboldt Fault zone. Your  
5 testimony does not discuss this relationship, correct?

6 **A.** No, sir. It's not in my testimony.

7 **Q.** Would you agree that the United States  
8 Geological Survey that you apparently reviewed some of  
9 their information has reported that recent increases  
10 in earthquakes since around 2013 is primarily  
11 attributed to disposal of waste water?

12 **A.** Yes, that's commensurate with my testimony.

13 **Q.** You've done no independent analysis of the  
14 faults that underlie the proposed UI well, correct?

15 **A.** I've done extensive studies in the area.

16 **Q.** You didn't report them in your testimony,  
17 correct?

18 **A.** No, it was not submitted as part of my  
19 testimony.

20 **Q.** So as far as your testimony is concerned,  
21 you don't have a basis to contest Dr. Aber's finding  
22 that the area of the proposed UI well is riddled or  
23 characterized by faults?

24 **A.** Riddled would be a misleading term. There  
25 are faults in the area, absolutely.



1           **Q.** But you have not done an independent  
2 analysis of the nature and extent of those faults that  
3 you reported in your testimony, correct?

4           **A.** No, it's not in my testimony.

5           **Q.** You would not have a basis in your testimony  
6 that you articulated to object or to contest Dr.  
7 Aber's finding that the faults underneath the proposed  
8 well offset basement rock and project upward through  
9 sedimentary layers, correct?

10           **MR. VINCZE:** I object to the form of the  
11 question. What he's doing is asking if -- it's kind  
12 of -- he's asking about comparison of the direct  
13 testimony, rebuttal testimony to Dr. Aber's testimony  
14 which will be part of the record that you can review  
15 and have handy, so I don't think this is -- it's kind  
16 of repetitive the same way of him asking whether or  
17 not it's in there or not. It is what it is, and so if  
18 he's asking Mr. Shobe as a geologist have you studied  
19 faults in that area, have you done independent studies  
20 in that area, that's a different question, but asking  
21 if it's in his testimony about what Dr. Aber said, you  
22 have Dr. Aber's testimony. You have Dr. Shobe's  
23 testimony and certainly anything else is just  
24 redundant.

25           **MR. EYE:** Cross examination is intended

1 to probe the particular points that a witness has  
2 asserted. I want to make sure that we differentiate  
3 Mr. Shobe's testimony from Dr. Aber's in terms of what  
4 it covered, what it didn't cover, and I want to stick  
5 to the witness' prefiled direct and rebuttal. I don't  
6 want to go beyond that because that would be contrary  
7 to the rules of practice of this Commission, so that's  
8 the reason I am asking him about his prefiled  
9 testimony and determining what is in it and what isn't  
10 in it.

11 COMMISSIONER FEIST ALBRECHT: Well, I  
12 will sustain the objection because I agree it's  
13 repetitious. You just said it's clearly stated and we  
14 can read the testimony and have read the testimony, so  
15 to the extent we are going to cross-examine, it needs  
16 to be based on the direct or the rebuttal that Mr.  
17 Shobe has filed, not what Mr. Aber has filed or Dr.  
18 Aber has filed.

19 MR. EYE: Thank you.

20 Q. (BY MR. EYE) Mr. Shobe, have you found that  
21 the faults that -- strike that. Mr. Shobe, in your  
22 testimony, you have reported no independent analysis  
23 of the faults underneath the proposed UI well,  
24 correct?

25 A. It is not in my testimony.

1           **Q.**   And you have made no reference to or  
2           discussion of the geologic characterization of the  
3           strata, of the geologic strata in the area of the UI  
4           well, correct?

5           **A.**   There's no reference to that in my  
6           testimony.

7           **Q.**   Would you agree that waste water injection  
8           fluids may have the effect of lubricating faults?

9           **A.**   The evidence for that is anecdotal.  There's  
10          very little direct evidence.

11          **Q.**   So you would dispute that?

12          **A.**   No, I'm saying there's a lack of evidence  
13          that that is the causal effect.

14          **Q.**   So you don't dispute it, but -- I want to  
15          make sure I understand your answer.  You accept that  
16          that is an assertion that's made by geologists perhaps  
17          other than you?

18          **A.**   That's a theory that has yet to be proven by  
19          research or facts that have been generated by rock  
20          mechanic studies.

21          **Q.**   So is it fair then to say that you would not  
22          see that there is a relationship between the use of UI  
23          wells and induced seismicity?

24          **A.**   No.

25          **Q.**   You find there's no relationship?

1           **A.** No, that's not what I said. There is some  
2 evidence that there is a relationship.

3           **Q.** In your rebuttal testimony at Page 2, Line 7  
4 or the beginning of Line 7, you testify that there was  
5 no evidence of earthquakes since 1950 with an  
6 epicenter in Morris County, Kansas. Do you see that?

7           **A.** Yes, I do.

8           **Q.** And is that -- does that include  
9 earthquakes of less than a 2.0 magnitude?

10          **A.** I searched for earthquakes of any magnitude  
11 that that particular website would return.

12          **Q.** So your answer is that would include  
13 microearthquakes?

14          **A.** I searched for everything.

15                   MR. EYE: Thank you. That concludes my  
16 cross examination.

17                   COMMISSIONER FEIST ALBRECHT:  
18 Commissioners?

19                   CHAIRMAN APPLE: Staff.

20                   COMMISSIONER FEIST ALBRECHT: I'm sorry.  
21 I apologize.

22                   MR. MYERS: It's quite all right.

23                                   **CROSS EXAMINATION**

24                   BY MR. MYERS:

25           **Q.** Mr. Shobe, if Quail Oil injects at the rate

1 or pressure for which they have applied, is it going  
2 to cause an earthquake?

3 **A.** No.

4 **Q.** Why do you say that?

5 **A.** I've studied the areas that have been  
6 affected by large volume injection wells and there's  
7 nothing in the Application that approaches any of the  
8 criteria available from the Kansas Corporation  
9 Commission or other studies that have been done. This  
10 well does not qualify in any way, shape or form.

11 **Q.** And what are some of those criteria you  
12 mentioned?

13 **A.** That would be high water volumes, high  
14 pressures, multiple wells immediately adjacent to each  
15 other.

16 **Q.** Anything else?

17 **A.** Those are the primary criteria.

18 **Q.** You mentioned earlier that you had done some  
19 independent analyses elsewhere regarding formations.  
20 Could you define those for a moment?

21 **A.** I am not sure I understand the question.  
22 Could you repeat it?

23 **Q.** Sure. You were asked on cross examination  
24 by Mr. Eye whether you had done any or more or less  
25 asked whether you had done any independent analyses

1 regarding formations and faults in the area.

2 **A.** Yeah, I've mapped -- in my experience, I've  
3 worked the entire Nemaha uplift from Central Oklahoma  
4 all the way up through Northern Kansas and I have  
5 mapped the faults associated with that uplift  
6 extensively including the main fault, the Humboldt  
7 Fault and just a wide variety of other faults  
8 associated with that thrust fault.

9 **Q.** Based upon your studies, why is it that  
10 these formations and faults are unlikely to result in  
11 earthquakes when there's injection at the rate applied  
12 for?

13 **A.** The areas in South Central Kansas and North  
14 Central Oklahoma that have experienced faults are in a  
15 much more complex structural portion of the Nemaha  
16 uplift, so, for example, the fault density per  
17 township which would be 36 square miles is much  
18 higher. The area in Morris County is a much more  
19 benign, simple structural complex part of the Nemaha  
20 uplift. There are much fewer faults per square mile.

21 **MR. MYERS:** Thank you. I have nothing  
22 further from Staff.

23 **COMMISSIONER FEIST ALBRECHT:**  
24 Commissioners?

25 **COMMISSIONER EMLER:** In response to Mr.

1 Eye's cross examination, your reply was that is not in  
2 my testimony to several questions. Do you recall  
3 that?

4 MR. SHOBE: Yes.

5 COMMISSIONER EMLER: Is there a reason  
6 or can you give me a reason why you don't include the  
7 information that he was quizzing you about in your  
8 testimony, either your direct or rebuttal?

9 MR. SHOBE: The only response I can make  
10 is I did not think it was pertinent at the time of my  
11 testimony.

12 COMMISSIONER EMLER: Even after you read  
13 Dr. Aber?

14 MR. SHOBE: I don't believe that Dr.  
15 Aber's established the critical criteria that there  
16 are faults immediately adjacent to the proposed  
17 injection well. He talked in very general terms about  
18 the Nemaha uplift. The only fault he specifically  
19 described was the Diamond Creek fault which is about  
20 18 miles south of the proposed injection well and the  
21 fact that it has a surface expression really has  
22 little or no bearing on the proposed injection well in  
23 the area.

24 COMMISSIONER EMLER: Nothing further.

25 COMMISSIONER FEIST ALBRECHT: I believe

1 I deferred a couple of questions that I was asking of  
2 Mr. Valentine to you of a geological nature. What is  
3 the scope and extent or the depth, the full thickness  
4 of the Arbuckle in the proposed well site?

5 MR. SHOBE: 265 feet.

6 COMMISSIONER FEIST ALBRECHT: So the  
7 Arbuckle and that well lie directly above basement  
8 rock?

9 MR. SHOBE: Yes.

10 COMMISSIONER FEIST ALBRECHT: And if I  
11 understood Mr. Valentine's testimony, the well as  
12 completed drilled through to about the 70-foot mark of  
13 that width of Arbuckle with perforations just into the  
14 upper 20 feet? Is that correct?

15 MR. SHOBE: The perforations in the  
16 Arbuckle are slightly below the top, about 10 feet  
17 below the top of the Arbuckle. The top 10 feet of  
18 Arbuckle is non-porous rock, so we drilled an  
19 additional 40 feet until we encountered good, clean  
20 what we consider porous Arbuckle rock and that's where  
21 the perforations were. There were 20 feet of  
22 perforations, approximately 20 feet into the Arbuckle.

23 COMMISSIONER FEIST ALBRECHT: So what is  
24 the difference between the lowest perforation and the  
25 bottom of the Arbuckle?



1 MR. SHOBE: 205 feet.

2 COMMISSIONER FEIST ALBRECHT: Could you  
3 distinguish how this well is completed -- well, let  
4 me ask you this: First, what is your knowledge  
5 regarding the injection wells that are completed in  
6 Harper and Sumner Counties that are the subject of the  
7 Commission's order in 15-CONS-770-CMSC, if you know?

8 MR. SHOBE: The Arbuckle disposal wells  
9 that I have looked at in South Central Kansas drill  
10 through the entire Arbuckle section, so they drill  
11 from the top all the way through the Arbuckle to the  
12 basement. To complete the Arbuckle as a disposal  
13 well, they don't just perforate a small section of the  
14 Arbuckle, they perforate all of the Arbuckle so they  
15 are putting water in the Arbuckle from the top all the  
16 way to the bottom which essentially is right on top of  
17 basement rock, so there's a pretty dramatic difference  
18 in the type of completion of the well in question at  
19 this hearing and the high volume wells that are  
20 completed in the south central part of the state.

21 COMMISSIONER FEIST ALBRECHT: Given the  
22 method of completion for the well in question, the Sly  
23 2-6, what is the likelihood of seismic activity  
24 related to disposal into the well at the gravity and  
25 pressure requested in the Application?

1 MR. SHOBE: Based on historical  
2 evidence, that would be nil. That would be zero.

3 COMMISSIONER FEIST ALBRECHT: And given  
4 the completion, does that affect anything in your mind  
5 at all in terms of distinguishing it from the wells  
6 that are completed in the Harper, Sumner County areas  
7 that are subject to the Commission order?

8 MR. SHOBE: Absolutely. They are  
9 completed totally differently.

10 COMMISSIONER FEIST ALBRECHT: Thank you.  
11 I have no more questions. Anything further?

12 MR. VINCZE: Nothing further.

13 COMMISSIONER FEIST ALBRECHT: Anything  
14 from Mr. Eye?

15 MR. EYE: No.

16 COMMISSIONER FEIST ALBRECHT: Thank you.  
17 Thank you for your testimony. You may call your  
18 witnesses, Mr. Eye.

19 MR. EYE: James Aber.

20 **JAMES ABER**

21 called as a witness on behalf of the Protestants,  
22 having been duly sworn on his oath by the reporter,  
23 testifies as follows:

24 **DIRECT EXAMINATION**

25 BY MR. EYE:

1 Q. Please state your name.

2 A. James Sandusky Aber.

3 Q. And are you the same James Aber that caused  
4 to be filed in this docket direct testimony?

5 A. I am.

6 Q. Do you have any corrections or changes to  
7 the testimony that you prefiled in this case?

8 A. No.

9 Q. Is the testimony true and correct to the  
10 best of your knowledge?

11 A. It is.

12 Q. And if the same questions that are in your  
13 prefiled direct testimony were asked of you today,  
14 would your answers be the same?

15 A. They would.

16 MR. EYE: I would move the admission of  
17 Dr. James Aber's prefiled direct testimony into the  
18 record.

19 COMMISSIONER FEIST ALBRECHT: Is there  
20 any objection?

21 MR. VINCZE: No objection.

22 COMMISSIONER FEIST ALBRECHT: I hear no  
23 objections, so it will be admitted.

24 MR. EYE: Thank you. I tender the  
25 witness for cross examination. Thank you.

1 MR. VINCZE: I have no cross  
2 examination.

3 COMMISSIONER FEIST ALBRECHT: Staff?

4 **CROSS EXAMINATION**

5 BY MR. MYERS:

6 Q. Good morning, Dr. Aber. If the Applicant  
7 injects at the rate and pressures that it proposes in  
8 its Application, is it going to cause an earthquake?

9 A. I don't know.

10 MR. MYERS: Nothing further.

11 COMMISSIONER FEIST ALBRECHT:

12 Commissioners.

13 COMMISSIONER EMLER: No questions.

14 COMMISSIONER FEIST ALBRECHT: Thank you  
15 for your testimony.

16 MR. EYE: May I redirect?

17 COMMISSIONER FEIST ALBRECHT: Sure. I'm  
18 sorry.

19 **REDIRECT EXAMINATION**

20 BY MR. EYE:

21 Q. Dr. Aber, you just testified that you don't  
22 know whether it will. What do you know concerning the  
23 relationship between the proposed well and induced  
24 seismicity?

25 A. What we are talking about here is

1 essentially an uncontrolled experiment. We can't  
2 predict what the outcome will be. This isn't like  
3 predicting river floods where we have long historical  
4 records and we can know what the 50-year flood or the  
5 100-year flood might be. We have very short  
6 historical records of these induced earthquakes. We  
7 don't know what all the parameters and all the  
8 thresholds might be in every situation, so it's  
9 impossible to make predictions. In my professional  
10 opinion, though, I think there is an increased risk  
11 for induced earthquakes in this situation.

12 Q. And is that what you discussed in your  
13 testimony?

14 A. It is.

15 MR. EYE: Thank you.

16 COMMISSIONER FEIST ALBRECHT: Anything  
17 further for this witness? Hearing none, thank you for  
18 your testimony. You may be excused.

19 DR. ABER: Thank you.

20 MR. EYE: Cindy Hoedel.

21 **CINDY HOEDEL**

22 called as a witness on behalf of the Protestants,  
23 having been duly sworn on her oath by the reporter,  
24 testifies as follows:

25 **DIRECT EXAMINATION**

1 BY MR. EYE:

2 Q. Please state your name.

3 A. Cindy Hoedel.

4 Q. Where do you live?

5 A. Matfield Green in Chase County.

6 Q. And did you cause to be filed certain  
7 testimony, direct testimony in this docket?

8 A. I did.

9 Q. And did you -- do you have any corrections  
10 or changes to that testimony today?

11 A. I do not.

12 Q. If the same questions were asked of you  
13 today that were asked in your prefiled direct  
14 testimony, would your answers be the same?

15 A. They would.

16 Q. And is your testimony true and correct to  
17 the best of your knowledge?

18 A. It is.

19 MR. EYE: I would move the admission of  
20 Cindy Hoedel's testimony into the record.

21 MR. VINCZE: No objection.

22 COMMISSIONER FEIST ALBRECHT: Hearing  
23 none, it will be admitted.

24 MR. EYE: Tender the witness for cross  
25 examination.

1 MR. VINCZE: We have no cross  
2 examination.

3 COMMISSIONER FEIST ALBRECHT: Staff.

4 MR. MYERS: Staff has none either.

5 Thank you for being present.

6 COMMISSIONER FEIST ALBRECHT:

7 Commissioners?

8 MS. HOEDEL: Thank you.

9 COMMISSIONER FEIST ALBRECHT: Wait. I  
10 am waiting for a response.

11 COMMISSIONER EMLER: No.

12 CHAIRMAN APPLE: No.

13 COMMISSIONER FEIST ALBRECHT: Thank you.

14 Thank you very much. Does anybody wish to make  
15 closing statements?

16 COMMISSIONER EMLER: Staff has a  
17 witness.

18 COMMISSIONER FEIST ALBRECHT: I'm sorry.  
19 I apologize. Staff, you may call your witness.

20 MR. MYERS: If Staff may, could we have  
21 a few moments?

22 COMMISSIONER FEIST ALBRECHT: We could  
23 take a break at this point. A few moments meaning?

24 MR. MYERS: Five minutes.

25 COMMISSIONER FEIST ALBRECHT: Let's

1 resume at 10:30.

2 MR. MYERS: Thank you.

3 (THEREUPON, the hearing is  
4 recessed from 10:17 o'clock AM  
5 until 10:22 o'clock AM.)

6 COMMISSIONER FEIST ALBRECHT: I believe  
7 we are at the point in the proceeding where Staff is  
8 ready to call its witness.

9 MR. MYERS: Yes. Staff would call Rene  
10 Stucky to the stand.

11 **RENE STUCKY**

12 called as a witness on behalf of Commission Staff,  
13 having been duly sworn on his oath by the reporter,  
14 testifies as follows:

15 MR. MYERS: May I proceed?

16 COMMISSIONER FEIST ALBRECHT: You may.

17 **DIRECT EXAMINATION**

18 BY MR. MYERS:

19 Q. Mr. Stucky, are you the same Rene Stucky who  
20 prefiled testimony in this docket?

21 A. Yes, I am.

22 Q. Now that you are under oath and considering  
23 the testimony that was presented in person here today,  
24 do you have any corrections or changes to your  
25 testimony?



1           **A.** I may have some changes. From the testimony  
2 that we've heard, I think I would recommend more  
3 that -- I would recommend we approve the Application  
4 at 2,000 barrels and 250 psi. I believe from what  
5 they stated they need, that would give them plenty of  
6 room for development but also give them pressure if  
7 they need to overcome gravity and I think it would  
8 probably last for quite some time. Obviously down the  
9 road if they would need to amend the Application, that  
10 is always a possibility.

11           **Q.** Do you have any other corrections or changes  
12 to your testimony?

13           **A.** No, I don't.

14           MR. MYERS: With that, I move for Rene  
15 Stucky's prefiled testimony to be admitted into the  
16 record taking note of the changes in his  
17 recommendation.

18           COMMISSIONER FEIST ALBRECHT: Is there  
19 any objection?

20           MR. VINCZE: May I have a moment?

21           COMMISSIONER FEIST ALBRECHT: You may.

22                           (Off the record)

23           MR. VINCZE: No objection.

24           COMMISSIONER FEIST ALBRECHT: Mr. Eye?

25           MR. EYE: No objection. I assume that

1 that's fair territory for cross examination.

2 COMMISSIONER FEIST ALBRECHT: Yes.

3 MR. MYERS: Staff would tender Mr.  
4 Stucky for cross examination.

5 COMMISSIONER FEIST ALBRECHT: And I will  
6 make the ruling we will admit the testimony of Mr.  
7 Stucky as well as considering the amendment as well.

8 MR. MYERS: Thank you.

9 CHAIRMAN APPLE: Could I ask a  
10 clarification? Typically when someone amends their  
11 testimony, we go to a page and a line and they change  
12 their testimony, so we are just having a general  
13 statement that Mr. Stucky intends to testify to a new  
14 injection volume or are we actually changing the  
15 testimony that was submitted?

16 MR. MYERS: It is not Staff's position  
17 that the testimony itself needs to be changed except  
18 that on Page 6, Line 14, Mr. Stucky's answer is: Yes,  
19 I recommend approval of the Application. Staff would  
20 like Mr. Stucky's testimony presented here today to  
21 supplement that, yes, I recommend approval of the  
22 Application but under the recommendations he just  
23 gave.

24 CHAIRMAN APPLE: Okay, thank you.

25 COMMISSIONER FEIST ALBRECHT: So that we

1 are all clear on what that recommendation is, it would  
2 be approve the Application with the maximum injection  
3 of 2,000 barrels per day at 200 pounds of maximum  
4 pressure of 200 pounds?

5 MR. STUCKY: 250.

6 COMMISSIONER FEIST ALBRECHT: On the  
7 pressure?

8 MR. STUCKY: Right.

9 COMMISSIONER FEIST ALBRECHT: Thank you.

10 MR. MYERS: Thank you.

11 COMMISSIONER FEIST ALBRECHT: The  
12 testimony with that supplementation will be admitted  
13 into the record and tender Mr. Stucky for cross. Mr.  
14 Eye? Oh, Quail first? I'm sorry. Proceed.

15 MR. VINCZE: I just reserve the right to  
16 cross after rebuttal.

17 COMMISSIONER FEIST ALBRECHT: So you  
18 have no examination that you wish to make now?

19 MR. VINCZE: No.

20 COMMISSIONER FEIST ALBRECHT: Okay. Mr.  
21 Eye.

22 **CROSS EXAMINATION**

23 BY MR. EYE:

24 Q. Mr. Stucky, I want to make sure I understand  
25 the basis for the proposed amendment, for the actual

1 amendment to your testimony that's been recognized by  
2 the Commission. Was that based upon testimony that  
3 you heard this morning from witnesses for the  
4 Applicant?

5 **A.** Correct.

6 **Q.** Is it -- so it's fair to say that it's  
7 still -- you are not altering any of the conclusions  
8 you reached in your testimony, correct?

9 **A.** No, no. I mean, basically I try to keep the  
10 permits, any permit, within a reasonable amount and  
11 not just give, you know, an exorbitant amount over  
12 what is actually needed at the time, just basically  
13 kind of keep a handle on what's going into the wells  
14 for volumes and stuff.

15 **Q.** And so the Application -- strike that. So  
16 the permit if approved and consistent with your  
17 recommendation would specify a 2,000 barrel daily  
18 limit?

19 **A.** Correct.

20 **Q.** You don't know what the threshold is for  
21 volumes that would induce seismicity, do you?

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

23 **Q.** And if the Application, excuse me, the  
24 permit is granted on the basis of Staff's  
25 recommendation, it would reduce the proposed psi to

1 250 from the present requested rate of 500?

2 **A.** Correct.

3 **Q.** You don't know what the threshold is for  
4 pressure that would cause induced seismicity, do you?

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

6 **Q.** So is it my understanding then that the  
7 amendment to your testimony is tied to economic  
8 considerations?

9 **A.** I am not sure I understand the question.  
10 Sorry.

11 **Q.** Well, the testimony, as I understood it,  
12 from the Applicant talked a good deal about the  
13 margins at which the proposed wells would be economic  
14 or economical.

15 **A.** Right.

16 **Q.** Is your proposed change in your testimony --  
17 not proposed -- your change in your testimony tied to  
18 that part of the Applicant's testimony concerning  
19 marginal profitability of the wells in question?

20 **A.** I mean, it's probably tied to numerous  
21 things. One of them would be the economics for the  
22 operator. I mean, I feel like I am giving enough for  
23 development and, you know, if it's a high volume he  
24 may want to go to a bigger pump or something and  
25 increase his volume to 600 or whatever, but then also,

1       like I said, I try to keep a permit within a  
2       reasonable range of what's actually being disposed or  
3       injected in that particular well merely to just kind  
4       of keep a handle and, you know, not just let anything  
5       go.

6                **Q.**    I don't remember which witness it was from  
7       the Applicant that said that there had been some  
8       conversations with KCC Staff about this Application.  
9       Did you ever have off the record discussions with Mr.  
10      Valentine or Mr. Shobe concerning this Application?

11               **A.**    Mr. Valentine and I discussed it when he  
12      initially filed the Application.

13               **Q.**    And at that time, the proposal was as it was  
14      eventually presented for 500 psi injection pressure,  
15      correct?

16               **A.**    Right.

17               **Q.**    But that changed today because of testimony  
18      concerning the marginal profitability of the wells,  
19      correct?

20               **A.**    No. Basically it changed because, I mean,  
21      they admitted that basically vacuum is probably  
22      what's -- and from my experience with Arbuckle,  
23      vacuum is usually the case.

24               **Q.**    And was that particular aspect of this  
25      Application discussed before the Application was

1 finalized and filed?

2 A. You mean initially?

3 Q. Yes.

4 A. In our initial conversation? I believe we  
5 talked about it a little bit, yes.

6 Q. And were you in agreement that the proposed  
7 500 psi was reasonable?

8 A. Yes. Yeah, I mean, I didn't -- when we  
9 initially discussed it, I didn't have a big problem  
10 with the 500.

11 Q. And did that take into account the marginal  
12 profitability of the wells in question?

13 A. Yes.

14 Q. But something between that time and now  
15 changed?

16 A. You know, unfortunately my memory is not  
17 that great. I know in our discussion Mr. Valentine,  
18 he kind of indicated some development and I don't  
19 remember the exact reasoning, but at the time, you  
20 know, he really wanted to stick to the 500 and I  
21 thought, yeah, that was okay.

22 Q. In your prefiled direct testimony you  
23 discuss Dr. Aber's testimony, correct?

24 A. Correct.

25 Q. Over on Page 6 beginning about Line 5?

1           **A.**    Yes.

2           **Q.**    And in Dr. Aber's testimony, he discusses  
3 detailed analyses of the fault complex that he asserts  
4 is in the substrata where the well, the proposed well  
5 is located, correct?

6           **A.**    Correct.

7           **Q.**    Have you done any sort of extensive analysis  
8 of the substrata that is related to the proposed UI  
9 well?

10          **A.**    No, I haven't.

11                   MR. EYE: Thank you. That would  
12 conclude my cross examination.

13                   MR. VINCZE: If I may.

14                   COMMISSIONER FEIST ALBRECHT: Well, let  
15 me look at my map here. I haven't been following it  
16 very well. Commissioners?

17                   MR. EYE: Are we going out of order on  
18 cross examination?

19                   COMMISSIONER FEIST ALBRECHT: That's  
20 what I am trying -- he waived cross on this one, so we  
21 went to you and now we are Staff.

22                   MR. MYERS: I think it's now  
23 Commissioners.

24                   COMMISSIONER FEIST ALBRECHT: I think we  
25 are ready for Commissioner questions.



1 MR. EYE: I got a little out of sequence  
2 in my own mind.

3 COMMISSIONER FEIST ALBRECHT: And it's  
4 easy to do as I can attest, but I think we are due for  
5 Commissioner questions before we begin the --

6 MR. VINCZE: Surrebuttal type?

7 COMMISSIONER FEIST ALBRECHT: Yes.

8 COMMISSIONER EMLER: No questions.

9 CHAIRMAN APPLE: Thank you. Mr. Stucky,  
10 the new recommendation of 2,000 barrels, is that  
11 based -- what is that based on?

12 MR. STUCKY: As I said, I like to keep  
13 the permits within reason of what's actually going to  
14 be used and that's really my sole reasoning for  
15 dropping it down to 2,000 cause it doesn't sound like  
16 they need it anywhere close to 5,000 at this time.

17 CHAIRMAN APPLE: So if I remember  
18 correctly, they thought maybe 300 barrels per day for  
19 two wells.

20 MR. STUCKY: Correct.

21 CHAIRMAN APPLE: So if the field was  
22 developed and they actually had a need now for 5,000  
23 barrels, would you have a different recommendation?

24 MR. STUCKY: Yeah, I would stay with  
25 5,000 if I felt it was needed.

1                   CHAIRMAN APPLE: So what would the  
2 process be if we were -- say we approved 2,000  
3 barrels per day and then they wanted to do some  
4 additional drilling, have some more production. What  
5 would be the process, to amend the Application? Would  
6 they file a new application, amend the Application?

7                   MR. STUCKY: Basically you can amend an  
8 application. There's a particular form for that. If  
9 you are increasing rate and pressure or if you would  
10 be going to like a different zone, you are required to  
11 notice and publish in the paper so there would be a  
12 30-day protest period and, you know, then the permit  
13 would either be granted or denied.

14                  CHAIRMAN APPLE: Possibly a hearing such  
15 as this?

16                  MR. STUCKY: Possibly.

17                  CHAIRMAN APPLE: I guess the thing that  
18 concerns me is that we've gone through witnesses this  
19 morning and now we have new information and I suppose  
20 we could address any information they want to bring  
21 forward in filing briefs later on, but it does kind of  
22 put us in an awkward spot to make sure everyone can be  
23 heard, but I understand that because of the  
24 information this morning you would now recommend the  
25 2,000 not based upon actual well construction or

1 concerns with a higher volume, more on the need based  
2 upon what they need at the present time.

3 MR. STUCKY: Yes.

4 CHAIRMAN APPLE: Okay, thank you.

5 COMMISSIONER FEIST ALBRECHT: I've got a  
6 question.

7 (THEREUPON, the Commission confers off  
8 the record.)

9 COMMISSIONER FEIST ALBRECHT: I have a  
10 few questions I think that I would like to develop a  
11 little bit, but I also have a procedural option to  
12 pursue. Let me speak regarding your responses to  
13 Commissioner Apple's questions. You spoke -- I don't  
14 know -- actually, never mind. I am going to go to  
15 the procedural option first because the questions that  
16 I have are better answered by the Applicant. Since  
17 this is new information, it seems only appropriate to  
18 allow the Applicant to call witnesses if it so chooses  
19 to rebut this evidence so that there's an opportunity  
20 for cross examination of the witnesses. In my view,  
21 we are talking about a factual situation and we need  
22 to resolve those facts. They need to be developed in  
23 this proceeding rather than through some sort of  
24 briefing, so my preference would be to allow you to  
25 proceed, proceed on any follow-up that you wish in

1 response to the cross examination here, and if you  
2 wish to call a witness to make a response to which we  
3 can pursue cross examination, that would be helpful to  
4 know.

5 MR. VINCZE: Thank you for that  
6 courtesy. We would like to do so.

7 COMMISSIONER FEIST ALBRECHT: Okay. Do  
8 you have any further examination of Mr. Stucky given  
9 any of the questions that have been asked of him thus  
10 far?

11 MR. VINCZE: No. Commissioner Apple  
12 asked the questions that I had in my mind very well.  
13 Thank you.

14 COMMISSIONER FEIST ALBRECHT: All right.  
15 Thank you. I think -- anything further from this  
16 witness from anyone?

17 MR. MYERS: Nothing.

18 COMMISSIONER FEIST ALBRECHT: Thank you.  
19 Thank you for your testimony.

20 MR. VINCZE: I call Wray Valentine to  
21 the stand.

22 **WRAY VALENTINE**

23 recalled as a witness on behalf of the Applicant,  
24 having been previously duly sworn on his oath by the  
25 reporter, testifies further as follows:

1 COMMISSIONER FEIST ALBRECHT: I would  
2 just remind you that you remain under oath.

3 MR. VALENTINE: Yes, ma'am.

4 **REDIRECT EXAMINATION**

5 BY MR. VINCZE:

6 Q. Mr. Valentine, if you know, what are the  
7 typical disposal volumes as far as pressure goes, psi,  
8 in Morris County?

9 A. Volumes are anywhere from 2,000 to I believe  
10 up to 4,000, maybe 5,000. I am not exactly sure.  
11 That would be a better question for Mr. Stucky.

12 Q. Are those -- and that would be in  
13 barrels --

14 A. Yes, sir.

15 Q. -- per day? Did Quail do a design proposal  
16 before it submitted this Application?

17 A. Yes. The KCC --

18 MR. EYE: I am going to object. That  
19 doesn't have anything to do with the proposal to amend  
20 Staff's position.

21 MR. MYERS: Staff would join.

22 COMMISSIONER FEIST ALBRECHT: I will  
23 overrule.

24 MR. VINCZE: Where we are going here is  
25 there were discussions related to 500 psi and

1 discussions in the Application and material submitted  
2 to the Commission relating to the 5,000 barrels per  
3 day and I was wanting to explore that with a few  
4 questions.

5 COMMISSIONER FEIST ALBRECHT: I will  
6 allow it because we are being asked to amend this,  
7 consider amending the permit that was approved, and to  
8 the extent that there was a justification for what we  
9 have before us that may be altered, I think it's  
10 appropriate to inquire.

11 MR. MYERS: If I may, Staff would like  
12 to be clear. Staff is not proposing amending the  
13 Application. The Application is the Applicant's  
14 Application. Staff's position is based upon the  
15 testimony regarding need and it has changed regarding  
16 whether the Application as it stands should be  
17 granted.

18 MR. VINCZE: Then let me just stipulate  
19 that the record and the Application remains and the  
20 Applicant is still seeking 500 psi and 5,000 barrels  
21 per day injection limitation, and then with respect to  
22 need, we can have a few questions on that.

23 Q. (BY MR. VINCZE) Mr. Valentine, you earlier  
24 testified that the Arbuckle injection will be on  
25 vacuum. Is that correct?

1           **A.**   Yes, sir.

2           **Q.**   At least initially?

3           **A.**   Yes, sir.

4           **Q.**   And you also testified, correct me if I'm  
5           wrong, that initial disposal would be about 300  
6           barrels per day of saltwater from the two producing  
7           wells?

8           **A.**   Yes, sir.

9           **Q.**   Do you have plans for future development of  
10          that field?

11          **A.**   If these wells are economical, we would  
12          probably go down to 10 acre spacing to drill these  
13          wells, and if all the wells would produce a hundred  
14          barrels a day of water in the future, we would need  
15          that 5,000 barrels a day. That may be 10 years down  
16          the road, but at some point we may need it.

17          **Q.**   Do you also have the ability to take  
18          disposal water from the wells that other people  
19          develop?

20          **A.**   No. No, sir, just our wells.

21          **Q.**   So it is limited to your two wells and your  
22          plans for future development of that field?

23          **A.**   Yes, sir.

24          **Q.**   When you were talking about -- did you have  
25          discussions about these economics, the 500 and the

1 5,000 with Mr. Stucky prior to today?

2 **A.** When I started the Application for this  
3 disposal well, I called him to ask him what -- how we  
4 were to proceed, and one of the things was the KCC has  
5 a design proposal that you can put all of your  
6 information together and ask for your volumes and your  
7 pressures and they will look that over, and if they  
8 are okay with it, they will okay that and then you can  
9 go ahead and submit your application from there and  
10 that's what I had done because I wanted to know what  
11 my volumes and my pressures were going to be prior to  
12 drilling the well and making sure I could have the  
13 disposal for these other two wells.

14 **Q.** And also is it fair to say to accommodate  
15 any future development of that field?

16 **A.** Yes, sir.

17 **Q.** Is there anything that you would like to  
18 offer to the Commission that I haven't thought to ask?

19 **MR. EYE:** I am going to object. That's  
20 not a proper direct question in this context.

21 **COMMISSIONER FEIST ALBRECHT:** I will  
22 sustain the objection at this point.

23 **MR. VINCZE:** All right. I have nothing  
24 further.

25 **COMMISSIONER FEIST ALBRECHT:** Mr. Eye.



1 MR. EYE: Thank you.

2 **REXCROSS EXAMINATION**

3 BY MR. EYE:

4 Q. Mr. Valentine, isn't it the case that when  
5 this Application was first initiated that the pressure  
6 that was being asked for whereas 650 psi?

7 A. Yes, sir.

8 Q. But you found that 500 would be an  
9 acceptable level of pressure for you to be able to do  
10 what you need to do with your waste water?

11 A. Yes. The design proposal I asked for was  
12 650 and they came back and asked if 500 would be fine  
13 and I said yes.

14 Q. And your testimony today is that actually  
15 you don't need any pressure to inject the waste water  
16 in the proposed well at all, correct?

17 A. Not currently.

18 Q. So you could actually just do a gravity flow  
19 for the indefinite future, correct?

20 A. Yes, sir.

21 Q. So Mr. Stucky's proposal to go to 250 psi  
22 could actually be reduced to zero, correct?

23 A. For some period of time.

24 Q. For this period of time?

25 A. I can't tell you what time frame that would

1 be.

2 Q. And you heard the testimony of Mr. Stucky  
3 that would allow you to come back into the Commission  
4 and seek additional authority for a higher level of  
5 pressure if that's what you needed subsequent to  
6 operation of the proposed well?

7 A. He said that and he also said that he didn't  
8 have a problem with the 5,000 and the 500 either. It  
9 was just a need basis at the time. My contention  
10 would be that if there's no difference between 5,000  
11 and 2,000 or 500 and 250 psi, why should I go through  
12 the process again of getting another application when  
13 they are fine with it now?

14 Q. But as of today, it's your testimony that  
15 you don't need any pressure to use this well, correct?

16 A. True.

17 Q. And you don't know when you might need  
18 pressure, correct?

19 A. Correct.

20 Q. Do you know what level of pressure might be  
21 required when you do need it, correct?

22 A. Correct.

23 Q. You testified earlier about the wells in  
24 Morris County and their pressure levels. How did  
25 you -- where did you come up with that information?

1           **A.**   What specifically are you asking?

2           **Q.**   Well, you testified about the pressure  
3           levels in Morris County -- of the wells in Morris  
4           County. I think you said something like 2,000, 3,000.  
5           I forget exactly what your testimony was, but you  
6           provided a quantitative response in that answer.

7           **A.**   If you could let me know what that was, I  
8           would respond to it, but I am not exactly sure what I  
9           responded to.

10          **Q.**   Do you have a basis to testify about the  
11          current pressures of wells used in Morris County?

12          **A.**   I don't have any other disposal so I don't  
13          know.

14                   MR. EYE: Thank you.

15                   COMMISSIONER FEIST ALBRECHT: Staff?

16                                   **REXCROSS EXAMINATION**

17           BY MR. MYERS:

18           **Q.**   Mr. Valentine, earlier today you testified  
19           that you don't know if the two oil wells are  
20           economical at the present time. Is that correct?

21           **A.**   They are not economical with the -- if I  
22           have to haul the water. The Sly 1-6 I have not  
23           produced because I know I need the disposal to make it  
24           economical, so to date I don't know how much oil it is  
25           going to produce.

1           Q.   Okay, but if the injection application is  
2           granted in some form, you will be producing those  
3           wells. Is that correct?

4           A.   That's true.

5           Q.   Turning to the amount of fluid you requested  
6           in your Application, you testified earlier that the  
7           two wells, two oil wells, presently they are -- you  
8           estimate would produce about 300 barrels of saltwater  
9           per day. Is that right?

10          A.   Yes, sir.

11          Q.   So how many wells do you think you would  
12          have to drill to be in need of 5,000 barrels per day?

13          A.   Thirty.

14          Q.   What's your time frame for drilling those 30  
15          wells?

16          A.   I am not sure currently. I've got to see if  
17          the second well is going to be economical first.

18          Q.   And if it is economical, what is your time  
19          frame?

20          A.   Again, that's uncertain due to the oil  
21          prices and how much money you can make to try to put  
22          the capital back into more wells.

23          Q.   If oil was at 60 barrels -- 60 dollars a  
24          barrel, how quickly would you drill those wells?

25          A.   Again, I don't know what the one well is

1 going to produce, so I am uncertain at this time.

2 Q. Thank you. I understand that it's difficult  
3 especially here to be making those calculations.

4 MR. MYERS: Thank you. Nothing further.

5 COMMISSIONER FEIST ALBRECHT:

6 Commissioners?

7 COMMISSIONER EMLER: I think in response  
8 to what I understood your counsel's question to be  
9 regarding Morris County, you testified that the  
10 average injection was 2,000 to 4,000 barrels per day.  
11 Is that correct?

12 MR. VALENTINE: I did some research on  
13 the KCC website and if I recall correctly, that's what  
14 I saw were the limits those wells could inject per day  
15 into the formations per disposal wells.

16 COMMISSIONER EMLER: So they weren't the  
17 actuals, those were just what the permits averaged?

18 MR. VALENTINE: Yes, sir. Yes, sir.

19 COMMISSIONER EMLER: All right, so I  
20 believe that clarifies a little bit of what your  
21 response was. I am not sure about the pressure issue  
22 that Mr. Eye was asking about. Thank you.

23 COMMISSIONER FEIST ALBRECHT: You  
24 mentioned that you would -- it would take 30 wells  
25 probably to reach the 5,000 mark. Is that what it

1 would take to fully develop the leases that you have  
2 on the spacing that you are allowed or is that a  
3 different number?

4 MR. VALENTINE: We could drill more  
5 wells than that on the leases we currently have.

6 COMMISSIONER FEIST ALBRECHT: Okay. I  
7 don't have anything further. Is there anything  
8 further for this witness?

9 MR. VINCZE: Nothing further, thank you.

10 COMMISSIONER FEIST ALBRECHT: Nothing  
11 further? Thank you. Thank you for your testimony.  
12 Is there anything further to come before the  
13 Commission before we get to closing statements?

14 MR. MYERS: Nothing from Staff.

15 COMMISSIONER FEIST ALBRECHT: All right.  
16 We are ready for closing statements then.

17 MR. MYERS: If I may inquire into the  
18 order here, what is it?

19 COMMISSIONER FEIST ALBRECHT: I don't  
20 have anything written as to the order, but I think  
21 typically the Applicant goes last, right, so I would  
22 suggest that Mr. Eye proceed then Staff or Staff and  
23 then Mr. Eye. We don't have a prescribed order, so if  
24 there's a preference.

25 MR. MYERS: Staff will waive its

1 closing.

2 MR. VINCZE: And I would prefer to go  
3 last. I just jumped up because no one else did.

4 COMMISSIONER FEIST ALBRECHT: Sure.

5 MR. EYE: If I may have a moment. I've  
6 got enough tabs here that I am trying to find the  
7 right one.

8 COMMISSIONER FEIST ALBRECHT: Certainly.

9 MR. EYE: The testimony that you have  
10 heard today -- may it please the Commission, the  
11 testimony that you heard today from the Applicant and  
12 from Staff is devoid of the kind of analytical  
13 assessment of the substrata of the area of this well.  
14 It is necessary to determine whether approving it is  
15 actually engaging in the uncontrolled experiment that  
16 Dr. Aber referenced during his testimony. This  
17 Commission has the statutory authority to do several  
18 things in this -- with this Application. You could  
19 reject it on the basis that it does produce, I'm  
20 sorry, that it does present a threat to the safety and  
21 welfare of the people of Kansas. You could undertake  
22 an independent investigation to try to determine  
23 whether Dr. Aber's assessment of the substrata is  
24 accurate and if used as proposed in this Application  
25 would present an unreasonable risk of imminent harm as

1 we've asserted in this proceeding. The Commission can  
2 obviously grant the Application, but now you've got  
3 multiple options on what that Application or what the  
4 permit might ultimately say. We have proceeded along  
5 in this docket on the basis that the Application was  
6 for a 500 psi limit at 5,000 barrels a day. We come  
7 in here today and now we get a shift in that position  
8 at least from Staff. Applicant has not amended its  
9 Application as of now and based upon the statements of  
10 counsel, it doesn't appear that they intend to do so,  
11 so really the Commission has got three -- at least  
12 three options: Turn the Application down altogether  
13 on the basis that I discussed a moment ago, grant it  
14 at the Applicant's proposed level or grant it at the  
15 Staff's proposed level. The evidence to support the  
16 Staff's proposed level is not well-developed. I think  
17 I am being charitable in that regard. We've come back  
18 from a break and the testimony has changed on a basis  
19 that's not well-articulated. It's partly economic.  
20 It's partly based upon the sense of the Staff that the  
21 limits that they now think are appropriate are what  
22 ought to be in the permit, but all these -- all those  
23 circumstances were extant before we came in here today  
24 and yet we get this shift. Ultimately, though, all of  
25 that is not pertinent when it comes to whether this



1 Application granted at either the Applicant's  
2 specified levels of volume and pressure or the Staff's  
3 proposed volumes of pressure and volume. The point is  
4 that no witness can testify as to what the potential  
5 threshold is for pressure or volume that will induce  
6 seismicity. What we do know based upon the analysis  
7 of Dr. Aber is that this is an area that's vulnerable  
8 because of its fault complex in the substrata beneath  
9 the proposed well. The idea that we can proceed with  
10 this well knowing that it's in an area with complex  
11 faults does begin to broach that uncontrolled  
12 experiment territory. There's no rush here for the  
13 Commission to make a decision that will have long  
14 range effects. It's more important to make a reasoned  
15 determination based upon the evidence that's come  
16 before you, and that evidence is that if this proposed  
17 well is used, it will be in an area that is vulnerable  
18 to seismic activity. If this proposed well is used,  
19 it will introduce the variables that we know induce  
20 seismicity, pressurized fluids that lubricate faults  
21 that slip, cause earthquakes. This Application should  
22 be denied in order to prevent what the evidence has  
23 shown today to be the likely outcome and result of  
24 injecting waste water under pressure into this  
25 formation as proposed either by Staff or by the

1 Applicant. There's no reason to undertake an  
2 uncontrolled experiment here. The Applicant has  
3 testified that while it may not be particularly  
4 economic right now -- we don't really have any  
5 economic analysis other than what we heard from the  
6 Applicant, while it may not be particularly economic  
7 now to haul water, we know that those economics change  
8 with the price of oil. Well, a fungible product does  
9 tend to fluctuate a fair amount in price that can be  
10 obtained by the Applicant, but the concern that ought  
11 to dominate the Commission's analysis of this is less  
12 about the marginal rates of return on a particular  
13 well and more about what can be done to assure that we  
14 are not engaging in an uncontrolled experiment that  
15 based upon the evidence you heard today will be done  
16 in a very vulnerable area seismically speaking.  
17 Certainly life is full of risk. There's no way to  
18 avoid all risk, but Dr. Aber's testimony describes a  
19 risk that's not necessary for us to take in order for  
20 this Applicant to pump oil out of his proposed wells.  
21 It doesn't have to have this well to dispose of its  
22 waste water. I would urge that there be a very  
23 cautious approach to granting this Application and as  
24 Mr. Valentine conceded, he could operate that well  
25 with no pressure. An unpressurized well at least has

1 the benefit of less likelihood of fluids being  
2 pressurized and moving to points where they may cause  
3 slippage in the faults, so as long as we are -- as  
4 long as we are amending positions and advancing new  
5 proposals here, I think the Commission should also  
6 consider if you are going to grant this permit  
7 specifying a zero pressure because that's something  
8 that can be accepted based upon the testimony of Mr.  
9 Valentine this morning. Ultimately, a pressurized  
10 well in this area is an uncontrolled experiment and  
11 there's no reason to engage in uncontrolled  
12 experiments in the regulatory aspect of this  
13 particular business. As in the prefiled testimony of  
14 Ms. Hoedel, the Protestants are taking a categorical  
15 opposition to underground injection, but it's like a  
16 lot of other things. It's acceptable and appropriate  
17 to some locations and not in others. The evidence in  
18 this proceeding weighs in favor of finding that this  
19 area is too seismically fragile, too prone to  
20 earthquakes to take a chance by allowing an injection  
21 well to operate. Thank you.

22 MR. VINCZE: May it please the  
23 Commission, the Applicant, Quail Oil, still  
24 respectfully requests 500 psi and 5,000 barrels per  
25 day to accommodate future development and I think what

1 we are looking at here from the testimony of Mr.  
2 Stucky was that he wants to have a handle in the  
3 questions and answers to Commissioner Apple's  
4 questions and inquiry to have a handle on this  
5 Application in that it's not necessary right now. The  
6 nature of the Application is that you are asking for a  
7 not to exceed number. That's your permit, and this  
8 kind of proceeding is an expense in itself and it's  
9 probably attributed into overhead in some fashion to  
10 the producing wells you have, so that would be an  
11 unnecessary administrative burden we feel to put Quail  
12 under especially when the answers had nothing to do  
13 with induced seismicity but only convenience. The  
14 Protestants have failed to show how the subject  
15 injection well would induce seismicity. I  
16 congratulate Dr. Aber on a very long and distinguished  
17 career, but his answer was I don't know. The  
18 testimony shows that injection wells have been used in  
19 Morris County since the 1920s with no record of  
20 seismic activity in the area. We have gleaned the  
21 records. Our geologist testified, and it's in the  
22 direct testimony and rebuttal testimony, that there is  
23 no significant or recorded seismic activity by the  
24 USGS at least since 1950. The experiment, if you  
25 will, has been going on for quite some time without

1 any evidence of induced seismicity in Morris County.  
2 Mr. Shobe's testimony in answer to the Commission and  
3 Staff's questions state that he looked at Diamond  
4 Creek faults. He looked at the other faults. He is  
5 very familiar with that geology in the region. He's  
6 done well borings in his direct prefiled testimony and  
7 none of it was relevant. He didn't feel like it  
8 presented any risk. In fact, he said zero risk of  
9 induced seismicity. With respect to the Protestants'  
10 concerns, the economics of the Flint Hills, the scenic  
11 beauty of the Flint Hills, if you haul water as  
12 presented in Dr. Shobe's rebuttal testimony and also  
13 Mr. Valentine's rebuttal testimony, you are using  
14 trucks. You are using it on, you know, dirt, gravel  
15 roads. You are coming in. You are coming out. It's  
16 a lot more intrusive certainly than using a low volume  
17 injection well. Also, as I showed -- as I stated in  
18 my opening argument and we have admitted the first and  
19 second orders on the record and I think that's a good  
20 thing because it shows that this is not an  
21 uncontrolled experiment, that a great deal of thought,  
22 energy and discussion has gone into the development of  
23 that first and second order and there have been  
24 reports and the Commission Staff has reported if that  
25 area should be expanded and they said no, and it

1 doesn't include Morris County, and just by way of  
2 recollection, 500 psi, 5,000 barrels per day outside  
3 of any area of induced seismicity as found in the  
4 first and second orders, and it's way below the 16,000  
5 barrels per day in the 2016 specified area and 8,000  
6 per day in the first 2015 specified areas and it's  
7 below the maximum injection rate of 5,000 barrels per  
8 day into the Arbuckle. It's not a large volume well  
9 by all of those criteria. So what we have here is an  
10 Application that meets all of the criteria. It's  
11 below all of the criteria studied ad nauseum in the  
12 first and second orders and as reported by Commission  
13 Staff in their report. It is below all of those  
14 things. It complies with the maximum injection  
15 pressures. It's not located in those specified areas  
16 and the other areas wherein designated, so it's not an  
17 uncontrolled experiment. There's been a great deal of  
18 thought and process behind here and this Application  
19 meets by design all of those criteria. I respectfully  
20 request on behalf of Quail Oil & Gas approval of its  
21 Application to authorize the injection of saltwater  
22 into the Arbuckle at the Sly 2-6 saltwater disposal  
23 well at 500 -- a maximum pressure of 500 psi and a  
24 maximum injection volume of 5,000 barrels per day.  
25 Thank you.

1                   COMMISSIONER FEIST ALBRECHT: Thank you.  
2           Do the parties wish to engage in briefing any of the  
3           issues that are before us today or is closing the  
4           record and submitting the evidence for decision  
5           appropriate at this time? Has there been any  
6           discussion about a need for briefing in anyone's view?

7                   MR. VINCZE: No, Your Honor. We have  
8           been waiting for quite some time for a decision. We  
9           await the decision.

10                   COMMISSIONER FEIST ALBRECHT: Hearing no  
11           indication that there is a desire for briefs, we will  
12           conclude the matter here today and it will be  
13           submitted to the Commission as soon as the transcript  
14           is ready for decision. Thank you very much for your  
15           consideration.

16                   CHAIRMAN APPLE: Can I say something? I  
17           want to thank the parties for the work that they have  
18           put into this. I think we had a really good  
19           discussion here today and I also want to thank  
20           everyone that's driven quite a ways to come here today  
21           and I see some friendly eyes I haven't seen for  
22           awhile. I'm glad to see you and we work hard to make  
23           sure people feel welcome at the KCC. One of the  
24           reasons we moved it from Wichita up to Topeka was so  
25           that we would have the space to accommodate in case we

1 had a little bit of a larger crowd. We also have  
2 another room that this is being broadcast into if we  
3 had an overflow crowd, so we are very glad that you  
4 are here, that you are able to spend some time with  
5 us. I just want you to know that we are very  
6 concerned that everyone has a chance to be heard and  
7 that when there is new information that pops up that  
8 we make sure that we go through the right process so  
9 that we don't jump out of order or somebody gets  
10 stepped over and that they haven't been treated I hate  
11 to use the word fairly, but we don't want to have  
12 people feel like they haven't been treated fairly.  
13 I'm glad Commissioner Albrecht brought things up so we  
14 could discuss them some more, but it's been a good day  
15 and we're glad everyone has been with us today.

16 COMMISSIONER FEIST ALBRECHT: Thank you.

17 (THEREUPON, the hearing is  
18 concluded at 11:25 o'clock AM.)  
19  
20  
21  
22  
23  
24  
25



C E R T I F I C A T E

STATE OF KANSAS )

) ss.

COUNTY OF SHAWNEE )

I, Sherri Hedberg, Certified Shorthand Reporter commissioned as such by the Supreme Court of the State of Kansas and authorized to administer oaths to witnesses pursuant to K.S.A. 20-913, certify that at 1500 Southwest Arrowhead Road, Topeka, Shawnee County, Kansas, on the 16th day of August, 2017, beginning at 9:00 o'clock AM, that the proceedings as herein set forth were taken by me in shorthand in the presence of said witnesses and afterwards reduced to written form by me; that I am not a relative or representative of any party or any attorney or otherwise interested in the elements of the actions of proceeding.

IN TESTIMONY WHEREOF, I have hereunto set my hand and Official Seal at Topeka, Kansas, this 21st day of August, 2017.

---

SHERRI HEDBERG  
Certified Shorthand Reporter

<b>\$</b>	<b>2-6</b> <sup>[13]</sup> - 1:4, 5:5, 10:22, 11:7, 11:19, 11:21, 11:24, 12:6, 13:8, 13:11, 32:1, 49:23, 86:22	<b>4840</b> <sup>[1]</sup> - 2:10	<b>83</b> <sup>[1]</sup> - 4:2 <b>8301</b> <sup>[1]</sup> - 2:5	66:4, 74:4 <b>address</b> <sup>[1]</sup> - 66:20 <b>adjacent</b> <sup>[2]</sup> - 45:14, 47:16 <b>administer</b> <sup>[1]</sup> - 89:7 <b>administrative</b> <sup>[12]</sup> - 6:6, 6:13, 6:18, 7:3, 7:10, 8:6, 8:13, 8:16, 9:10, 9:22, 9:24, 84:11 <b>admission</b> <sup>[5]</sup> - 7:9, 18:18, 38:24, 51:16, 54:19 <b>admit</b> <sup>[1]</sup> - 58:6 <b>admitted</b> <sup>[11]</sup> - 14:2, 18:21, 20:20, 20:23, 39:3, 51:23, 54:23, 57:15, 59:12, 62:21, 85:18 <b>admitting</b> <sup>[1]</sup> - 20:19 <b>admonition</b> <sup>[1]</sup> - 16:6 <b>advancing</b> <sup>[1]</sup> - 83:4 <b>affected</b> <sup>[2]</sup> - 13:6, 50:4 <b>affected</b> <sup>[1]</sup> - 45:6 <b>afterwards</b> <sup>[1]</sup> - 89:13 <b>ago</b> <sup>[1]</sup> - 80:13 <b>agree</b> <sup>[7]</sup> - 20:3, 20:25, 24:3, 24:11, 40:7, 42:12, 43:7 <b>agreement</b> <sup>[1]</sup> - 63:6 <b>ahead</b> <sup>[1]</sup> - 72:9 <b>Albrecht</b> <sup>[2]</sup> - 1:18, 88:13 <b>ALBRECHT</b> <sup>[113]</sup> - 5:1, 5:16, 5:21, 6:3, 6:11, 6:16, 6:24, 7:2, 7:19, 8:3, 8:24, 9:21, 10:10, 10:14, 13:18, 16:15, 16:23, 18:13, 18:17, 18:23, 19:1, 21:3, 27:10, 27:15, 29:20, 30:12, 30:16, 30:20, 31:9, 31:16, 32:7, 32:13, 32:18, 32:22, 34:13, 34:17, 34:20, 34:22, 36:14, 36:18, 37:20, 38:16, 39:2, 39:7, 42:11, 44:17, 44:20, 46:23, 47:25, 48:6, 48:10, 48:23, 49:2, 49:21, 50:3, 50:10, 50:13, 50:16, 51:19, 51:22, 52:3, 52:11, 52:14, 52:17, 53:16, 54:22, 55:3, 55:6, 55:9, 55:13, 55:18, 55:22, 55:25, 56:6, 56:16, 57:18, 57:21, 57:24, 58:2, 58:5, 58:25,
<b>\$250</b> <sup>[1]</sup> - 29:4	<b>2.0</b> <sup>[3]</sup> - 26:9, 26:11, 44:9	<b>5</b>	<b>9</b>	
·	<b>20</b> <sup>[5]</sup> - 7:7, 32:3, 48:14, 48:21, 48:22	<b>5</b> <sup>[2]</sup> - 17:20, 63:25 <b>5,000</b> <sup>[21]</sup> - 11:6, 11:17, 12:19, 28:11, 65:16, 65:22, 65:25, 69:10, 70:2, 70:20, 71:15, 72:1, 74:8, 74:10, 76:12, 77:25, 80:6, 83:24, 86:2, 86:7, 86:24	<b>9</b> <sup>[2]</sup> - 6:15, 14:1 <b>9:00</b> <sup>[2]</sup> - 1:15, 89:11	
<b>'15</b> <sup>[1]</sup> - 30:15	<b>20-913</b> <sup>[1]</sup> - 89:8	<b>50</b> <sup>[2]</sup> - 3:16, 32:5 <b>50-year</b> <sup>[1]</sup> - 53:4	<b>A</b>	
<b>0</b>	<b>200</b> <sup>[3]</sup> - 13:1, 59:3, 59:4	<b>500</b> <sup>[22]</sup> - 11:21, 12:12, 29:7, 29:13, 30:21, 61:1, 62:14, 63:7, 63:10, 63:20, 69:25, 70:20, 71:25, 73:8, 73:12, 74:8, 74:11, 80:6, 83:24, 86:2, 86:23	<b>Aber</b> <sup>[30]</sup> - 14:21, 14:22, 16:1, 19:5, 19:13, 19:16, 19:21, 20:5, 20:7, 20:15, 22:8, 22:16, 22:20, 23:15, 39:13, 39:19, 39:23, 40:3, 41:21, 42:17, 42:18, 47:13, 50:19, 51:2, 51:3, 52:6, 52:21, 79:16, 81:7, 84:16 <b>ABER</b> <sup>[3]</sup> - 3:15, 50:20, 53:19 <b>Aber's</b> <sup>[17]</sup> - 14:25, 20:23, 21:13, 22:1, 23:22, 39:11, 40:21, 41:7, 41:13, 41:22, 42:3, 47:15, 51:17, 63:23, 64:2, 79:23, 82:18 <b>ability</b> <sup>[1]</sup> - 71:17 <b>able</b> <sup>[3]</sup> - 8:19, 73:9, 88:4 <b>absolutely</b> <sup>[2]</sup> - 40:25, 50:8 <b>accept</b> <sup>[1]</sup> - 43:15 <b>acceptable</b> <sup>[2]</sup> - 73:9, 83:16 <b>accepted</b> <sup>[1]</sup> - 83:8 <b>accommodate</b> <sup>[3]</sup> - 72:14, 83:25, 87:25 <b>accordingly</b> <sup>[1]</sup> - 16:7 <b>account</b> <sup>[1]</sup> - 63:11 <b>accurate</b> <sup>[3]</sup> - 18:3, 38:21, 79:24 <b>acre</b> <sup>[1]</sup> - 71:12 <b>action</b> <sup>[2]</sup> - 11:1, 11:4 <b>actions</b> <sup>[1]</sup> - 89:16 <b>activities</b> <sup>[1]</sup> - 22:18 <b>activity</b> <sup>[6]</sup> - 22:19, 24:12, 49:23, 81:18, 84:20, 84:23 <b>actual</b> <sup>[2]</sup> - 59:25, 66:25 <b>actuals</b> <sup>[1]</sup> - 77:17 <b>ad</b> <sup>[1]</sup> - 86:11 <b>add</b> <sup>[1]</sup> - 31:4 <b>added</b> <sup>[1]</sup> - 7:24 <b>addition</b> <sup>[1]</sup> - 11:2 <b>additional</b> <sup>[3]</sup> - 48:19,	
<b>Othe</b> <sup>[1]</sup> - 15:7	<b>2005</b> <sup>[1]</sup> - 17:22	<b>52</b> <sup>[1]</sup> - 3:16		
<b>1</b>	<b>2006</b> <sup>[1]</sup> - 17:22	<b>53</b> <sup>[1]</sup> - 3:18		
<b>1</b> <sup>[1]</sup> - 30:23	<b>2013</b> <sup>[6]</sup> - 15:9, 22:24, 23:9, 24:11, 24:24, 40:10	<b>55-162(b)</b> <sup>[1]</sup> - 11:5		
<b>1-6</b> <sup>[8]</sup> - 13:10, 13:13, 27:24, 30:19, 75:22	<b>2014</b> <sup>[1]</sup> - 30:15	<b>56</b> <sup>[1]</sup> - 3:20		
<b>10</b> <sup>[7]</sup> - 3:3, 24:7, 28:5, 48:16, 48:17, 71:12, 71:15	<b>2015</b> <sup>[7]</sup> - 6:9, 11:10, 11:16, 11:25, 14:1, 86:6	<b>59</b> <sup>[1]</sup> - 3:20		
<b>100-year</b> <sup>[1]</sup> - 53:5	<b>2016</b> <sup>[11]</sup> - 6:15, 6:22, 7:7, 10:2, 11:9, 12:1, 12:5, 14:2, 30:15, 38:9, 86:5	<b>6</b>		
<b>10:17</b> <sup>[1]</sup> - 56:4	<b>2017</b> <sup>[4]</sup> - 1:14, 12:3, 89:10, 89:20	<b>6</b> <sup>[4]</sup> - 1:5, 5:6, 58:18, 63:25		
<b>10:22</b> <sup>[1]</sup> - 56:5	<b>205</b> <sup>[1]</sup> - 49:1	<b>60</b> <sup>[2]</sup> - 76:23		
<b>10:30</b> <sup>[1]</sup> - 56:1	<b>20th</b> <sup>[2]</sup> - 6:22, 10:2	<b>600</b> <sup>[1]</sup> - 61:25		
<b>11:25</b> <sup>[1]</sup> - 88:18	<b>21st</b> <sup>[2]</sup> - 2:5, 89:19	<b>65</b> <sup>[1]</sup> - 3:21		
<b>120</b> <sup>[1]</sup> - 12:24	<b>250</b> <sup>[5]</sup> - 57:4, 59:5, 61:1, 73:21, 74:11	<b>650</b> <sup>[2]</sup> - 73:6, 73:12		
<b>13</b> <sup>[1]</sup> - 3:3	<b>265</b> <sup>[1]</sup> - 48:5	<b>66049</b> <sup>[1]</sup> - 2:11		
<b>14</b> <sup>[1]</sup> - 58:18	<b>27</b> <sup>[1]</sup> - 3:8	<b>66604</b> <sup>[1]</sup> - 2:15		
<b>15</b> <sup>[1]</sup> - 28:6	<b>29</b> <sup>[1]</sup> - 3:9	<b>67206</b> <sup>[1]</sup> - 2:6		
<b>15-CONS-770-CMSC</b> <sup>[6]</sup> - 6:8, 7:5, 9:23, 11:12, 14:1, 49:7	<b>3</b>	<b>69</b> <sup>[1]</sup> - 3:9		
<b>1500</b> <sup>[3]</sup> - 1:16, 2:15, 89:9	<b>3</b> <sup>[3]</sup> - 37:9, 38:1	<b>6E</b> <sup>[2]</sup> - 1:5, 5:7		
<b>16</b> <sup>[1]</sup> - 3:4	<b>3,000</b> <sup>[1]</sup> - 75:4	<b>7</b>		
<b>16,000</b> <sup>[2]</sup> - 11:9, 86:4	<b>30</b> <sup>[4]</sup> - 7:15, 9:5, 76:14, 77:24	<b>7</b> <sup>[2]</sup> - 44:3, 44:4		
<b>16th</b> <sup>[2]</sup> - 1:14, 89:10	<b>30-day</b> <sup>[1]</sup> - 66:12	<b>70</b> <sup>[2]</sup> - 32:5, 32:9		
<b>17</b> <sup>[2]</sup> - 3:7, 5:6	<b>300</b> <sup>[6]</sup> - 28:9, 28:12, 29:9, 65:18, 71:5, 76:8	<b>70-foot</b> <sup>[1]</sup> - 48:12		
<b>17-CONS-3484</b> <sup>[1]</sup> - 1:4	<b>4</b>	<b>73</b> <sup>[1]</sup> - 3:10		
<b>17-CONS-3484-CUIC</b> <sup>[1]</sup> - 5:8	<b>4,000</b> <sup>[2]</sup> - 69:10, 77:10	<b>75</b> <sup>[1]</sup> - 3:10		
<b>17S</b> <sup>[1]</sup> - 1:5	<b>40</b> <sup>[1]</sup> - 48:19	<b>77</b> <sup>[1]</sup> - 3:11		
<b>18</b> <sup>[1]</sup> - 47:20	<b>44</b> <sup>[1]</sup> - 3:13	<b>77-536</b> <sup>[1]</sup> - 14:10		
<b>1867</b> <sup>[1]</sup> - 14:19	<b>450</b> <sup>[1]</sup> - 2:6	<b>77-536(a)</b> <sup>[1]</sup> - 11:2		
<b>19</b> <sup>[4]</sup> - 3:8, 6:9, 11:16, 14:1	<b>46</b> <sup>[1]</sup> - 3:14	<b>77-536(b)</b> <sup>[1]</sup> - 16:9		
<b>1920s</b> <sup>[1]</sup> - 84:19		<b>79</b> <sup>[1]</sup> - 4:2		
<b>1950</b> <sup>[3]</sup> - 26:8, 44:5, 84:24		<b>8</b>		
<b>2</b>		<b>8,000</b> <sup>[2]</sup> - 11:14, 86:5		
<b>2</b> <sup>[1]</sup> - 44:3		<b>82-3-403</b> <sup>[1]</sup> - 12:11		
<b>2,000</b> <sup>[11]</sup> - 57:4, 59:3, 60:17, 65:10, 65:15, 66:2, 66:25, 69:9, 74:11, 75:4, 77:10				
<b>2,710</b> <sup>[1]</sup> - 13:2				
<b>2,730</b> <sup>[1]</sup> - 13:3				

59:6, 59:9, 59:11, 59:17, 59:20, 64:14, 64:19, 64:24, 65:3, 65:7, 67:5, 67:9, 68:7, 68:14, 68:18, 69:1, 69:22, 70:5, 72:21, 72:25, 75:15, 77:5, 77:23, 78:6, 78:10, 78:15, 78:19, 79:4, 79:8, 87:1, 87:10, 88:16  
**allow** [7] - 15:23, 20:16, 21:4, 67:18, 67:24, 70:6, 74:3  
**allowed** [1] - 78:2  
**allowing** [1] - 83:20  
**altered** [1] - 70:9  
**altering** [1] - 60:7  
**altogether** [1] - 80:12  
**AM** [5] - 1:15, 56:4, 56:5, 88:18, 89:11  
**amend** [6] - 57:9, 66:5, 66:6, 66:7, 69:19, 70:6  
**amended** [1] - 80:8  
**amending** [3] - 70:7, 70:12, 83:4  
**amendment** [4] - 58:7, 59:25, 60:1, 61:7  
**amends** [1] - 58:10  
**amount** [7] - 9:7, 29:1, 29:5, 60:10, 60:11, 76:5, 82:9  
**analyses** [3] - 45:19, 45:25, 64:3  
**analysis** [9] - 14:13, 26:23, 40:13, 41:2, 42:22, 64:7, 81:6, 82:5, 82:11  
**analytical** [1] - 79:12  
**anecdotal** [1] - 43:9  
**answer** [9] - 25:13, 27:6, 37:17, 43:15, 44:12, 58:18, 75:6, 84:17, 85:2  
**answered** [4] - 37:18, 38:12, 38:14, 67:16  
**answers** [4] - 51:14, 54:14, 84:3, 84:12  
**anticipate** [2] - 28:8, 29:13  
**apologize** [3] - 10:15, 44:21, 55:19  
**appear** [1] - 80:10  
**APPEARANCES** [1] - 2:1  
**appearances** [1] - 5:9  
**Apple** [1] - 1:17  
**APPLE** [15] - 29:23, 30:2, 30:11, 44:19,

55:12, 58:9, 58:24, 65:9, 65:17, 65:21, 66:1, 66:14, 66:17, 67:4, 87:16  
**apple** [2] - 32:24, 68:11  
**Apple's** [1] - 67:13  
**apple's** [1] - 84:3  
**Applicant** [2] - 3:6, 12:8, 17:4, 35:3, 52:6, 60:4, 61:12, 62:7, 67:16, 67:18, 68:23, 70:20, 78:21, 79:11, 80:8, 82:1, 82:2, 82:6, 82:10, 82:20, 83:23  
**Applicant's** [4] - 61:18, 70:13, 80:14, 81:1  
**application** [33] - 7:22, 9:9, 11:7, 14:7, 16:18, 16:22, 28:11, 29:6, 35:23, 52:8, 62:8, 62:10, 62:25, 66:6, 66:8, 69:16, 70:14, 72:9, 73:5, 74:12, 76:1, 76:6, 79:18, 79:24, 80:3, 80:9, 81:1, 81:21, 82:23, 84:5, 86:10, 86:18, 86:21  
**Application** [34] - 1:3, 5:3, 7:15, 9:6, 10:20, 10:23, 12:9, 12:10, 13:11, 30:21, 31:2, 45:7, 49:25, 57:3, 57:9, 58:19, 58:22, 59:2, 60:15, 60:23, 62:12, 62:25, 66:5, 66:6, 70:1, 70:13, 70:16, 70:19, 72:2, 80:2, 80:5, 80:12, 84:6  
**applied** [3] - 27:22, 45:1, 46:11  
**apply** [2] - 12:12, 14:9  
**approach** [3] - 6:10, 16:1, 82:23  
**approaches** [1] - 45:7  
**appropriate** [9] - 5:19, 10:7, 31:18, 37:4, 67:17, 70:10, 80:21, 83:16, 87:5  
**appropriately** [1] - 36:10  
**approval** [6] - 10:19, 13:11, 16:21, 58:19, 58:21, 86:20  
**approve** [2] - 57:3, 59:2

**approved** [4] - 12:10, 60:16, 66:2, 70:7  
**approving** [1] - 79:14  
**Arbuckle** [38] - 1:4, 5:5, 10:21, 11:18, 12:15, 13:5, 25:15, 25:19, 25:23, 26:1, 27:3, 31:21, 31:24, 32:3, 32:6, 32:9, 32:14, 32:16, 48:4, 48:7, 48:13, 48:16, 48:17, 48:18, 48:20, 48:22, 48:25, 49:8, 49:10, 49:11, 49:12, 49:14, 49:15, 62:22, 70:24, 86:8, 86:22  
**Arch** [3] - 20:8, 20:12, 21:9  
**area** [53] - 11:10, 12:1, 14:14, 14:15, 14:18, 14:19, 15:1, 15:25, 20:9, 21:14, 21:22, 21:24, 22:5, 22:9, 23:2, 23:3, 23:5, 23:11, 23:12, 25:5, 25:9, 25:12, 25:21, 26:2, 30:9, 31:23, 32:4, 36:2, 36:3, 36:7, 38:10, 39:20, 40:15, 40:22, 40:25, 41:19, 41:20, 43:3, 46:1, 46:18, 47:23, 79:13, 81:7, 81:10, 81:17, 82:16, 83:10, 83:19, 84:20, 85:25, 86:3, 86:5  
**areas** [16] - 11:25, 12:2, 12:5, 12:7, 12:8, 12:14, 13:25, 15:11, 25:22, 36:7, 45:5, 46:13, 50:6, 86:6, 86:15, 86:16  
**argument** [1] - 85:18  
**arise** [1] - 38:3  
**Arrowhead** [3] - 1:16, 2:15, 89:9  
**articulated** [3] - 21:13, 41:6, 80:19  
**aspect** [2] - 62:24, 83:12  
**asserted** [2] - 42:2, 80:1  
**assertion** [5] - 22:13, 22:20, 23:23, 25:15, 43:16  
**asserts** [1] - 64:3  
**assessment** [2] - 79:13, 79:23  
**associated** [3] - 26:1, 46:5, 46:8

**assume** [1] - 57:25  
**assuming** [3] - 33:7, 33:17  
**assumption** [2] - 15:23, 22:12  
**assure** [1] - 82:13  
**attendant** [1] - 14:12  
**attest** [1] - 65:4  
**attorney** [1] - 89:15  
**Attorneys** [2] - 2:5, 2:10  
**attributable** [2] - 24:24, 36:12  
**attributed** [4] - 22:24, 23:9, 40:11, 84:9  
**August** [5] - 1:14, 6:15, 14:1, 89:10, 89:20  
**authority** [3] - 14:10, 74:4, 79:17  
**authorize** [5] - 1:3, 5:4, 10:20, 30:23, 86:21  
**authorized** [1] - 89:7  
**available** [3] - 37:10, 38:5, 45:8  
**average** [1] - 77:10  
**averaged** [1] - 77:17  
**avoid** [2] - 14:12, 82:18  
**await** [1] - 87:9  
**awareness** [1] - 15:17  
**awhile** [1] - 87:22  
**awkward** [1] - 66:22

## B

**bachelor's** [1] - 35:15  
**background** [1] - 35:14  
**barred** [1] - 7:16  
**barrel** [2] - 60:17, 76:24  
**barrels** [33] - 11:6, 11:9, 11:14, 11:18, 28:4, 28:6, 28:7, 28:9, 28:11, 28:12, 29:9, 57:4, 59:3, 65:10, 65:18, 65:23, 66:3, 69:13, 70:2, 70:20, 71:6, 71:14, 71:15, 76:8, 76:12, 76:23, 77:10, 80:6, 83:24, 86:2, 86:5, 86:7, 86:24  
**based** [2] - 8:25, 12:10, 14:13, 16:20, 33:18, 34:14, 42:16, 46:9, 50:1, 60:2, 65:11, 66:25, 67:1,

70:14, 80:9, 80:20, 81:6, 81:15, 82:15, 83:8  
**basement** [9] - 19:8, 21:18, 22:2, 22:16, 39:14, 41:8, 48:7, 49:12, 49:17  
**basis** [23] - 21:12, 21:17, 21:25, 22:13, 22:20, 22:25, 23:10, 23:14, 23:17, 23:22, 24:9, 25:2, 37:13, 40:21, 41:5, 59:25, 60:24, 74:9, 75:10, 79:19, 80:5, 80:13, 80:18  
**bearing** [1] - 47:22  
**beauty** [1] - 85:11  
**become** [2] - 33:3, 33:18  
**BEFORE** [1] - 1:1  
**begin** [5] - 33:9, 33:19, 65:5, 81:11  
**beginning** [4] - 1:14, 44:4, 63:25, 89:11  
**behalf** [13] - 5:14, 12:22, 14:21, 17:2, 17:4, 18:6, 34:25, 35:3, 50:21, 53:22, 56:12, 68:23, 86:20  
**Behalf** [6] - 2:3, 2:8, 2:12, 3:6, 3:15, 3:19  
**behind** [1] - 86:18  
**below** [10] - 11:8, 11:13, 13:1, 26:11, 48:16, 48:17, 86:4, 86:7, 86:11, 86:13  
**beneath** [1] - 81:8  
**benefit** [2] - 34:8, 83:1  
**benign** [1] - 46:19  
**best** [4] - 18:9, 38:22, 51:10, 54:17  
**better** [2] - 67:16, 69:11  
**between** [16] - 8:20, 13:4, 14:4, 15:12, 15:18, 19:21, 20:11, 21:8, 23:15, 27:2, 40:3, 43:22, 48:24, 52:23, 63:14, 74:10  
**beyond** [1] - 42:6  
**big** [1] - 63:9  
**bigger** [1] - 61:24  
**Billings** [1] - 2:10  
**bit** [5] - 37:23, 63:5, 67:11, 77:20, 88:1  
**Bob** [1] - 2:10  
**borings** [1] - 85:6  
**bottom** [2] - 48:25, 49:16

<p><b>boundaries</b> [1] - 12:5  <b>bounded</b> [1] - 15:1  <b>Bourbon</b> [3] - 20:8, 20:12, 21:8  <b>break</b> [2] - 55:23, 80:18  <b>briefing</b> [3] - 67:24, 87:2, 87:6  <b>briefly</b> [2] - 16:17, 17:15  <b>briefs</b> [2] - 66:21, 87:11  <b>bring</b> [1] - 66:20  <b>broach</b> [1] - 81:11  <b>broadcast</b> [1] - 88:2  <b>brought</b> [1] - 88:13  <b>Buchanan</b> [5] - 6:19, 7:5, 7:13, 8:17, 10:3  <b>Buchanan's</b> [1] - 9:25  <b>burden</b> [1] - 84:11  <b>buried</b> [2] - 19:8, 39:14  <b>business</b> [1] - 83:13  <b>Butler</b> [1] - 35:10  <b>buying</b> [1] - 17:23  <b>BY</b> [21] - 17:8, 19:3, 21:6, 27:19, 35:7, 36:19, 38:8, 38:19, 39:9, 42:20, 44:24, 50:25, 52:5, 52:20, 54:1, 56:18, 59:23, 69:5, 70:23, 73:3, 75:17</p>	<p><b>Central</b> [6] - 15:10, 15:22, 24:15, 24:19, 46:13, 49:9  <b>certain</b> [3] - 24:5, 31:13, 54:6  <b>certainly</b> [7] - 15:24, 27:17, 29:11, 41:23, 79:8, 82:17, 85:16  <b>Certified</b> [2] - 89:5, 89:24  <b>certify</b> [1] - 89:8  <b>Chairman</b> [1] - 1:17  <b>CHAIRMAN</b> [15] - 29:23, 30:2, 30:11, 44:19, 55:12, 58:9, 58:24, 65:9, 65:17, 65:21, 66:1, 66:14, 66:17, 67:4, 87:16  <b>chance</b> [2] - 83:20, 88:6  <b>change</b> [4] - 58:11, 61:16, 61:17, 82:7  <b>changed</b> [6] - 58:17, 62:17, 62:20, 63:15, 70:15, 80:18  <b>changes</b> [6] - 51:6, 54:10, 56:24, 57:1, 57:11, 57:16  <b>changing</b> [1] - 58:14  <b>characteristic</b> [1] - 39:16  <b>characteristics</b> [2] - 14:15, 15:19  <b>characterization</b> [1] - 43:2  <b>characterized</b> [3] - 14:23, 15:1, 40:23  <b>charitable</b> [1] - 80:17  <b>Chase</b> [1] - 54:5  <b>Cheyenne</b> [1] - 17:22  <b>chlorides</b> [1] - 12:18  <b>chooses</b> [1] - 67:18  <b>chosen</b> [1] - 32:11  <b>Cindy</b> [3] - 53:20, 54:3, 54:20  <b>CINDY</b> [2] - 3:17, 53:21  <b>circulate</b> [3] - 6:10, 6:15, 6:23  <b>circumstances</b> [1] - 80:23  <b>citizens</b> [1] - 10:19  <b>clarification</b> [1] - 58:10  <b>clarifies</b> [1] - 77:20  <b>clean</b> [1] - 48:19  <b>clear</b> [2] - 59:1, 70:12  <b>clearly</b> [1] - 42:13  <b>close</b> [3] - 32:15, 33:13, 65:16</p>	<p><b>closing</b> [5] - 55:15, 78:13, 78:16, 79:1, 87:3  <b>Closing</b> [1] - 4:1  <b>collateral</b> [1] - 7:17  <b>combined</b> [1] - 15:2  <b>coming</b> [3] - 34:1, 85:15  <b>commensurate</b> [1] - 40:12  <b>comments</b> [2] - 7:14, 8:1  <b>commercial</b> [1] - 30:9  <b>COMMISSION</b> [2] - 1:1, 2:14  <b>Commission</b> [55] - 1:15, 2:12, 3:9, 3:11, 3:14, 3:16, 3:19, 3:21, 5:2, 5:15, 5:22, 5:24, 6:6, 6:13, 6:17, 7:3, 8:10, 8:19, 9:19, 9:22, 10:7, 10:18, 13:21, 14:9, 15:14, 16:8, 16:15, 16:18, 16:19, 18:7, 30:22, 34:25, 36:24, 37:8, 42:7, 45:9, 50:7, 56:12, 60:2, 67:7, 70:2, 72:18, 74:3, 78:13, 79:10, 79:17, 80:1, 80:11, 81:13, 83:5, 83:23, 85:2, 85:24, 86:12, 87:13  <b>Commission's</b> [4] - 8:5, 13:25, 49:7, 82:11  <b>commissioned</b> [1] - 89:6  <b>COMMISSIONER</b> [134] - 5:1, 5:16, 5:21, 6:3, 6:11, 6:16, 6:24, 7:2, 7:19, 8:3, 8:24, 9:21, 10:10, 10:14, 13:18, 16:15, 16:23, 18:13, 18:17, 18:23, 19:1, 21:3, 27:10, 27:15, 29:20, 29:22, 30:12, 30:16, 30:20, 31:9, 31:16, 32:7, 32:13, 32:18, 32:21, 32:22, 32:23, 33:6, 33:16, 33:22, 33:25, 34:4, 34:7, 34:12, 34:13, 34:17, 34:20, 34:22, 36:14, 36:18, 37:20, 38:16, 39:2, 39:7, 42:11, 44:17, 44:20, 46:23, 46:25, 47:5, 47:12, 47:24, 47:25, 48:6, 48:10,</p>	<p>48:23, 49:2, 49:21, 50:3, 50:10, 50:13, 50:16, 51:19, 51:22, 52:3, 52:11, 52:13, 52:14, 52:17, 53:16, 54:22, 55:3, 55:6, 55:9, 55:11, 55:13, 55:16, 55:18, 55:22, 55:25, 56:6, 56:16, 57:18, 57:21, 57:24, 58:2, 58:5, 58:25, 59:6, 59:9, 59:11, 59:17, 59:20, 64:14, 64:19, 64:24, 65:3, 65:7, 65:8, 67:5, 67:9, 68:7, 68:14, 68:18, 69:1, 69:22, 70:5, 72:21, 72:25, 75:15, 77:5, 77:7, 77:16, 77:19, 77:23, 78:6, 78:10, 78:15, 78:19, 79:4, 79:8, 87:1, 87:10, 88:16  <b>Commissioner</b> [11] - 1:17, 1:18, 27:13, 32:24, 34:14, 64:25, 65:5, 67:13, 68:11, 84:3, 88:13  <b>Commissioners</b> [12] - 7:8, 9:8, 10:17, 16:17, 29:21, 44:18, 46:24, 52:12, 55:7, 64:16, 64:23, 77:6  <b>committee</b> [1] - 10:1  <b>Committee</b> [2] - 6:21, 7:6  <b>companies</b> [1] - 30:7  <b>company</b> [2] - 17:18, 17:21  <b>Company</b> [1] - 5:11  <b>comparison</b> [2] - 27:2, 41:12  <b>compels</b> [1] - 15:18  <b>complete</b> [1] - 49:12  <b>completed</b> [6] - 48:12, 49:3, 49:5, 49:20, 50:6, 50:9  <b>completes</b> [1] - 16:24  <b>completion</b> [3] - 49:18, 49:22, 50:4  <b>complex</b> [5] - 46:15, 46:19, 64:3, 81:8, 81:10  <b>complies</b> [4] - 11:22, 16:18, 16:19, 86:14  <b>conceded</b> [1] - 82:24  <b>concern</b> [1] - 82:10  <b>concerned</b> [2] - 40:20, 88:6  <b>concerning</b> [4] -</p>	<p>52:22, 61:18, 62:10, 62:18  <b>concerns</b> [3] - 66:18, 67:1, 85:10  <b>conclude</b> [3] - 6:25, 64:12, 87:12  <b>concluded</b> [1] - 88:18  <b>concludes</b> [2] - 27:8, 44:15  <b>conclusion</b> [2] - 8:21, 14:25  <b>conclusions</b> [1] - 60:7  <b>confers</b> [2] - 9:20, 67:7  <b>confined</b> [1] - 12:21  <b>congratulate</b> [1] - 84:16  <b>consider</b> [6] - 20:10, 21:7, 26:11, 48:20, 70:7, 83:6  <b>consideration</b> [3] - 13:17, 13:23, 87:15  <b>considerations</b> [1] - 61:8  <b>considering</b> [2] - 56:22, 58:7  <b>consistent</b> [2] - 8:21, 60:16  <b>construction</b> [1] - 66:25  <b>contend</b> [1] - 22:20  <b>contention</b> [1] - 74:9  <b>contest</b> [10] - 21:13, 21:17, 22:1, 22:13, 23:10, 23:18, 23:22, 24:9, 40:21, 41:6  <b>context</b> [1] - 72:20  <b>continent</b> [1] - 35:21  <b>contract</b> [1] - 30:6  <b>contrary</b> [1] - 42:6  <b>convenience</b> [1] - 84:13  <b>conversation</b> [1] - 63:4  <b>conversations</b> [1] - 62:8  <b>copy</b> [2] - 18:1, 18:8  <b>CORPORATION</b> [2] - 1:1, 2:14  <b>Corporation</b> [3] - 1:15, 5:2, 45:8  <b>correct</b> [54] - 18:9, 20:1, 21:10, 21:11, 21:15, 21:16, 21:19, 22:6, 22:7, 22:10, 25:3, 25:9, 25:20, 26:12, 26:20, 26:23, 27:5, 27:24, 33:20, 34:11, 40:5, 40:14, 40:17, 41:3, 41:9,</p>
<b>C</b>				
<p><b>calculations</b> [1] - 77:3  <b>Camp</b> [1] - 13:6  <b>capable</b> [2] - 28:3, 28:12  <b>capital</b> [1] - 76:22  <b>care</b> [2] - 33:15, 36:15  <b>career</b> [1] - 84:17  <b>case</b> [11] - 9:11, 9:17, 25:11, 25:19, 28:16, 36:21, 39:25, 51:7, 62:23, 73:4, 87:25  <b>categorical</b> [1] - 83:14  <b>category</b> [2] - 7:14, 9:9  <b>causal</b> [1] - 43:13  <b>caused</b> [2] - 14:11, 51:3  <b>cautious</b> [2] - 16:1, 82:23  <b>center</b> [1] - 37:12  <b>central</b> [9] - 15:10, 15:21, 23:3, 23:4, 24:13, 24:19, 46:3, 46:14, 49:20</p>				

42:24, 43:4, 48:14, 51:9, 54:16, 60:5, 60:8, 60:19, 61:2, 62:15, 62:19, 63:23, 63:24, 64:5, 64:6, 65:20, 70:25, 71:4, 73:16, 73:19, 73:22, 74:15, 74:18, 74:19, 74:21, 74:22, 75:20, 76:3, 77:11

**corrections** [4] - 51:6, 54:9, 56:24, 57:11

**correctly** [2] - 65:18, 77:13

**correlative** [1] - 13:6

**corresponding** [1] - 22:19

**cost** [4] - 29:1, 29:4, 34:9

**Counsel** [1] - 2:14

**counsel** [2] - 5:9, 80:10

**counsel's** [1] - 77:8

**counties** [9] - 12:1, 14:3, 25:20, 26:2, 27:3, 31:22, 36:5, 36:8, 49:6

**COUNTY** [1] - 89:4

**County** [29] - 1:5, 1:16, 5:7, 12:2, 25:8, 26:5, 26:20, 27:5, 34:1, 34:2, 34:3, 36:1, 36:4, 36:7, 36:25, 44:6, 46:18, 50:6, 54:5, 69:8, 74:24, 75:3, 75:4, 75:11, 77:9, 84:19, 85:1, 86:1, 89:10

**couple** [1] - 48:1

**course** [3] - 12:1, 15:11, 38:2

**court** [4] - 9:14, 18:2, 18:7, 36:24

**Court** [1] - 89:6

**courtesy** [1] - 68:6

**cover** [1] - 42:4

**covered** [1] - 42:4

**Creek** [6] - 13:7, 22:6, 22:10, 36:2, 47:19, 85:4

**criteria** [8] - 45:8, 45:11, 45:17, 47:15, 86:9, 86:10, 86:11, 86:19

**critical** [1] - 47:15

**CROSS** [6] - 19:2, 27:18, 39:8, 44:23, 52:4, 59:22

**cross** [28] - 10:5, 18:24, 20:8, 20:24,

21:9, 27:8, 31:18, 39:6, 41:25, 42:15, 44:16, 45:23, 47:1, 51:25, 52:1, 54:24, 55:1, 58:1, 58:4, 59:13, 59:16, 64:12, 64:18, 64:20, 67:20, 68:1, 68:3

**Cross** [5] - 3:8, 3:8, 3:13, 3:13, 3:20

**cross-examine** [1] - 42:15

**crowd** [2] - 88:1, 88:3

**CUIC** [1] - 1:4

**cure** [1] - 16:7

**current** [4] - 12:5, 17:12, 30:1, 75:11

**cut** [2] - 20:8, 21:9

## D

**daily** [1] - 60:17

**damage** [3] - 11:3, 16:11, 31:13

**danger** [1] - 10:25

**date** [2] - 7:15, 75:24

**days** [2] - 7:15, 9:5

**deal** [3] - 61:12, 85:21, 86:17

**decision** [5] - 81:13, 87:4, 87:8, 87:9, 87:14

**deems** [1] - 10:7

**deferred** [1] - 48:1

**define** [1] - 45:20

**degree** [2] - 17:19, 35:15

**denied** [2] - 66:13, 81:22

**density** [2] - 36:6, 46:16

**DEPEW** [1] - 2:4

**depth** [5] - 12:23, 13:2, 32:8, 32:14, 48:3

**described** [1] - 47:19

**describes** [5] - 19:16, 19:21, 39:23, 40:3, 82:18

**design** [4] - 69:15, 72:5, 73:11, 86:19

**designated** [1] - 86:16

**desire** [1] - 87:11

**detail** [1] - 14:20

**detailed** [2] - 15:19, 64:3

**determination** [2] - 26:18, 81:15

**determine** [3] - 33:8, 79:14, 79:22

**determining** [2] - 14:24, 42:9

**develop** [3] - 67:10, 71:19, 78:1

**developed** [3] - 65:22, 67:22, 80:16

**development** [10] - 13:21, 35:17, 57:6, 61:23, 63:18, 71:9, 71:22, 72:15, 83:25, 85:22

**devoid** [1] - 79:12

**Diamond** [5] - 22:5, 22:9, 36:2, 47:19, 85:3

**difference** [3] - 48:24, 49:17, 74:10

**different** [8] - 9:9, 32:1, 37:23, 38:1, 41:20, 65:23, 66:10, 78:3

**differentiate** [1] - 42:2

**differentiating** [1] - 26:5

**differently** [1] - 50:9

**difficult** [1] - 77:2

**direct** [26] - 9:2, 36:10, 36:11, 37:4, 37:8, 37:14, 37:16, 37:19, 38:9, 38:19, 38:25, 39:20, 41:12, 42:5, 42:16, 43:10, 47:8, 51:4, 51:13, 51:17, 54:7, 54:13, 63:22, 72:20, 84:22, 85:6

**DIRECT** [5] - 17:7, 35:6, 50:24, 53:25, 56:17

**Direct** [5] - 3:7, 3:12, 3:16, 3:18, 3:20

**direction** [1] - 20:17

**directly** [1] - 48:7

**director** [2] - 6:19, 7:13

**dirt** [1] - 85:14

**disagree** [4] - 20:25, 22:25, 23:14, 25:2

**discernible** [1] - 24:12

**discuss** [5] - 19:25, 24:25, 40:5, 63:23, 88:14

**discussed** [7] - 14:20, 20:5, 53:12, 62:11, 62:25, 63:9, 80:13

**discusses** [2] - 20:7, 64:2

**discussion** [6] - 31:21, 43:2, 63:17, 85:22, 87:6, 87:19

**discussions** [4] -

62:9, 69:25, 70:1, 71:25

**disposable** [2] - 28:21, 29:10

**disposal** [30] - 5:6, 10:22, 11:7, 11:21, 12:6, 12:13, 13:9, 13:12, 13:15, 22:24, 23:9, 24:24, 30:8, 30:9, 30:10, 33:13, 33:23, 40:11, 49:8, 49:12, 49:24, 69:7, 71:5, 71:18, 72:3, 72:13, 75:12, 75:23, 77:15, 86:22

**dispose** [6] - 12:16, 30:3, 30:5, 30:7, 33:2, 82:21

**disposed** [3] - 12:18, 22:9, 62:2

**disposing** [2] - 13:12, 32:4

**dispute** [2] - 43:11, 43:14

**distinction** [1] - 9:12

**distinguish** [1] - 49:3

**distinguished** [2] - 10:18, 84:16

**distinguishing** [1] - 50:5

**distribution** [1] - 36:6

**docket** [12] - 6:8, 6:14, 11:12, 14:5, 14:22, 15:7, 16:5, 16:13, 51:4, 54:7, 56:20, 80:5

**Docket** [4] - 1:3, 5:7, 7:4, 9:23

**doctor** [1] - 21:21

**dollars** [1] - 76:23

**dominate** [1] - 82:11

**dominated** [1] - 14:15

**done** [16] - 25:4, 26:22, 33:4, 40:13, 40:15, 41:1, 41:19, 45:9, 45:18, 45:24, 45:25, 64:7, 72:10, 82:13, 82:15, 85:6

**dovetails** [1] - 8:16

**down** [6] - 36:4, 57:8, 65:15, 71:12, 71:15, 80:12

**DR** [1] - 53:19

**Dr** [44] - 14:21, 14:22, 14:25, 16:1, 19:13, 19:16, 19:21, 20:5, 20:7, 20:15, 20:23, 21:13, 22:1, 22:8, 22:16, 22:20, 23:14, 23:22, 39:11, 39:13,

39:19, 39:23, 40:3, 40:21, 41:6, 41:13, 41:21, 41:22, 42:3, 42:17, 47:13, 47:14, 51:17, 52:6, 52:21, 63:23, 64:2, 79:16, 79:23, 81:7, 82:18, 84:16, 85:12

**dramatic** [1] - 49:17

**draw** [1] - 8:19

**drill** [7] - 32:11, 49:9, 49:10, 71:12, 76:12, 76:24, 78:4

**drilled** [6] - 30:13, 32:5, 32:9, 32:14, 48:12, 48:18

**drilling** [7] - 17:21, 17:22, 28:14, 32:15, 66:4, 72:12, 76:14

**driven** [1] - 87:20

**dropping** [1] - 65:15

**due** [2] - 65:4, 76:20

**duly** [6] - 17:5, 35:4, 50:22, 53:23, 56:13, 68:24

**dumped** [1] - 34:1

**during** [2] - 17:17, 79:16

## E

**earthquake** [5] - 14:17, 20:3, 37:12, 45:2, 52:8

**earthquakes** [30] - 14:8, 14:11, 15:4, 15:8, 15:9, 15:21, 16:5, 22:23, 23:8, 23:17, 24:7, 24:16, 24:19, 24:23, 25:5, 25:6, 26:5, 26:6, 26:8, 26:9, 26:11, 40:10, 44:5, 44:9, 44:10, 46:11, 53:6, 53:11, 81:21, 83:20

**easily** [1] - 8:7

**East** [1] - 2:5

**easy** [1] - 65:4

**economic** [8] - 13:16, 28:18, 61:7, 61:13, 80:19, 82:4, 82:5, 82:6

**economical** [19] - 28:13, 28:17, 28:19, 28:21, 28:24, 30:3, 32:25, 33:1, 33:3, 33:8, 33:18, 34:8, 61:14, 71:11, 75:20, 75:21, 75:24, 76:17, 76:18

**economics** [4] - 61:21, 71:25, 82:7, 85:10  
**educational** [1] - 35:13  
**effect** [3] - 16:3, 43:8, 43:13  
**effective** [1] - 30:24  
**effectively** [2] - 23:16, 34:7  
**effects** [3] - 13:23, 15:11, 81:14  
**either** [10] - 7:4, 18:19, 19:14, 47:8, 55:4, 66:13, 74:8, 81:1, 81:25  
**elected** [1] - 10:18  
**elements** [1] - 89:16  
**elsewhere** [2] - 13:22, 45:19  
**EMLER** [21] - 29:22, 32:21, 32:23, 33:6, 33:16, 33:22, 33:25, 34:4, 34:7, 34:12, 46:25, 47:5, 47:12, 47:24, 52:13, 55:11, 55:16, 65:8, 77:7, 77:16, 77:19  
**Emler** [1] - 1:18  
**encounter** [1] - 15:20  
**encountered** [1] - 48:19  
**end** [4] - 11:1, 11:4, 12:6, 33:13  
**energy** [5] - 6:21, 7:6, 10:1, 17:19, 85:22  
**engage** [2] - 83:11, 87:2  
**engaging** [2] - 79:15, 82:14  
**enlarging** [1] - 12:8  
**entered** [3] - 6:14, 11:16, 13:22  
**entertain** [1] - 38:2  
**entire** [3] - 14:19, 46:3, 49:10  
**entirely** [1] - 7:21  
**environment** [3] - 6:22, 7:7, 10:2  
**epicenter** [1] - 44:6  
**equipment** [1] - 26:24  
**especially** [2] - 77:3, 84:12  
**essentially** [2] - 49:16, 53:1  
**established** [2] - 15:13, 47:15  
**estimate** [2] - 29:1, 76:8  
**eventually** [2] - 31:8,

62:14  
**evidence** [18] - 14:2, 15:6, 16:13, 43:9, 43:10, 43:12, 44:2, 44:5, 50:2, 67:19, 80:15, 81:15, 81:16, 81:22, 82:15, 83:17, 85:1, 87:4  
**EVIDENTIARY** [1] - 1:12  
**exact** [1] - 63:19  
**exactly** [4] - 21:2, 69:10, 75:5, 75:8  
**EXAMINATION** [15] - 17:7, 19:2, 27:18, 35:6, 39:8, 44:23, 50:24, 52:4, 52:19, 53:25, 56:17, 59:22, 69:4, 73:2, 75:16  
**examination** [26] - 10:6, 15:19, 18:24, 20:24, 20:25, 27:9, 31:18, 34:18, 36:10, 41:25, 44:16, 45:23, 47:1, 51:25, 52:2, 54:25, 55:2, 58:1, 58:4, 59:18, 64:12, 64:18, 67:20, 68:1, 68:3, 68:8  
**Examination** [13] - 3:7, 3:8, 3:8, 3:9, 3:10, 3:10, 3:12, 3:13, 3:13, 3:16, 3:18, 3:20, 3:20  
**examine** [1] - 42:15  
**examined** [1] - 5:18  
**example** [1] - 46:16  
**exceed** [1] - 84:7  
**except** [1] - 58:17  
**excuse** [1] - 60:23  
**excused** [1] - 53:18  
**Exhibit** [1] - 4:6  
**exist** [1] - 12:25  
**exorbitant** [1] - 60:11  
**expanded** [1] - 85:25  
**expense** [2] - 13:14, 84:8  
**experience** [4] - 17:15, 35:19, 46:2, 62:22  
**experienced** [1] - 46:14  
**experiment** [9] - 53:1, 79:15, 81:12, 82:2, 82:14, 83:10, 84:24, 85:21, 86:17  
**experiments** [1] - 83:12  
**expert** [2] - 14:23, 22:4

**explains** [1] - 16:2  
**exploration** [2] - 35:17, 35:20  
**explore** [1] - 70:3  
**exploring** [1] - 17:23  
**expression** [1] - 47:21  
**extant** [1] - 80:23  
**extend** [2] - 13:16, 28:13  
**extensive** [2] - 40:15, 64:7  
**extensively** [2] - 36:3, 46:6  
**extent** [10] - 8:18, 15:25, 24:21, 32:8, 32:10, 38:13, 41:2, 42:15, 48:3, 70:8  
**extremely** [1] - 25:24  
**Eye** [9] - 2:9, 3:3, 3:8, 3:10, 3:13, 3:16, 3:18, 3:20, 4:2  
**eye** [15] - 5:13, 13:19, 19:1, 34:17, 39:4, 45:24, 50:14, 50:18, 57:24, 59:14, 59:21, 72:25, 77:22, 78:22, 78:23  
**EYE** [50] - 2:9, 5:12, 6:2, 6:5, 6:12, 6:17, 7:1, 8:2, 8:4, 13:20, 19:3, 20:22, 21:5, 21:6, 27:8, 34:19, 36:9, 37:3, 37:13, 37:18, 38:15, 39:9, 41:25, 42:19, 42:20, 44:15, 50:15, 50:19, 50:25, 51:16, 51:24, 52:16, 52:20, 53:15, 53:20, 54:1, 54:19, 54:24, 57:25, 59:23, 64:11, 64:17, 65:1, 69:18, 72:19, 73:1, 73:3, 75:14, 79:5, 79:9  
**eye's** [2] - 31:17, 47:1  
**eyes** [1] - 87:21

## F

**fact** [5] - 9:1, 12:17, 26:13, 47:21, 85:8  
**factors** [2] - 12:11, 33:17  
**facts** [4] - 10:23, 11:3, 43:19, 67:22  
**factual** [1] - 67:21  
**failed** [1] - 84:14  
**fair** [6] - 27:1, 43:21, 58:1, 60:6, 72:14, 82:9

**fairly** [2] - 88:11, 88:12  
**falls** [1] - 7:13  
**familiar** [3] - 20:6, 35:23, 85:5  
**far** [3] - 40:20, 68:10, 69:7  
**fashion** [1] - 84:9  
**father** [1] - 17:17  
**Fault** [4] - 14:16, 39:19, 40:4, 46:7  
**fault** [14] - 19:13, 19:16, 19:19, 19:22, 20:4, 25:25, 39:25, 46:6, 46:8, 46:16, 47:18, 47:19, 64:3, 81:8  
**faults** [46] - 14:16, 14:20, 15:1, 15:3, 15:25, 16:3, 16:4, 20:8, 20:12, 21:9, 21:15, 21:18, 22:1, 22:8, 22:16, 22:18, 23:16, 23:17, 24:4, 27:2, 27:4, 36:1, 36:2, 36:6, 40:14, 40:23, 40:25, 41:2, 41:7, 41:19, 42:21, 42:23, 43:8, 46:1, 46:5, 46:7, 46:10, 46:14, 46:20, 47:16, 81:11, 81:20, 83:3, 85:4  
**favor** [1] - 83:18  
**feature** [2] - 19:10, 39:21  
**fed** [1] - 25:12  
**feet** [13] - 12:24, 13:1, 13:3, 32:10, 48:5, 48:14, 48:16, 48:17, 48:19, 48:21, 48:22, 49:1  
**Feist** [1] - 1:18  
**FEIST** [113] - 5:1, 5:16, 5:21, 6:3, 6:11, 6:16, 6:24, 7:2, 7:19, 8:3, 8:24, 9:21, 10:10, 10:14, 13:18, 16:15, 16:23, 18:13, 18:17, 18:23, 19:1, 21:3, 27:10, 27:15, 29:20, 30:12, 30:16, 30:20, 31:9, 31:16, 32:7, 32:13, 32:18, 32:22, 34:13, 34:17, 34:20, 34:22, 36:14, 36:18, 37:20, 38:16, 39:2, 39:7, 42:11, 44:17, 44:20, 46:23, 47:25, 48:6, 48:10, 48:23, 49:2, 49:21, 50:3,

50:10, 50:13, 50:16, 51:19, 51:22, 52:3, 52:11, 52:14, 52:17, 53:16, 54:22, 55:3, 55:6, 55:9, 55:13, 55:18, 55:22, 55:25, 56:6, 56:16, 57:18, 57:21, 57:24, 58:2, 58:5, 58:25, 59:6, 59:9, 59:11, 59:17, 59:20, 64:14, 64:19, 64:24, 65:3, 65:7, 67:5, 67:9, 68:7, 68:14, 68:18, 69:1, 69:22, 70:5, 72:21, 72:25, 75:15, 77:5, 77:23, 78:6, 78:10, 78:15, 78:19, 79:4, 79:8, 87:1, 87:10, 88:16  
**felt** [2] - 15:11, 65:25  
**few** [5] - 55:21, 55:23, 67:10, 70:3, 70:22  
**fewer** [1] - 46:20  
**field** [7] - 13:7, 17:17, 28:14, 65:21, 71:10, 71:22, 72:15  
**fields** [1] - 17:16  
**file** [1] - 66:6  
**filed** [9] - 9:6, 35:24, 42:17, 42:18, 51:4, 54:6, 62:12, 63:1  
**filling** [1] - 66:21  
**finalized** [1] - 63:1  
**findings** [1] - 21:14  
**fine** [3] - 38:18, 73:12, 74:13  
**first** [18] - 6:9, 7:10, 9:12, 10:11, 11:15, 11:23, 16:25, 29:11, 49:4, 59:14, 67:15, 73:5, 76:17, 85:18, 85:23, 86:4, 86:6, 86:12  
**five** [2] - 13:5, 55:24  
**Flint** [2] - 85:10, 85:11  
**flood** [2] - 53:4, 53:5  
**floods** [1] - 53:3  
**flow** [1] - 73:18  
**fluctuate** [1] - 82:9  
**fluid** [4] - 23:20, 24:1, 29:5, 76:5  
**fluids** [11] - 12:20, 15:2, 16:2, 23:15, 24:3, 25:17, 25:22, 27:23, 43:8, 81:20, 83:1  
**FM** [1] - 32:21  
**follow** [1] - 67:25  
**follow-up** [1] - 67:25

<p><b>followed</b> [1] - 24:18  <b>following</b> [1] - 64:15  <b>follows</b> [6] - 17:6, 35:5, 50:23, 53:24, 56:14, 68:25  <b>foot</b> [2] - 32:3, 32:5  <b>forget</b> [1] - 75:5  <b>form</b> [6] - 20:13, 41:10, 45:10, 66:8, 76:2, 89:14  <b>formal</b> [2] - 9:5, 9:10  <b>formally</b> [1] - 20:20  <b>formation</b> [20] - 1:4, 5:5, 10:21, 11:18, 12:15, 12:16, 13:4, 13:5, 23:20, 24:1, 25:16, 25:17, 25:19, 25:24, 26:2, 27:3, 31:12, 31:14, 32:3, 81:25  <b>formations</b> [5] - 12:25, 45:19, 46:1, 46:10, 77:15  <b>forth</b> [2] - 10:24, 89:12  <b>forward</b> [1] - 66:21  <b>four</b> [1] - 12:20  <b>fragile</b> [1] - 83:19  <b>frame</b> [4] - 29:16, 73:25, 76:14, 76:19  <b>frequency</b> [1] - 15:7  <b>fresh</b> [1] - 12:23  <b>friendly</b> [1] - 87:21  <b>full</b> [5] - 17:9, 32:10, 35:8, 48:3, 82:17  <b>fully</b> [1] - 78:1  <b>function</b> [1] - 20:24  <b>fungible</b> [1] - 82:8  <b>furthermore</b> [1] - 12:3  <b>future</b> [6] - 71:9, 71:14, 71:22, 72:15, 73:19, 83:25</p>	<p>43:2, 43:3  <b>geological</b> [16] - 14:15, 15:5, 15:16, 15:19, 20:11, 21:7, 22:22, 23:7, 24:6, 24:22, 37:11, 39:16, 39:21, 40:8, 48:2  <b>Geological</b> [2] - 6:20, 15:15  <b>geologist</b> [9] - 12:17, 19:12, 22:21, 27:6, 31:19, 32:20, 35:12, 41:18, 84:21  <b>geologists</b> [1] - 43:16  <b>geology</b> [2] - 14:14, 85:5  <b>GILLEN</b> [1] - 2:4  <b>given</b> [5] - 10:6, 21:21, 49:21, 50:3, 68:8  <b>glad</b> [4] - 87:22, 88:3, 88:13, 88:15  <b>gleaned</b> [1] - 84:20  <b>grant</b> [5] - 30:23, 80:2, 80:13, 80:14, 83:6  <b>granted</b> [5] - 60:24, 66:13, 70:17, 76:2, 81:1  <b>granting</b> [1] - 82:23  <b>gravel</b> [1] - 85:14  <b>gravity</b> [5] - 25:12, 31:3, 49:24, 57:7, 73:18  <b>great</b> [3] - 63:17, 85:21, 86:17  <b>greater</b> [3] - 14:20, 26:8, 36:7  <b>Green</b> [1] - 54:5  <b>ground</b> [1] - 13:1  <b>guess</b> [2] - 30:5, 66:17</p>	<p><b>hauled</b> [1] - 33:23  <b>hauling</b> [3] - 28:19, 33:20, 34:9  <b>health</b> [1] - 10:25  <b>hear</b> [3] - 5:19, 5:23, 51:22  <b>heard</b> [11] - 7:20, 8:2, 57:2, 60:3, 66:23, 74:2, 79:10, 79:11, 82:5, 82:15, 88:6  <b>HEARING</b> [1] - 1:12  <b>hearing</b> [12] - 5:3, 5:24, 12:9, 18:20, 39:3, 49:19, 53:17, 54:22, 56:3, 66:14, 87:10, 88:17  <b>Hedberg</b> [1] - 89:5  <b>HEDBERG</b> [1] - 89:23  <b>held</b> [1] - 1:14  <b>help</b> [1] - 31:14  <b>helpful</b> [1] - 68:3  <b>herein</b> [1] - 89:12  <b>hereunto</b> [1] - 89:18  <b>high</b> [7] - 17:17, 25:24, 31:25, 45:13, 49:19, 61:23  <b>higher</b> [3] - 46:18, 67:1, 74:4  <b>Hills</b> [2] - 85:10, 85:11  <b>historical</b> [3] - 50:1, 53:3, 53:6  <b>history</b> [2] - 14:18, 20:4  <b>HOEDEL</b> [3] - 3:17, 53:21, 55:8  <b>Hoedel</b> [3] - 53:20, 54:3, 83:14  <b>Hoedel's</b> [1] - 54:20  <b>Honor</b> [1] - 87:7  <b>honorable</b> [2] - 7:8, 10:17  <b>House</b> [3] - 6:21, 7:6, 10:1  <b>human</b> [1] - 22:17  <b>Humboldt</b> [10] - 14:16, 19:13, 19:22, 20:4, 20:9, 21:9, 36:2, 39:19, 40:4, 46:6  <b>hundred</b> [1] - 71:13</p>	<p>11:1, 11:4  <b>immediately</b> [2] - 45:14, 47:16  <b>imminent</b> [2] - 16:10, 79:25  <b>impermeable</b> [1] - 13:4  <b>important</b> [1] - 81:14  <b>impossible</b> [1] - 53:9  <b>IN</b> [1] - 89:18  <b>inch</b> [1] - 30:22  <b>include</b> [4] - 44:8, 44:12, 47:6, 86:1  <b>included</b> [3] - 12:2, 36:11, 37:5  <b>including</b> [3] - 14:16, 36:2, 46:6  <b>increase</b> [4] - 15:21, 23:8, 26:18, 61:25  <b>increased</b> [4] - 15:8, 15:12, 34:9, 53:10  <b>increases</b> [4] - 22:23, 23:8, 24:23, 40:9  <b>increasing</b> [2] - 24:18, 66:9  <b>indefinite</b> [1] - 73:19  <b>independent</b> [9] - 26:17, 26:22, 40:13, 41:1, 41:19, 42:22, 45:19, 45:25, 79:22  <b>indicated</b> [2] - 31:21, 63:18  <b>indication</b> [1] - 87:11  <b>induce</b> [5] - 16:4, 60:21, 81:5, 81:19, 84:15  <b>induced</b> [17] - 8:14, 8:20, 9:16, 14:4, 14:8, 15:6, 15:18, 16:12, 43:23, 52:23, 53:6, 53:11, 61:4, 84:13, 85:1, 85:9, 86:3  <b>information</b> [18] - 9:2, 9:5, 9:7, 21:20, 36:25, 37:2, 37:10, 37:12, 38:6, 40:9, 47:7, 66:19, 66:20, 66:24, 67:17, 72:6, 74:25, 88:7  <b>initial</b> [2] - 63:4, 71:5  <b>initiated</b> [1] - 73:5  <b>inject</b> [6] - 25:17, 27:23, 29:9, 30:21, 73:15, 77:14  <b>injected</b> [5] - 13:2, 16:2, 25:22, 25:23, 62:3  <b>injecting</b> [4] - 29:17, 31:23, 31:24, 81:24</p>	<p><b>injection</b> [45] - 1:4, 5:4, 7:23, 10:21, 11:6, 11:8, 11:11, 11:14, 11:16, 11:17, 11:19, 11:20, 11:22, 11:23, 12:12, 12:21, 12:24, 13:5, 13:24, 25:12, 27:23, 31:23, 43:7, 45:6, 46:11, 47:17, 47:20, 47:22, 49:5, 58:14, 59:2, 62:14, 70:21, 70:24, 76:1, 77:10, 83:15, 83:20, 84:15, 84:18, 85:17, 86:7, 86:14, 86:21, 86:24  <b>injections</b> [1] - 25:7  <b>injects</b> [2] - 44:25, 52:7  <b>inquire</b> [3] - 34:14, 70:10, 78:17  <b>inquiry</b> [1] - 84:4  <b>instances</b> [1] - 24:5  <b>instanced</b> [1] - 21:24  <b>intend</b> [2] - 30:25, 80:10  <b>intended</b> [1] - 41:25  <b>intends</b> [1] - 58:13  <b>interested</b> [1] - 89:16  <b>interim</b> [2] - 6:19, 7:13  <b>introduce</b> [1] - 81:19  <b>introduced</b> [1] - 12:20  <b>intrusive</b> [1] - 85:16  <b>investigation</b> [1] - 79:22  <b>invoke</b> [1] - 16:8  <b>issue</b> [3] - 7:18, 15:17, 77:21  <b>issued</b> [1] - 30:24  <b>issues</b> [2] - 9:17, 87:3  <b>itself</b> [2] - 58:17, 84:8</p>
<p style="text-align: center;"><b>G</b></p> <p><b>Gas</b> [10] - 1:3, 2:3, 5:4, 10:17, 10:20, 17:2, 17:13, 17:24, 35:24, 86:20  <b>gas</b> [4] - 13:21, 17:24, 35:16, 35:20  <b>gauge</b> [1] - 30:22  <b>general</b> [4] - 21:21, 23:19, 47:17, 58:12  <b>generalized</b> [1] - 23:24  <b>generally</b> [2] - 15:10, 25:16  <b>generated</b> [1] - 43:19  <b>geologic</b> [6] - 19:10, 23:16, 25:16, 36:25,</p>	<p style="text-align: center;"><b>H</b></p> <p><b>hall</b> [1] - 30:1  <b>hand</b> [1] - 89:19  <b>handle</b> [4] - 60:13, 62:4, 84:2, 84:4  <b>handy</b> [1] - 41:15  <b>hard</b> [2] - 21:22, 87:22  <b>harm</b> [1] - 79:25  <b>harms</b> [1] - 14:12  <b>Harper</b> [10] - 11:25, 14:3, 25:20, 26:2, 27:3, 31:22, 36:4, 36:8, 49:6, 50:6  <b>hate</b> [1] - 88:10  <b>haul</b> [11] - 13:14, 28:24, 29:2, 29:4, 29:24, 30:4, 33:1, 33:10, 75:22, 82:7, 85:11</p>	<p style="text-align: center;"><b>I</b></p> <p><b>idea</b> [1] - 81:9  <b>ideal</b> [1] - 12:16  <b>identifies</b> [6] - 19:7, 19:13, 20:7, 39:13, 39:19  <b>identify</b> [2] - 19:18, 39:25  <b>immediate</b> [3] - 10:25,</p>	<p><b>initial</b> [2] - 63:4, 71:5  <b>initiated</b> [1] - 73:5  <b>inject</b> [6] - 25:17, 27:23, 29:9, 30:21, 73:15, 77:14  <b>injected</b> [5] - 13:2, 16:2, 25:22, 25:23, 62:3  <b>injecting</b> [4] - 29:17, 31:23, 31:24, 81:24</p>	<p style="text-align: center;"><b>J</b></p> <p><b>JAMES</b> [2] - 3:15, 50:20  <b>James</b> [6] - 14:21, 19:5, 50:19, 51:2, 51:3, 51:17  <b>January</b> [3] - 6:22, 7:7, 10:2  <b>Jay</b> [1] - 1:18  <b>join</b> [4] - 36:13, 37:7, 38:15, 69:21  <b>Jon</b> [1] - 5:14  <b>Jonathan</b> [1] - 2:13  <b>judicial</b> [1] - 9:14  <b>jump</b> [1] - 88:9  <b>jumped</b> [1] - 79:3  <b>jurisdiction</b> [1] - 5:23</p>

<p><b>justification</b> [1] - 70:8 <b>justifies</b> [1] - 16:13</p>	<p><b>lease</b> [1] - 33:14 <b>leases</b> [2] - 78:1, 78:5 <b>least</b> [5] - 71:2, 80:8, 80:11, 82:25, 84:24 <b>leave</b> [1] - 33:17 <b>lectern</b> [1] - 27:16 <b>Lee</b> [6] - 12:22, 17:11, 34:25, 35:10, 37:9, 38:25 <b>LEE</b> [2] - 3:12, 35:2 <b>legislative</b> [1] - 10:4 <b>legislators</b> [1] - 7:18 <b>less</b> [5] - 36:7, 44:9, 45:24, 82:11, 83:1 <b>level</b> [7] - 31:13, 73:9, 74:4, 74:20, 80:14, 80:15, 80:16 <b>levels</b> [3] - 74:24, 75:3, 81:2 <b>license</b> [1] - 5:8 <b>License</b> [1] - 1:5 <b>lie</b> [1] - 48:7 <b>life</b> [2] - 17:16, 82:17 <b>likelihood</b> [2] - 49:23, 83:1 <b>likely</b> [1] - 81:23 <b>limit</b> [2] - 60:18, 80:6 <b>limitation</b> [1] - 70:21 <b>limited</b> [1] - 71:21 <b>limits</b> [2] - 77:14, 80:21 <b>line</b> [4] - 44:3, 44:4, 58:11, 63:25 <b>Line</b> [2] - 37:9, 58:18 <b>Litigation</b> [1] - 2:14 <b>live</b> [1] - 54:4 <b>LLC</b> [1] - 2:9 <b>located</b> [9] - 1:5, 5:6, 11:24, 12:7, 12:13, 19:8, 39:14, 64:5, 86:15 <b>location</b> [1] - 24:8 <b>locations</b> [1] - 83:17 <b>look</b> [3] - 20:16, 64:15, 72:7 <b>looked</b> [4] - 26:7, 49:9, 85:3, 85:4 <b>looking</b> [1] - 84:1 <b>low</b> [2] - 12:19, 85:16 <b>lower</b> [4] - 13:14, 25:23, 26:13, 31:24 <b>lowest</b> [1] - 48:24 <b>lubricate</b> [4] - 15:3, 23:16, 24:4, 81:20 <b>lubricating</b> [2] - 16:3, 43:8</p>	<p><b>magnitude</b> [4] - 26:8, 26:11, 44:9, 44:10 <b>main</b> [1] - 46:6 <b>manager</b> [1] - 17:13 <b>Manhattan</b> [1] - 14:18 <b>Manhattan-Wamego</b> [1] - 14:18 <b>map</b> [2] - 38:10, 64:15 <b>mapped</b> [4] - 36:1, 36:3, 46:2, 46:5 <b>March</b> [5] - 6:9, 11:16, 12:3, 14:1 <b>marginal</b> [4] - 61:19, 62:18, 63:11, 82:12 <b>margins</b> [1] - 61:13 <b>mark</b> [2] - 48:12, 77:25 <b>markedly</b> [1] - 11:8 <b>material</b> [1] - 70:1 <b>matfield</b> [1] - 54:5 <b>math</b> [1] - 33:5 <b>Matter</b> [1] - 1:3 <b>matter</b> [5] - 5:3, 5:20, 5:23, 18:15, 87:12 <b>matters</b> [3] - 5:25, 6:25, 10:8 <b>maximum</b> [15] - 11:5, 11:8, 11:13, 11:17, 11:20, 11:22, 12:12, 31:6, 31:7, 59:2, 59:3, 86:7, 86:14, 86:23, 86:24 <b>MCINTEER</b> [1] - 2:4 <b>McPherson</b> [1] - 34:2 <b>mean</b> [8] - 32:9, 32:10, 60:9, 61:20, 61:22, 62:20, 63:2, 63:8 <b>meaning</b> [1] - 55:23 <b>mechanic</b> [1] - 43:20 <b>meets</b> [2] - 86:10, 86:19 <b>memory</b> [3] - 30:14, 32:5, 63:16 <b>mentioned</b> [4] - 15:14, 45:12, 45:18, 77:24 <b>merely</b> [1] - 62:3 <b>method</b> [1] - 49:22 <b>microearthquakes</b> [3] - 26:6, 26:19, 44:13 <b>mid</b> [1] - 35:21 <b>mid-continent</b> [1] - 35:21 <b>might</b> [5] - 53:5, 53:8, 74:17, 74:20, 80:4 <b>mile</b> [3] - 12:24, 13:8, 46:20 <b>miles</b> [4] - 21:23, 24:8, 46:17, 47:20 <b>mind</b> [4] - 50:4, 65:2, 67:14, 68:12 <b>minutes</b> [1] - 55:24</p>	<p><b>misleading</b> [1] - 40:24 <b>moment</b> [5] - 28:24, 45:20, 57:20, 79:5, 80:13 <b>moments</b> [2] - 55:21, 55:23 <b>money</b> [1] - 76:21 <b>moreover</b> [1] - 11:19 <b>morning</b> [8] - 5:12, 27:20, 27:21, 52:6, 60:3, 66:19, 66:24, 83:9 <b>Morris</b> [24] - 1:5, 5:7, 12:2, 25:8, 26:5, 26:19, 27:5, 34:1, 34:3, 36:1, 36:4, 36:7, 36:25, 44:6, 46:18, 69:8, 74:24, 75:3, 75:11, 77:9, 84:19, 85:1, 86:1 <b>most</b> [3] - 25:11, 25:22, 29:11 <b>move</b> [6] - 6:6, 9:7, 38:24, 51:16, 54:19, 57:14 <b>moved</b> [1] - 87:24 <b>movement</b> [2] - 15:3, 16:4 <b>moving</b> [1] - 83:2 <b>MR</b> [177] - 5:10, 5:12, 5:14, 5:18, 6:2, 6:5, 6:12, 6:17, 7:1, 7:8, 7:21, 8:2, 8:4, 8:23, 8:25, 10:9, 10:13, 10:16, 13:20, 16:17, 17:1, 17:8, 18:11, 18:16, 18:22, 18:25, 19:3, 20:13, 20:22, 21:5, 21:6, 27:8, 27:12, 27:17, 27:19, 29:19, 29:25, 30:6, 30:14, 30:18, 31:5, 31:11, 32:2, 32:12, 32:17, 33:4, 33:11, 33:21, 33:24, 34:3, 34:6, 34:11, 34:15, 34:19, 34:21, 34:24, 35:7, 36:9, 36:13, 36:16, 36:19, 37:3, 37:7, 37:8, 37:13, 37:16, 37:18, 38:4, 38:7, 38:8, 38:11, 38:15, 38:18, 38:19, 38:24, 39:5, 39:9, 41:10, 41:25, 42:19, 42:20, 44:15, 44:22, 44:24, 46:21, 47:4, 47:9, 47:14, 48:5, 48:9, 48:15, 49:1, 49:8, 50:1, 50:8, 50:12, 50:15, 50:19, 50:25, 51:16, 51:21, 51:24, 52:1, 52:5, 52:10, 52:16, 52:20, 53:15, 53:20, 54:1, 54:19, 54:21, 54:24, 55:1, 55:4, 55:20, 55:24, 56:2, 56:9, 56:15, 56:18, 57:14, 57:20, 57:23, 57:25, 58:3, 58:8, 58:16, 59:5, 59:8, 59:10, 59:15, 59:19, 59:23, 64:11, 64:13, 64:17, 64:22, 65:1, 65:6, 65:12, 65:20, 65:24, 66:7, 66:16, 67:3, 68:5, 68:11, 68:17, 68:20, 69:3, 69:5, 69:18, 69:21, 69:24, 70:11, 70:18, 70:23, 72:19, 72:23, 73:1, 73:3, 75:14, 75:17, 77:4, 77:12, 77:18, 78:4, 78:9, 78:14, 78:17, 78:25, 79:2, 79:5, 79:9, 83:22, 87:7 <b>MS</b> [1] - 55:8 <b>multiple</b> [2] - 45:14, 80:3 <b>must</b> [2] - 8:25, 9:17 <b>Myers</b> [7] - 2:13, 3:4, 3:8, 3:10, 3:13, 3:20, 5:14 <b>MYERS</b> [39] - 5:14, 5:18, 7:21, 10:9, 16:17, 27:12, 27:17, 27:19, 29:19, 34:21, 36:13, 37:7, 38:11, 44:22, 44:24, 46:21, 52:5, 52:10, 55:4, 55:20, 55:24, 56:2, 56:9, 56:15, 56:18, 57:14, 58:3, 58:8, 58:16, 59:10, 64:22, 68:17, 69:21, 70:11, 75:17, 77:4, 78:14, 78:17, 78:25</p>
<p><b>K</b></p> <p><b>K.S.A</b> [2] - 14:10, 89:8 <b>KANSAS</b> [3] - 1:1, 2:14, 89:2 <b>Kansas</b> [34] - 1:5, 1:15, 1:17, 2:6, 2:11, 2:15, 5:2, 5:7, 6:20, 11:2, 11:5, 12:11, 13:21, 14:17, 15:8, 15:11, 15:15, 15:22, 17:21, 20:4, 23:3, 24:15, 24:20, 35:20, 36:8, 44:6, 45:8, 46:4, 46:13, 49:9, 79:21, 89:7, 89:10, 89:19 <b>KCC</b> [7] - 11:12, 31:5, 62:8, 69:17, 72:4, 77:13, 87:23 <b>KCC's</b> [1] - 8:8 <b>keep</b> [7] - 24:14, 24:16, 60:9, 60:13, 62:1, 62:4, 65:12 <b>keeping</b> [1] - 12:4 <b>kind</b> [10] - 9:2, 26:24, 41:11, 41:15, 60:13, 62:3, 63:18, 66:21, 79:12, 84:8 <b>knowing</b> [1] - 81:10 <b>knowledge</b> [6] - 18:9, 32:17, 38:22, 49:4, 51:10, 54:17 <b>known</b> [2] - 19:9, 39:14</p>	<p><b>M</b></p> <p><b>ma'am</b> [1] - 69:3</p>	<p><b>N</b></p> <p><b>name</b> [4] - 17:10, 35:9, 51:1, 54:2 <b>national</b> [1] - 37:11 <b>nature</b> [4] - 15:24, 41:2, 48:2, 84:6 <b>nauseum</b> [1] - 86:11 <b>near</b> [1] - 22:10 <b>necessary</b> [4] - 29:8</p>	
<p><b>L</b></p> <p><b>lack</b> [1] - 43:12 <b>Lansing</b> [1] - 13:4 <b>large</b> [4] - 11:19, 26:6, 45:6, 86:8 <b>larger</b> [1] - 88:1 <b>largest</b> [2] - 14:17, 20:3 <b>last</b> [3] - 57:8, 78:21, 79:3 <b>lastly</b> [1] - 13:10 <b>latter</b> [1] - 10:3 <b>law</b> [1] - 9:14 <b>Law</b> [2] - 2:5, 2:10 <b>LAW</b> [1] - 2:9 <b>Lawrence</b> [1] - 2:11 <b>layers</b> [3] - 21:19, 22:3, 41:9 <b>LC</b> [6] - 1:3, 2:3, 5:4, 10:17, 10:20, 17:2</p>			



<p>79:14, 82:19, 84:5  <b>need</b> [26] - 12:18,  31:4, 31:8, 31:14,  57:5, 57:7, 57:9,  65:16, 65:22, 67:1,  67:2, 67:21, 67:22,  70:15, 70:22, 71:14,  71:16, 73:10, 73:15,  74:9, 74:15, 74:17,  74:21, 75:23, 76:12,  87:6  <b>needed</b> [3] - 60:12,  65:25, 74:5  <b>needing</b> [1] - 29:13  <b>needs</b> [2] - 42:15,  58:17  <b>Nemaha</b> [10] - 19:9,  19:22, 20:8, 21:9,  39:15, 40:4, 46:3,  46:15, 46:19, 47:18  <b>Nemaha-Humboldt</b>  [1] - 21:9  <b>never</b> [2] - 30:19,  67:14  <b>new</b> [7] - 58:13, 65:10,  66:6, 66:19, 67:17,  83:4, 88:7  <b>nil</b> [1] - 50:2  <b>non</b> [1] - 48:18  <b>non-porous</b> [1] -  48:18  <b>NONE</b> [1] - 4:7  <b>none</b> [9] - 5:24, 10:9,  18:21, 26:21, 39:3,  53:17, 54:23, 55:4,  85:7  <b>North</b> [1] - 2:5  <b>north</b> [6] - 15:10,  15:21, 23:4, 24:12,  24:19, 46:13  <b>northern</b> [1] - 46:4  <b>note</b> [1] - 57:16  <b>nothing</b> [14] - 29:19,  34:15, 45:7, 46:21,  47:24, 50:12, 52:10,  68:17, 72:23, 77:4,  78:9, 78:10, 78:14,  84:12  <b>notice</b> [13] - 5:17,  5:19, 6:6, 6:13, 6:18,  7:4, 8:6, 8:16, 9:14,  9:22, 9:24, 12:9,  66:11  <b>noticed</b> [1] - 8:7  <b>number</b> [2] - 78:3,  84:7  <b>numerous</b> [1] - 61:20</p>	<p style="text-align: center;"><b>O</b></p> <p><b>o'clock</b> [5] - 1:15,  56:4, 56:5, 88:18,  89:11  <b>oath</b> [8] - 17:5, 35:4,  50:22, 53:23, 56:13,  56:22, 68:24, 69:2  <b>oaths</b> [1] - 89:7  <b>object</b> [13] - 7:12,  8:25, 9:17, 20:13,  36:9, 37:5, 37:13,  37:19, 38:11, 41:6,  41:10, 69:18, 72:19  <b>objection</b> [17] - 7:9,  7:24, 18:18, 37:3,  37:25, 38:3, 38:15,  38:17, 39:3, 42:12,  51:20, 51:21, 54:21,  57:19, 57:23, 57:25,  72:22  <b>objections</b> [3] - 5:22,  7:3, 51:23  <b>obligations</b> [1] - 33:14  <b>obtained</b> [1] - 82:10  <b>obviously</b> [2] - 57:8,  80:2  <b>occupation</b> [1] - 35:11  <b>occur</b> [1] - 14:8  <b>occurred</b> [1] - 14:18  <b>OF</b> [4] - 1:1, 89:2, 89:4  <b>offer</b> [1] - 72:18  <b>Offered</b> [1] - 4:6  <b>offered</b> [3] - 7:6, 10:4,  21:1  <b>OFFICE</b> [1] - 2:9  <b>Official</b> [1] - 89:19  <b>officials</b> [1] - 10:18  <b>offset</b> [3] - 21:18,  22:2, 41:8  <b>oil</b> [23] - 13:13, 13:16,  13:21, 17:16, 17:17,  17:24, 28:4, 28:6,  28:22, 30:1, 32:25,  33:3, 33:7, 35:16,  35:19, 75:19, 75:24,  76:7, 76:20, 76:23,  82:8, 82:20, 83:23  <b>Oil</b> [15] - 1:3, 2:3, 5:4,  5:10, 10:17, 10:20,  10:23, 17:2, 17:13,  17:24, 18:6, 35:1,  35:24, 44:25, 86:20  <b>Oklahoma</b> [9] - 15:10,  15:21, 17:19, 23:4,  24:13, 24:19, 35:20,  46:3, 46:14  <b>one</b> [12] - 8:5, 9:16,  12:11, 20:22, 37:23,  61:21, 64:20, 72:4,</p>	<p>76:25, 79:3, 79:7,  87:23  <b>opening</b> [4] - 10:11,  10:12, 16:24, 85:18  <b>OPENING</b> [1] - 3:2  <b>operate</b> [3] - 30:25,  82:24, 83:21  <b>operation</b> [1] - 74:6  <b>operator</b> [1] - 61:22  <b>opinion</b> [1] - 53:10  <b>opportunity</b> [5] - 9:1,  9:4, 20:19, 38:13,  67:19  <b>opposition</b> [1] - 83:15  <b>option</b> [3] - 29:23,  67:11, 67:15  <b>options</b> [2] - 80:3,  80:12  <b>order</b> [19] - 5:2, 6:9,  6:13, 6:15, 11:11,  11:15, 11:17, 11:23,  29:9, 49:7, 50:7,  64:17, 78:18, 78:20,  78:23, 81:22, 82:19,  85:23, 88:9  <b>orders</b> [14] - 6:7, 7:4,  7:10, 7:23, 8:15,  9:13, 9:15, 9:23,  13:25, 15:14, 85:19,  86:4, 86:12  <b>otherwise</b> [3] - 15:7,  20:17, 89:16  <b>ought</b> [2] - 80:22,  82:10  <b>ounce</b> [1] - 16:6  <b>outcome</b> [2] - 53:2,  81:23  <b>outside</b> [2] - 11:10,  86:2  <b>overcome</b> [2] - 31:14,  57:7  <b>overflow</b> [1] - 88:3  <b>overhead</b> [1] - 84:9  <b>overrule</b> [1] - 69:23  <b>own</b> [3] - 17:23, 30:8,  65:2</p> <p style="text-align: center;"><b>P</b></p> <p><b>Page</b> [5] - 37:9, 38:1,  44:3, 58:18, 63:25  <b>page</b> [2] - 37:22, 58:11  <b>paper</b> [1] - 66:11  <b>parameters</b> [1] - 53:7  <b>Parkway</b> [1] - 2:10  <b>part</b> [11] - 7:11, 7:16,  8:8, 9:10, 9:15,  31:24, 40:18, 41:14,  46:19, 49:20, 61:18  <b>particular</b> [9] - 7:22,</p>	<p>39:15, 42:1, 44:11,  62:3, 62:24, 66:8,  82:12, 83:13  <b>particularly</b> [3] - 15:4,  82:3, 82:6  <b>parties</b> [3] - 5:25,  87:2, 87:17  <b>partly</b> [2] - 80:19,  80:20  <b>parts</b> [1] - 25:23  <b>party</b> [1] - 89:15  <b>Pat</b> [1] - 1:17  <b>people</b> [4] - 71:18,  79:21, 87:23, 88:12  <b>per</b> [33] - 11:6, 11:9,  11:14, 11:18, 28:4,  28:6, 28:9, 28:11,  28:12, 29:9, 30:22,  46:16, 46:20, 59:3,  65:18, 66:3, 69:15,  70:2, 70:21, 71:6,  76:9, 76:12, 77:10,  77:14, 77:15, 83:24,  86:2, 86:5, 86:6,  86:7, 86:24  <b>perforate</b> [2] - 49:13,  49:14  <b>perforated</b> [1] - 32:2  <b>perforation</b> [1] - 48:24  <b>perforations</b> [4] -  48:13, 48:15, 48:21,  48:22  <b>perhaps</b> [3] - 20:15,  31:1, 43:16  <b>period</b> [7] - 24:17,  25:7, 30:18, 31:1,  66:12, 73:23, 73:24  <b>permeability</b> [1] -  12:15  <b>permissible</b> [1] -  27:14  <b>permit</b> [11] - 30:24,  60:10, 60:16, 60:24,  62:1, 66:12, 70:7,  80:4, 80:22, 83:6,  84:7  <b>permits</b> [3] - 60:10,  65:13, 77:17  <b>permitting</b> [1] - 12:10  <b>person</b> [1] - 56:23  <b>pertaining</b> [1] - 23:5  <b>pertinent</b> [3] - 14:13,  47:10, 80:25  <b>petroleum</b> [2] - 17:19,  35:12  <b>phase</b> [1] - 13:22  <b>piece</b> [1] - 10:3  <b>place</b> [3] - 5:20, 5:24,  20:4  <b>placed</b> [1] - 11:13</p>	<p><b>plans</b> [2] - 71:9, 71:22  <b>plea</b> [1] - 14:13  <b>plenty</b> [1] - 57:5  <b>podium</b> [1] - 27:13  <b>point</b> [10] - 8:18,  20:16, 29:16, 30:9,  31:11, 55:23, 56:7,  71:16, 72:22, 81:3  <b>points</b> [4] - 20:22,  21:1, 42:1, 83:2  <b>pops</b> [1] - 88:7  <b>porous</b> [2] - 48:18,  48:20  <b>portion</b> [1] - 46:15  <b>position</b> [5] - 17:12,  58:16, 69:20, 70:14,  80:7  <b>positions</b> [1] - 83:4  <b>possibility</b> [1] - 57:10  <b>possibly</b> [2] - 66:14,  66:16  <b>posted</b> [1] - 8:11  <b>potential</b> [1] - 81:4  <b>pound</b> [1] - 16:7  <b>pounds</b> [3] - 30:22,  59:3, 59:4  <b>powers</b> [1] - 16:9  <b>ppm</b> [1] - 12:19  <b>practice</b> [1] - 42:7  <b>predict</b> [1] - 53:2  <b>predicting</b> [1] - 53:3  <b>predictions</b> [1] - 53:9  <b>prefer</b> [2] - 27:16, 79:2  <b>preference</b> [2] - 67:24,  78:24  <b>prefiled</b> [30] - 9:2,  10:24, 17:25, 18:5,  18:19, 36:11, 36:20,  37:4, 37:9, 37:14,  37:19, 38:8, 38:14,  38:20, 38:25, 39:20,  42:5, 42:8, 51:7,  51:13, 51:17, 54:13,  56:20, 57:15, 63:22,  83:13, 85:6  <b>preliminary</b> [3] - 5:25,  6:25, 10:8  <b>prescient</b> [1] - 9:13  <b>prescribed</b> [1] - 78:23  <b>presence</b> [4] - 8:13,  20:10, 21:7, 89:13  <b>present</b> [12] - 7:12,  16:20, 19:17, 25:20,  28:18, 39:24, 55:5,  61:1, 67:2, 75:20,  79:20, 79:25  <b>presentation</b> [2] - 8:9,  37:6  <b>presented</b> [8] - 9:25,  10:1, 27:5, 56:23,</p>
--	---	--	--	---

<p>58:20, 62:14, 85:8, 85:12</p> <p><b>presently</b> [2] - 28:25, 76:7</p> <p><b>presents</b> [1] - 16:10</p> <p><b>pressure</b> [36] - 11:20, 11:22, 29:6, 29:7, 30:21, 31:4, 31:6, 31:8, 31:15, 45:1, 49:25, 57:6, 59:4, 59:7, 61:4, 62:14, 66:9, 69:7, 73:5, 73:9, 73:15, 74:5, 74:15, 74:18, 74:20, 74:24, 75:2, 77:21, 81:2, 81:3, 81:5, 81:24, 82:25, 83:7, 86:23</p> <p><b>pressures</b> [6] - 45:14, 52:7, 72:7, 72:11, 75:11, 86:15</p> <p><b>pressurized</b> [3] - 81:20, 83:2, 83:9</p> <p><b>pretty</b> [1] - 49:17</p> <p><b>prevent</b> [3] - 13:12, 14:11, 81:22</p> <p><b>prevention</b> [2] - 16:6, 16:7</p> <p><b>previously</b> [1] - 68:24</p> <p><b>price</b> [6] - 32:25, 33:2, 33:7, 33:18, 82:8, 82:9</p> <p><b>prices</b> [3] - 28:22, 30:1, 76:21</p> <p><b>primarily</b> [5] - 22:24, 23:9, 24:24, 35:19, 40:10</p> <p><b>primary</b> [1] - 45:17</p> <p><b>probe</b> [1] - 42:1</p> <p><b>problem</b> [2] - 63:9, 74:8</p> <p><b>procedural</b> [2] - 67:11, 67:15</p> <p><b>proceed</b> [10] - 6:4, 10:15, 21:4, 56:15, 59:14, 67:25, 72:4, 78:22, 81:9</p> <p><b>proceeded</b> [1] - 80:4</p> <p><b>proceeding</b> [7] - 10:5, 56:7, 67:23, 80:1, 83:18, 84:8, 89:17</p> <p><b>proceedings</b> [1] - 89:11</p> <p><b>process</b> [5] - 66:2, 66:5, 74:12, 86:18, 88:8</p> <p><b>produce</b> [7] - 28:5, 30:17, 71:13, 75:25, 76:8, 77:1, 79:19</p> <p><b>produced</b> [6] - 12:19,</p>	<p>13:13, 27:23, 28:20, 30:19, 75:23</p> <p><b>producers</b> [1] - 30:13</p> <p><b>producing</b> [9] - 13:7, 28:1, 28:4, 28:25, 29:3, 33:20, 71:6, 76:2, 84:10</p> <p><b>product</b> [1] - 82:8</p> <p><b>production</b> [4] - 13:17, 28:8, 28:15, 66:4</p> <p><b>professional</b> [1] - 53:9</p> <p><b>profitability</b> [3] - 61:19, 62:18, 63:12</p> <p><b>prohibit</b> [1] - 16:12</p> <p><b>project</b> [3] - 21:18, 22:2, 41:8</p> <p><b>prone</b> [1] - 83:19</p> <p><b>propensity</b> [1] - 15:2</p> <p><b>proper</b> [3] - 9:11, 12:8, 72:20</p> <p><b>properly</b> [1] - 7:14</p> <p><b>proposal</b> [6] - 62:13, 69:15, 69:19, 72:5, 73:11, 73:21</p> <p><b>proposals</b> [1] - 83:5</p> <p><b>proposed</b> [47] - 12:20, 12:24, 13:8, 14:14, 14:19, 15:4, 15:20, 15:25, 16:9, 16:13, 19:8, 20:9, 21:10, 21:14, 27:4, 38:10, 39:13, 39:24, 40:14, 40:22, 41:7, 42:23, 47:16, 47:20, 47:22, 48:4, 52:23, 59:25, 60:25, 61:13, 61:16, 61:17, 63:6, 64:4, 64:8, 73:16, 74:6, 79:24, 80:14, 80:15, 80:16, 81:3, 81:9, 81:16, 81:18, 81:25, 82:20</p> <p><b>proposes</b> [1] - 52:7</p> <p><b>proposing</b> [3] - 19:18, 31:25, 70:12</p> <p><b>protest</b> [1] - 66:12</p> <p><b>Protestants</b> [13] - 2:8, 3:15, 5:13, 9:4, 14:5, 14:9, 14:12, 14:22, 16:8, 50:21, 53:22, 83:14, 84:14</p> <p><b>Protestants'</b> [2] - 14:23, 85:9</p> <p><b>proven</b> [1] - 43:18</p> <p><b>proverbial</b> [1] - 16:6</p> <p><b>proves</b> [1] - 15:7</p> <p><b>provided</b> [2] - 6:21, 75:6</p> <p><b>psi</b> [18] - 11:21, 12:12,</p>	<p>29:7, 29:13, 57:4, 60:25, 62:14, 63:7, 69:7, 69:25, 70:20, 73:6, 73:21, 74:11, 80:6, 83:24, 86:2, 86:23</p> <p><b>public</b> [3] - 5:15, 10:25, 16:11</p> <p><b>publicly</b> [2] - 37:10, 38:5</p> <p><b>publish</b> [1] - 66:11</p> <p><b>pulled</b> [1] - 8:5</p> <p><b>pump</b> [3] - 33:18, 61:24, 82:20</p> <p><b>pumping</b> [2] - 33:9, 33:19</p> <p><b>purpose</b> [2] - 8:11, 8:15</p> <p><b>purposes</b> [1] - 14:24</p> <p><b>pursuant</b> [3] - 11:2, 11:5, 89:8</p> <p><b>pursue</b> [3] - 31:3, 67:12, 68:3</p> <p><b>put</b> [12] - 9:4, 9:9, 23:20, 24:2, 26:8, 26:13, 26:15, 66:22, 72:5, 76:21, 84:11, 87:18</p> <p><b>putting</b> [1] - 49:15</p>	<p><b>quite</b> [5] - 44:22, 57:8, 84:25, 87:8, 87:20</p> <p><b>quizzing</b> [1] - 47:7</p> <p><b>quote</b> [6] - 10:24, 11:1, 11:3, 11:4, 12:4, 12:6</p>	<p>60:1</p> <p><b>recollection</b> [1] - 86:2</p> <p><b>recommend</b> [6] - 12:7, 57:2, 57:3, 58:19, 58:21, 66:24</p> <p><b>recommendation</b> [8] - 5:17, 12:4, 57:17, 59:1, 60:17, 60:25, 65:10, 65:23</p> <p><b>recommendations</b> [1] - 58:22</p> <p><b>recommended</b> [1] - 12:4</p> <p><b>recommends</b> [1] - 16:21</p> <p><b>record</b> [31] - 6:14, 7:10, 7:17, 7:25, 9:5, 9:11, 9:20, 11:13, 16:21, 17:10, 18:14, 18:18, 20:18, 20:20, 20:21, 35:9, 37:14, 37:21, 38:21, 41:14, 51:18, 54:20, 57:16, 57:22, 59:13, 62:9, 67:8, 70:19, 84:19, 85:19, 87:4</p> <p><b>recorded</b> [1] - 84:23</p> <p><b>records</b> [4] - 26:16, 53:4, 53:6, 84:21</p> <p><b>REXCROSS</b> [2] - 73:2, 75:16</p> <p><b>Recross</b> [2] - 3:10, 3:10</p> <p><b>redirect</b> [1] - 52:16</p> <p><b>Redirect</b> [1] - 3:9</p> <p><b>REDIRECT</b> [2] - 52:19, 69:4</p> <p><b>reduce</b> [2] - 16:3, 60:25</p> <p><b>reduced</b> [2] - 73:22, 89:13</p> <p><b>reducing</b> [3] - 11:11, 11:15, 11:23</p> <p><b>reduction</b> [1] - 38:10</p> <p><b>redundant</b> [1] - 41:24</p> <p><b>reference</b> [2] - 43:1, 43:5</p> <p><b>referenced</b> [1] - 79:16</p> <p><b>referring</b> [2] - 20:14, 37:22</p> <p><b>reflect</b> [1] - 37:21</p> <p><b>regard</b> [3] - 10:2, 25:3, 80:17</p> <p><b>regarding</b> [10] - 5:17, 9:8, 10:22, 45:19, 46:1, 49:5, 67:12, 70:15, 77:9</p> <p><b>region</b> [2] - 34:5, 85:5</p> <p><b>regulation</b> [1] - 12:11</p> <p><b>regulations</b> [2] -</p>
<b>R</b>				
<p><b>radius</b> [2] - 13:8, 13:9</p> <p><b>Range</b> [1] - 1:5</p> <p><b>range</b> [3] - 5:7, 62:2, 81:14</p> <p><b>rapid</b> [1] - 15:20</p> <p><b>rate</b> [11] - 11:6, 11:8, 11:14, 11:17, 12:12, 44:25, 46:11, 52:7, 61:1, 66:9, 86:7</p> <p><b>rates</b> [4] - 11:12, 11:16, 11:23, 82:12</p> <p><b>RATHBUN</b> [1] - 2:4</p> <p><b>rather</b> [2] - 14:7, 67:23</p> <p><b>reach</b> [1] - 77:25</p> <p><b>reached</b> [1] - 60:8</p> <p><b>reactivated</b> [1] - 22:17</p> <p><b>read</b> [7] - 19:4, 20:23, 39:10, 39:11, 42:14, 47:12</p> <p><b>ready</b> [4] - 56:8, 64:25, 78:16, 87:14</p> <p><b>really</b> [8] - 7:23, 8:14, 47:21, 63:20, 65:14, 80:11, 82:4, 87:18</p> <p><b>reason</b> [8] - 27:22, 31:2, 42:8, 47:5, 47:6, 65:13, 82:1, 83:11</p> <p><b>reasonable</b> [3] - 60:10, 62:2, 63:7</p> <p><b>reasoned</b> [1] - 81:14</p> <p><b>reasoning</b> [2] - 63:19, 65:14</p> <p><b>reasons</b> [1] - 87:24</p> <p><b>rebut</b> [1] - 67:19</p> <p><b>rebuttal</b> [15] - 9:3, 18:5, 18:20, 36:20, 38:20, 38:25, 41:13, 42:5, 42:16, 44:3, 47:8, 59:16, 84:22, 85:12, 85:13</p> <p><b>recalled</b> [1] - 68:23</p> <p><b>Received</b> [1] - 4:6</p> <p><b>received</b> [1] - 35:15</p> <p><b>recent</b> [5] - 22:23, 23:7, 23:8, 24:23, 40:9</p> <p><b>recently</b> [1] - 30:13</p> <p><b>recessed</b> [1] - 56:4</p> <p><b>recognized</b> [5] - 14:4, 14:6, 15:2, 15:13,</p>	<p><b>Q</b></p> <p><b>Quail</b> [24] - 1:3, 2:3, 5:3, 5:10, 10:17, 10:20, 10:23, 11:20, 12:22, 13:10, 14:7, 17:2, 17:13, 17:24, 18:6, 27:5, 35:1, 35:24, 44:25, 59:14, 69:15, 83:23, 84:11, 86:20</p> <p><b>Quail's</b> [1] - 25:15</p> <p><b>qualify</b> [1] - 45:10</p> <p><b>quantitative</b> [1] - 75:6</p> <p><b>quarter</b> [2] - 12:23, 13:8</p> <p><b>questions</b> [26] - 18:12, 27:11, 29:22, 34:14, 34:18, 36:9, 38:12, 47:2, 48:1, 50:11, 51:12, 52:13, 54:12, 64:25, 65:5, 65:8, 67:10, 67:13, 67:15, 68:9, 68:12, 70:4, 70:22, 84:3, 84:4, 85:3</p> <p><b>Questions</b> [5] - 3:9, 3:11, 3:14, 3:16, 3:21</p> <p><b>quickly</b> [1] - 76:24</p>			

<p>16:19, 16:20  <b>regulatory</b> [6] - 8:13, 9:16, 15:22, 16:1, 16:14, 83:12  <b>reject</b> [1] - 79:19  <b>relate</b> [1] - 21:22  <b>related</b> [8] - 14:2, 14:6, 14:17, 31:17, 36:25, 49:24, 64:8, 69:25  <b>relating</b> [2] - 9:16, 70:2  <b>relationship</b> [17] - 8:12, 8:19, 14:4, 14:6, 15:12, 15:17, 19:21, 20:1, 20:11, 21:8, 23:15, 40:3, 40:5, 43:22, 43:25, 44:2, 52:23  <b>relative</b> [2] - 14:23, 89:14  <b>relevance</b> [1] - 7:22  <b>relevant</b> [1] - 85:7  <b>remain</b> [2] - 27:14, 69:2  <b>remains</b> [1] - 70:19  <b>remedial</b> [1] - 11:4  <b>remember</b> [5] - 19:23, 26:14, 62:6, 63:19, 65:17  <b>remind</b> [1] - 69:2  <b>Rene</b> [3] - 56:9, 56:19, 57:14  <b>RENE</b> [2] - 3:19, 56:11  <b>repeat</b> [1] - 45:22  <b>repetitious</b> [2] - 37:15, 42:13  <b>repetitive</b> [1] - 41:16  <b>reply</b> [1] - 47:1  <b>Report</b> [1] - 12:3  <b>report</b> [2] - 40:16, 86:13  <b>reported</b> [8] - 22:23, 23:7, 24:23, 40:9, 41:3, 42:22, 85:24, 86:12  <b>reporter</b> [9] - 17:5, 18:2, 18:7, 35:4, 36:24, 50:22, 53:23, 56:13, 68:25  <b>Reporter</b> [2] - 89:6, 89:24  <b>reports</b> [1] - 85:24  <b>representation</b> [1] - 18:3  <b>representative</b> [1] - 89:15  <b>representing</b> [1] - 10:16  <b>represents</b> [1] - 16:10</p>	<p><b>request</b> [3] - 10:19, 29:7, 86:20  <b>requested</b> [4] - 29:6, 49:25, 61:1, 76:5  <b>requests</b> [1] - 83:24  <b>required</b> [3] - 16:4, 66:10, 74:21  <b>requirements</b> [1] - 8:6  <b>requires</b> [1] - 13:22  <b>requiring</b> [1] - 11:1  <b>research</b> [3] - 25:4, 43:19, 77:12  <b>reserve</b> [1] - 59:15  <b>resolve</b> [1] - 67:22  <b>respect</b> [2] - 70:21, 85:9  <b>respectfully</b> [3] - 10:19, 83:24, 86:19  <b>respond</b> [2] - 36:15, 75:8  <b>responded</b> [1] - 75:9  <b>response</b> [12] - 15:22, 16:14, 31:17, 32:23, 46:25, 47:9, 55:10, 68:1, 68:2, 75:6, 77:7, 77:21  <b>responses</b> [1] - 67:12  <b>result</b> [5] - 11:3, 16:11, 28:8, 46:10, 81:23  <b>resume</b> [1] - 56:1  <b>return</b> [2] - 44:11, 82:12  <b>review</b> [3] - 20:19, 36:24, 41:14  <b>reviewed</b> [5] - 37:10, 38:5, 38:9, 39:11, 40:8  <b>reviewing</b> [1] - 7:25  <b>Rex</b> [4] - 6:18, 7:5, 7:12, 9:25  <b>riddled</b> [4] - 14:20, 21:15, 40:22, 40:24  <b>Ridge</b> [3] - 19:9, 19:22, 39:15  <b>ridge</b> [3] - 20:9, 21:9, 40:4  <b>rights</b> [1] - 13:6  <b>rise</b> [1] - 33:7  <b>rises</b> [1] - 33:3  <b>risk</b> [7] - 53:10, 79:25, 82:17, 82:18, 82:19, 85:8  <b>river</b> [1] - 53:3  <b>Road</b> [3] - 1:16, 2:15, 89:9  <b>road</b> [2] - 57:9, 71:16  <b>roads</b> [1] - 85:15  <b>Robert</b> [5] - 2:4, 2:9, 5:10, 5:13, 10:16</p>	<p><b>ROBERT</b> [1] - 2:9  <b>rock</b> [10] - 13:4, 21:18, 22:2, 22:16, 41:8, 43:19, 48:8, 48:18, 48:20, 49:17  <b>room</b> [2] - 57:6, 88:2  <b>rules</b> [1] - 42:7  <b>ruling</b> [1] - 58:6  <b>rush</b> [1] - 81:12</p> <p style="text-align: center;"><b>S</b></p> <p><b>safety</b> [2] - 10:25, 79:20  <b>Sager</b> [4] - 13:10, 13:13, 27:24, 30:15  <b>saltwater</b> [27] - 1:4, 5:4, 5:5, 7:23, 10:21, 10:22, 11:7, 11:8, 11:11, 11:14, 11:15, 11:21, 11:23, 12:6, 12:13, 12:18, 12:20, 13:2, 13:8, 13:11, 28:7, 28:20, 29:9, 71:6, 76:8, 86:21, 86:22  <b>Sandusky</b> [1] - 51:2  <b>save</b> [2] - 31:20, 32:19  <b>saw</b> [1] - 77:14  <b>scars</b> [1] - 22:17  <b>scenic</b> [1] - 85:10  <b>scheme</b> [1] - 9:16  <b>Schlumberger</b> [1] - 17:20  <b>school</b> [1] - 17:18  <b>scientific</b> [1] - 15:16  <b>scope</b> [1] - 48:3  <b>Scott</b> [1] - 1:18  <b>Seal</b> [1] - 89:19  <b>searched</b> [2] - 44:10, 44:14  <b>seated</b> [1] - 27:14  <b>second</b> [9] - 7:10, 9:12, 11:11, 11:17, 76:17, 85:19, 85:23, 86:4, 86:12  <b>Section</b> [2] - 1:5, 5:6  <b>section</b> [3] - 32:9, 49:10, 49:13  <b>sedimentary</b> [3] - 21:19, 22:3, 41:9  <b>see</b> [5] - 43:22, 44:6, 76:16, 87:21, 87:22  <b>seek</b> [1] - 74:4  <b>seeking</b> [1] - 70:20  <b>seeks</b> [1] - 30:21  <b>seismic</b> [8] - 13:24, 14:24, 22:19, 24:12, 49:23, 81:18, 84:20, 84:23</p>	<p><b>seismically</b> [3] - 13:24, 82:16, 83:19  <b>seismicity</b> [19] - 8:14, 8:20, 9:16, 14:5, 15:6, 15:13, 15:18, 16:12, 43:23, 52:24, 60:21, 61:4, 81:6, 81:20, 84:13, 84:15, 85:1, 85:9, 86:3  <b>sense</b> [2] - 8:13, 80:20  <b>sequence</b> [1] - 65:1  <b>series</b> [1] - 14:16  <b>served</b> [1] - 17:18  <b>serves</b> [2] - 30:14, 32:5  <b>set</b> [3] - 10:23, 89:12, 89:18  <b>several</b> [2] - 47:2, 79:17  <b>shape</b> [1] - 45:10  <b>share</b> [1] - 8:1  <b>Shari</b> [1] - 1:17  <b>SHAWNEE</b> [1] - 89:4  <b>Shawnee</b> [2] - 1:16, 89:9  <b>Sherri</b> [1] - 89:5  <b>SHERRI</b> [1] - 89:23  <b>shift</b> [2] - 80:7, 80:24  <b>Shobe</b> [16] - 12:22, 34:25, 35:8, 35:10, 36:12, 36:19, 37:9, 38:19, 39:1, 39:10, 41:18, 42:17, 42:20, 42:21, 44:25, 62:10  <b>SHOBE</b> [12] - 3:12, 35:2, 47:4, 47:9, 47:14, 48:5, 48:9, 48:15, 49:1, 49:8, 50:1, 50:8  <b>Shobe's</b> [4] - 41:22, 42:3, 85:2, 85:12  <b>short</b> [1] - 53:5  <b>Shorthand</b> [2] - 89:5, 89:24  <b>shorthand</b> [1] - 89:12  <b>show</b> [3] - 11:3, 37:2, 84:14  <b>showed</b> [1] - 85:17  <b>shown</b> [2] - 10:23, 81:23  <b>shows</b> [3] - 12:22, 84:18, 85:20  <b>sides</b> [1] - 7:18  <b>significance</b> [2] - 20:11, 21:8  <b>significant</b> [1] - 84:23  <b>significantly</b> [1] - 15:8  <b>simple</b> [1] - 46:19  <b>site</b> [3] - 15:4, 22:10, 48:4</p>	<p><b>situation</b> [3] - 53:8, 53:11, 67:21  <b>slightly</b> [1] - 48:16  <b>slip</b> [2] - 22:18, 81:21  <b>slippage</b> [1] - 83:3  <b>Sly</b> [19] - 1:4, 5:5, 10:22, 11:7, 11:18, 11:21, 11:24, 12:6, 13:8, 13:10, 13:11, 13:13, 27:24, 30:15, 30:19, 32:1, 49:22, 75:22, 86:22  <b>small</b> [1] - 49:13  <b>smaller</b> [1] - 21:24  <b>sole</b> [1] - 65:14  <b>someone</b> [1] - 58:10  <b>someplace</b> [1] - 30:3  <b>somewhere</b> [4] - 30:4, 33:2, 33:23, 34:4  <b>soon</b> [1] - 87:13  <b>sorry</b> [9] - 10:12, 33:10, 39:10, 44:20, 52:18, 55:18, 59:14, 61:10, 79:20  <b>sort</b> [2] - 64:7, 67:23  <b>sound</b> [1] - 65:15  <b>south</b> [4] - 5:6, 23:3, 47:20, 49:20  <b>South</b> [6] - 15:10, 15:22, 24:15, 24:19, 46:13, 49:9  <b>Southwest</b> [3] - 1:16, 2:15, 89:9  <b>space</b> [1] - 87:25  <b>spacing</b> [2] - 71:12, 78:2  <b>speaking</b> [2] - 25:16, 82:16  <b>specific</b> [2] - 20:15, 39:23  <b>specifically</b> [2] - 47:18, 75:1  <b>specified</b> [12] - 11:10, 11:15, 11:22, 11:25, 12:1, 12:5, 12:14, 81:2, 86:5, 86:6, 86:15  <b>specify</b> [1] - 60:17  <b>specifying</b> [2] - 21:22, 83:7  <b>spend</b> [1] - 88:4  <b>spot</b> [1] - 66:22  <b>spread</b> [1] - 18:14  <b>square</b> [3] - 30:22, 46:17, 46:20  <b>ss</b> [1] - 89:3  <b>Staff</b> [49] - 2:12, 3:19, 5:15, 5:16, 5:18, 7:19, 7:21, 8:1, 10:9, 10:18, 12:4, 12:7,</p>
--	---	---	---	--

16:16, 16:21, 27:10, 29:19, 34:20, 34:21, 36:13, 38:11, 44:19, 46:22, 52:3, 55:3, 55:4, 55:16, 55:19, 55:20, 56:7, 56:9, 56:12, 58:3, 58:19, 62:8, 64:21, 69:21, 70:11, 70:12, 75:15, 78:14, 78:22, 78:25, 79:12, 80:8, 80:20, 81:25, 85:24, 86:13  
**Staff's** [9] - 38:9, 58:16, 60:24, 69:20, 70:14, 80:15, 80:16, 81:2, 85:3  
**stand** [3] - 27:13, 56:10, 68:21  
**Standing** [2] - 6:21, 7:6  
**standing** [1] - 10:1  
**stands** [1] - 70:16  
**start** [2] - 29:11, 29:17  
**started** [2] - 17:23, 72:2  
**State** [1] - 89:7  
**state** [8] - 11:1, 17:9, 17:19, 35:8, 49:20, 51:1, 54:2, 85:3  
**STATE** [3] - 1:1, 1:1, 89:2  
**statement** [2] - 23:19, 58:13  
**STATEMENTS** [1] - 3:2  
**statements** [8] - 10:11, 10:12, 16:24, 20:18, 55:15, 78:13, 78:16, 80:9  
**Statements** [1] - 4:1  
**States** [7] - 15:15, 22:22, 23:6, 24:6, 24:22, 37:11, 40:7  
**statute** [2] - 11:2, 11:5  
**statutory** [2] - 14:10, 79:17  
**stay** [1] - 65:24  
**stepped** [1] - 88:10  
**stick** [2] - 42:4, 63:20  
**still** [6] - 7:25, 18:8, 33:12, 60:7, 70:20, 83:23  
**stipulate** [1] - 70:18  
**stipulated** [1] - 11:20  
**strata** [2] - 43:3  
**Street** [1] - 2:5  
**strengthen** [1] - 8:12  
**stress** [2] - 16:4, 22:18  
**strike** [2] - 42:21, 60:15

**structural** [2] - 46:15, 46:19  
**structures** [1] - 26:1  
**STUCKY** [10] - 3:19, 56:11, 59:5, 59:8, 65:12, 65:20, 65:24, 66:7, 66:16, 67:3  
**Stucky** [14] - 56:10, 56:19, 58:4, 58:7, 58:13, 59:13, 59:24, 65:9, 68:8, 69:11, 72:1, 74:2, 84:2  
**Stucky's** [4] - 57:15, 58:18, 58:20, 73:21  
**studied** [3] - 41:18, 45:5, 86:11  
**studies** [5] - 40:15, 41:19, 43:20, 45:9, 46:9  
**study** [1] - 25:25  
**stuff** [1] - 60:14  
**subject** [6] - 10:5, 11:6, 38:2, 49:6, 50:7, 84:14  
**submit** [3] - 9:1, 36:19, 72:9  
**submitted** [13] - 7:15, 9:8, 17:25, 18:2, 18:5, 18:7, 36:23, 38:21, 40:18, 58:15, 69:16, 70:1, 87:13  
**submitting** [1] - 87:4  
**Subsection** [1] - 14:11  
**subsequent** [1] - 74:5  
**substrata** [9] - 14:24, 15:23, 19:17, 39:24, 64:4, 64:8, 79:13, 79:23, 81:8  
**suggest** [1] - 78:22  
**suggests** [1] - 16:1  
**suitability** [1] - 14:25  
**suitable** [2] - 15:24, 25:16  
**suite** [1] - 2:6  
**summarize** [2] - 17:14, 35:13  
**Sumner** [10] - 11:25, 14:3, 25:20, 26:2, 27:3, 31:22, 36:4, 36:8, 49:6, 50:6  
**supplement** [1] - 58:21  
**supplementation** [1] - 59:12  
**support** [1] - 80:15  
**suppose** [1] - 66:19  
**Supreme** [1] - 89:6  
**surface** [4] - 12:25, 13:1, 22:9, 47:21  
**surrebuttal** [1] - 65:6

**survey** [7] - 15:16, 22:22, 23:7, 24:6, 24:22, 37:11, 40:8  
**Survey** [2] - 6:20, 15:15  
**sustain** [4] - 37:25, 38:17, 42:12, 72:22  
**SWD** [1] - 1:4  
**sworn** [6] - 17:5, 35:4, 50:22, 53:23, 56:13, 68:24

## T

**tabs** [1] - 79:6  
**tectonic** [2] - 22:17, 22:18  
**tend** [1] - 82:9  
**tender** [5] - 39:5, 51:24, 54:24, 58:3, 59:13  
**tendering** [1] - 18:24  
**Tennessee** [1] - 35:16  
**tens** [1] - 21:23  
**term** [1] - 40:24  
**terms** [4] - 28:4, 42:3, 47:17, 50:5  
**territory** [2] - 58:1, 81:12  
**testified** [11] - 12:17, 52:21, 70:24, 71:4, 74:23, 75:2, 75:18, 76:6, 77:9, 82:3, 84:21  
**testifies** [6] - 17:6, 35:5, 50:23, 53:24, 56:14, 68:25  
**testify** [4] - 44:4, 58:13, 75:10, 81:4  
**testimony** [143] - 6:7, 6:18, 6:20, 7:5, 7:12, 7:17, 7:25, 8:4, 8:11, 8:17, 8:21, 9:3, 9:18, 9:24, 9:25, 10:3, 10:4, 10:24, 12:22, 14:21, 16:2, 17:25, 18:3, 18:6, 18:14, 18:19, 18:20, 19:5, 19:10, 19:23, 19:25, 20:10, 20:15, 20:23, 21:6, 21:13, 21:20, 22:1, 24:25, 34:23, 36:20, 36:23, 37:9, 37:15, 38:9, 38:14, 38:20, 38:25, 39:11, 39:16, 40:2, 40:5, 40:6, 40:12, 40:16, 40:19, 40:20, 41:3, 41:4, 41:5, 41:13, 41:21, 41:22, 41:23, 42:3, 42:9, 42:14, 42:22, 42:25, 43:6, 44:3, 47:2, 47:8, 47:11, 48:11, 50:17, 51:4, 51:7, 51:9, 51:13, 51:17, 52:15, 53:13, 53:18, 54:7, 54:10, 54:14, 54:16, 54:20, 56:20, 56:23, 56:25, 57:1, 57:12, 57:15, 58:6, 58:11, 58:12, 58:15, 58:17, 58:20, 59:12, 60:1, 60:2, 60:8, 61:7, 61:11, 61:16, 61:17, 61:18, 62:17, 63:22, 63:23, 64:2, 68:19, 70:15, 73:14, 74:2, 74:14, 75:5, 78:11, 79:9, 79:11, 79:16, 80:18, 82:18, 83:8, 83:13, 84:1, 84:18, 84:22, 85:2, 85:6, 85:12, 85:13  
**TESTIMONY** [1] - 89:18  
**THE** [2] - 1:1, 1:1  
**theory** [1] - 43:18  
**therefore** [1] - 33:1  
**thereto** [1] - 15:22  
**THEREUPON** [4] - 9:19, 56:3, 67:7, 88:17  
**thicker** [1] - 25:21  
**thickness** [1] - 48:3  
**thirty** [1] - 76:13  
**thoroughly** [1] - 8:10  
**thousand** [1] - 13:3  
**threat** [2] - 16:10, 79:20  
**three** [3] - 12:17, 80:11, 80:12  
**threshold** [3] - 60:20, 61:3, 81:5  
**thresholds** [1] - 53:8  
**thrust** [1] - 46:8  
**tied** [3] - 61:7, 61:17, 61:20  
**today** [21] - 51:13, 54:10, 54:13, 56:23, 58:20, 62:17, 72:1, 73:14, 74:14, 75:18, 79:10, 79:11, 80:7, 80:23, 81:23, 82:15, 87:3, 87:12, 87:19, 87:20, 88:15  
**together** [2] - 28:5, 72:6  
**took** [1] - 20:4  
**top** [8] - 13:5, 32:3,

48:16, 48:17, 49:11, 49:15, 49:16  
**Topeka** [5] - 1:16, 2:15, 87:24, 89:9, 89:19  
**totally** [1] - 50:9  
**township** [2] - 5:6, 46:17  
**Township** [1] - 1:5  
**track** [2] - 24:14, 24:16  
**transcript** [1] - 87:13  
**treated** [2] - 88:10, 88:12  
**trend** [1] - 24:18  
**tried** [1] - 26:13  
**triggered** [1] - 24:7  
**truck** [2] - 13:14, 33:9  
**trucks** [1] - 85:14  
**true** [7] - 18:2, 18:9, 38:21, 51:9, 54:16, 74:16, 76:4  
**truly** [1] - 29:8  
**try** [4] - 60:9, 62:1, 76:21, 79:22  
**trying** [2] - 64:20, 79:6  
**turn** [2] - 28:23, 80:12  
**turning** [2] - 29:5, 76:5  
**two** [14] - 6:7, 8:15, 12:14, 20:22, 20:23, 30:13, 65:19, 71:6, 71:21, 72:13, 75:19, 76:7  
**type** [2] - 49:18, 65:6  
**typical** [1] - 69:7  
**typically** [2] - 58:10, 78:21

## U

**UI** [33] - 8:14, 8:20, 13:23, 14:3, 14:4, 14:7, 14:12, 14:14, 14:19, 14:25, 15:2, 15:4, 15:12, 15:18, 15:20, 15:24, 19:17, 20:10, 21:10, 21:14, 22:10, 24:8, 26:19, 27:4, 39:13, 39:24, 40:14, 40:22, 42:23, 43:3, 43:22, 64:8  
**ultimately** [4] - 28:14, 80:4, 80:24, 83:9  
**uncertain** [2] - 76:20, 77:1  
**uncontrolled** [9] - 53:1, 79:15, 81:11, 82:2, 82:14, 83:10, 83:11, 85:21, 86:17  
**under** [12] - 11:11, 11:16, 14:10, 16:9,

<p>19:17, 25:24, 39:24, 56:22, 58:22, 69:2, 81:24, 84:12</p> <p><b>underground</b> [2] - 13:23, 83:15</p> <p><b>underlie</b> [3] - 27:2, 27:4, 40:14</p> <p><b>underlying</b> [1] - 8:15</p> <p><b>underneath</b> [2] - 41:7, 42:23</p> <p><b>understood</b> [3] - 48:11, 61:11, 77:8</p> <p><b>undertake</b> [2] - 79:21, 82:1</p> <p><b>uneconomical</b> [1] - 29:25</p> <p><b>unfortunately</b> [1] - 63:16</p> <p><b>United</b> [7] - 15:15, 22:22, 23:6, 24:6, 24:22, 37:11, 40:7</p> <p><b>university</b> [1] - 35:16</p> <p><b>unlikely</b> [1] - 46:10</p> <p><b>unnecessary</b> [1] - 84:11</p> <p><b>unpressurized</b> [1] - 82:25</p> <p><b>unreasonable</b> [1] - 79:25</p> <p><b>unsuitable</b> [1] - 15:5</p> <p><b>up</b> [10] - 6:1, 33:13, 46:4, 67:25, 69:10, 74:25, 79:3, 87:24, 88:7, 88:13</p> <p><b>uplift</b> [7] - 19:9, 39:14, 46:3, 46:5, 46:16, 46:20, 47:18</p> <p><b>upper</b> [1] - 48:14</p> <p><b>upward</b> [3] - 21:18, 22:2, 41:8</p> <p><b>urge</b> [3] - 14:9, 16:8, 82:22</p> <p><b>usable</b> [2] - 12:23, 12:25</p> <p><b>USGS</b> [6] - 24:9, 26:7, 26:15, 26:21, 38:6, 84:24</p> <p><b>USGS'</b> [1] - 25:3</p>	<p>33:21, 33:24, 34:3, 34:6, 34:11, 38:7, 68:22, 69:3, 77:12, 77:18, 78:4</p> <p><b>Valentine</b> [17] - 17:1, 17:9, 17:11, 18:20, 19:4, 27:20, 48:2, 62:10, 62:11, 63:17, 68:20, 69:6, 70:23, 73:4, 75:18, 82:24, 83:9</p> <p><b>Valentine's</b> [2] - 48:11, 85:13</p> <p><b>variables</b> [1] - 81:19</p> <p><b>variety</b> [1] - 46:7</p> <p><b>verifiable</b> [1] - 8:7</p> <p><b>vetted</b> [1] - 8:10</p> <p><b>view</b> [2] - 67:20, 87:6</p> <p><b>Vincze</b> [7] - 2:4, 3:3, 3:7, 3:9, 4:2, 5:10, 10:16</p> <p><b>VINCZE</b> [50] - 5:10, 7:8, 8:23, 8:25, 10:13, 10:16, 17:1, 17:8, 18:11, 18:16, 18:22, 18:25, 20:13, 34:15, 34:24, 35:7, 36:16, 36:19, 37:8, 37:16, 38:4, 38:8, 38:18, 38:19, 38:24, 39:5, 41:10, 50:12, 51:21, 52:1, 54:21, 55:1, 57:20, 57:23, 59:15, 59:19, 64:13, 65:6, 68:5, 68:11, 68:20, 69:5, 69:24, 70:18, 70:23, 72:23, 78:9, 79:2, 83:22, 87:7</p> <p><b>Vincze's</b> [1] - 8:1</p> <p><b>Vincze</b> [1] - 3:12</p> <p><b>volume</b> [14] - 11:19, 31:25, 45:6, 49:19, 58:14, 61:23, 61:25, 67:1, 81:2, 81:3, 81:5, 85:16, 86:8, 86:24</p> <p><b>volumes</b> [9] - 25:24, 45:13, 60:14, 60:21, 69:7, 69:9, 72:6, 72:11, 81:3</p> <p><b>voluminous</b> [1] - 9:7</p> <p><b>vulnerability</b> [1] - 15:5</p> <p><b>vulnerable</b> [5] - 13:24, 13:25, 81:7, 81:17, 82:16</p>	<p><b>wait</b> [3] - 14:7, 31:3, 55:9</p> <p><b>waiting</b> [2] - 55:10, 87:8</p> <p><b>waive</b> [1] - 78:25</p> <p><b>waived</b> [1] - 64:20</p> <p><b>Wamego</b> [1] - 14:18</p> <p><b>wants</b> [1] - 84:2</p> <p><b>waste</b> [11] - 13:12, 22:25, 23:10, 23:15, 24:25, 25:17, 40:11, 43:7, 73:15, 81:24, 82:22</p> <p><b>water</b> [40] - 12:16, 12:23, 12:25, 13:13, 13:14, 22:25, 23:10, 23:15, 24:25, 25:17, 28:15, 28:20, 28:24, 29:2, 29:4, 29:24, 30:1, 30:4, 30:8, 31:12, 33:1, 33:10, 33:20, 33:22, 33:25, 34:9, 40:11, 43:7, 45:13, 49:15, 71:14, 71:18, 73:10, 73:15, 75:22, 81:24, 82:7, 82:22, 85:11</p> <p><b>ways</b> [1] - 87:20</p> <p><b>website</b> [9] - 8:5, 8:8, 8:11, 26:7, 26:21, 37:12, 38:6, 44:11, 77:13</p> <p><b>weighs</b> [1] - 83:18</p> <p><b>weight</b> [1] - 10:6</p> <p><b>welcome</b> [2] - 5:1, 87:23</p> <p><b>welfare</b> [2] - 11:1, 79:21</p> <p><b>well-articulated</b> [1] - 80:19</p> <p><b>well-developed</b> [1] - 80:16</p> <p><b>wells</b> [72] - 8:14, 8:20, 13:7, 13:9, 13:13, 13:15, 13:16, 13:23, 13:24, 14:3, 14:4, 15:12, 15:18, 15:24, 25:11, 25:12, 26:19, 28:1, 28:11, 28:13, 28:16, 28:18, 28:25, 29:3, 29:10, 31:22, 31:23, 32:24, 33:3, 33:8, 33:13, 33:18, 34:8, 43:23, 45:6, 45:14, 49:5, 49:8, 49:19, 50:5, 60:13, 61:13, 61:19, 62:18, 63:12, 65:19, 71:7, 71:11, 71:13, 71:18, 71:20, 71:21, 72:13,</p>	<p>74:23, 75:3, 75:11, 75:19, 76:3, 76:7, 76:11, 76:15, 76:22, 76:24, 77:14, 77:15, 77:24, 78:5, 82:20, 84:10, 84:18</p> <p><b>whereas</b> [1] - 73:6</p> <p><b>wherein</b> [1] - 86:16</p> <p><b>WHEREOF</b> [1] - 89:18</p> <p><b>Wichita</b> [2] - 2:6, 87:24</p> <p><b>wide</b> [1] - 46:7</p> <p><b>width</b> [2] - 32:8, 48:13</p> <p><b>wish</b> [8] - 6:1, 7:20, 18:14, 55:14, 59:18, 67:25, 68:2, 87:2</p> <p><b>withdraw</b> [1] - 36:16</p> <p><b>witness</b> [29] - 10:11, 16:25, 17:4, 18:24, 20:16, 20:22, 20:25, 31:19, 34:16, 35:3, 37:16, 38:5, 39:5, 42:1, 50:21, 51:25, 53:17, 53:22, 54:24, 55:17, 55:19, 56:8, 56:12, 62:6, 68:2, 68:16, 68:23, 78:8, 81:4</p> <p><b>witness'</b> [1] - 42:5</p> <p><b>witnesses</b> [7] - 50:18, 60:3, 66:18, 67:18, 67:20, 89:8, 89:13</p> <p><b>WITNESSES</b> [1] - 3:5</p> <p><b>word</b> [1] - 88:11</p> <p><b>worker</b> [1] - 17:17</p> <p><b>worth</b> [1] - 16:7</p> <p><b>WRAY</b> [3] - 3:7, 17:3, 68:22</p> <p><b>Wray</b> [4] - 17:1, 17:11, 18:20, 68:20</p> <p><b>written</b> [2] - 78:20, 89:14</p>
<b>V</b>			<b>Y</b>
			<b>years</b> [4] - 17:20, 29:12, 35:18, 71:15
			<b>Z</b>
<p><b>vacuum</b> [8] - 12:16, 25:14, 29:11, 29:17, 31:1, 62:21, 62:23, 70:25</p> <p><b>VALENTINE</b> [24] - 3:7, 17:3, 29:25, 30:6, 30:14, 30:18, 31:5, 31:11, 32:2, 32:12, 32:17, 33:4, 33:11,</p>			<b>zero</b> [4] - 50:2, 73:22, 83:7, 85:8
	<b>W</b>		<b>zone</b> [7] - 12:21, 19:14, 20:5, 39:19, 40:4, 66:10
		<b>waist</b> [1] - 73:10	<b>zones</b> [5] - 19:16, 19:19, 19:22, 39:23, 40:1