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UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF LOUISIANA

IN RE: OIL SPILL BY THE OIL RIG \* Docket 10-MD-2179  
*DEEPWATER HORIZON* IN THE \*  
GULF OF MEXICO ON APRIL 20, 2010 \* Section J  
Applies to: \* New Orleans, Louisiana  
Docket 10-CV-02771, \* March 4, 2013  
*IN RE: THE COMPLAINT AND* \*  
*PETITION OF TRITON ASSET* \*  
*LEASING GmbH, et al* \*  
Docket 10-CV-4536, \*  
*UNITED STATES OF AMERICA v.* \*  
*BP EXPLORATION & PRODUCTION,* \*  
*INC., et al* \*  
\* \* \* \* \*

DAY 5, AFTERNOON SESSION  
TRANSCRIPT OF NONJURY TRIAL  
BEFORE THE HONORABLE CARL J. BARBIER  
UNITED STATES DISTRICT JUDGE

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I N D E X

	<u>Page</u>
1	
2	
3	Andrew Hurst
4	Direct Examination By Mr. Leger: 1512
5	Cross-Examination By Mr. Miller: 1576
6	Cross-Examination By Mr. Regan: 1578
7	Redirect Examination Mr. Leger 1617
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
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24	
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1                                    **AFTERNOON SESSION**

2                                    **(March 4, 2013)**

3                                    \* \* \* \* \*

4                    **THE DEPUTY CLERK:** All rise.

5                    **THE COURT:** Please be seated, everyone.

6                                    All right. Next witness for the plaintiffs.

7                    **MR. STERBCOW:** Your Honor, if I may, if it please the  
8 Court, Plaintiffs Steering Committee.

9                                    A couple of quick housekeeping matters. We are  
10 going to offer and introduce into evidence all of our exhibits,  
11 demonstratives, and call-outs used during Mr. Bly's testimony.

12                                    I just spoke to Ms. Karis. She said she wanted  
13 to compare her list to ours, both for -- I think, possibly  
14 duplicates and some objections. We're going to get together  
15 after court today, make sure the lists are clean; and then  
16 we'll offer ours into evidence.

17                                    The second issue I wanted to bring to the  
18 Court's attention, it was our intent to call Mike Williams, a  
19 Transocean rig hand, live, as the Court knows. He was not  
20 under the Court's subpoena power. We didn't have control over  
21 him. It was all voluntary. Mr. Williams advised us late last  
22 week that he had changed his mind and did not want to come.

23                    **THE COURT:** Where does he live?

24                    **MR. STERBCOW:** He lives north of Dallas in  
25 Silver Springs, Texas, I believe.



1           **THE COURT:** All right.

2           **MR. STERBCOW:** So in conjunction with that decision,  
3 we are going to offer his deposition bundle. And we would also  
4 ask the Court, because we were going to bring him live and to  
5 put some other context in other witnesses, like we did with  
6 Mr. Hayward and Mr. Lacy, that we be permitted to play a brief  
7 video clip from his deposition.

8           **THE COURT:** Okay. Anybody have any objections to  
9 that?

10          **MR. UNDERHILL:** From BP, I think I saw a note from my  
11 team this morning that his designations and counter  
12 designations are not complete yet because it was expected that  
13 he would be a live witness. So there is work to do in that  
14 space. And, of course, we would just request the notice that's  
15 in place by the court order in terms of playing live testimony  
16 so that we'll have a chance to look at that and make any  
17 suggestions you deem appropriate to the Court about it.

18          **MR. STERBCOW:** I think we just sent the videos out.

19                   Am I correct on that, Cindy?

20                   Okay. It's about to be sent to everyone now,  
21 Judge. We just put this together at the last minute. In terms  
22 of the bundle, we'll hold it to make sure that everybody's had  
23 the opportunity to do what they need to do.

24          **THE COURT:** Okay. All right.

25          **MR. BECK:** Your Honor, David Beck for Cameron. We'd

1 like to offer the following documents used during the  
2 cross-examination of Mr. Mark Bly: TRES 1893, which is  
3 Appendix H to the Bly report, which contained a description of  
4 the BOP stack and control system. And then D-4213, which is  
5 the depiction of the *Deepwater Horizon* rig to the BOP we put up  
6 on the screen.

7 **THE COURT:** All right. Anyone has any objections to  
8 that?

9 No objection, those are admitted.

10 **MR. BECK:** Thank you, Your Honor.

11 **THE COURT:** Give copies of that to everyone else,  
12 Mr. Beck?

13 **MR. BECK:** I'm sorry, Your Honor?

14 **THE COURT:** When these lists are being submitted to  
15 us, I'm assuming that everybody's getting copies of these?

16 **MR. BECK:** That is correct. We e-mailed them.

17 **THE COURT:** Okay. Good. Thank you.

18 **MR. UNDERHILL:** Thank you, Your Honor. Mike  
19 Underhill on behalf of the United States.

20 Like Mr. Beck, I have a written list and also a  
21 CD-ROM because there are some video clips and also, I believe,  
22 an animation for the clip of Mr. Bly that I prepared to submit  
23 to the Court and to Ben and also to the parties.

24 So I would offer those into evidence. And if  
25 the parties want to try to clean them up later, I think that's

1 the correspondence. There is actually an agreement, but I  
2 formally offer them now.

3 **THE COURT:** All right. Is there any objection to  
4 that?

5 **MS. KARIS:** Your Honor, Hariklia Karis for BP.

6 We don't have an objection that I know of at  
7 this time. If I could have the same opportunity to review that  
8 list, as I'm going to do with Mr. Sterbcow, and inform  
9 Mr. Underhill by the end of day if we have any issues, I'd  
10 appreciate it.

11 **THE COURT:** All right. Very well.

12 **MS. KARIS:** Thank you, Your Honor.

13 **MR. KANNER:** Good afternoon, Your Honor. We would  
14 move into evidence TREN 2701 --

15 **THE COURT:** Say who you are and who you represent.

16 **MR. KANNER:** I'm sorry. Allan Kanner for the State  
17 of Louisiana. I apologize, Your Honor.

18 We're moving into evidence TREN 2701. That was  
19 the risk matrix we used with Mr. Bly. And TREN 0860 and 0861,  
20 which were the alternative approaches to the Swiss cheese  
21 model.

22 We copied everybody on our list, and we'd move  
23 them into evidence.

24 **THE COURT:** Is there any objection to these?

25 All right. Without objection, those are

1 admitted.

2 **MR. BRIAN:** Your Honor, Brad Brian for Transocean.  
3 We prepared, over the noon hour, a list of the exhibits that  
4 we're offering, all of which I used during the  
5 cross-examination of Mr. Bly. I gave a copy to Mr. Alan, and  
6 I've distributed copies. BP's counsel asked the opportunity  
7 overnight to review it. That's acceptable to me if it's  
8 acceptable with the Court. So I would offer them in tomorrow  
9 morning.

10 **THE COURT:** All right. That's fine.

11 **MR. GODWIN:** Same, Your Honor. Don Godwin for  
12 Halliburton. We'll circulate this evening, Your Honor, our  
13 exhibits, and then we'll offer them first thing in the morning.

14 **THE COURT:** Okay. Good.

15 **MR. GODWIN:** Thank you, Judge.

16 **THE COURT:** Sure.

17 Mr. Roberts, you're up and walking. I heard  
18 about your disability.

19 **MR. ROBERTS:** I just spoke to Mr. Williams. Could  
20 you set a date for the submission for the Mike Williams bundle  
21 because I think we're all in the same boat and need to do some  
22 revisions. We just need a time frame in which to do it.

23 **THE COURT:** All right. How much time? Can someone  
24 suggest how much time you-all need today?

25 **MR. STERBCOW:** By the end of the week, Your Honor.

1           **MR. ROBERTS:** By the end of the week is fine, Your  
2 Honor.

3           **THE COURT:** Okay. Very well.

4                     Are you ready to proceed with the next witness?

5           **MR. REGAN:** Matt Regan on behalf of BP, Your Honor.

6                     As with some of the other witnesses, there is a  
7 *Daubert* motion that's pending. Based on the way we've handled  
8 these before, Your Honor, I understand that it may be your  
9 preference to take the testimony and then give it the weight  
10 you decide to later on, but I wanted to just for the record  
11 note there is a motion pending.

12           **THE COURT:** Yeah. I have looked at the report,  
13 obviously; and I've looked at the *Daubert* motion. I do have  
14 some questions about this expert and this report, I'll admit.  
15 But, hopefully -- and when I hear him, I may have some  
16 questions for myself on exactly what he's talking about here  
17 and how it relates to this incident. Maybe Mr. Leger can help  
18 me with that, too -- help us all with that.

19           **MR. LEGER:** I will attempt to, Your Honor.

20           **THE COURT:** Well, it's somewhat of an unusual expert  
21 report because it doesn't look like an expert report. It looks  
22 like an academic article to me. And I guess that's part of the  
23 confusion, you know. I don't want to say *confusion*. That's  
24 part of trying to understand how this relates to this trial,  
25 but we'll see where it goes. Okay?

1           **MR. REGAN:** Thank you, Your Honor.

2           **MR. LEGER:** Thank you, Your Honor. Walter Leger, Jr.  
3 on behalf of the plaintiff's steering committee, Your Honor.  
4 And we would call, as our next witness, Professor Andrew Hurst.

5           **THE COURT:** Professor Hurst. Is he outside? Oh,  
6 there he is.

7           (WHEREUPON, **ANDREW HURST**, having been duly sworn,  
8 testified as follows.)

9           **THE DEPUTY CLERK:** Please state your full name and  
10 correct spelling for the record.

11           **THE WITNESS:** My name's Andrew Hurst, and that's  
12 A-N-D-R-E-W. Hurst is H-U-R-S-T.

13           **MR. LEGER:** And, Your Honor, in connection with the  
14 testimony of Professor Hurst, we would offer into evidence his  
15 report, Trial Exhibit No. 07500, and attachments to the report,  
16 including illustrations and otherwise, 07501.

17           **THE COURT:** All right. That's the report dated, it  
18 looks like, August 19th, 2011; correct?

19           **MR. LEGER:** That's correct, Your Honor.

20           **THE COURT:** It's only a single report; right?

21           **MR. LEGER:** It's a single report and the curriculum  
22 vitae is attached.

23           **THE COURT:** And the CV and all of that. Okay. I'm  
24 going to allow the evidence, again, subject to the objections  
25 that have been raised. I will have to consider them, of

## ANDREW HURST - DIRECT

1 course.

2 MR. LEGER: Understand, Your Honor.

3 THE COURT: Sure.

4 DIRECT EXAMINATION

5 BY MR. LEGER:

6 Q. Professor Hurst, your report and your CV has already been  
7 offered and submitted into evidence and -- but I'd like to ask  
8 you a few questions about your background in connection with  
9 your expertise.

10 Professor, can you tell us a little bit about your  
11 educational background, first of all?

12 A. Yes. I should have got the microphone technology under  
13 control here.

14 My background is a degree, Bachelor of Science degree  
15 in geology and mineralogy in 1977. I then did a Ph.D., a  
16 doctoral study, in the University of Reading, which I completed  
17 in 1981.

18 Q. And what did you study in connection with your doctoral  
19 studies?

20 A. My doctoral studies were to do with how sand and mud  
21 become rock.

22 Q. And when did you begin your professional career, Doctor?

23 A. I began my professional career in 1981.

24 Q. And I'm going to kind of walk you through it. As I  
25 appreciate it, you began working for Statoil; is that correct?

## ANDREW HURST - DIRECT

1 A. Yes.

2 Q. What did you do for Statoil?

3 A. I was, ironically, hired as an expert at a very tender age  
4 to develop laboratory and analytical programs for the  
5 prediction of porosity -- permeability in particular -- in  
6 sandstones.

7 Q. And did you have a promotion in 1982 with Statoil?

8 A. Yes, I did.

9 Q. What were you promoted to do?

10 A. I don't actually remember what I was promoted to.

11 Q. Did you become a senior geologist in the reservoir  
12 department at Statoil?

13 A. Yes, that's correct.

14 Q. And in 1986, you were promoted to lead geoscientist in the  
15 petroleum technology group; correct?

16 A. That's correct.

17 Q. And in 1990, you left Statoil; correct?

18 A. That's correct.

19 Q. By the way, what is Statoil?

20 A. Statoil is the national oil company of Norway.

21 Q. And does Statoil drill and explore in the Gulf of Mexico?

22 A. Yes, they do. They've been exploring here for more than a  
23 decade.

24 Q. And, Doctor, when you left Statoil, where did you go to  
25 work?



## ANDREW HURST - DIRECT

1 A. I went to work for Unocal, who were a California-based  
2 independent oil company; and I moved to London.

3 Q. What did you do for Unocal?

4 A. I was working as an exploration geologist in a fairly sea  
5 capacity and exploring on the United Kingdom continental shelf.

6 Q. And were you involved in the prediction of predrill pore  
7 pressures at that time?

8 A. That was a routine part of my work.

9 Q. And in 1982, did you begin your academic career?

10 A. I did.

11 Q. Tell us about that briefly.

12 A. I was very fortunate to be invited to apply for the  
13 position that I was ultimately offered and I was -- became the  
14 first Shell professional production geoscience at the  
15 University of Aberdeen.

16 Q. What have you done as a professor of geoscience?

17 A. The reason I was hired was that the University of Aberdeen  
18 wanted to improve their research income and also research  
19 profile with respect to the oil industry. So I -- my goal was  
20 really to liaise with the national and international industry  
21 to create research programs that would help them attain their  
22 goals in terms of recovering reserves from reservoirs, and also  
23 exploring for new reserves.

24 Q. And did you do that?

25 A. I hope I've done that, yes. They haven't thrown me out

## ANDREW HURST - DIRECT

1 yet.

2 Q. What type of students and courses have you taught,  
3 generally?

4 A. Generally, I've attempted to specialize masters and the  
5 sea level courses and -- doctoral students.

6 Q. Did any of your teaching involve the teaching of  
7 prediction of pore pressure?

8 A. All of my teaching involves the prediction of pore  
9 pressure. This is part of an integrated study of the  
10 subsurface because you can't -- in my opinion, you can't just  
11 study pore pressure.

12 Q. And, Professor, you are continuing to teach today;  
13 correct?

14 A. Oh, yes.

15 Q. And have you written scholarly and academic articles?

16 A. Yes, I have. Yes.

17 Q. How many articles have you written in your field?

18 A. More than 160.

19 Q. Have you been the recipient of any particular awards that  
20 you're proud of in your field?

21 A. Yes, I have. Yes.

22 Q. And can you tell us about them, please.

23 A. I'm not great at awards. In 2004, I was honored by the  
24 European Association of Geoscientists and Engineers. They  
25 awarded me the Wegener Medal.

## ANDREW HURST - DIRECT

1 Q. What was the Wegener Medal awarded for?

2 A. The Wegener Medal is -- it's in recognition of my  
3 contribution to petroleum geoscience and engineering in my  
4 times in academia, particularly in terms of research but also  
5 in terms of teaching.

6 Q. And, Professor, have you received another award recently?

7 A. Yes, I did. Last year, I received the American  
8 Association of Petroleum Geologists, Grover E. Murray Award as  
9 a distinguished educator, which, in essence, was very similar  
10 achievements to the European award a few years earlier.

11 Q. Was that a particularly prestigious award?

12 A. That was nice not to be American and receive an award like  
13 that. That was very flattering.

14 Q. How many members are there of the American Association of  
15 Petroleum Geologists?

16 A. I think there's something like 55,000.

17 Q. And how many at this convention?

18 A. Oh, wow. At the convention, there was probably about a  
19 5,000 and a probably a couple of thousand at the presentations.

20 Q. Professor, have you ever testified as an expert witness  
21 before?

22 A. No.

23 Q. Have you ever been in an American courtroom before?

24 A. Briefly, the other day, to listen to Alan Huffman.

25 Q. Have you ever been in a courtroom before that day?

## ANDREW HURST - DIRECT

1 A. No.

2 Q. You ever been in a courtroom in Great Britain?

3 A. No.

4 Q. This was your first time?

5 A. Yes.

6 Q. Let me introduce you to Judge Carl Barbier for your first  
7 trip into the courtroom.

8 MR. LEGER: At this point, Your Honor, I would offer  
9 Professor Hurst as an expert in the field of petroleum geology  
10 and geoscience.

11 THE COURT: All right. Do you have questions now, or  
12 do you just want to take him on cross-examination and we'll --

13 MR. REGAN: I'll take it on cross-examination with  
14 the understanding that the Court is going to take the testimony  
15 as a whole.

16 THE COURT: Okay. Good.

17 MR. LEGER: And, Your Honor, I'm going to explore a  
18 little bit --

19 THE COURT: Tell me again, what is he being offered  
20 in?

21 MR. LEGER: An expert in the field of petroleum  
22 geology and geoscience.

23 BY MR. LEGER:

24 Q. Professor, what were you asked to do by the Plaintiffs  
25 Steering Committee in this case?

## ANDREW HURST - DIRECT

1 A. My brief was to look at the background exploration  
2 potential of the Gulf of Mexico but in particular the  
3 Mississippi Submarine Canyon area where the Macondo disaster  
4 occurred.

5 So I was directed to investigate what an exploration  
6 geologist would really do prior to drilling a well or locating  
7 a well in the Mississippi Submarine Canyon area and to review  
8 the public domain data that was available to anyone really who  
9 was wishing to do that type of operation.

10 Q. And is this data that you examined generally available to,  
11 for example, petroleum geologists that work for oil companies  
12 like BP?

13 A. Absolutely. All the data that I've referred to are in the  
14 public domain.

15 Q. And, Professor, you heard the judge a few moments ago; and  
16 I've asked you about this, too. Your report is a little  
17 different than the reports that we're used to seeing. You  
18 haven't seen any other expert reports in litigation, have you?

19 A. No, I haven't.

20 Q. And you, in fact -- what's interesting to me about your  
21 report is you actually outlined some opinions which were  
22 academically the same opinions as to some of the theories that  
23 you offer and opinions you offer; is that correct?

24 A. Yes, that's correct.

25 Q. Why did you do that, Doctor?

## ANDREW HURST - DIRECT

1 A. Well, you know, in science, we're always trying to take  
2 steps forward, you know, get the right answer. Otherwise,  
3 there wouldn't be a place for science in civilization.

4 But we're always trying to move forward, and there  
5 have been a variety of theories that are relevant to what I was  
6 writing about that I felt should be mentioned because there are  
7 dissenting voices. And also, I did actually refute, I think in  
8 all cases, the relevance of those dissenting ideas to the  
9 relevance of what I thought was the best model available.

10 Q. Fair to say you thought it was intellectually important  
11 and intellectually honest to deal with the same opinions --

12 A. Absolutely. I'm a scientist.

13 Q. Now, Professor, if I may, I'm going to direct you -- and  
14 your report is quite extensive and quite voluminous. In fact,  
15 there are numerous -- I believe we counted 75 references to  
16 other peer-reviewed literature. Is that fair?

17 A. Yes.

18 Q. I'm going to direct you to two narrow points in our  
19 discussion today. The Court has before it your expert report  
20 and will have all of it available.

21 First, I'd like to ask you about the Gulf of Mexico  
22 itself.

23 A. Yes.

24 Q. Can you tell us what -- and, by the way, would you agree  
25 with Lamar McKay, the president of BP America, when he

## ANDREW HURST - DIRECT

1 testified the other day that it's really not the depth of the  
2 water but rather the nature of the formation in which you're  
3 drilling that determines the hazards of the place in which  
4 you're drilling?

5 A. I would agree completely with that. What I perceive as  
6 the importance of what I've done is this all starts with an  
7 analysis of the rocks. It also --

8 Q. When you say *this*, the drilling?

9 A. Everything we do, any exploration well, if you don't have  
10 the big picture, it's no point just having a little picture.  
11 Geology is the ultimate wealth creator in this equation. This  
12 is where it starts.

13 Q. Now, in that connection, you're not an expert -- you're  
14 not a drilling engineer; correct?

15 A. Correct.

16 Q. You're not a petroleum engineer; correct?

17 A. Correct.

18 Q. You're not an expert on the cementing of wells; correct?

19 A. Indeed.

20 Q. Although you've had exposure to all of those things;  
21 correct?

22 A. I've worked with all these people.

23 Q. You are definitely not an expert in the operations of a  
24 drilling vessel; correct?

25 A. I'm not, sir.

## ANDREW HURST - DIRECT

1 Q. In fact, you have no particular expertise as to whether  
2 the drilling takes place in shallow water, deep water or on  
3 land; correct?

4 A. Correct.

5 Q. Your expertise takes place below the line of the surface  
6 of the earth; correct?

7 A. Indeed, it does.

8 Q. And would you tell us a little bit about what happens in  
9 the formations, particularly the Gulf of Mexico?

10 A. Yes. Would it be useful to use the demonstratives?

11 Q. Yes. Demonstrate D-2457, Trial Exhibit 20003.004.

12 Is that a demonstrative that you have prepared,  
13 Professor?

14 A. Yes, it is. Yes. Yes.

15 Q. And will it assist us in explaining your testimony to the  
16 Court?

17 A. Yeah. My reason for wanting to talk about this is because  
18 this really provides the data background to anything that one  
19 might do in exploration of hydrocarbons in the offshore Gulf of  
20 Mexico. And this is from a paper published by Stephen  
21 Ehrenberg in the American Association of Petroleum Geologists  
22 in 2008. It was actually presented two or three years before  
23 at a conference in the U.S.

24 Q. What are all these dots?

25 A. Well, let me just make sure everyone realizes that this is



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1 the coast of the modern Gulf of Mexico. There's the  
2 Mississippi Delta, a little bit of Mississippi and Alabama up  
3 here. And these dots are actually a plot on the geographic map  
4 of the locations of reservoirs and the -- this reservoir  
5 database -- reservoirs as encountered in boreholes -- is more  
6 than 11,000 data points which are held -- were held by MMS and  
7 I -- they're now curated by BOEMRE. And all these data are  
8 publically available and free.

9           So the data include things such as the age of the  
10 reservoir, the oil in the reservoir, the porosity, the pore  
11 pressure, all the sorts of information you would want to know  
12 about where you were going exploring.

13 Q. And so have geoscientists and petroleum geologists, like  
14 yourself, had the opportunity to study the information from all  
15 these 11,000 reservoirs in the Gulf of Mexico?

16 A. Well, the work I refer to is by Ehrenberg, who was one of  
17 the group of scientists working for Statoil long after I left  
18 them. And they, in fact, created a global database of more  
19 than 120,000 data points of this type so that they could start  
20 to define a framework for prediction globally. And I will come  
21 back to this framework and its importance a little later.

22 Q. Now, Professor, in connection with the congregation of all  
23 of these dots, does this bear any particular relationship to  
24 the depth of the water?

25 A. Just a little bit. Surprisingly, the water is shallowest

## ANDREW HURST - DIRECT

1 near the coast and gets deeper as you go offshore. But what's  
2 also interesting is that all these reservoirs in the blues and  
3 greens, they're closest to the shore. They're very shallow,  
4 but they're also the oldest rocks. And when we say *old rocks*  
5 here, we're talking less than 60 million years, you know. So  
6 this isn't even dinosaur country.

7 But as we come further offshore, the rocks get  
8 progressively younger. So the red and the purple, these red  
9 and purple reservoirs, they're all very, very young indeed. In  
10 fact, they were deposited at the time of the last glaciation.

11 Q. Now, Professor, are you ready to go to the next line?

12 A. What I'd like to point out, as we -- we have a  
13 ridiculously large star here to locate the Macondo, the site of  
14 the Macondo well. But what I'll particularly want to do is  
15 point out that there's relatively few data -- this is probably  
16 going back to about 2006 when these data were collected, but  
17 there are relatively few points around the Macondo well.

18 And the next slide will actually elucidate a little  
19 more about the relevance of --

20 Q. Does this area have a particular name?

21 A. Yes, it does. This is --

22 Q. By the way, we're now looking at Demonstrative 2458, Trial  
23 Exhibit 20003.005. That was also a slide you prepared;  
24 correct?

25 A. It's a slide that I've used from a publication by Paul

## ANDREW HURST - DIRECT

1 Nadeau, and I have added to it. I've got some little red  
2 crosses on it. And this slide is very central to what I'm  
3 going to talk about.

4           Again, we have the Mississippi Delta here. There's  
5 the modern part of the delta out here. And this is the  
6 coastline, obviously. And you can see there are contours on  
7 this map, blue contours. These are bathymetric contours,  
8 bathymetric contours representing the depth of the water.

9 Q. For example, Professor, this one says 20?

10 A. That's right.

11 Q. Is that, according to the scale up here, 20 meters?

12 A. 20 meters, yeah, yes.

13 Q. Which is about 66 feet in American; correct?

14 A. In American, that is probably the case, yes.

15           And this blue line with 20 on it means that, right  
16 along there, we have 20 meters depth. And as we come further  
17 south on the map towards the deeper water, these contours get  
18 bigger.

19           And we get to 100 around about here. And at that  
20 point, this very low angle of slope, this is actually called  
21 the continental shelf. And if you were to stand on that  
22 seafloor, you wouldn't be able to see that you're sloping, it's  
23 such a gentle gradient, less than 1 degree.

24           But when we get to just over 100 meters, you can see  
25 there's an awful lot more blue color down here; and some of it

## ANDREW HURST - DIRECT

1 is very, very irregular. You can also see a little feature  
2 here cutting back, for those of you who are familiar with maps,  
3 it looks like a valley and that is because it is a canyon and  
4 it's the Mississippi Submarine Canyon.

5 But the tightness of blue contours here is actually  
6 understated, because the contours below 100 meters are every  
7 200 meters, I believe. They go to every 200-meter contour. So  
8 this is a very, very steep slope, indeed, as we go down on to  
9 the ocean floor of the Gulf of Mexico.

10 So we have two very distinct areas to look at, the  
11 shallow shelf and the steep slope. And about 17,000 years ago,  
12 when the ice age was at its maximum -- in other words, there  
13 was more ice -- more water trapped in ice than any other time  
14 in the last ice age, the U.S. Gulf Coast started about where  
15 that 100-meter mark is. So all this was land because the sea  
16 level was more than 100 meters shallower than it is today.

17 The Mississippi Delta wasn't there. There was  
18 another very large river, much bigger than the modern  
19 Mississippi, that was coming out on to the coast here and  
20 leading toward where we now have the Submarine Canyon. All  
21 this is very well documented by other scientists than me. I'm  
22 simply summarizing their work.

23 What happened -- and we believe now that this can be  
24 tied down to about 11 1/2 thousand years ago -- was the slope  
25 in the vicinity of where this Submarine Canyon is today, it

## ANDREW HURST - DIRECT

1 collapsed. It collapsed because it became saturated with all  
2 the cold water from this river. And approximately somewhere  
3 around 1500 to 2,000 cubic kilometers, which is about 480 cubic  
4 miles of sediment, fell away from this part of the slope and  
5 was redistributed down here on the deep floor of the basin.

6 And --

7 Q. What significance does that have in the context of  
8 exploring for oil in this area?

9 A. This has a remarkable coincidence. Because what happened  
10 was we removed, in places, more than a kilometer thickness of  
11 sediment. The removal of that kilometer thickness of  
12 sediment --

13 Q. A kilometer is about .62 miles?

14 A. You have to excuse me, I'm completely metric.

15 **THE WITNESS:** Excuse me, Your Honor.

16 A. Yeah, it's .62 of a mile, yeah.

17 And the removal of that load of sediment, you can  
18 imagine, it's like someone taking a weight off you, you know.  
19 Exactly that.

20 So removal of that sediment means that the rocks that  
21 were underneath it suddenly were less loaded. In geology, we'd  
22 call this *unloading*. And that unloading changes the physical  
23 properties of rocks below them.

24 What it does, because rocks are not plastic, they're  
25 not -- they don't stretch back into shape. You know, they

## ANDREW HURST - DIRECT

1 don't suddenly fill the canyon from below. What happens is the  
2 unloading of the rocks causes them to crack. It causes them to  
3 fracture. And along those fractures, we get a huge amount of  
4 escape of fluids onto the floor of the Submarine Canyon. And  
5 that's a natural process of seepage that would have been  
6 accelerated during that slumping event.

7           And the slumping occurred in at least two phases and  
8 is ongoing today. It's just not such major volumes of  
9 sedimented moved today.

10 **BY MR. LEGER:**

11 **Q.** Is this slumping common all over the northern Gulf of  
12 Mexico?

13 **A.** No. There are two other locations, one near Florida and  
14 one further west; but they're relatively small features,  
15 relative to this one. This is, I think, the second largest  
16 known submarine landslide in the world.

17 **Q.** Now, you noted, Professor, that there are seismic events  
18 associated with major hydraulic fracture formations in which  
19 low-confining rock stress prevails. What is that all about?

20 **A.** Well, first of all, if we could refer to the low-confining  
21 stress and, in particular, the -- yeah, the leak-off pressures  
22 which have been measured in wells drilled within that dashed  
23 sort of approximately circular area.

24           This area was mapped out by Paul Nadeau of Statoil;  
25 and he discovered that there was a very large number of

## ANDREW HURST - DIRECT

1 formations below 3 kilometers, which were very fragile, had  
2 low-confining stress. *Low-confining stress* means how easily a  
3 rock can hold itself together. If you left it on the table,  
4 would it become a pile of sand or would it be there like a  
5 statue forever more, you know? It's how fragile a rock's  
6 structure is.

7           And I think we have another demonstrative that we'll  
8 come to in a moment. But that is a very significant factor in  
9 the Mississippi Submarine Canyon area, that we have rocks that  
10 are extremely fragile, and there's a reason for that.

11           The other thing which I have added to this diagram  
12 are the red crosses with the dates and also with the  
13 magnitudes -- earthquake magnitudes alongside them. These are  
14 the hypercenters, or more commonly, we -- I think in laymen's  
15 terms we call them *epicenters*. These are the focus, the foci,  
16 of the earthquakes in the Mississippi Submarine Canyon.

17 Q. Earthquakes?

18 A. Earthquakes.

19 Q. Those are earthquakes off the coast of Louisiana?

20 A. Oh, yes, you've got them. Yes.

21 Q. Is that common across the entire Gulf of Mexico?

22 A. It's extremely unusual. The Mississippi -- the northern  
23 Gulf of Mexico is what geologists call a *passive margin*. And  
24 it's a passive margin because it doesn't encounter tectonic  
25 events such as earthquakes. And there are other earthquakes,

## ANDREW HURST - DIRECT

1 but there are very few of them, and there is certainly -- there  
2 is no other place along the northern Gulf of Mexico where we  
3 have an accumulation of these events.

4 Q. So you generally, in geology, do not find earthquakes off  
5 the coast of the northern Gulf of Mexico near Texas; correct?

6 A. It's very unusual.

7 Q. You don't find earthquakes off the coast of Florida;  
8 correct?

9 A. Indeed.

10 Q. You don't even find earthquakes off the coast of Lafayette  
11 and Lake Charles in Louisiana; correct?

12 A. Well, they would be on that diagram if --

13 Q. Well, what is it about -- is this circle here, the dotted  
14 line, is that what you are referring to as the *Mississippi*  
15 *Canyon area*?

16 A. Yes, that's approximately the area that we're talking --  
17 in fact, the Macondo well would be somewhere, just as the  
18 modern Mississippi, somewhere around back here. I can't quite  
19 hold that green dot still enough to show you. So that is --  
20 the Macondo well site is within that area that we're looking at  
21 there.

22 Q. Professor, what is it that contributes to the fact of  
23 earthquakes in this area but nowhere else in the Gulf of  
24 Mexico?

25 A. Well, there's clearly a genetic link between the unloading



## ANDREW HURST - DIRECT

1 of the canyon and the generation of these seismic events, of  
2 these earthquakes. Because the seismic events -- some of these  
3 earthquakes have been studied in detail, I should add.

4           These seismic events are not like the deep crustal  
5 events that will record in California, for example. They're  
6 not tens of kilometers below the earth's surface. These events  
7 probably occur -- they're most likely to occur between 4 and  
8 6 kilometers below the sea floor, which is the sort of  
9 interval, depth interval, 15- to 20,000 feet where people are  
10 actively exploring for oil and gas.

11           Some of the rocks above reservoirs and some of the  
12 reservoirs themselves, such as Macondo, may well be in that --  
13 well, they almost certainly are in that type of depth interval.

14 Q. What happens, Professor, to the rock formations at the  
15 level of 15,000, 20,000 feet if you have an earthquake at that  
16 level?

17 A. Well, it's the rocks that create the earthquake. And this  
18 is the link, is that these pore fluids, they are trying to  
19 escape to the sea -- to the bottom of the sea, and there are  
20 some rocks that are so impermeable that they cannot escape  
21 easily. And the pressure of the pore fluid builds up below  
22 those rocks. These are called seals, or aquitards.

23           As the pore pressure builds up, it gets to the stage  
24 where it's so great it causes the widespread fracture of rocks,  
25 of these low permeable rocks, and that widespread fracture and

## ANDREW HURST - DIRECT

1 failure hydraulically is what creates the seismic signal that's  
2 recorded in an earthquake.

3 Q. Does that -- I'm sorry.

4 A. What I was going to say is what happens to the rocks is  
5 they become shattered. They're no longer layered. They're  
6 fragmented; and at least for a period, they become very  
7 permeable so fluids escape through them quickly.

8 Q. Professor, is it fair to say that, relative to the rest of  
9 the Gulf of Mexico, that this area, the Mississippi Canyon  
10 area, is more fragile in the context of the formations that you  
11 find there as a petroleum geologist?

12 A. Yes, it is.

13 I think what I would like to do is to -- if that's  
14 possible, is to demonstrate to the judge what fragile rock is  
15 actually like. Is that okay? We have a demonstrative.

16 MR. LEGER: Your Honor, we presented a photograph of  
17 a rock to opposing counsel, and he has brought a rock with him  
18 that he would like to show Your Honor.

19 MR. REGAN: Your Honor, not being a geologist, I'm  
20 happy to have him show you a rock.

21 THE WITNESS: You're welcome to come and examine it  
22 if you'd like.

23 MR. REGAN: I'd just say wait for the  
24 cross-examination on the rock, I suppose.

25

## ANDREW HURST - DIRECT

1 **BY MR. LEGER:**

2 **Q.** Professor, will you tell us about what you have brought  
3 and why you have brought it.

4 **A.** Well, you can look at as many graphs and cross plots and  
5 maps as you wish, but --

6 **MR. LEGER:** Judge, this is a picture of the rock.

7 **THE WITNESS:** Yes, the real thing.

8 **MR. LEGER:** Get it a little closer too.

9 TREX trial exhibit 22944, for the record; and I  
10 think Demonstrative 3146.

11 **BY MR. LEGER:**

12 **Q.** I'm sorry, go ahead.

13 **A.** No, no, of course.

14 I just think very often -- and I find this when I'm  
15 teaching a nongeologist about rocks, that when you actually  
16 touch things and see things, it does make a difference. So,  
17 you know, it's my hope that anyone who's not familiar with  
18 rocks might like to have a little look at this.

19 **Q.** What does that rock have to do with anything regarding  
20 your testimony in this case?

21 **A.** It's a fragile rock. It's a fragile rock. And the rock  
22 is actually exactly the same age or pretty much exactly the  
23 same age as a Miocene rock from California. The grain size,  
24 the porosity of the rock are pretty much identical. This rock  
25 just happens to be today at the earth's surface.

## ANDREW HURST - DIRECT

1 Q. Basically, when you say the Miocene level of California,  
2 it's the same -- basically the same age?

3 A. The same period of geologic time.

4 Q. The type of rock you expect to find --

5 A. From the same environment and deposition, yes. It's very  
6 similar.

7 THE WITNESS: Would you like to have a look at this?

8 MR. REGAN: Your Honor, I don't know if it's a proper  
9 legal objection, but just to be clear, for foundation for the  
10 rock, this is not a rock from Macondo, because the witness  
11 hasn't looked at anything with respect to the well. Just in  
12 terms of what you're representing the rocks to be.

13 BY MR. LEGER:

14 Q. You've looked at no rocks with respect to the well?

15 A. I looked at no rocks, that's correct.

16 MR. LEGER: This is not a rock from the Macondo well.  
17 This is offered really just to illustrate the professor's  
18 testimony to the Court.

19 THE COURT: Okay.

20 THE WITNESS: I'm sorry if it seems like a stunt.  
21 This is supposed to be quite educational.

22 This rock is --

23 BY MR. LEGER:

24 Q. Do you do this in class? You show people in class these  
25 types of things?

## ANDREW HURST - DIRECT

1 A. Well, you can't understand rocks unless you look at them,  
2 frankly.

3 Q. I would agree with that.

4 A. Yes. And this rock is held together by oil. You'll --  
5 when it comes out of its bag, you'll see it's black. And it's  
6 the heavy oil that characterizes California.

7 Q. And we've given you some paper towels to open the rock up  
8 on.

9 A. Actually, you can see that it's falling to pieces in the  
10 bag. It's fairly solid.

11 Q. For the record, you brought the rock here in a plastic  
12 bag, is what you're talking about?

13 A. Yeah, yeah. That's right, yeah. It's falling to pieces.

14 But it's actually full of oil. So if you scrape your  
15 fingers on it, Your Honor, you see the grains start to come  
16 away very easily.

17 So this is the fragility of a rock when it  
18 actually -- under finger touch will fall to pieces.

19 In fact, my impression from reading what I am sure  
20 are accurate descriptions in the BP reports is that the rock in  
21 Macondo is considered looser, less, and more fragile than this.

22 Q. And would that be unexpected in the Mississippi Canyon?

23 A. No, no. It would be expected.

24 Q. And is that the type of thing that you, as a petroleum  
25 geologist, would be looking for when you would be preparing the

## ANDREW HURST - DIRECT

1 well plan and drilling the well in the Mississippi --

2 A. When a geologist makes a well prognosis --

3 Q. Yeah.

4 A. -- you have to be very careful not only that you're  
5 predicting the presence of a rock that will contain oil, but  
6 you have to be very careful that you predict the rock  
7 properties both above where you're expecting to find the oil  
8 and below look where you're expecting -- where you're going to  
9 find the oil itself.

10 So you need really good descriptions of the rock  
11 properties, their fracture gradient, their fracture pressure,  
12 which is their leak-off pressure, their porosity, so that when  
13 you drill the well, you can find the optimum conditions for  
14 success in drilling.

15 Q. What do you call this rock? What kind of rock is --

16 A. Sandstone.

17 Q. Can this rock be fractured in Nature?

18 A. Oh, absolutely.

19 Q. Earthquakes and seismic events, are they the type of  
20 things that can fracture the formations made of this type of  
21 rock?

22 A. Yeah. The regional widespread development of fractures is  
23 actually something that produces earthquakes in the shallow  
24 waters.

25 Q. Is this type of rock the type of rock that can be

## ANDREW HURST - DIRECT

1 fractured with excessive use of mud weight?

2 A. Oh, absolutely. If there was too high mud weight in  
3 contact with fragile sandstone, it would literally blow it  
4 away.

5 Q. Now, Professor, if we can go back -- are you finished --

6 A. With my rock, I am.

7 Q. -- with your rock?

8 MR. LEGER: Professor, if we could go back to  
9 Demonstrative 2458.

10 BY MR. LEGER:

11 Q. I just want to make sure we understand the plottings on  
12 this exhibit, on this demonstrative, the little crosses and the  
13 Xs represent relatively recent earthquakes; correct?

14 A. That's correct, the last 20 years or so.

15 But there's one earthquake that's missing from that.  
16 There were two earthquakes in 2006, one in February, which  
17 occurred in the Green Canyon, which is -- where's my little  
18 thing gone -- which is over here, which was a 5.2 magnitude  
19 earthquake.

20 But over here -- in fact, one of the reasons it's not  
21 put on there is the scale of this map, it's exactly coincident  
22 with the location of the Macondo well. And that --

23 Q. Excuse me, Doctor. There was an earthquake in the  
24 location of the Macondo well in 2006?

25 A. On April 18, 2006, there was a magnitude 6 earthquake.

## ANDREW HURST - DIRECT

1 Q. Now, that was three years before the Macondo well was  
2 drilled; correct?

3 A. Yes.

4 Q. So it didn't happen around the time of the Macondo well?

5 A. No, no. It has nothing to do with that.

6 Q. Professor, what do we know about that earthquake?

7 A. Well, that earthquake is one of these very shallow  
8 earthquakes. This has a very shallow epicenter. So it would  
9 have caused widespread destruction make of the rocks at that  
10 sort of 15- to 20,000 feet.

11 Q. When you say *very shallow* --

12 A. That's what I'm talking about, 15- to 20,000 feet subsea.  
13 Yeah.

14 And the effect on the rocks is it would make rocks  
15 which were already relatively fragile and had low-confining  
16 stresses even more fragile.

17 Q. Now, Professor, do we know the magnitude of the -- well,  
18 first, the earthquake earlier in the year in Green Canyon?

19 A. Yeah. I think it was 5.2 in Green Canyon. And that  
20 earthquake was quite interesting because there are lots of  
21 installations, oil platforms, in Green Canyon, and that 5.2  
22 earthquake actually shook one of the platforms. I think it was  
23 a shallow platform. And that was reported, in fact. And  
24 the --

25 Q. What was the strength or the power of the earthquake



## ANDREW HURST - DIRECT

1 you're talking about in April of 2006 in the area that would  
2 eventually be Macondo?

3 A. Yeah. The 18th of April earthquake had a magnitude of 6.  
4 So it's almost an order of magnitude 10 times more than the one  
5 in Green Canyon.

6 Q. So a magnitude earthquake of 1 is a relatively light  
7 earthquake; correct?

8 A. Yeah. We wouldn't notice it.

9 Q. If you have a magnitude 2, that's twice as powerful as a  
10 1?

11 A. No, it's 10 times.

12 Q. And a magnitude 3 is --

13 A. Is 100 times more than 1.

14 Q. More than 1.

15 A. Yes.

16 Q. So when you get up to 6, that's a pretty significant  
17 earthquake?

18 A. Oh, if we had a 6 in New Orleans, we would be slightly  
19 unhappy about it, I would suggest. It would do damage.

20 Q. Now, Professor, with respect -- you talked about there are  
21 low leak-off pressures found in the Mississippi Canyon. What  
22 do you mean by that? Would you explain that?

23 A. Yes. In fact, if we can go to the next demonstrative, I  
24 think that would be easy to illustrate.

25 Q. That would be D-2500, Trial Exhibit 20133.

## ANDREW HURST - DIRECT

1 A. Yes.

2 Q. By the way, Professor, you didn't write that word up  
3 there?

4 A. No, no. I think that's a William Shakespeare word; isn't  
5 it?

6 Q. What is that supposed to be?

7 A. It's supposed to be *anomalously*.

8 Q. What is meant by *anomalously low leak-off pressures*?

9 A. Well, on this diagram, what we've got plotted here is  
10 depth in kilometers. So each one of these is a sixth of a mile  
11 or something like that. And along the bottom, actually, we  
12 have pressure. It's not sort of marked on this what pressures,  
13 but we've increased pressure from left to right.

14 And on that diagram, leak-off pressure data are  
15 plotted, and there's a dotted line here -- or a dashed line in  
16 black, and that line is the global average leak-off pressure  
17 trend.

18 Q. Now, does that come from -- you talked about some of the  
19 literature that you've reviewed in order to report to the  
20 Court; is that correct?

21 A. Yes. This is a tremendously useful summary that Nadeau  
22 provided me in one of his papers. And that's based on this  
23 database of more than 120,000 wells.

24 Q. So this line here is the average leak-off pressures that  
25 one would find worldwide --

## ANDREW HURST - DIRECT

1 A. That's right.

2 Q. -- correct, out of 120,000 wells?

3 A. That's correct. That's correct.

4 Q. What does the red line --

5 A. Well, the solid red line indicates the 1.7 gradient,  
6 specifically gravity grams per cubic centimeter. And that is  
7 the average leak-off pressure for the entire Gulf of Mexico.  
8 So the entire northern Gulf of Mexico has more sensitive, more  
9 fragile formations than the global trend. So it --

10 Q. If I may, I'm sorry to interrupt you. But just to remind  
11 us, we've heard the testimony -- and you did too -- of  
12 Dr. Huffman last week; correct?

13 A. Yes.

14 Q. And Dr. Huffman told us about what leak-off pressures  
15 were; correct?

16 A. Yes.

17 Q. Would you remind us? Tell us what a leak-off pressure is.

18 A. Well, as a geologist -- and probably Dr. Huffman is a  
19 geophysicist who would probably like to call them *fracture*  
20 *pressures*. But the leak-off pressure comes from conducting  
21 leak-off tests in the borehole, which are designed to test the  
22 minimum strength of the borehole, the borehole being rock that  
23 you drill it through.

24 Q. And that essentially tests the fracture gradient; correct?

25 A. Yes. When -- the leak-off pressure is the pressure, the

## ANDREW HURST - DIRECT

1 minimum pressure at which mud will escape into the borehole,  
2 and the borehole fractures naturally during the drilling  
3 process.

4           So the leak-off pressure is designed to give you the  
5 minimum pressure, mud weight pressure at which a rock will  
6 fracture.

7 **Q.** So is there a particular hazard connected to there being  
8 anomalously low leak-off pressures?

9 **A.** Absolutely. If you have rocks that are anomalously --  
10 excuse me. If you have anomalously low leak-off pressures, it  
11 means you have to be really careful about your mud weight. And  
12 it means that if you -- and certainly you need to set very  
13 clear, safe margins around mud weights so that you do not  
14 unnecessarily damage the borehole and formations adjacent to  
15 it.

16           **MR. REGAN:** Your Honor, I just object that the last  
17 answer is outside the scope of Dr. Hurst's report. He  
18 describes what a leak-off pressure test is, but he doesn't give  
19 any explanation of what it means. And he didn't look at any of  
20 that with respect to this well. So with respect, I'd move to  
21 strike that answer.

22           **MR. LEGER:** We'll move on, Your Honor, but I think it  
23 is important, however, in the context of his expertise, that he  
24 understands -- and we're not talking about the specifics of  
25 Macondo -- but the principle of why we do look for leak-off

## ANDREW HURST - DIRECT

1 pressures.

2           **THE COURT:** Okay. I'll overrule the objection with  
3 that explanation that it's not relevant to exactly what  
4 happened in this case.

5           **MR. LEGER:** Well, it may be relevant, Your Honor, but  
6 not directly pertinent.

7           **THE COURT:** It's not explanatory of what happened, at  
8 least not yet.

9           **MR. LEGER:** That's correct. Not necessarily. That's  
10 for other witnesses to talk about.

11           **THE COURT:** We'll see. Okay.

12 **BY MR. LEGER:**

13 **Q.** Now, Professor, in connection with the anomalously low  
14 leak-off pressures, I think you said, in the entire Gulf of  
15 Mexico relative to the rest of the world, is there any  
16 difference in the leak-off pressures that are found by  
17 scientists in the Mississippi Canyon part of the Gulf of  
18 Mexico?

19 **A.** Indeed, there are. And, of course, the relevance to the  
20 Macondo is that, in the Mississippi Submarine Canyon, in that  
21 area there -- in that area there is below 3 kilometers burial,  
22 which is -- oh, how many feet is that -- that's 2 1/2 miles.

23 **Q.** 2 1/2 miles or so?

24 **A.** Yeah. So below 3 kilometers burial, there is all the  
25 wells that Nadeau could find to analyze had even lower leak-off

## ANDREW HURST - DIRECT

1 pressures than the Gulf of Mexico average.

2           So we're already applying great care when drilling  
3 into Gulf of Mexico wells. But in the Mississippi Submarine  
4 Canyon, the leak-off pressures are so low, the rocks are so  
5 fragile that they're going to require extreme caution when  
6 designing drilling programs.

7 Q. Even more than other areas; correct?

8 A. Yes. And this, I would say, is the predictability part of  
9 geology because identifying these leak-off pressures and  
10 relating them to the more scientific fracture pressures of  
11 rocks, this shows there was a direct link between the leak-off  
12 pressures and the abundance of seismic activity, earthquakes,  
13 in the Mississippi Submarine Canyon area. By fitting these two  
14 things together and trying to understand how the rocks have  
15 behaved allows us to make important predictions about how to  
16 drill wells safely.

17 **BY MR. LEGER:**

18 Q. Now, Professor, if we may, look at Exhibit No. 07502.

19           Have you seen this document, Professor?

20 A. I have.

21 Q. What is it?

22 A. This is the shallow hazard report of -- shallow hazards  
23 assessment provided -- written by BP prior to starting the  
24 Macondo well.

25 Q. Professor, what is the date of the shallow hazards

## ANDREW HURST - DIRECT

1 assessment?

2 A. The 8th of June, is it? Yes, the 8th of June, 2009.

3 Q. And this indicates who it's prepared by, but in  
4 circulation to Mark Hafle, Binh Van Nguyen, Charles Bondurant,  
5 Jonothan Bellows, and Jasper Peijs; right?

6 A. That's correct.

7 Q. Professor, have you seen shallow hazard assessments  
8 before?

9 A. Yes, many times.

10 Q. Is this a particularly good work?

11 A. I think, as a stand-alone document, it's fine.

12 Q. Now, Professor, I'd like to refer you now to page 22,  
13 plate 1 -- I'm sorry, 24, plate 1. Professor, what is this?

14 A. Well, it looks better on my screen than it does over  
15 there, but it's the location map, and you can just about see  
16 the Gulf Coast coastline here. You can see the shelf, as it's  
17 marked "shelf." And where we start getting these bright bits,  
18 this here is the submarine slope onto the basin floor, there's  
19 the Macondo well, and this is the area -- it's on the edge of  
20 what BP have called the Mississippi Canyon area.

21 Q. And this is a BP document?

22 A. This is a BP document. Correct.

23 Q. Now, Professor, what are these -- the shelf itself, by the  
24 way, is the area that you were talking about thousands of years  
25 ago --

## ANDREW HURST - DIRECT

1 A. That's correct.

2 Q. -- would have been coastline --

3 A. Correct.

4 Q. -- of Louisiana; correct?

5 And then, the quick dropoff is right in this area  
6 right here?

7 A. That's here where we got this different pattern,  
8 basically, yes.

9 Q. What are these white images?

10 A. Well, the light and dark -- excuse me.

11 Q. The contrast?

12 **THE WITNESS:** I'm sorry. I think the stenographer  
13 was trying to contact the judge.

14 **THE COURT:** I've lost communication with you, yes.

15 What do you have to do? Do you have to reboot?

16 Let's take about a 5-minute recess and see if we  
17 can get back in operation.

18 (WHEREUPON, the Court took a recess.)

19 **THE COURT:** Be seated. And did we lose our witness?  
20 There he is. Okay.

21 **MR. LEGER:** Just for the record, Your Honor, I've  
22 been asked to make it clear that the demonstrative that we're  
23 looking at now is Exhibit No. 07502. We were actually on  
24 page 24, which is Exhibit 07502.24.

25 **THE COURT:** There's actually nothing on the screen



## ANDREW HURST - DIRECT

1 right now. You mean the one we were looking at before?

2 **MR. LEGER:** The one we were looking at.

3 **THE COURT:** The last one we were looking at.

4 Are you trying to get it back up on the screen?

5 Somebody getting it back up on the screen? Okay.

6 **MR. LEGER:** 07502.24, page 24.

7 **THE COURT:** All right. We're back in business.

8 **BY MR. LEGER:**

9 **Q.** Now, Professor, I think what I was asking right before we  
10 took a break was about what the indications of the various  
11 colors are, particularly the lights and the dark colors in the  
12 Mississippi Canyon area.

13 **A.** Yes, certainly.

14 **THE COURT:** You're interfering with the mic there.

15 Okay.

16 **THE WITNESS:** Yeah, the light and dark are  
17 artificially added shade to an image. So where we have the  
18 light, it indicates topographic highs on the seafloor relative  
19 to the darker bits, which are topographic lows.

20 So, for example, there -- that's not very good,  
21 is it. Let's use my pointer.

22 This area where it's dark, it means we have like  
23 a deep valley, where the light would be higher points adjacent  
24 to that.

25

## ANDREW HURST - DIRECT

1 **BY MR. LEGER:**

2 **Q.** What about all the area where the BP scientists would have  
3 indicated Macondo was planned to be?

4 **A.** Well, you can't see much detail there; but it's certainly  
5 on the slope, which is why it's black.

6 **Q.** What we know is: That's approximately 5,000 feet of water  
7 depth; correct?

8 **A.** Yes.

9 **THE COURT:** Wait, wait, wait, wait, wait. I don't  
10 know what kind of --

11 (Discussion off the record.)

12 **THE WITNESS:** I think we can move to the next slide,  
13 can't we?

14 **BY MR. LEGER:**

15 **Q.** Yes. Next slide, Trial Exhibit No. 07502.25, which would  
16 be plate 2, page 25 of the exhibit.

17 Now, Professor, this is the second plate or a figure  
18 that's attached to the shallow hazard assessment. Can you tell  
19 us what this is and what it illustrates to you?

20 **A.** Yes. This is the detailed location of the proposed  
21 location for splitting the Macondo well, and it was the actual  
22 location for splitting the Macondo well. And this is a very  
23 standard sort of plot of the topography of the seafloor  
24 immediately adjacent to the well.

25 And you can see on the left-hand edge, just so we

## ANDREW HURST - DIRECT

1 have a bit of a feeling for scale here, that is a 3-mile scale  
2 bar. So 3 miles is from there to there (indicating), to get  
3 some feeling for the scale of this. And --

4 Q. So this is basically an overhead view of the --

5 A. So, yes, it's an overhead view of the seafloor. And this  
6 is --

7 Q. And it's developed by -- it says here, edge map produced  
8 from exploration 3-D seismic data; correct?

9 A. Indeed it does, yes. This is the 3-D data seismic which  
10 was acquired by Fugro in 2003; and I believe it was the data  
11 that was used to map the Macondo prospect, all those thousands  
12 of feet below the surface.

13 Q. And does the document reflect what seismic data was used?

14 A. The document on the legend on the left-hand side, it shows  
15 the areas covered by different types of data. So there was an  
16 earlier set of data from 1998, again, what we call 3-D seismic;  
17 and then there's this Fugro seismic as well.

18 Q. Now, have you ever heard of KC Offshore?

19 A. I haven't.

20 Q. Have you ever heard of Fugro?

21 A. Yeah, Fugro are a global operator of seismic acquisition.

22 Q. They're a pretty reputable, worldwide seismic acquisition  
23 company?

24 A. Absolutely.

25 Q. Was there any work that was done in order to capture this

## ANDREW HURST - DIRECT

1 view of the seafloor later than 2003?

2 A. As far as I know, there was no data acquired after 2003  
3 with the exception of the automated underwater vehicle, the  
4 AUV, which carried out surveys in 2009 immediately adjacent to  
5 the location of the borehole.

6 Q. And that would be what's indicated here?

7 A. Yes. It's very difficult on the diagram to see what  
8 exactly the areas of investigation are. But I believe the AUV  
9 was operated in this area here.

10 Q. And was looking for what?

11 A. It was looking for anchor points on the seafloor. It  
12 would be looking if there were any archeological artifacts that  
13 needed to be avoided by the heavy equipment that --

14 Q. That's an actual vehicle that floats around --

15 A. Yes, that's right.

16 Q. -- and takes pictures and looks and reports up top --

17 A. An unmanned vehicle, yes, that's correct.

18 Q. Is there anything of particular note that you, as a  
19 petroleum geologist and a geoscientist, would like to have  
20 known from this particular picture?

21 A. Well, yes. I think there's quite a lot of interest,  
22 actually. As I said, I thought the report was a good  
23 stand-alone report in the sense that it showed where there was  
24 a good place to put a well, you know. The seafloor and the  
25 shallow hazards immediately below the seafloor looked very

## ANDREW HURST - DIRECT

1 manageable. That's fine.

2 By the way, that is a pipeline running along there,  
3 which I think is a Shell pipeline. So not everything is  
4 natural on this diagram. What we have on the edges of the  
5 diagram are these black sort of cross-state lines and they are  
6 actually, again, indicating slope.

7 So what we have in the middle here where the Macondo  
8 is and this sort of area here is a relatively flat-lying area  
9 surrounded by slopes. So these are high points, this is a low  
10 area. And those high areas at the edge are all salt domes.  
11 They don't actually reach the seafloor, but they've lifted the  
12 seafloor adjacent to Macondo.

13 Now, the other interesting thing here, though -- the  
14 salt domes are pretty obvious -- is this line here, like an  
15 L-shape, and there's another one running sort of roughly  
16 northeast/southwest, which you can see coming in here.

17 Q. What does that indicate to you?

18 A. Well, those are the sort of things that get geologists a  
19 little bit excited because, you know, we're expecting this to  
20 be a very flat area; but when you get ridges or troughs or  
21 anything like that on these areas, they'll show up as black or  
22 dark markers, which means there's a relief there.

23 So in the report, BP's shallow hazard expert has  
24 interpreted this as a -- this big feature as a slump. In fact,  
25 my investigation report would tend to think that that's a very

## ANDREW HURST - DIRECT

1 inappropriate interpretation. But the point is: If it's a  
2 slump or possibly a fault, it's something that a geologist  
3 would be interested in trying to understand the relationship of  
4 those features to what might be occurring deeper below us in  
5 the earth's surface.

6 Q. And what could it be? What are the possibilities or the  
7 concerns you, as a petroleum geologist --

8 A. Well, if we -- obviously, the BP interpretation is that  
9 this is a slump scar, a slump scar, you know, what's left  
10 behind when sediment is slumped away. But my interest would be  
11 if these are faults; and if they're faults, they're going to be  
12 associated with very local earthquake seismic events.

13 Q. Professor, in connection with this particular study, this  
14 document produced in June of 2009, this shallow hazard  
15 assessment, is there any indication of any investigation  
16 seismically of the occurrence in this area of the Mississippi  
17 Canyon of an earthquake in April of 2006?

18 A. To the best of my knowledge, there was no data acquired  
19 that would capture any changes to the formations caused by the  
20 2008 earthquake.

21 Q. And -- the 2006 earthquake?

22 A. 2006 earthquake, excuse me.

23 Q. And, Professor, would you expect that that type of  
24 investigation would have been done?

25 A. It's the -- if you're going to be drilling a well where

## ANDREW HURST - DIRECT

1 you know there are problems with fragile formations, where we  
2 have low leak-off pressures, where we have knowledge of  
3 seismicity, earthquakes that would have created even more  
4 fragile formations than one might have expected, you have to  
5 take into very serious accounts the care with which that well  
6 has to be drilled.

7 I think in this case, coupled with the fact that the  
8 well was also deemed to be a well that was going to be  
9 converted into a production well and the data acquisition  
10 planned for the well was very, very thorough. BP wanted to  
11 acquire a lot of data from this well. They wanted this well to  
12 work. It was a real investment. They weren't only going to  
13 discover an oilfield, they were going to use this well as a  
14 primary source of income for the development of the well.

15 To secure an investment like that, you really have to  
16 be very, very careful with your drilling program. And alluding  
17 to the sort of things that Alan Huffman was talking about, one  
18 has to be very careful about drilling through formations that  
19 are fragile.

20 Q. Does this area, particularly in light of the knowledge of  
21 an earthquake in relative recent occurrence, call for a  
22 particularly high degree of care in developing the wellbore?

23 A. I would say a very high degree of caution.

24 Q. Now, do you have any reason to believe that the geologists  
25 and geophysicists at BP would not have known that there was an

## ANDREW HURST - DIRECT

1 earthquake in this vicinity in 2006, three years before they  
2 decided to actually spud in and drill Macondo?

3 **MR. REGAN:** Your Honor, I'm going to object to this  
4 question because we're getting outside the scope of the report  
5 that Dr. Hurst has submitted and the reliance materials that he  
6 submitted in support of that.

7 In essence, on its face, the question is asking  
8 him to speculate.

9 **THE COURT:** Sustained.

10 **BY MR. LEGER:**

11 **Q.** Have you seen any evidence that BP knew of this  
12 earthquake?

13 **A.** Yes.

14 **Q.** And what evidence have you seen?

15 **A.** There are two lines of evidence. One is that they -- they  
16 convened or their -- their employees were -- published on these  
17 earthquakes -- in particular, the Green Canyon earthquake on  
18 the west side of the Submarine Canyon -- geophysicists of BP.  
19 And also in one of the publications, Macondo location for the  
20 earthquake, the 1996 earthquake, is referred to.

21 And I'm also aware that the geological institute --  
22 oceanographic institute in Mississippi, who are studying an  
23 area of the seafloor very close to Macondo, have had  
24 communication with the same BP scientists.

25 **MR. REGAN:** Your Honor, I move to strike to the



## ANDREW HURST - DIRECT

1 extent that the witness is now talking about information that  
2 wasn't set forth in his report and it may be from his  
3 professional experience, but in terms of reliance materials.  
4 The same objection.

5 **THE WITNESS:** It's in my report, actually.

6 **MR. REGAN:** The question -- if it's in the report, I  
7 could just ask for where is it in the report.

8 **THE COURT:** Well, is it BP's position in this trial  
9 that your company was not aware of this?

10 **MR. REGAN:** No, I'm just asking --

11 **THE COURT:** It's a pretty straightforward matter. It  
12 sounds like this is generally available to people in this  
13 industry; right?

14 **THE WITNESS:** Sure. Absolutely.

15 **THE COURT:** Okay. Let's move on.

16 **BY MR. LEGER:**

17 **Q.** Professor, in the context of the hazards you've discussed  
18 in this particular area of the Mississippi Canyon of the Gulf  
19 of Mexico, in the context of the fact that there have been  
20 recent seismic activity in this area, do you believe that the  
21 accurate of the prediction of the pore pressure and fracture  
22 gradient is important?

23 **A.** That is important in every well you drill. It's extremely  
24 important here because the margins for error are so great.

25 **Q.** Now, is there a scientifically verifiable approach

## ANDREW HURST - DIRECT

1 available to use in the planning to drill a well of this  
2 nature, like Macondo?

3 A. I believe there is.

4 Q. And what is it, Professor?

5 A. This is what I've referred to in my report as the *Golden*  
6 *Zone concept*.

7 Q. Now, Professor, I'd like to show you a demonstrative that  
8 you've prepared, Demonstrative 2466, Trial Exhibit 20003.013,  
9 and ask if this will assist you in explaining briefly the  
10 concepts of the Golden Zone?

11 A. I will do my best to be concise.

12 Q. What is the Golden Zone concept?

13 A. Well, it's something that one of the managers in Statoil,  
14 early in the 2000s, he coined the phrase for the zone in which  
15 most of the world's oil occurs.

16 And if I can explain this diagram. On the left-hand  
17 side, this chart is a temperature in the vertical scale. And  
18 it has the composition of oil and gas on the horizon scale. So  
19 this is all oil; and over here, we have dry gas, methane. And  
20 everything between there is a mixture of those.

21 What you can see on that diagram is these 11,000 or  
22 more data points that were on the very first map, as I  
23 showed --

24 Q. So all of these little spots or whatever they are,  
25 represent each of -- one each of 11,000 --

## ANDREW HURST - DIRECT

1 A. That's correct.

2 Q. -- reservoirs; correct?

3 A. That's correct.

4 And what you can see then -- this is the Gulf of  
5 Mexico data; and what you can see is that most of these points,  
6 if we draw two lines horizontally across here, are between  
7 60 degrees Celsius and 120 degrees Celsius.

8 Q. Now, just so that we can understand, 60 degrees equals  
9 about 140 degrees Fahrenheit?

10 A. Yes.

11 Q. And 120 degrees Celsius equals 248 degrees Fahrenheit;  
12 correct?

13 A. That's correct.

14 Q. Now, you show straight lines. Is that the nature that  
15 these temperature gradients appear at the same level below the  
16 surface of the earth?

17 A. No. Because the rate at which temperature changes as we  
18 go deeper into the earth isn't constant. In some places, the  
19 temperature rises more quickly than others.

20 Q. Does the temperature always get warmer the deeper you  
21 go --

22 A. It always get warmer, yeah. Now, the --

23 Q. Are there temperature gradients at the North Pole and the  
24 South Pole?

25 A. There are temperature gradients there, too, yes, indeed.

## ANDREW HURST - DIRECT

1 Q. And is 60 degrees as close at the North Pole as it is in  
2 South Louisiana?

3 A. Well, it does vary. Because if the earth's temperature is  
4 warmer, when you start to go into the ground, it obviously gets  
5 hotter quicker because you're starting at a warmer temperature.

6 But what I'd like to point out with these data, these  
7 are deliberately used, the Gulf of Mexico data. If you compare  
8 these with the rest of the world, it is exactly the same  
9 picture. More than 90 percent -- it's about 93 percent of the  
10 world's light oil and gas occur in this thermal window, a  
11 window between 60 and 120 Celsius, which this guy, Maloney,  
12 decided to call the Golden Zone.

13 Q. And is that another name for -- what you call the Golden  
14 Zone, the accumulation zone?

15 A. The importance of the right-hand side of the diagram is  
16 this provides a really good cartoon of the processes that take  
17 place in order to give us this.

18 Because what this shows is that, above 60 degrees  
19 Celsius, that sedimentary material -- sediment and sedimentary  
20 rock actually loses its porosity, which is what holds the  
21 fluids by mechanical compaction, simply by the weight of the  
22 material squeezing grains together.

23 There are no thermal-controlled reactions that are  
24 important during that period. When we get to 60 degrees  
25 Celsius, the earth changes. The minerals which are most

## ANDREW HURST - DIRECT

1 important in mud and mudstone and shale are clay minerals.

2           Some of these minerals you will not be familiar with.  
3 But one of them which is very characteristic of the Gulf Coast,  
4 smectite, is thermally unstable at 60 degrees Celsius. It  
5 decomposes and a new material called *illite* starts to grow.

6           The effect of that transformation in the mineralogy  
7 is that the rocks decrease their permeability by many orders of  
8 magnitude. Thus, the --

9 Q. Why is that decrease in permeability important to our  
10 discussions with respect to drilling?

11 A. It's important because those rocks become very good seals  
12 for hydrocarbons. These are the rocks that we need to  
13 reservoir -- to be above the reservoirs where hydrocarbons are  
14 located.

15           But unfortunately, there's a downside to these rocks  
16 becoming very low permeability. It means, obviously, it's more  
17 difficult for fluids to escape through, but that same property  
18 means that those rocks will tend to fracture hydraulically,  
19 naturally.

20           So when the pressure gets too much, these rocks have  
21 become more brittle and they fail. So as we go from 60 to  
22 120 degrees, there's an increase probability of the rocks  
23 forming better seals, because they're less permeable; but at  
24 the same time, they become more brittle and more prone to  
25 fracturing.

## ANDREW HURST - DIRECT

1 Q. And what happens over 120 degrees?

2 A. Above 120 degrees, most of the rock -- the main process  
3 that's taking place in the rocks is one of expulsion of fluids,  
4 whether it's aqueous fluids, water, or whether it's hydrocarbon  
5 fluids, oil and gas. All the molecules of liquids down here  
6 want to get out of this -- well, they want to get to the  
7 earth's surface, but most of them get trapped in this  
8 accumulation zone.

9 And this is where, of course, people make most of  
10 their money by drilling into that zone.

11 Q. And, Professor, these chemical processes or, I guess,  
12 thermal processes that you talked about, is that anything new  
13 in geology?

14 A. No, it's not anything new at all. In fact, some of the  
15 first work on this was done -- in fact, I reference this in my  
16 report -- way back in the late '50s and '60s, particularly  
17 looking at clays. But the work that is behind the Statoil  
18 concept is actually very broadly published since the mid/early  
19 1980s through to the present day.

20 So there's a huge amount of literature both by  
21 Statoil and other people that document the importance of these  
22 thermally-driven reactions. I think the good thing that the  
23 Golden Zone concept does is it ties these together in a way  
24 that we can consider pore pressure, which I'll come back to,  
25 porosity and the presence of oil and gas.

## ANDREW HURST - DIRECT

1           When we're considering pore pressure, also consider  
2 the tendency for rocks to fracture, whether they are fragile or  
3 not. All of these can be looked at in one big unified package,  
4 not in a well-by-well manual.

5           If I can just revert to the plot here, this little  
6 segment here. We've got temperature going down this axis.

7 **BY MR. LEGER:**

8 **Q.** Can we blow this up a little bit or is that sufficient for  
9 you, Professor?

10 **A.** It's sufficient for me, but I know what I'm talking about.

11 **Q.** I'm --

12 **A.** No objection.

13 **Q.** I'm glad about that.

14           Okay. Professor, let's behave now. This is not a  
15 classroom.

16 **A.** Excuse me. I am British.

17 **Q.** Now, Professor, what's the significance of this thing you  
18 just had blown up and you understand?

19 **A.** Yeah, sure.

20 **Q.** And try to make us understand.

21 **A.** Yeah, sure. We have temperature down the vertical axis  
22 and that's the Golden Zone, 60 degrees, 120 degrees. And along  
23 the bottom, we have pressure. On this diagram -- and those of  
24 you who heard Huffman's testimony will have heard about the  
25 hydrostatic gradient and the lithostatic gradient. The

## ANDREW HURST - DIRECT

1 hydrostatic gradient is the weight of water above you in a  
2 rock.

3 Q. And so the deeper you go and the higher you go, the weight  
4 of water depth increases?

5 A. That's right. That's right. Water's heavy.

6 Q. The deeper you go, the higher you go, the weight of the  
7 rocks --

8 A. That's right. At the same time, rocks are a mixture of  
9 water and mineral, and mineral is more dense than water. So  
10 the weight of the minerals is greater than the weight of the  
11 water. So, therefore --

12 Q. What's the big deal about temperature?

13 A. Beg your pardon?

14 Q. What's the big deal about temperature?

15 A. Well, the big deal about temperature is that, from looking  
16 at all the data from the Gulf of Mexico, we can see that  
17 there's a clear relationship between temperature and pore  
18 pressure. And it's pore pressure that we need to be able to  
19 predict so as we can understand where and when we're going to  
20 locate pockets of high pressure during the drilling of a well  
21 or when we go into a reservoir.

22 And this diagram shows the thick black line going  
23 down here, then swinging across there. It's a bit of a ramp on  
24 there. There is actually the average of all these data plotted  
25 as pore pressure. What this shows is that, down to about



## ANDREW HURST - DIRECT

1 70 degrees Celsius, the hydraulic gradient and the pore  
2 pressure, on average, occur together.

3 Q. So as temperature increases, the pore pressure -- pore  
4 fluid pressure --

5 A. Above approximately 70 degrees, average pore fluid  
6 pressure starts to grow, and then it grows exponentially as you  
7 get closer to the 120-degree islands there.

8 Q. Is there any particular concern in the context of drilling  
9 a well involving the pore pressure closing in on the  
10 lithostatic pressure gradient?

11 A. There are two concerns. One is that you will -- the pore  
12 pressure will exceed the fracture gradient of the rock, which  
13 is about 10 percent below the lithostatic gradient. I'm going  
14 to sort of try to put this onto here -- anyway, that's my  
15 approximate fracture gradient, slightly below the lithostatic  
16 gradient. And that's when rocks fail naturally. When we're  
17 drilling them, they fail naturally. So that becomes an  
18 increased risk.

19 The other risk is that you are likely to encounter  
20 far higher pore pressures in any type of rock that you're  
21 drilling through but particularly the reservoirs that you drill  
22 into.

23 So there are two things that go together: You're  
24 going to hit more elevated pore pressures; you're also going to  
25 have a greater chance of encountering rocks that have been

## ANDREW HURST - DIRECT

1 fractured.

2 Q. And what does that tell us about drilling risks,  
3 Professor?

4 A. Well, both things are important. In the one case, if the  
5 fracture has occurred, you may be underestimating the leak-off  
6 pressure, the fracture gradient of the rock; and on the other  
7 hand, you also have to be careful you have a mud weight which  
8 can cope with the overpressure present in the pore fluids.

9 Q. So is it true, Professor, that as the pore fluid pressure  
10 approaches the fracture gradient, you get to be very concerned  
11 about the integrity of the formation?

12 A. That's absolutely correct.

13 Q. And we're not going to talk -- Professor, you heard  
14 Dr. Huffman talk about the safe drilling margin issue. You're  
15 not an expert on safe drilling margins, are you?

16 A. No, no. But I provide the engineers with a lot of the  
17 information they need, of course.

18 Q. Now, Professor, have you had an opportunity to investigate  
19 and look into some of the BP data to determine at what  
20 temperature the well -- the Macondo well was?

21 A. Yes, I did. And I referenced --

22 Q. What did you conclude?

23 A. I reference that in my expert report. It appears that the  
24 best estimate for the reservoir temperature is 117 degrees  
25 Celsius.

## ANDREW HURST - DIRECT

1 Q. Have you seen other, even higher estimates?

2 A. Yes, there are some estimates for higher, there are some  
3 for lower. I thought 117 was probably as good as they could  
4 get.

5 Q. Now, Professor, have you also looked, in connection with  
6 your analysis, at a technical memorandum published by BP?

7 A. I have.

8 Q. And may I refer you to Trial Exhibit 03375?

9 Is this that technical memorandum that you looked at?

10 A. It is.

11 Q. And what is this technical memorandum about?

12 A. This is the post-well subsurface description of the  
13 Macondo well. That's the title.

14 Q. And it's dated what?

15 A. That's the 25th, I think, of May -- or 26th -- 25th of  
16 May, 2010.

17 Q. And so that's about a month after the Macondo explosion;  
18 correct?

19 A. That's correct.

20 Q. It seems to be an analysis written by the people whose  
21 names are on here: Marty Albertin --

22 A. Yes.

23 Q. -- Chuck Bondurant, Kelly McAughan, Binh Van Nguyen, Bryan  
24 Ritchie, Craig Scherschel and Galina Skripnikova?

25 A. Yes.

## ANDREW HURST - DIRECT

1           **MR. LEGER:** Can we see the screen again?

2           **BY MR. LEGER:**

3           **Q.** Is there an indication of their belief of the reservoir  
4 temperature after study post-explosion?

5           **A.** They got -- I know there are -- 236 Fahrenheit is what's  
6 stated.

7           **Q.** By the way, the upper limit of the Golden Zone in general  
8 terms is 120 degrees Centigrade or 248 degrees Fahrenheit;  
9 correct?

10          **A.** It's very close to that.

11          **Q.** So by this number or the other number, the 117 degrees,  
12 where does Macondo fit into the context of increased pressures  
13 with respect to increased temperatures?

14          **A.** Where the Macondo well intersected the oil-bearing  
15 reservoir, we are just above the base of the Golden Zone, and  
16 that is a place where we've got this very rapid increase in  
17 high pore pressures.

18                 So it's the sort of place where you would imagine  
19 that you were going to encounter some of the features that are  
20 commonly -- some of the characteristics which are common at the  
21 base of the Golden Zone or below the Golden Zone.

22                 What one has to remember is the well in Macondo  
23 penetrates a shallow part of the Macondo reservoir. There's  
24 plenty of deeper parts to the reservoir that the well didn't  
25 get into that, of course, will be hotter because they're

## ANDREW HURST - DIRECT

1 deeper.

2           So you're right on the edge of the Golden Zone. So  
3 all the associated issues that we've just been talking about,  
4 you would expect to have some effect in this location.

5 Q. And we should not be surprised in predicting the well;  
6 correct?

7 A. Indeed, you should not be surprised.

8 Q. Now, in the context of your review, this --

9           **THE COURT:** Excuse me, excuse me. Wait a minute,  
10 wait a minute. When you say they were *on the edge*, you mean  
11 the lower edge?

12           **THE WITNESS:** Yes. They're slightly cooler --

13           **THE COURT:** "Lower edge" meaning the higher  
14 temperature?

15           **THE WITNESS:** Lower temperature. So they're at 117,  
16 they haven't reached 120.

17           **THE COURT:** Wouldn't that be -- I'm probably just  
18 using the wrong terminology.

19           The zone that you're talking about runs between  
20 60 and 120 Centigrade; right? They're close to the edge of the  
21 120 is what you're saying?

22           **THE WITNESS:** Indeed, that's correct, yes, yes.

23           Some parts are --

24           **THE COURT:** That would be the lower- or  
25 higher-temperature part of the zone.

## ANDREW HURST - DIRECT

1           **THE WITNESS:** There will be parts of the Macondo  
2 structure, the oil-containing reservoir, that are at a hotter  
3 temperature than where the borehole intersected.

4           These geologists have a three-dimensional  
5 conceptual way of thinking.

6           **MR. LEGER:** Can we go back for a moment on that  
7 issue, to the previous demonstrative, 2466, Trial  
8 Exhibit 20003.103.

9 **BY MR. LEGER:**

10 **Q.** So, Professor, your testimony is that generally it's your  
11 opinion that, based on looking at all of the data, the Macondo  
12 well at its deepest point, the total depth was somewhere  
13 physically above 120 degrees, at about 117 degrees; correct?

14 **A.** That's correct.

15 **Q.** But on the lower end, physically, of the Golden Zone;  
16 correct?

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

18 **Q.** On the warmer edge, which is lower --

19 **A.** Yes.

20 **Q.** -- than the Golden Zone; in fact, nearer the expulsion  
21 zone; correct?

22 **A.** Yes. This is where we are on this curve where the pore  
23 pressure gradient is getting very close to the fracture  
24 gradient, and you would either expect the hydraulic fracture of  
25 some of the rocks or you would expect elevated pore pressures.

## ANDREW HURST - DIRECT

1 Q. Right at the point where you would expect the hazard to  
2 increase dramatically; correct?

3 A. But you would expect there to be plenty of oil there, and  
4 we know there was plenty of that because it's still within the  
5 Golden Zone.

6 Q. Do we have any reason to believe that the Macondo  
7 reservoir was entirely above -- and I say "above" -- below,  
8 temperature\_wise, 117 degrees Centigrade?

9 A. It was entirely above. Well, I think the best estimate is  
10 it was 117. So unless something was obviously --

11 Q. But physically the reservoir would have been lower --

12 A. Deeper and hotter.

13 Q. -- closer to the center of the earth and farther from the  
14 crust?

15 A. That's correct. That's correct.

16 Q. Now, back to Trial Exhibit 03375. And I'd now like to  
17 turn your attention, Professor, to page 11, which would be  
18 Trial Exhibit 03375.11.

19 A. Yes. I think we can zoom in here. That's good.

20 Q. Professor, is there anything in particular -- what is  
21 this?

22 A. Well, this is a summary of BP's own evaluation of their  
23 ability to predict pore pressure and fracture gradient in the  
24 Macondo well.

25 These scribbles on the report are not mine, actually,

## ANDREW HURST - DIRECT

1 so we're --

2 Q. Those lines are not yours --

3 A. No, they're not mine.

4 Q. Professor, by the way, in your examination of this  
5 technical memorandum which examined the geological aspects of  
6 the Macondo well, did you find any evidence that the thermal  
7 theory that you referred to as the *Golden Zone* was used by BP  
8 in the preparation for drilling this well?

9 A. I have found absolutely no evidence. The start of this --  
10 the first sentence in this section actually shows the type of  
11 data that they are using to predict pressure and fracture  
12 gradient in the Macondo well. And if you read through the  
13 first four and a half lines, and when you get to Figure 9 --

14 Q. You can read them for us if you want. Whatever you think  
15 is perfect.

16 A. I prefer not to read that, unless, Your Honor, you want me  
17 to.

18 Q. What is important to you as a petroleum geologist in this  
19 paragraph, Professor?

20 A. Well, actually, there are a couple things that are  
21 important. One is that they don't use temperature as a  
22 predictor of pore pressure. They use principles which are  
23 actually well known not to be particularly successful, and even  
24 very, very difficult to make predictions using the methods  
25 they're using there.



## ANDREW HURST - DIRECT

1           But also, the sentence following the reference, the  
2 Fig. 9, pore pressure is higher, and the pre-drill most likely  
3 occurred from that depth to that.

4           And they then say the --

5 Q.   10,000 feet to 17,750 feet; right?

6 A.   Yeah, that's right.

7           Then they say the pre-drill pressure prediction was  
8 too low in this interval due to a slower-than-predicted  
9 interval velocity and the apparent need for higher pressure  
10 transform model.

11          Now, you don't need to be a lawyer to misunderstand  
12 this, actually, because I think this is really obtuse. This is  
13 saying, Our model didn't work scientifically, so we're going to  
14 try and fudge it.

15          This is all this is, scientific fudging, to try and  
16 get the right answer after the event.

17          And, in fact, this type of approach to pore pressure  
18 prediction unfortunately is still used widely in the industry.  
19 Even the people who work with this are not confident that they  
20 can ever predict pore pressure. What they like to think they  
21 can do is, when they know what the answer is -- they should be  
22 able to predict the answer when they know what it is. So they  
23 can do predictions with hindsight, but they can't do  
24 predictions in foresight.

25 Q.   Anything else of interest to you as a petroleum geologist?

## ANDREW HURST - DIRECT

1 A. Absolutely. Unfortunately, there's some rather condemning  
2 comments in this report, one of which is that the -- that the  
3 reservoir pressures are much lower than predicted. To write  
4 "much lower than predicted" --

5 Q. Is that right there?

6 A. Yeah, that's right. It's a bit of an admission. They  
7 obviously weren't very happy with their performance or I think  
8 *much* wouldn't have been included in that sentence.

9 Q. Now, what is meant by *reservoir pressures*? Is that pore  
10 fluid pressure?

11 A. Excuse me, yes. That's the pore fluid pressure in the  
12 reservoir.

13 Q. What's the concern, in looking backwards at that time,  
14 about finding that the reservoir pressures were lower than they  
15 had expected them to be?

16 A. Well, what happens, if you go into a rock like the one  
17 that we were looking at earlier, the fragile sandstone, and you  
18 have too high mud pressure going into a rock which is fragile,  
19 it blows it away. It literally -- it fractures the material  
20 and it destabilizes it.

21 Now, that may not be instantaneous throughout the  
22 reservoir, but it will start to begin. And as long as you keep  
23 the high mud weight in the formation, that borehole  
24 integrity -- the rocks around the borehole will start to  
25 degrade and fracture.

## ANDREW HURST - DIRECT

1 Q. What's the big fear about that?

2 A. Well, the fear is that the borehole wall completely loses  
3 its integrity, which means that, for example, if you try to  
4 cement it, there's nothing for cement to bind to; and there's  
5 nothing for the cement to bind to because you're trying to  
6 cement geological mush.

7 MR. REGAN: Your Honor, I just -- I think actually  
8 Mr. Leger established about a half hour ago that the expert is  
9 not an expert on cementing. I would move to strike his opinion  
10 about how cementing takes place in this well.

11 MR. LEGER: Your Honor, we're not offering him as an  
12 expert in the field of cementing --

13 THE WITNESS: Well, the problem I'm having here is  
14 understanding whether he believes that's what happened in this  
15 case or if this is a theory of what could happen. That's what  
16 it sounds like to me.

17 You're not saying you can say that's what  
18 happened in this case; right?

19 THE WITNESS: What I'm saying is that, if you have  
20 too high mud weight when you go into a reservoir which has a  
21 lower predicted pore pressure than the mud weight is designed  
22 to cope with, that mud weight will essentially cause the  
23 formation to disintegrate. And although I'm not an expert in  
24 cement, I'm an expert in what you put the cement onto, which is  
25 the rock.

## ANDREW HURST - DIRECT

1           Many disciplines work together, and if they're  
2 not working together, you get into a mess.

3           **THE COURT:** But the question is: Are you able -- are  
4 you here to testify that you have an opinion as to whether that  
5 is what occurred in this case?

6           **THE WITNESS:** My opinion is that the formation around  
7 the borehole disintegrated in the reservoir. I don't see how  
8 anything else could have happened.

9           **MR. REGAN:** Your Honor, I move to object -- move to  
10 strike the last answer, because that's not an opinion that's  
11 founded --

12           **THE COURT:** Well, I guess I provoked that by my  
13 question. I'm just trying to understand the difference between  
14 his testimony, you know, theories and what could happen if --  
15 increased risk as opposed to what actually happened in this  
16 case. That's where I'm having trouble translating all this.

17           **MR. LEGER:** Your Honor, we're offering with this  
18 witness the concept of the hypotheticals of what happens in  
19 Nature, what happens when welling under circumstances. Other  
20 witnesses -- in fact, Dr. Huffman has testified to some degree  
21 what happened here specifically, and other witnesses will  
22 testify specifically.

23           **THE COURT:** All right. Thank you.

24 **BY MR. LEGER:**

25 **Q.** Professor, let me ask you this: Does the -- does drilling

## ANDREW HURST - DIRECT

1 in the Mississippi Canyon, in the area where Macondo ultimately  
2 was drilled, present significant geological challenges and  
3 hazards?

4 A. Yes.

5 Q. These challenges, should they be by a competent and  
6 prudent operator, an oil company, should these challenges be  
7 predictable?

8 A. They should be predictable, yes.

9 Q. And by the way, before that, this Golden Zone thing, is  
10 that just a name?

11 A. It's just a name, yeah.

12 Q. Where did that name come from?

13 A. It came from Statoil.

14 Q. What does it mean? What is the Golden Zone?

15 A. Well, it's referring, I think, to the black gold, which  
16 is, you know, the wealth we find in that temperature.

17 Q. The principles surrounding the Golden Zone are not  
18 brand-new, are they?

19 A. No, absolutely not.

20 Q. In fact, the papers that you cite cite hundreds of  
21 articles supporting the concept of the Golden Zone; correct?

22 A. Yes. There are many articles.

23 Q. Now, in the context of drilling in the Golden Zone itself,  
24 and particularly on the hotter edge of the Golden Zone, are  
25 there particular challenges and hazards?

## ANDREW HURST - DIRECT

1 A. Yes, there are.

2 Q. And do these challenges, in your view, in the Mississippi  
3 River Canyon, particularly in the area where Macondo was  
4 drilled, require pre-drill pore pressure modeling?

5 A. They require -- every well requires accurate pore pressure  
6 modeling, but they require particularly careful modeling in  
7 this location for the reasons we've presented.

8 Q. Would you suggest that the hazards and the risks involved  
9 in drilling in this location, particularly the location of  
10 Macondo, in light of the fact that there's slumping and mud  
11 slides and fragile formations and rocks of low-confining stress  
12 and anomalously low leak-off pressures and earthquakes -- would  
13 you suggest the use of the best available data and scientific  
14 methodology in the context of developing, predicting, and  
15 building wells in this region?

16 A. You should use that anywhere, but it's particularly  
17 important when you know you've got challenging formations that  
18 you're going to be drilling into.

19 Q. From what you've seen, was that done?

20 A. There is very little evidence of this.

21 **THE WITNESS:** We're talking about hypothesis, Your  
22 Honor. Every well is a hypothesis. Every exploration work is  
23 testing a hypothesis. And part of the hypothesis is that  
24 you're going to find commercial volumes of oil and gas, or gas.  
25 And that hypothesis is only tested by the drilling of the well.

## ANDREW HURST - CROSS

1                   So the type of things I'm talking about allow  
2 people to make a prognosis in the well plan to test what riches  
3 the earth has to offer in terms of its oil and gas. But in  
4 order to do that, you need a framework of knowledge and data  
5 which is based on sound science, sound scientific principles,  
6 to allow you to drill safely and successfully.

7                   **MR. LEGER:** No more questions, at this time, Your  
8 Honor.

9                   **THE COURT:** Okay. Does the United States have  
10 anything?

11                   **MR. LEGER:** Thank you, Professor Hurst.

12                   **MR. UNDERHILL:** None from the United States, Your  
13 Honor.

14                   **MR. MAZE:** No questions from Alabama.

15                   **MR. KANNER:** No questions for Louisiana, Your Honor.

16                   **THE COURT:** Let's see, Transocean was next.

17                   **CROSS-EXAMINATION**

18 **BY MR. MILLER:**

19 **Q.** Good afternoon, Professor Hurst.

20 **A.** Good afternoon.

21 **Q.** My name is Kerry Miller, and I'm a lawyer for Transocean.  
22 I have you under cross-examination.

23                   Professor Hurst, I reviewed your report, and I  
24 didn't see any reference to Transocean in your report. Sir, is  
25 it true that you have no opinions with respect to Transocean

## ANDREW HURST - CROSS

1 set forth in your report?

2 A. That's correct.

3 Q. And, sir, I didn't see any reference in your report to the  
4 responsibilities of a drillings contract.

5 Is it true, sir, that you don't have any opinions in  
6 your report with respect to the responsibilities of a drilling  
7 contractor?

8 A. That's correct.

9 Q. Sir, I looked at -- I think Attachment 4 to your report  
10 was your list of reliance materials.

11 A. Okay. Thank you.

12 Q. I didn't see any Transocean witness depositions or  
13 Transocean documents referenced in those materials.

14 Is it true, sir, that you didn't rely upon any  
15 Transocean employee depositions or Transocean documents to  
16 render your opinion in this case?

17 A. That's correct.

18 MR. MILLER: No further question, Your Honor.

19 THE COURT: All right. Thank you.

20 Halliburton?

21 MR. GODWIN: No questions for Halliburton, Your  
22 Honor.

23 THE COURT: All right. Thank you.

24 BP.

25 MR. REGAN: One moment, Your Honor.



## ANDREW HURST - CROSS

1                   Our apologies, Your Honor. We just have to swap  
2 out the teams.

3   **CROSS-EXAMINATION**

4 **BY MR. REGAN:**

5 **Q.** Mr. Hurst, again, Matt Regan on behalf of BP --

6                   **MR. REGAN:** And I have Dr. Hurst on  
7 cross-examination, for the reporter.

8 **BY MR. REGAN:**

9 **Q.** Dr. Hurst, I'd like to just start kind of where you  
10 finished with respect to the Golden Zone.

11                   As you described it, I think, both today and in your  
12 report, it's a concept with respect to particular geological  
13 conditions in which commercial hydrocarbons occur; is that  
14 right?

15 **A.** That's correct.

16 **Q.** And based on research that you've reviewed, approximately  
17 90 percent of commercial hydrocarbon discoveries that have  
18 already taken place occur within this thermal window; correct?

19 **A.** That's correct.

20 **Q.** You then described to the Court what the rock conditions  
21 can be like in that Golden Zone; correct?

22 **A.** That's correct.

23 **Q.** And the rocks in the Golden Zone, you described, could  
24 become brittle or be prone to fracture, in so many words?

25 **A.** Yes.

## ANDREW HURST - CROSS

1 Q. So would it be correct that, under your view, 90 percent  
2 of the discoveries of oil and gas in the world have this  
3 phenomenon that you have described with respect to rocks that  
4 are brittle or prone to fracture?

5 A. You have to be a little more analytical about the  
6 individual conditions that you find a reservoir in, both in  
7 terms of the geologic age and in terms of the location of the  
8 Golden Zone. And also because chemical -- there are some  
9 temperature-driven reactions that are kinetic; they don't  
10 happen instantly. You also have to consider how long rocks  
11 have been at the particular temperature.

12 Q. But with respect to the Gulf of Mexico area, would it be  
13 your view that all of the discoveries in that area that are in  
14 this Golden Zone would have that condition with respect to the  
15 rocks because they're of a common age?

16 A. If they're of a common age, you would expect a great deal  
17 of similarity.

18 Q. Okay. It's true that you are not aware of any operator in  
19 the Gulf of Mexico that has used this Golden Zone concept with  
20 respect to developing a pore pressure prediction; correct?

21 A. Actually, no, that's not correct. And I know that that  
22 was something that was noted in my deposition, but it's  
23 obviously not correct because Statoil have used this in the  
24 Gulf of Mexico. Otherwise, I wouldn't be talking about it and  
25 referring to their work. At the time of my deposition, I was

## ANDREW HURST - CROSS

1 not aware of other operators than Statoil using the concept of  
2 the Golden --

3 Q. That's true today as well. Other than Statoil, you're not  
4 aware of a single other operator in the Gulf of Mexico that  
5 uses this Golden Zone concept in developing their pore pressure  
6 predictions?

7 A. I'm not sure about that anymore, no.

8 Q. You're not sure?

9 A. No, I'm not sure because there are -- you know, as with  
10 any good idea, there is a tendency for people eventually to get  
11 around to testing it. My understanding is that many more  
12 companies are now actually incorporating thermal controls into  
13 their models for predicting pore pressure.

14 Q. You would agree with me, at the time you issued your  
15 expert report and at the time you gave your deposition, you  
16 were not in a position to identify any other operators in the  
17 Gulf of Mexico that used this concept; correct?

18 A. At the time of my deposition, that was correct. Today, it  
19 is not.

20 Q. And that was in 2011; correct?

21 A. November 2011, I believe, sir.

22 Q. You would agree that the Golden Zone concept is not  
23 routinely used to support safe and optimal drilling practice;  
24 correct?

25 A. That follows on from your previous question because that

## ANDREW HURST - CROSS

1 is probably what I thought, with the exception of Statoil, in  
2 2011 and when I wrote my report. But today I think that  
3 picture has changed.

4 Q. You came to your deposition prepared to give the testimony  
5 in support of the report that you had submitted; correct?

6 A. Of course.

7 Q. With respect to your report, you also make clear that you  
8 were not aware of any direct confirmation that the exploration  
9 and production industry was even aware of or applying the  
10 Golden Zone concepts that you described in your report;  
11 correct?

12 A. I don't remember.

13 Q. If you turn to your report. I think it's TREX-7500,  
14 page 12.1. This is from your report, page 12, Dr. Hurst. This  
15 is the section that I think Mr. Leger pointed out in your  
16 report where you described the arguments against the Golden  
17 Zone; correct?

18 A. Yes.

19 Q. And you used the -- in the first sentence, you say  
20 *three-fold zonation*. That's another way of describing your  
21 Golden Zone concept, that there is a compaction zone, the 60-  
22 to 120-degree zone, and then an expulsion zone. So one, two,  
23 three; correct?

24 A. That's correct.

25 Q. "Three-fold zonation is quite possibly an implicitly

## ANDREW HURST - CROSS

1 recognized concept in the hydrocarbon exploration community,  
2 but there is no direct confirmation of this."

3 Did you write that in your report?

4 A. I did, and it is correct. Do you want me to give you a  
5 little more context about that?

6 Q. I'd just like to ask you if you wrote this in your report  
7 that you submitted to the Court.

8 A. Yes.

9 Q. The last sentence in that paragraph states: "The citation  
10 indices do not give any indication of whether the exploration  
11 and production industry is aware of or is applying Golden Zone  
12 concepts."

13 Did you write that in your report?

14 A. I did.

15 Q. And did you believe it to be accurate when you submitted  
16 it?

17 A. I certainly -- yes, I did. Yes.

18 Q. And you did an extensive review of the literature to  
19 support the report that you submitted; correct?

20 A. Yes.

21 Q. Now, with respect to page 27, if we could go to G-201,  
22 page 27 of the report, same exhibit.

23 You have a "Conclusion" section in the report that's  
24 on page 27. While it's coming up, if I could ask you: Did you  
25 conclude in your report and state, "My report is compiled in

## ANDREW HURST - CROSS

1 the absence of specific knowledge of what procedures oil  
2 companies operating in the Mississippi Submarine Canyon follow  
3 when creating a prognosis of the conditions to be encountered  
4 in a new well."

5 Did you write that in the conclusion of your report?

6 A. Yes, sir. If it's in the conclusions, I'm happy to say  
7 that I wrote that in the conclusions.

8 Q. All right. So, Dr. Hurst, with respect to comparing this  
9 well and what BP did with respect to its pre-drill pore  
10 pressure prediction, your testimony in your report was prepared  
11 in the absence of specific knowledge of what any oil company  
12 operating in that Mississippi Submarine Canyon actually does  
13 when creating a prognosis, as set forth in your report?

14 A. What I've done in my report is referred to 11,000 data  
15 points from the Gulf of Mexico, all of which have a prognosis  
16 made for them. The results of the wells are probably more  
17 important when you're looking at exploration risks today than  
18 knowing the individual prognosis of any single well.

19 **THE COURT:** Mr. Regan, wait.

20 Could you move the microphone back just a couple  
21 inches from you when you're speaking because I think we're  
22 getting a little bounce back every now and then.

23 **THE WITNESS:** Excuse me. Is that okay?

24 **THE COURT:** Usually, I gotta tell witnesses to get  
25 closer to it. You're right on top of it.

## ANDREW HURST - CROSS

1 **BY MR. REGAN:**

2 **Q.** It's true, as you wrote in your report, that you compiled  
3 your opinions from your research in the absence of any specific  
4 knowledge of what procedures oil companies operating in the  
5 Mississippi Canyon follow when creating a prognosis of the  
6 conditions to be encountered in a new well. Is that a true  
7 statement?

8 **A.** Should I repeat my answer?

9 **Q.** My question is: Is that a true statement?

10 **A.** You've already asked me that question, and I've already  
11 answered it.

12 **Q.** I apologize. If you'll indulge me once more --

13 **THE COURT:** I sustain his objection. I think he has  
14 answered it.

15 **MR. REGAN:** Okay. We'll move on.

16 **BY MR. REGAN:**

17 **Q.** Let me ask you, then, not with respect to what other oil  
18 companies operating in the Mississippi Submarine Canyon follow.  
19 I'd ask with respect to Macondo: You were not asked to review  
20 in detail what happened during the drilling of the Macondo  
21 well; correct?

22 **A.** I was not.

23 **Q.** I couldn't hear your answer. I'm sorry. It's just --

24 **A.** I was not.

25 **Q.** You did not look at any of the Macondo-specific data to

## ANDREW HURST - CROSS

1 reach your opinions in this case; correct?

2 A. Apart from the reports that I referred to in my report.

3 Q. Would it be fair to say, Dr. Hurst, that your opinions in  
4 this case are based on your general geologic observations about  
5 particular strata and geological conditions in the Macondo or  
6 Mississippi Canyon area rather than anything specific to the  
7 Macondo well?

8 A. My opinions are based on science and my understanding of  
9 science, as it allows us to explore successfully for oil and  
10 gas.

11 Q. And in using science, your opinions, as you've expressed  
12 them, are based on general geological or scientific  
13 observations rather than anything specific to the drilling of  
14 the well?

15 A. I think my report has a great relevance to drilling of  
16 wells in the Mississippi Submarine Canyon when Macondo was  
17 sited.

18 Q. But -- it may be a poor question. Let me try it one more  
19 time.

20 With respect to the opinions in this case, you come  
21 at it from a general geological observation rather than looking  
22 at the specifics of drilling this well that's the subject of  
23 this case?

24 A. I do not attempt to form a prognosis for the drilling of  
25 the Macondo well, if that's what you mean.



## ANDREW HURST - CROSS

1 Q. And you do not attempt to express an opinion about what  
2 caused the blowout on the night of April 20th that resulted in  
3 a fire and an explosion on the *Deepwater Horizon*; correct?

4 A. That was not part of my report.

5 Q. In the literature review that you did for your report, I  
6 believe you said it on your direct testimony, that you've  
7 written approximately 160 articles; is that correct?

8 A. I have, yes.

9 Q. And none of your publications deal with drilling of a  
10 well; correct?

11 A. No.

12 Q. Is that correct?

13 A. None do, yes.

14 Q. None of your publications deal specifically with drilling  
15 risks associated with drilling a well in geological formations  
16 that may have overpressure; correct?

17 A. That's correct.

18 Q. And during your literature review, you found three  
19 articles that you say specifically tie drilling operations to  
20 formations with overpressure; correct?

21 A. Yes.

22 Q. You were not the author of any of those articles; correct?

23 A. Offhand, I don't remember the articles.

24 Q. I have a chart that might help you. If I pull up D-4368.

25 The three articles that you cited were all by one

## ANDREW HURST - CROSS

1 author, Paul Nadeau. Do you recall that?

2 A. Yes. I can -- yes.

3 Q. The first article by Mr. Nadeau was in 2005; correct?

4 A. Yes.

5 Q. And the other two articles from Mr. Nadeau that you relied  
6 on were published after the blowout and were submitted in  
7 September of 2010, published in 2011, with the third published  
8 in January of 2011; correct?

9 A. Yes.

10 Q. You did not generate any original data yourself on the  
11 topics that are the subject of your report; correct?

12 A. That's correct.

13 Q. And you did not go behind the articles that you cite, that  
14 is, to try to audit or verify the data sources that were relied  
15 upon by the authors on which you relied?

16 A. That would have been an awesome task, so I didn't do it.

17 Q. Okay. Understood. I didn't do it either.

18 With respect to the literature, you did find -- you  
19 did find that there is a standard that the industry does use  
20 with respect to looking at pore pressure development; correct?  
21 The compaction theory?

22 A. Yes. I refer to the compaction theory, yes, correct.

23 Q. And the compaction theory is one that's used by the  
24 industry; correct?

25 A. It's been very widely used by the industry.

## ANDREW HURST - CROSS

1 Q. It's one that's been widely used by operators operating in  
2 the Gulf of Mexico; correct?

3 A. I wouldn't know in detail, but I suspect that's the case.

4 Q. You're familiar with the term *basin modeling*?

5 A. Yes, I am.

6 Q. Basin modeling is a way to understand how sediments and/or  
7 fluids behave and evolve; correct?

8 A. That's correct.

9 Q. And you would agree that pore pressure prediction -- and  
10 let me just take a pause to make sure we know what we're  
11 talking about when we talk about pore pressure prediction.

12 You're talking about predicting what's going to be  
13 seen in a well before it's ever been drilled; correct?

14 A. That's correct.

15 Q. So there's no casing in the hole; correct?

16 A. It's the virgin native pressure.

17 Q. Okay. And you would agree that pore pressure prediction  
18 is one part of basin modeling; right?

19 A. I would agree with that.

20 Q. And historically, this compaction theory, not Golden Zone,  
21 has been the predominant feature of basin modeling; correct?

22 A. That's correct.

23 Q. And as Mr. Nadeau, the author that you cited three times,  
24 acknowledged in one of the articles you cite --

25 MR. REGAN: Go to 7506.4.1.

## ANDREW HURST - CROSS

1 **BY MR. REGAN:**

2 **Q.** Mr. Nadeau wrote, in the article that you cite: "It is  
3 important to acknowledge that the GZ," or Golden Zone, "view  
4 for overpressure development is not shared by most basin  
5 modelers."

6 Correct?

7 **A.** That was the view of Nadeau, yes.

8 **Q.** And he said: "The commonly held view by analysts, as  
9 implemented in these numerical simulators, is that mechanical  
10 compaction disequilibrium is dominantly responsible for  
11 overpressure generation . . . in combination with low  
12 permeability shale aquitards, which are crucial components of  
13 overpressure."

14 Correct?

15 **A.** Yes, there is a mixture of principles he's talking about  
16 there.

17 **Q.** Okay. To put it simply, there are material-scientific  
18 views that differ from the view you've expressed with respect  
19 to what creates overpressure?

20 **A.** There certainly are.

21 **Q.** The Golden Zone is one that you ascribe to; correct?

22 **A.** Yes.

23 **Q.** Others ascribe to compaction or perhaps even other  
24 theories; correct?

25 **A.** Yes.

## ANDREW HURST - CROSS

1 Q. Okay. With respect to software, you mentioned earlier  
2 that, at one point in time, you were developing some laboratory  
3 and analytical programs. Do you remember that?

4 A. Yes.

5 Q. But there is software for modeling pore pressures before  
6 wells are drilled; correct?

7 A. That's correct.

8 Q. Are you aware of any software that has been developed that  
9 includes the temperature dynamic that you believe should be  
10 included in such models?

11 A. I have recently become aware of this. At the time of my  
12 deposition and writing the report, I was unaware of it.

13 Q. And with respect to the literature review that you  
14 conducted to prepare your report, is it true that you could not  
15 find any presentations from a professional society in the  
16 United States of America about predicting pore pressure using  
17 temperature?

18 A. That's correct, but it's a slight oversimplification of  
19 fact.

20 Q. You are not a drilling engineer; correct?

21 A. I am not.

22 Q. You're not a regulator; is that correct?

23 A. That's correct.

24 Q. And your field is geology?

25 A. Correct.

## ANDREW HURST - CROSS

1 Q. In forming your opinions, you could not --

2 THE COURT: Wait, wait, wait, Mr. Regan. I want to  
3 ask the witness: What did you mean, "It's a slight  
4 oversimplification"?

5 THE WITNESS: Well, for example, in the Ehrenberg  
6 paper, in the background on the slide for the moment, we can  
7 see this map of the Gulf of Mexico with the 11,000 reservoirs.  
8 And the American Association of Petroleum Geologists has an  
9 annual meeting, and there are regularly special sessions in  
10 that annual meeting where people will present on pore pressure  
11 prediction or on other aspects of geology.

12 And in those subsections of the meeting, of the  
13 conference, there have been many sessions at which pore  
14 pressure was part of the agenda; and my recollection is that  
15 Ehrenberg actually presented in one of those pore pressure  
16 prediction meetings, I think two years before the paper was  
17 published.

18 So it will be correct to say that, you know --  
19 actually, quite rightly so -- a lot of people do this  
20 prediction using mechanical algorithms which are based on  
21 mechanical compaction. However, that doesn't mean to say that  
22 those same people have not been in an environment in conference  
23 conditions where alternative matters have been presented and  
24 discussed.

25

## ANDREW HURST - CROSS

1 **BY MR. REGAN:**

2 **Q.** With respect to your -- the recent award that you received  
3 from the American Association of Petroleum Geologists, do you  
4 recall making a quote, in sum and substance, upon receiving the  
5 award, that you sat, in your view, on the lunatic fringe of  
6 geology?

7 **A.** Absolutely. Would you like me to explain that?

8 **THE COURT:** I'd like you to explain it.

9 **THE WITNESS:** In public?

10 **BY MR. REGAN:**

11 **Q.** And my answer is yes.

12 And the full quote, just for the record, was: "I sit  
13 on the lunatic fringe of geology, having worked with clay  
14 mineralogy, probe permeametry and sand injectables *[verbatim]*,  
15 amongst other interests."

16 **A.** Sand injectites. That was very good there, yes.

17 The reason that I put that in there is because I feel  
18 it's very dangerous in science to be trapped by convention.  
19 You know, to make things better in science and in technology,  
20 you constantly have to use new methods and ask new questions  
21 and get new answers.

22 And I worked for 13 years in the oil industry where I  
23 did as I was told to and I developed methods. Some of those  
24 methods were not taken on board, even though I thought they  
25 were defensible and practical scientifically. As an academic,

## ANDREW HURST - CROSS

1 I get the opportunity to investigate things that I wouldn't  
2 normally have got to investigate in the oil industry.

3 I believe that a lot of the interest, which is what  
4 counselor actually refers to, show my willingness to step  
5 outside of the geological constraints of my science. So the  
6 probe permeametry, I was working in the physics, the flow, of  
7 porous media. So I interact a lot with physicists, engineers,  
8 statisticians. So I am very happy to cross the boundaries of  
9 geology, which is why I call myself a lunatic or something like  
10 that.

11 **THE COURT:** Let me ask you this, Professor: Is it  
12 the case that your theory, the Golden Zone, the temperature --  
13 using high-pressure, high-temperature modeling, correct, is  
14 that necessarily in conflict with the more accepted, if I'm  
15 understanding correctly, compaction methodology? Or are you  
16 saying: This is just something additional that can and should  
17 be considered?

18 **THE WITNESS:** The use of mechanical compaction works  
19 perfectly well down to 60 degrees Celsius. Above 60 degrees  
20 Celsius, there is a marked divergence between predictions and  
21 reality.

22 Golden Zone theory allows us to address those  
23 problems in the 60 to 120 and higher temperature zones where  
24 mechanical compaction simply doesn't deliver.

25 In my reports, I refer fairly extensively to



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1 some work that was published by proponents of mechanical  
2 compaction theories in 1998 when they basically say, We can't  
3 do the job properly. You know, we're keeping on trying to  
4 improve our algorithms; but basically we weren't improving the  
5 science.

6 What the Golden Zone does is give us a better  
7 scientific framework to apply this practical work.

8 And what counsel has very rightly presented is  
9 information about the Golden Zone and these relatively recent  
10 publications; but these are based on solid scientific research  
11 that has been widely published internationally, which is then  
12 fed into the concept of the Golden Zone as a predictive  
13 framework.

14 So they are different ways of doing things, but  
15 mechanical compaction works at less than 60 Celsius. It  
16 doesn't work beyond that, generally.

17 **BY MR. REGAN:**

18 **Q.** You used the phrase on your direct examination of *big*  
19 *picture, little picture*. So I have some little picture  
20 questions I want to ask with respect to the well, if I could.

21 You did not examine the data with respect to the mud  
22 losses that took place at Macondo?

23 **A.** I did not.

24 **Q.** And you did not examine any of the kicks that took place  
25 at the well; correct?

## ANDREW HURST - CROSS

1 A. Correct.

2 Q. You did not look for generally at how many deepwater wells  
3 in the Gulf of Mexico suffer mud losses or have kicks; correct?

4 A. I did not.

5 Q. You did not look at what steps, if any, BP took in its  
6 well design with respect to dealing with high pressure or high  
7 temperature; correct?

8 A. Over and above what I saw in the reports that I have  
9 referred to.

10 Q. You did not look at BP's leak-off pressure data for the  
11 Macondo well; correct?

12 A. Correct.

13 Q. You did not look at how many leak-off pressure tests were  
14 done; correct?

15 A. Correct.

16 Q. You do know not whether or not BP gathered leak-off  
17 pressure data or near neighbor wells or offset wells that are  
18 located near Macondo; correct?

19 A. Well, I do know that, actually, because BP referred to the  
20 use of data from the near neighbor wells, which includes  
21 leak-off.

22 Q. Let me ask a more precise question.

23 You know that BP did look at offset wells, including  
24 the Murray and a few others that were on the documents that  
25 we've shown; but with respect to the actual data from those

## ANDREW HURST - CROSS

1 wells, that's not something that you looked at?

2 A. I have not looked at the hard data, no.

3 Q. With respect to your teaching, you do not teach courses on  
4 drilling risks or drilling; correct?

5 A. I don't teach drilling of engineering risks.

6 Q. Geology risk -- geological risks and drilling risks are  
7 two different things; correct?

8 A. Not necessarily, no. In fact, they should not be so.

9 Q. Do any of your classes deal with the risks of drilling  
10 problems that may be encountered during the drilling of a well?

11 A. Yes.

12 Q. Do you recall being asked at your deposition:

13 "QUESTION: Do any of the the risks in your class  
14 deal -- this class, deal with drilling problems that may  
15 be encountered during the drilling of a well?

16 "ANSWER: No."

17 A. Yeah, I think there were several questions that Mr. Morris  
18 asked me that I -- he was asking me very specifically, as I  
19 remember, about how to -- do I do classes in pore pressure  
20 prediction? No. But I do classes which involve understanding  
21 why and how we predict pore pressure with relation to all the  
22 other geological phenomena that are occurring.

23 So to deal with any prediction of a single parameter  
24 is probably a mistake. You usually have to combine the  
25 different disciplines and the different types of processes

## ANDREW HURST - CROSS

1 taking place to get a holistic view of what's happening.

2 Q. My question is a little bit more narrow but -- and maybe I  
3 can take it up with Mr. Morris. But with respect to your  
4 deposition, do you recall being asked if any of the risks in  
5 your class that you teach deal with drilling problems that may  
6 be encountered during the drilling of a well and answering  
7 "no"?

8 A. No, that is probably incorrect.

9 Q. Deposition at page 68 --

10 A. It's probably an incorrect answer, not an incorrect quote.

11 Q. Okay. This can have different implications.

12 If we look at line 11, and my question -- maybe it's  
13 easier to see it on the screen than have you read it. But do  
14 you see that question and that answer?

15 A. Yes, I do. I don't know what preceded it, though. That's  
16 quite often -- we had rolls of questions where the two of us  
17 successfully manage to have a very challenging dialogue from  
18 time to time.

19 Q. I'll move forward. I think we have an understanding of  
20 the type of work that you do.

21 A. Thank you.

22 Q. With respect to the BP documents that you looked at, you  
23 list those in your report; correct?

24 A. Yes.

25 Q. And one of the documents you -- you reviewed those

## ANDREW HURST - CROSS

1 documents for temperature and pressure data, among other  
2 things; correct?

3 A. Yes.

4 Q. And one of the documents that you showed on your direct  
5 exam was a BP technical memorandum; correct?

6 A. Yes.

7 Q. And that's TREN-3375.

8 MR. REGAN: If we could put up TREN-3375.11.1.

9 BY MR. REGAN:

10 Q. Now, it's true that, amongst this technical memorandum  
11 document, Dr. Hurst, this is the one paragraph that you relied  
12 upon; right?

13 THE COURT: Remind me again what this document is.

14 MR. REGAN: Yes. If we could go to page 1 of the  
15 document.

16 BY MR. REGAN:

17 Q. Let me ask you, Dr. Hurst: Do you recognize this as a  
18 technical memorandum that was prepared after the blowout in May  
19 of 2010?

20 THE COURT: Is this in conjunction with BP's  
21 investigation?

22 MR. REGAN: It is not, Your Honor.

23 THE COURT: Okay.

24 THE WITNESS: Yes, I recognize this.

25

## ANDREW HURST - CROSS

1 BY MR. REGAN:

2 Q. So within this technical memorandum, Dr. Hurst, you relied  
3 on a paragraph on page 11, correct, which you were shown in  
4 your direct exam?

5 A. You have to forgive my ignorance of the -- when you say  
6 *relied*, I looked at the whole report. This particular section  
7 was of particular interest and specifically important, I think,  
8 today.

9 Q. Well, the entire basis of your knowledge about what BP did  
10 or did not do with respect to its prediction of pore pressure  
11 at Macondo was this page 11, this paragraph on this technical  
12 memorandum; correct?

13 A. I have become privy to more information which is relevant  
14 to the predictions they made since.

15 Q. At the time of your deposition, after you submitted your  
16 report, you testified that this was the sole paragraph that you  
17 looked at --

18 A. Yes.

19 Q. Is that correct?

20 A. That is correct, yes.

21 Q. And other than looking at this one paragraph, you did not  
22 look at any of BP's pre-drilled planning documents; correct?

23 A. I have seen a pre-drilled planning document, but I didn't  
24 have access to this when I wrote my report.

25 Q. Now, one of the sentences that you referred to in this

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1 paragraph is the one that's -- has the right margin line:  
2 "Pore pressure is higher than the pre-drill most likely curve,  
3 from 9,000 feet to 17750 TVDKB."

4 Do you see that?

5 A. Yes.

6 Q. And do you understand what TVDKB refers to?

7 A. Yeah, true vertical depth kelly bushing.

8 Q. All right. And so *kelly bushing* is basically to add the  
9 distance from the water to the actual drill floor on the rig,  
10 that distance all the way down to 17,750; correct?

11 A. Yes.

12 Q. Now, the well -- the total depth of the well was 18,360;  
13 correct?

14 A. Yes, I believe so.

15 Q. So this sentence by its face refers to a space in the well  
16 from 9,000 to 17,750; correct?

17 A. Yes.

18 Q. You said that the fact that it was acknowledged after the  
19 accident that there was a difference between the prediction and  
20 what was experienced -- I think the phrase you used is that you  
21 viewed this memo as "someone who made a scientific fudge to get  
22 it right"?

23 A. Yes, I believe so.

24 Q. But you said that the analysis set forth here is an  
25 analysis that was widely used in the industry; correct?

## ANDREW HURST - CROSS

1 A. I think the approach is reasonable -- yeah, the data that  
2 they're using is a reasonable way of going forward. In my  
3 opinion, you can do it better.

4 Q. But the use of synthesis of logging while drilling, LWD at  
5 the top, wireline, pressure indicators, drilling parameters and  
6 data, direct drilling communicators, and Geo Tap, MDT pressure  
7 measurements, those are the types of things that people  
8 drilling wells today are out there using to try to help  
9 understand pore pressures; correct?

10 A. You have a mixture of things in that list because some of  
11 these data are data that are available prior to drilling. Some  
12 of them are available during drilling, like LWD, Geo Tap, MDT  
13 pressures, and others -- so you're getting a range of different  
14 types of data that's available at different times.

15 So a lot of those data would not have been available  
16 to BP when they were doing their original well prognosis.

17 Q. And that's actually something that's common, that a  
18 prediction --

19 A. It's unavoidable.

20 Q. It's unavoidable that a prediction that's made before you  
21 have put anything into the ground with respect to drilling a  
22 well, before you jettied the first conductor casing, that when  
23 you actually get into the hole conditions, it can differ from  
24 your prediction. You see that all the time?

25 A. Absolutely.



## ANDREW HURST - CROSS

1 Q. So the fact that there's a difference between the  
2 prediction and the actual experience is not unusual at all?

3 A. It's not unusual at all. It would be the scale of the  
4 difference that is of interest.

5 Q. And you testified, I think, in response to one of the  
6 Court's questions that you believed that the well fractured  
7 because the borehole disintegrated. Do you recall giving that  
8 answer?

9 A. Well, the borehole -- the rocks around the borehole wall  
10 disintegrated.

11 Q. There are ways to measure the rocks around the borehole in  
12 a well that is drilled; correct?

13 A. Yes, there are.

14 Q. And one of the ways is to actually do what's called a  
15 *caliper log*; correct?

16 A. Absolutely.

17 Q. And you're familiar that, between April 9th and April  
18 20th, there was no further drilling -- do you know that, after  
19 April 9th and after April 20th, there was no further drilling  
20 of the Macondo well?

21 A. I believe that's the case.

22 Q. And logging runs were done where the actual well was  
23 analyzed; correct?

24 A. That's correct.

25 Q. And a lot of data was acquired with specialized tools that

## ANDREW HURST - CROSS

1 are used to take samples and to get information about the  
2 borehole; correct?

3 A. Yes.

4 Q. And one of the things that can be done is what's called a  
5 caliper log, which literally physically measures the wall?

6 A. That's correct.

7 Q. You did not look at the caliper log in connection with the  
8 work that you did in this case; correct?

9 A. I think the caliper log was exhibited in -- it may have  
10 been exhibited in some of the figures later in that report, but  
11 I'm not sure. The caliper log, as you correctly point out, is  
12 a very, very useful measurement.

13 Q. You never reviewed BP's GP 1015 on pore pressure  
14 prediction, which applies to the pre-drill prediction of pore  
15 and fracture pressures; correct?

16 A. I'm afraid you'd have to show me the document. I don't  
17 recognize it.

18 Q. Well, I can show you in your report in terms of the list  
19 of reliance materials and we can see if it's listed there. I  
20 represent to you that it's not.

21 A. Okay. It may be a document that I've seen subsequently.

22 Q. The same is true with respect to GP 1016.

23 **MR. REGAN:** Let me pull up TREX-1532, if we could.

24 **BY MR. REGAN:**

25 Q. This is the document that I just asked you about, BP's

## ANDREW HURST - CROSS

1 pore pressure prediction. This is not a document that you  
2 relied upon in preparing your report; correct?

3 A. That's correct.

4 MR. REGAN: If we can pull up TREX-1533.

5 BY MR. REGAN:

6 Q. "Pore Pressure Detection During Well Operations," this,  
7 again, is not a document that you reviewed in preparing your  
8 report; correct?

9 A. Correct.

10 Q. You did not look at what BP's actual pore pressure  
11 prediction modeling data was; correct? Outside of the one  
12 paragraph that we've just shown?

13 A. Well, presumably the one paragraph I was just shown is an  
14 accurate record of what BP did.

15 Q. And you can't say, Dr. Hurst, whether or not BP's pore  
16 pressure prediction and fracture gradient procedures were  
17 consistent with industry standards because you did not look at  
18 them; correct?

19 A. I would contest the value of using a phrase like *industry*  
20 *standards*. I have no idea what you mean.

21 Q. You do not understand the concept of industry standards in  
22 your world?

23 A. Industry standards? Do you think the oil companies sit  
24 and talk to each other about the regulations they would like to  
25 define?

## ANDREW HURST - CROSS

1 Q. So you're not able to compare BP's conduct to conduct by  
2 similar operators in similar situations --

3 A. Of course, there will be similarities and, of course,  
4 providers of technology will have common ground; but to say  
5 there's an industry standard for something, I think, requires  
6 careful examination, because if industry standards -- well, I  
7 just think it's something that's extremely difficult to  
8 understand.

9 The industry is not self-regulating.

10 Q. With respect to the actual thing that the industry does in  
11 the Gulf of Mexico with respect to pore pressure frac gradient  
12 pre-drill predictions, you did not examine what the industry  
13 does to compare it to BP's conduct?

14 A. Only in the context of what's in the public domain.

15 Q. You were also shown the shallow hazards document on your  
16 direct exam. Do you recall seeing that?

17 A. Yes.

18 Q. You thought that was a good document?

19 A. Good, stand-alone report.

20 Q. And it contains relevant seafloor observations with  
21 respect to the area in which the Macondo well was drilled;  
22 correct?

23 A. It contains some, and some I don't agree with. It  
24 contains some, yes.

25 Q. You relied upon seismic data and other information that

## ANDREW HURST - CROSS

1 was from the types of companies that, in your experience,  
2 prudent operators would enlist to give them seismic  
3 information?

4 A. Certainly, Fugro I know very well, yes.

5 Q. And with respect to that document, that paper, they were  
6 talking at some length about earthquakes in the Mississippi  
7 Canyon area. Do you recall that part of your direct  
8 examination?

9 A. I do.

10 Q. And is it your testimony, Dr. Hurst, that the blowout that  
11 took place on April 20th was precipitated by an earthquake?

12 A. Who?

13 Q. Your discussion of earthquakes is related to your  
14 explanation of how earthquakes can change geology; is that  
15 fair?

16 A. Earthquakes record a change in geology.

17 Q. All right. But geological change is on a different time  
18 scale than the time scale that we might use in our daily life;  
19 correct?

20 A. Not all elements of geology are on a different time scale.

21 Q. The Mississippi Canyon area is viewed as possibly young in  
22 some fashion because it's 17,000 years ago that something took  
23 place?

24 A. That's correct.

25 Q. So that would be, in geological terms, young?

## ANDREW HURST - CROSS

1 A. The blink of an eye, some might say.

2 THE COURT: Yesterday?

3 THE WITNESS: Yesterday.

4 BY MR. REGAN:

5 Q. A couple million years ago might be last week?

6 A. Yes.

7 Q. So the impact of a seismic event on the geological  
8 conditions of an area could take place immediately, could take  
9 place over the course of 10, 10,000, 10 million years. Is that  
10 fair?

11 A. No, that's not fair at all.

12 Q. Would you refer to the idea that a tectonic shift would be  
13 immediate?

14 A. No, that's not correct either.

15 Q. With respect to your expert report, you referred to an  
16 author that wrote a report who tried to explain that the  
17 geological conditions could have been impacted at Macondo with  
18 respect to this 2006 earthquake; correct?

19 A. Yes.

20 Q. And you found that he had no direct evidence presented to  
21 assign how to make that connection; correct?

22 A. This is the work by McGee, I think you're referring to, in  
23 2010, yes.

24 Q. Is that fair? Okay.

25 You talked about *seepage*. Do you remember referring

## ANDREW HURST - CROSS

1 to that?

2 A. Yes. I used the term *seepage*, yes.

3 Q. Just for definitional purposes, what you're referring to  
4 there is actually the natural seepage of oil or gas from the  
5 seafloor or from the mud line in the Gulf of Mexico?

6 A. All fluids seep. The fluids that seep most are actually  
7 aqueous, not hydrocarbons. But yes, the hydrocarbons seep.

8 Q. In your report, you talk about that it would be helpful to  
9 have a plausible coupled model for regional scale hydrocarbon  
10 seepage; correct?

11 A. Yes.

12 Q. As you sit here today, or as of your deposition, you  
13 weren't aware of any such model that had ever been developed;  
14 correct?

15 A. I think that's correct.

16 Q. And in your review of your literature, you found nothing  
17 to indicate that anyone had ever produced this plausible  
18 coupled model for regional scale hydrocarbon seepage; correct?

19 A. That's correct.

20 Q. And with respect, then, to -- and I'm sure I'm going to  
21 get this wrong, but I'm going to try.

22 With respect to your theory about the occurrence of  
23 seismicity -- in essence, seismic activity -- with respect to  
24 the Mississippi Canyon area, you talk about, first, in the  
25 instance of literally parts of the seafloor moving over other

## ANDREW HURST - CROSS

1 parts; correct?

2 A. Yes.

3 Q. And the part of the seafloor that moves over makes one  
4 part then heavier -- I'm trying to do rough justice -- one  
5 part, in essence, there's a heavier overburden; correct?

6 A. Well, why don't you carry on; then I'll maybe comment on  
7 it.

8 Q. Well, let me ask it this way: With respect to this entire  
9 theory -- I'll try and see if we can just wrap it up very  
10 quickly -- this theory of the occurrence of seismicity and  
11 these earthquakes and this unloading concept, this is a  
12 hypothesis that, you agree, requires some testing?

13 A. Yes.

14 Q. Finally, you put up a chart with respect to temperature  
15 and pressures, and I'd like to ask you a few questions about  
16 that.

17 There is a standard definition for what are called  
18 high-pressure, high-temperature wells; correct?

19 A. Again, we have this word "standard." There are  
20 definitions for high-pressure, high-temperature, HPHT. But  
21 those standards are defined by different people, different  
22 countries, different conditions. But I know what you're going  
23 to show, so please.

24 Q. Well, if I could bring everybody else into the room here.  
25 Would you agree that, whether you disagree with the



## ANDREW HURST - CROSS

1 word standard, that there is a definition of HPHT, or  
2 high-pressure, high-temperature wells that exists in the  
3 industry; correct?

4 A. I'm not entirely sure if the industry, again, has a sort  
5 of agreement about what constitutes high-temperature,  
6 high-pressure.

7 Q. We'll go to your report, Exhibit 7500.23.1. I'd like to  
8 start with the bottom of the quote and your words *industry*  
9 *definitions*. Okay?

10 So using those words, however you want to define  
11 them, when you wrote your report to the Court, you said there  
12 are industry definitions of 149 degrees Celsius and  
13 approximately 15 ppg, or 1.7 grams per cubic centimeter,  
14 specific gravity equivalent gradients for HPHT wells; correct?

15 A. That is the definition used by Schlumberger.

16 Q. And you refer to that definition as an industry  
17 definition; correct?

18 A. Because Schlumberger are part of the oil industry.

19 Q. You and Mr. Nadeau have a different definition; correct?

20 A. I adopt and agree with the definition that Mr. Nadeau has  
21 used.

22 MR. MILLER: If we could bring up 7508.1.1.

23 BY MR. MILLER:

24 Q. This is Mr. Nadeau's chart?

25 A. No, no, no, it's Schlumberger's chart.

## ANDREW HURST - CROSS

1 Q. Schlumberger's chart. Sorry.

2 This is the one that shows the industry definition of  
3 150 degrees Celsius and a reservoir pressure in this sort of  
4 gradient 10,000; is that right?

5 A. Yes, yes.

6 Q. So this yellow box right here is the industry line,  
7 industry definition, as you use that phrase in your report, for  
8 when you get into an HPHT well; correct?

9 A. Yes.

10 Q. Now, I want to show your chart, if we could.

11 Well, let me ask you first, would you have any reason  
12 to think that operators in the Gulf of Mexico were not using  
13 that industry definition in talking about HPHT wells?

14 A. It depends what they're using it for. Excuse me. There's  
15 a very important definition, which I think is written below  
16 there. This classification is all to do with the functioning  
17 of components, things we put into boreholes. Because at  
18 certain temperatures, the properties of elastomers change, the  
19 property of electrical components change. So at these very  
20 high temperatures, things don't operate the same way.

21 So if you want to acquire borehole data at  
22 temperatures above 149 degrees Celsius, you would not expect  
23 the same tools to be in use in the borehole as you would if you  
24 were logging lower temperatures than that, simply because the  
25 temperatures stop them from working.

## ANDREW HURST - CROSS

1           So this definition is actually only to do with the  
2 effect of absolute temperature and pressure on pieces of  
3 equipment. It's not actually to do with the geology of  
4 high-temperature, high-pressure reservoirs, and Schlumberger  
5 acknowledged that in that paper.

6 Q.   And then if we go back to your report, though, you would  
7 say this is an industry definition of HPHT: 150 degrees  
8 Celsius gradient and 10,000 psi static reservoir pressure;  
9 correct?

10 A.   I just explained that.

11 Q.   You suggest redefining this definition to lower the  
12 temperature. Remember, you cited Mr. Nadeau's proposal in your  
13 report, at Exhibit 7500.25.1, saying, "Nadeau suggests  
14 redefining the lower limit of HPHT drilling conditions in line  
15 with geological considerations in drilling history"; correct?

16 A.   Yes.

17 Q.   That's a suggestion by Mr. Nadeau that you, I take it,  
18 agree with?

19 A.   Correct.

20 Q.   Okay.

21           If we could go to -- you said on direct examination  
22 that your estimate of the temperature at Macondo was  
23 approximately 117 degrees Celsius; correct?

24 A.   I adopted the BP estimate of 117 degrees to be most  
25 likely.

## ANDREW HURST - CROSS

1           **MR. REGAN:** If we could pull up D-2003.

2                           I'll try to do this quickly, Your Honor.

3 **BY MR. REGAN:**

4 **Q.** This is one of the charts that you prepared and relied  
5 upon; is that right?

6 **A.** That's correct, yes.

7 **Q.** So again, in the yellow box, HPHT tech -- just a  
8 technology definition; is that right?

9 **A.** Oh, it is, yes. Sorry about that. Yeah, that is correct.  
10 Yes, yes.

11 **Q.** So that's a temperature of 115 and above a specific  
12 gravity pressure of 1.7; right?

13 **A.** That corresponds to what we just saw on the multicolored  
14 Schlumberger diagram.

15 **Q.** Your revised definition -- or Nadeau's revised definition  
16 that he suggests and which you adopt, is this purple box;  
17 right?

18 **A.** That's correct.

19 **Q.** And you lower the pressure to about 1.4 specific gravity?

20 **A.** Yes.

21 **Q.** And you lower the temperature to 120; is that right?

22 **A.** Yes.

23 **Q.** Macondo is not in that purple box, is it?

24 **A.** No. It's very close to it.

25 **Q.** Macondo -- let me ask you -- just asking you a question

## ANDREW HURST - CROSS

1 here. Macondo would be up here; right? 117 degrees?

2 A. That's correct.

3 Q. And the pressure --

4 **THE COURT:** Can you -- let me ask the witness.

5 Can you put an X or something with your finger  
6 about where Macondo would fall?

7 **MR. REGAN:** I can --

8 **THE COURT:** One of you, yes.

9 **BY MR. REGAN:**

10 Q. Let me ask if you would agree with this, Dr. Hurst --

11 **THE COURT:** I'd like the witness to do it.

12 **THE WITNESS:** I think counsel might do a pretty good  
13 job of this, actually.

14 It should be a little bit above 120 there. Do  
15 you want me to try it again?

16 **BY MR. REGAN:**

17 Q. Well, that gives us temperature. But what about pressure?  
18 Where would it be with respect to pressure?

19 A. I don't actually have the pressure data on there, but I  
20 haven't really worried too much about the pressure and  
21 temperature in the Macondo well. As I said in my testimony  
22 earlier, that's just one point in the Macondo reservoir. There  
23 would be a large volume of the Macondo reservoir which is at  
24 higher pressure and absolutely higher temperature than the  
25 117 degrees.

## ANDREW HURST - CROSS

1           Because the reservoir -- I'm going to use my hands  
2 here. The reservoir that we sampled is up here, but there will  
3 be some of it that's deeper in other parts of the field. So  
4 that 117 is just one sample of quite a large area of the  
5 reservoir, probably one of the shallowest temperatures you'll  
6 find there.

7 Q. Let me represent to you, Doctor -- first of all, with  
8 respect to the temperature, the temperature information that  
9 you got from BP's documents were based on actual measurements  
10 that were taken; correct?

11 A. Correct.

12 Q. So with respect to if it was a connected reservoir, it's  
13 your testimony that there may be different levels of  
14 temperature throughout that reservoir?

15 A. Temperature increases as you get deeper.

16 Q. Right. But with respect to the actual temperature that  
17 was taken, it was 117 degrees; correct?

18 A. Yes. There's no specific depth assigned to that  
19 temperature, is my recollection.

20 Q. With respect to the pressure, understanding you testified  
21 that you didn't look at that, if you just take the M56  
22 reservoir --

23 A. I did look at it. I can't remember it.

24 Q. Maybe this will refresh your recollection. A 12.6 ppg  
25 reservoir, if I convert that to specific gravity, it's about

## ANDREW HURST - CROSS

1 1.5 grams per cubic centimeter?

2 A. Okay.

3 Q. So if I want to put an X on where Macondo was -- well,  
4 first, before I do my X, what are all these black dots?

5 A. That's the 11,000-plus data from the Gulf of Mexico.

6 Q. So 11,000 reservoirs in the Gulf of Mexico, you have some  
7 down here that are HPHT under the technology definition;  
8 correct?

9 A. Correct.

10 Q. You have some that are inside your purple box under the  
11 proposed revised definition; correct?

12 A. Yes.

13 Q. You have some that are over here, a bulk in the middle?

14 A. Yes.

15 Q. And some up top?

16 A. Yes.

17 Q. If we take Macondo, the Macondo well, and we put its  
18 temperature and its pressure, it would be right in the middle,  
19 right about there?

20 A. Yes. That's completely consistent with what I spoke  
21 earlier about in my testimony, that the Macondo well was just  
22 at the base of the Golden Zone.

23 Q. The Macondo was not an outlier in terms of pressure. It  
24 was not way over here on the right side of the chart, was it?

25 A. Absolutely not.

## ANDREW HURST - REDIRECT

1 Q. It was not an outlier with respect to temperature. It  
2 wasn't way down here in the bottom of the chart?

3 A. Correct.

4 Q. It wasn't a low-pressure, high-temperature well. It was  
5 right in the middle of the reservoirs that have been drilled in  
6 the Gulf of Mexico; correct?

7 A. Actually, it wasn't right in the middle, because right in  
8 the middle is what's called the P50 line, which is this line  
9 curving through here. That P50 line, there's a 50/50 chance of  
10 it being high-pressure and low-pressure, or overpressure. And  
11 Macondo lies, in fact, on the high-pressure side of that line.

12 But I think your point is a very good point.

13 MR. REGAN: Nothing further, Your Honor. Thank you.

14 THE COURT: Okay. Any questions from Cameron?

15 UNIDENTIFIED SPEAKER: No questions of this witness,  
16 Your Honor.

17 THE COURT: Mr. Leger, do you have any redirect?

18 MR. LEGER: Judge, I just have a few.

19 REDIRECT EXAMINATION

20 MR. LEGER: I'm not sure what the number was of that  
21 last exhibit.

22 THE COURT: Maybe Mr. Regan could help you.

23 MR. REGAN: Yes.

24 MR. LEGER: Could that be called up for me?

25 MR. REGAN: Yes. D-2003 was the one that --



## ANDREW HURST - REDIRECT

1           **MR. LEGER:** That will work.

2           **MR. REGAN:** Same picture.

3 **BY MR. LEGER:**

4 **Q.** I'll be very brief.

5           Professor, you indicated that these plots, all of  
6 these little black crosses are actually indications of the  
7 wells in the entire Gulf of Mexico; correct?

8 **A.** That's correct.

9 **Q.** We can't --

10           **THE COURT:** Wells or reservoirs?

11 **BY MR. LEGER:**

12 **Q.** Well, wells that reach reservoirs; correct.

13 **A.** Yeah. They're reservoir data as opposed to just borehole  
14 data. So they are inherently from a borehole through a  
15 reservoir.

16 **BY MR. LEGER:**

17 **Q.** So a borehole went down from above the water and into the  
18 ground, and then it reached the reservoir. And this -- these  
19 dots reflect data that were gathered; correct?

20 **A.** These are hard data, yes.

21 **Q.** Now, that's the entire Gulf of Mexico; correct?

22 **A.** That's correct.

23 **Q.** We don't have any indication here of which of these wells  
24 were found in the extremely hazardous area of the Mississippi  
25 Canyon, do we?

## ANDREW HURST - REDIRECT

1 A. No, that's correct.

2 Q. So when we talk about where Macondo stands with respect to  
3 wells in the Mississippi Canyon, there's not a lot of data on  
4 wells in the Mississippi Canyon, is there?

5 A. Indeed, there is not.

6 Q. In fact, so we don't know if Macondo is an extreme well in  
7 terms of pressure and temperature in the Mississippi Canyon or  
8 if it's just a run-pre-drill-the-mill well like counsel for BP  
9 was suggesting and is relative to the rest of the Gulf of  
10 Mexico; correct?

11 A. Correct.

12 MR. LEGER: Now, if I could, Your Honor, call Trial  
13 Exhibit 07508.

14 BY MR. LEGER:

15 Q. Now, you recognize this article?

16 A. I do, yes.

17 Q. This is one of the articles that you put into your list of  
18 reference articles; correct?

19 A. Correct.

20 Q. This is something you looked at in the context of putting  
21 together the facts or opinions that you presented in your  
22 expert report; correct?

23 A. That's correct.

24 Q. You're familiar with the gentlemen that are involved in  
25 the writing of this report; correct?

## ANDREW HURST - REDIRECT

1 A. They're not personal acquaintances, but I'm familiar with  
2 the report.

3 Q. You've heard of these people before?

4 A. Yes, yes.

5 Q. They're pretty reputable people in the industry; correct?

6 A. They're mainly Schlumberger employees.

7 Q. Can we do a little bit broader? This is the one where we  
8 got this thing here demonstrating what Schlumberger calls  
9 high-pressure, high-temperature; correct?

10 A. That's correct.

11 Q. Now, can we go back to the bigger picture. Can we pull up  
12 this paragraph right here. Would you highlight -- starting  
13 here, "The oil and gas industry," it says, "has contended with  
14 elevated temperatures and pressures for years; however" what?

15 A. "There are no industrywide standards" --

16 Q. "That define HPHT conditions and the associated  
17 interrelationship between temperature and pressure"; correct,  
18 Professor?

19 A. Correct.

20 Q. Does that differ from your opinion regarding definitions  
21 of HPHT?

22 A. It seems to summarize my opinion pretty well.

23 Q. In fact, all you have said is that, from a geological  
24 perspective, as opposed to a --

25 **MR. LEGER:** Go back, please, and would you highlight

## ANDREW HURST - REDIRECT

1 this area here.

2 **BY MR. LEGER:**

3 Q. "In the context of elastometric seals and electronic  
4 devices, from a geological perspective," which is your  
5 expertise, "there is a different way of looking at high  
6 pressure and high temperature"; correct, Professor?

7 A. Absolutely.

8 Q. Now, in the context -- let's just talk about the science  
9 of the Golden Zone for just a few moments.

10 **MR. LEGER:** By the way, if we can call up -- I  
11 believe it was Demonstrative 4368 that counsel for BP used.

12 **BY MR. LEGER:**

13 Q. Now, this demonstrative talks about three articles by Paul  
14 Nadeau; correct?

15 A. It does, yes.

16 Q. Now, are these the only articles in the history of  
17 geological science that talked about the principles which  
18 underlie the use of thermal modeling to predict pore pressure?

19 A. Absolutely not.

20 Q. Now, if we look at --

21 **MR. LEGER:** May we pull up Trial Exhibit 20093?

22 **BY MR. LEGER:**

23 Q. This is an article written, I believe, in 2011, by  
24 Professor Nadeau; correct?

25 A. Published in 2011, correct.

## ANDREW HURST - REDIRECT

1 Q. And it regards a lecture or a speech given by  
2 Professor Nadeau sometime before that; correct?

3 A. In 2010, yes.

4 MR. LEGER: Can we turn to the reference part --  
5 let's see. Page 19.

6 So it would be TREX-20093.19, for the record,  
7 Your Honor.

8 BY MR. LEGER:

9 Q. And there's a list of references; correct?

10 A. Yes.

11 Q. Can you see those references? There's an article that  
12 starts -- what's -- how do you pronounce it?

13 A. Bjorkum.

14 Q. You speak Swedish -- or Norwegian also, don't you?

15 A. I speak Norwegian.

16 Q. That's an article in 1996; correct?

17 A. Yes, it's 1996, that's correct.

18 Q. Is it safe to say there's an article by Hurst in 1969?  
19 Correct?

20 A. Yes.

21 Q. And if you turn to page 20 and 21 and 22 and 23 and 24, is  
22 it safe to say -- there's about 125 citation and references  
23 that support the concept of the thermal zonation, which is  
24 called the Golden Zone. Is that fair?

25 A. Yes. And interestingly, I -- there's 125 which just look

## ANDREW HURST - REDIRECT

1 at the minerals. There's hundreds more that look at the  
2 organic matter issue, which is also an integral part of Golden  
3 Zone. So there's massive, massive literature written in  
4 science to support this.

5 Q. I'm sorry. I didn't mean to interrupt.

6 And out of this, I think -- I'm sorry. The next  
7 exhibit, Trial Exhibit 07506, and on page 2 -- I'm sorry -- on  
8 page 4 of Trial Exhibit 07506.4, counsel for BP showed a  
9 paragraph that suggests the Golden Zone -- "It's important to  
10 acknowledge the Golden Zone due to overpressure development is  
11 not shared on those basin models."

12 Correct? And it went on to say -- correct?

13 A. Yes.

14 Q. The rest of that whole article, though, however, is  
15 establishing the good, hard science of the Golden Zone;  
16 correct?

17 A. And it's applying it to the practical problems of drilling  
18 in the Gulf of Mexico.

19 Q. And is it safe to say there's about 42 citations of  
20 authority and other peer-reviewed scientific literature in  
21 support at the end of this article?

22 A. That's correct.

23 Q. And, in fact, can we go to -- ah, the first article,  
24 20093, was that based on an article that was written in -- by  
25 Paul Nadeau and another individual?

## ANDREW HURST - REDIRECT

1 A. This article is built on several earlier articles that  
2 Nadeau coauthors and Statoil had presented. And in particular,  
3 it comes from a technical memorandum that was published by  
4 Statoil for external use in 2005, which provided the underlying  
5 description of how the Golden Zone operates.

6 Q. So just basically, without -- we can go on for a while --  
7 but by the way, in that article by Statoil, you're acknowledged  
8 as contributing by Professor Nadeau; correct?

9 A. I think I must have read something for him.

10 Q. Among a bunch of other scientists; correct?

11 A. Yes. Some very eminent people.

12 Q. Now, concepts that lead up to the development of the use  
13 of the thermal modeling are not new at the time that the name  
14 Golden Zone was given; correct?

15 A. Absolutely not.

16 Q. In fact, they go back some time.

17 Do you, in fact, know that geologists at BP are aware  
18 of the concepts of the Golden Zone?

19 A. I'm sure they are, yes.

20 Q. How many geology and geoscientific students have you  
21 taught since the onset of discussions of this thermal modeling  
22 theory?

23 A. Well, not only is the Golden Zone very useful practically;  
24 it's also very useful educationally. And I've been using --  
25 it's not called the Golden Zone, because it wasn't called the

## ANDREW HURST - REDIRECT

1 Golden Zone when I started using this framework. But since  
2 about 1997, 1998, I've been teaching this as a basis for  
3 understanding how to predict reservoir quality, how to predict  
4 pore pressure, fracture gradients, and so on.

5 So in that time, looking at the one class of  
6 petroleum geoscientists that I teach, I have probably taught  
7 about 300 students this principle and how it use it.

8 Q. Have any of those students had the great honor and  
9 privilege of going to work for BP after graduating?

10 A. Yeah. I would say there's usually between three and five  
11 students a year that go to BP.

12 Q. So a few dozen?

13 A. Yes. Several dozen, yes.

14 Q. All of them have been taught about the Golden Zone  
15 concepts?

16 A. Yes, they have. Yes.

17 Q. And this was all before 2009, correct, Professor?

18 A. Absolutely.

19 Q. Now, when you made a statement saying that you were on the  
20 lunatic fringe of geology, did you really mean that you were  
21 crazy?

22 A. I think not. You have to be --

23 Q. I just want the record to reflect you were smiling when  
24 you said -- acknowledged that you were on the lunatic fringe.

25 A. I'm flattered with counsel's referring to it.



## ANDREW HURST - REDIRECT

1 Q. Now, additionally, Professor, you were asked if -- you  
2 gave testimony about the massive slumping of formations and of  
3 this mushy sediment that exists on the slope of the Mississippi  
4 Canyon in the Gulf of Mexico; correct?

5 A. Yes.

6 Q. Is that a theory or is that fact?

7 A. That's fact.

8 Q. You also gave testimony regarding the existence and the  
9 presence of seismic activities, or earthquakes, not far, in  
10 fact, in the Mississippi Canyon, not far from the location of  
11 the eventual Macondo well; correct?

12 A. That's correct.

13 Q. Is that theory or is that fact?

14 A. No, those are facts.

15 MR. LEGER: Professor, I have no further questions.

16 Your Honor, I tender the witness.

17 THE COURT: Okay. We're going to tender him right  
18 out of the courtroom.

19 Have a good trip back.

20 THE WITNESS: Thank you very much.

21 THE COURT: Okay. You're welcome.

22 MR. LEGER: At this point, Your Honor, the plaintiffs  
23 would offer into evidence all exhibits, demonstratives, and  
24 call-outs used or discussed during the testimony of  
25 Professor Andrew Hurst which have not already been admitted

## ANDREW HURST - REDIRECT

1 into evidence. And as per the Court's prior instructions, we  
2 will submit in globo a list of those specific exhibits either  
3 today or tomorrow.

4 **THE COURT:** I imagine other people will have some  
5 too. So let's get this all together and make sure everybody  
6 has it, and either later this afternoon or early tomorrow  
7 morning you can all submit it.

8 All right. Let's take a 15-minute recess, and  
9 we'll come back.

10 **THE DEPUTY CLERK:** All rise.

11 (WHEREUPON, the Court took a recess.)

12 **THE DEPUTY CLERK:** All rise.

13 **THE COURT:** All right. Please be seated, everyone.

14 Plaintiffs can call the next witness.

15 **MR. STERBCOW:** Your Honor, Paul Sterbcow, the  
16 Plaintiffs Steering Committee. Need to clarify something for  
17 the record. I misunderstood when we had a discussion about  
18 bundles specifically tied to Mike Williams. I thought that the  
19 other bundles other than ours had not been submitted.

20 Now, I've been corrected. All bundles were  
21 previously submitted a long time ago. To the extent that any  
22 party wants to now pull bundles back and redo them, the  
23 Plaintiffs Steering Committee objects to that and I had no idea  
24 that that's what the suggestion was. If it's a pullback of the  
25 two-page summaries or resubmission, we have no problems with

## ANDREW HURST - REDIRECT

1 that. And I think, simply because a witness at the last minute  
2 is now unavailable, to now allow everyone to go back and  
3 re-pull bundles, redo bundles, resubmit bundles --

4 **THE COURT:** Let's call your next witness. We can  
5 deal with this later.

6 **MR. STERBCOW:** Well, we are going to play  
7 Mr. Williams' video right now.

8 **THE COURT:** Let's go ahead and play it. Well, I  
9 thought you had another witness, live witness here today.

10 **MR. STERBCOW:** There is a live witness here.

11 **THE COURT:** No, I saw on the list -- the list I was  
12 given said Mr. Randy Ezell was going to be the next witness.

13 **MR. STERBCOW:** Originally, we had Mike Williams  
14 slotted in this spot before he became unavailable.

15 **THE COURT:** Well, you-all must have changed your  
16 list, the order, because the list I had had following Andrew  
17 Hurst was Randy Ezell.

18 **MS. CLINGMAN:** Your Honor, may I comment? Rachel  
19 Clingman for Transocean.

20 I believe that's correct, Your Honor. We  
21 actually received that list last Wednesday in anticipation of  
22 plaintiff's moving a little faster than they have. Mr. Ezell  
23 has come in from Purvis, Mississippi, on Wednesday and has been  
24 waiting since.

25 So if there is an opportunity to progress with

## ANDREW HURST - REDIRECT

1 his testimony, I think Transocean on his behalf and Mr. Ezell  
2 himself would probably appreciate that. But he is waiting  
3 outside.

4 **THE COURT:** Well, we obviously wouldn't finish him  
5 today anyway. So he'll be here tomorrow anyway.

6 I'm just trying to figure out -- this witness  
7 list keeps changing, apparently. I thought we had the final  
8 witness list and I had Mike Williams testifying after Mr. Ezell  
9 and after Mr. Ronnie Sepulvado, but let's go ahead and play it.  
10 How long is this --

11 **MR. STERBCOW:** 17 minutes.

12 **THE COURT:** And then what are you playing?

13 **MR. STERBCOW:** We'll put Mr. Ezell on if that's --

14 **THE COURT:** Let's go ahead and play the video. This  
15 is a portion of Mike Williams' deposition; correct?

16 **MR. STERBCOW:** Taken from the bundles that have been  
17 submitted, from our bundles.

18 **THE COURT:** All right.

19 **UNIDENTIFIED SPEAKER:** We have one thing to say on  
20 the bundles at the right time, for the record.

21 **THE COURT:** Okay. Stephanie, turn the big lights  
22 down.

23 (WHEREUPON, a portion of the videotaped deposition of  
24 **Mike Williams** was played.)

25

## ANDREW HURST - REDIRECT

1           **MR. KENDRICK:** Your Honor, John Kinchen for  
2 Transocean. Just wanted to notify the court that Transocean  
3 will be playing a responsive video clip during its own case  
4 that puts these comments into context.

5           **THE COURT:** Okay. Sure.

6           **MR. STERBCOW:** Your Honor, at this point, we would  
7 offer Mike Williams' depo excerpt on behalf myself, PSC,  
8 U.S.A., and the States. We're going to put it on the flash  
9 drive, as was previously discussed, and give it to the Court.

10          **THE COURT:** Do you have a written transcript?

11          **MR. STERBCOW:** I have the written transcript as well.

12          **THE COURT:** Any objections to that?

13                   We'll admit that.

14          **MR. STERBCOW:** At this time, if you're ready to  
15 proceed.

16          **THE COURT:** Call your next witness.

17          **MR. STERBCOW:** Randy Ezell.

18          **THE COURT:** Okay. Mr. Ezell.

19                   (WHEREUPON, **MILES RANDAL EZELL**, having been duly  
20 sworn, testified as follows.)

21          **THE DEPUTY CLERK:** Please state your full name and  
22 correct spelling for the record.

23          **THE WITNESS:** Miles Randal Ezell, M-I-L-E-S --

24          **THE COURT:** Pull that microphone a little bit closer  
25 to you, sir.

## MILES RANDAL EZELL - DIRECT

1                   **THE WITNESS:** Yes, sir.

2                   M-I-L-E-S, R-A-N-D-A-L, E-Z-E-L-L.

3                   **DIRECT EXAMINATION**

4 **BY MR. STERBCOW:**

5 **Q.** Good afternoon, Mr. Ezell. My name's Paul Sterbcow. I'm  
6 going to be questioning you under cross-examination on behalf  
7 of the Plaintiffs Steering Committee.

8 **A.** Good afternoon.

9 **Q.** My understanding is that, on the date of blowout and for  
10 some time before, you were the senior toolpusher aboard the  
11 *Horizon*?

12 **A.** Yes, sir, that is correct.

13 **Q.** How long had you worked in the oil field prior to  
14 April 2010?

15 **A.** My total experience in the oil field at that point was  
16 like 33 years.

17 **Q.** So that would put you back in the late '70s when you  
18 started, thereabouts?

19 **A.** Yes, sir. 1977, I believe, was my starting year.

20 **Q.** Did you start as a roustabout?

21 **A.** I did.

22 **Q.** And who did you work for?

23 **A.** Back in that day, it was a company called Penrod Drilling  
24 Company. They have disappeared now.

25 **Q.** Were you a roustabout aboard Penrod's jack-up rigs in the

## MILES RANDAL EZELL - DIRECT

1 Gulf of Mexico?

2 A. It was a Penrod platform rig that I started on.

3 Q. Shallow water?

4 A. Yes, sir, relatively shallow.

5 Q. Where did you go from there?

6 A. I went to a Penrod inland barge right after that. I  
7 stayed a total of about a little bit over four years, maybe,  
8 with Penrod.

9 Q. Four years total with Penrod?

10 A. Yes, sir.

11 Q. Did you roustabout the whole time?

12 A. No, sir. I was a floor hand after a short period of time.

13 Q. Was all your work with Penrod either on the inland  
14 drilling barges or jack-up rigs or platform rigs?

15 A. Yes, sir, to the best of my knowledge.

16 Q. And when you left there, where did you go?

17 A. Well, I went to Sedco Southeastern Drilling Company, and I  
18 worked with them in Alaska for a period of about four or four  
19 and a half years.

20 Q. Did you do floorhand work for them as well?

21 A. Yes, sir, I did. I was a floorhand. And also, they had a  
22 terminology, it was called a *mud watcher*, which is somebody who  
23 took care of the shell shuckers and mixed chemicals. And solid  
24 control equipment was under my domain then as well.

25 Q. Did you come back to the Gulf of Mexico after that?

## MILES RANDAL EZELL - DIRECT

1 A. Yes, sir, I did.

2 Q. Who did you go to work for?

3 A. I went to work at that time for a company called Sonat,  
4 which actually was Transocean now.

5 Q. Have you been continuously with Sonat, and then later  
6 Transocean, since that time?

7 A. Yes, sir. I'm -- I'm approaching 26 years with that  
8 company.

9 Q. With those two companies, starting at Sonat and then later  
10 became Transocean?

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

12 Q. What job positions have you held since you started with  
13 Sonat and then through Transocean?

14 A. I've been a floorhand, I've been a derrickman, I've been  
15 an assistant driller, I've been a driller, I've been a  
16 toolpusher, senior toolpusher. And I have done some OIM  
17 filling in on the rig.

18 Q. So is it fair to say that, from the time you first started  
19 as a roustabout back in 1977 for Penrod up through the date of  
20 this catastrophe, you've essentially held just about every  
21 operational position on the drilling side that there is?

22 A. Yes, sir, it would be fair to say that.

23 Q. So you're very familiar with what is involved in drilling  
24 a well on a jack-up rig, semisubmersible deepwater? You have a  
25 lot of knowledge about that?



## MILES RANDAL EZELL - DIRECT

1 A. I suppose I do.

2 Q. All right. Was it your intent -- are you still with  
3 Transocean today?

4 A. Yes, sir, I am.

5 Q. Are you an OIM now?

6 A. No, sir, I'm not. I'm working in the Macaé training  
7 center in South America, in Brazil.

8 Q. When did you first start working aboard the *Deepwater*  
9 *Horizon*?

10 A. It was in 2001, and I can't remember the exact month.

11 Q. Did you take her out of the shipyard, or was she already  
12 in the Gulf when you got -- when you were assigned to her?  
13 Excuse me.

14 A. No, sir. When I actually got on the rig, it was making  
15 its way from the shipyard to the first major leg, which was  
16 Cape Town, South Africa. And I got on the rig then at  
17 Cape Town and rode the rig all the way to Curaçao, but never  
18 really got into the Gulf because it was time for me to get off  
19 on my rotation.

20 Q. Then when you got back on, was she in the Gulf of Mexico?

21 A. Yes, sir.

22 Q. Did you do any work in terms of assessing her systems  
23 during the transit period and record any observations, anything  
24 you felt needed to be changed, what you liked, didn't like?  
25 Anything like that?

## MILES RANDAL EZELL - DIRECT

1 A. Well, there was a lot of data I was trying to learn  
2 because I had gone from being a conventional driller to a  
3 high-tech driller. So yes, I was soaking up some information.

4 Q. All right. And you make a good point. I was going to ask  
5 you about that. Being a driller, as you were, prior to your  
6 deepwater job and prior to, specifically -- your *Deepwater*  
7 *Horizon* job was a lot different than being a driller aboard  
8 this particular vessel, wasn't it?

9 A. It did have some differences.

10 Q. This is a much more high-tech, if you will, vessel, than  
11 the vessels you had worked on previously; correct?

12 A. That's a correct statement.

13 Q. And you go back so far as you can remember the days where  
14 you had levers and brakes and so forth that you used manually;  
15 correct?

16 A. I'm afraid so.

17 Q. And back in those days, you didn't have the computerized  
18 systems that you had on the *Deepwater Horizon* to monitor well  
19 conditions; correct?

20 A. No, sir, it was different.

21 Q. It was gauges?

22 A. Yes, sir, it was. Still monitoring, but it was different.

23 Q. Okay. Were you provided any formal off-the-rig training  
24 by Transocean on how to take your previous driller experience,  
25 using the old brake pedal/lever gauge equipment, and translate

## MILES RANDAL EZELL - DIRECT

1 that to the high-tech equipment?

2 A. I went through a high-tech class in Houston; and also, I  
3 was mentored daily by the toolpusher when I was on the rig that  
4 had that high technology.

5 Q. Somebody who had that knowledge and was giving it to you  
6 during your hitches aboard the vessel?

7 A. Yes, sir. That's one of the good things, with the  
8 toolpusher on the rig floor around the clock, they're there to  
9 mentor the drillers.

10 Q. Right. And that's the way this was set up; correct?

11 A. Yes, sir.

12 Q. "This" meaning the *Deepwater Horizon*?

13 A. Yes.

14 Q. As the senior pusher, you had two pushers who reported  
15 directly to you; correct?

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

17 Q. And on this particular rig, would that have been Wyman  
18 Wheeler and Jason Anderson --

19 A. Yes, sir. During the time frame --

20 Q. During the time frame we're going to talk about?

21 A. Yes, sir.

22 Q. As the senior pusher, did you have daily duties that would  
23 take you up to the drill floor?

24 A. Yes, sir. I had like an overview over drilling  
25 operations, crane activities that are on deck. But yes, to

## MILES RANDAL EZELL - DIRECT

1 answer your question, yes, I made several rounds by the rig  
2 floor.

3 Q. All right. And would you also interact regularly with the  
4 OIM -- who at this point in time was Jimmy Harrell; correct?

5 A. Yes, sir, I would.

6 Q. And was he the person that you reported directly to?

7 A. That's exactly right.

8 Q. And in terms of the drill crew aboard the *Deepwater*  
9 *Horizon*, was Mr. Harrell the highest authority?

10 A. That's correct, for the drill crew.

11 Q. Then you would be next; and then from you would be the  
12 pushers, who would then be responsible for the drillers; and  
13 then we would move down to the drill crew; correct?

14 A. That is correct.

15 Q. Now, there was another crew aboard the *Deepwater Horizon*,  
16 I understand, that you all called the *marine crew*; correct?

17 A. Yes, sir.

18 Q. Do you have enough knowledge, given your experience and  
19 the length of time you were on the vessel, to just give the  
20 Court a general description of what the marine crew did versus  
21 what the drill crew did?

22 A. Well, of course, the drill crew were responsible for the  
23 well program and drilling the well, you know. The marine crew  
24 was more responsible for, you know, keeping the rig on location  
25 and keeping everything, the stability, you know, perfect.

## MILES RANDAL EZELL - DIRECT

1 Q. Once you were on location, attached via riser to the BOP  
2 and to whatever well you happened to be drilling, would then  
3 the drill crew essentially take over the operation of the  
4 vessel?

5 A. No, sir, I don't think that would be correct.

6 Q. What did the marine crew do while you were drilling, while  
7 you were spudded on-site?

8 A. They assured that we stayed on location. That was a  
9 constant monitoring for them.

10 Q. And was that done through the vessel's dynamic positioning  
11 system?

12 A. Yes, sir, it was.

13 Q. And there would be people in the bridge who would be  
14 specifically responsible to make sure that the vessel stayed in  
15 the location where the drill crew needed it to stay to do your  
16 job?

17 A. That's correct.

18 Q. There was a captain and a first mate; correct?

19 A. Yes, sir.

20 Q. Were the dynamic positioning officers on the marine side?

21 A. They were.

22 Q. Do you know of any other job positions besides captain,  
23 first mate, and BPOs that would have been on the marine side?

24 A. Yes, sir, bosun and able-bodied seamen and ordinary  
25 seamen, they were also a part.

## MILES RANDAL EZELL - DIRECT

1 Q. When the well was over, or for whatever reason the  
2 *Deepwater Horizon* would have to move, would they then basically  
3 be solely responsible, versus Mr. Harrell and your crew, for  
4 getting the vessel from one location to the next?

5 A. That was their primary job during that phase, was the  
6 transit of the rig.

7 Q. All right. And what did the drill crew do during transit?

8 A. Various things. It's according to what well we were going  
9 to and how much time we had available. We typically did  
10 equipment maintenance; or in some cases, we would prepare tools  
11 for the next well and have them ready on deck.

12 Q. How would you handle a BOP during transit? Would it be  
13 decked, or would it remain subsea and be pulled?

14 A. No, sir. It would be on deck in what we call the *moon*  
15 *pool*.

16 Q. All right. So it was lifted -- if you were transiting  
17 from one well to another, the BOP was taken out of the sea,  
18 secured on deck in the moon pool area, and transported with the  
19 vessel; correct?

20 A. Typically, yes.

21 Q. And the best of your recollection is you had the same BOP  
22 aboard the *Deepwater Horizon* from the time you were assigned in  
23 2001 all the way through this event?

24 A. Yes, sir, it was the same.

25 Q. You don't recall there ever being any change-out, any

## MILES RANDAL EZELL - DIRECT

1 change in equipment, if you will?

2 A. Not a total change-out of the BOP, no, sir.

3 Q. And would you agree with me that the BOP was an essential  
4 piece of vessel equipment insofar as you could not drill a well  
5 without a functioning BOP? Correct?

6 A. Correct.

7 Q. And would you also agree with me that, not only the  
8 primary purpose of this vessel, but the sole purpose of this  
9 vessel was to drill deepwater wells? Is that a fair statement?

10 A. Yes, sir, it is.

11 Q. It didn't do any -- it wasn't a crew boat, it wasn't a  
12 supply boat, it wasn't a fishing vessel. This was designed,  
13 built, and operated, to the best of your knowledge and as long  
14 as you were on it, for one purpose, which was to drill  
15 deepwater wells.

16 And in the case of this vessel, I think the vast  
17 majority, if not all of them, were drilled in the Gulf of  
18 Mexico; is that right?

19 A. Yes, sir, they were all in the Gulf of Mexico.

20 Q. All in the Gulf of Mexico?

21 A. Yes, sir.

22 Q. And throughout that time period, every well that the  
23 *Deepwater Horizon* drilled was drilled for BP, I think, with the  
24 exception of one maybe; is that right?

25 A. That's right, with the exception of one.

## MILES RANDAL EZELL - DIRECT

1 Q. Do you have a ballpark estimate of about how many wells  
2 were drilled between the time you started on the vessel up  
3 until the date of the -- or up until you got to Macondo?

4 A. Yes, sir. It was in excess of 50 wells.

5 Q. So of those -- in excess of those 50, all we have to do is  
6 subtract one, and every other well was drilled for BP; correct?

7 A. Correct.

8 Q. So in the nine years, I presume that you and your drill  
9 crew got to know the BP well-site leaders pretty well, those  
10 that were assigned to the *Deepwater Horizon*?

11 A. Yes, sir. Some were rotated away from the rig at times.  
12 But yes, sir, we got to know them pretty well.

13 Q. Was there ever an occasion or more than one occasion where  
14 any BP personnel informed you that you would be bound by and  
15 needed to learn BP's drilling operation and procedures versus  
16 Transocean's?

17 A. I'm sorry. Could you -- you lost me just for a minute.

18 Q. Sure. That's okay. I'll be happy to rephrase it.

19 Throughout your time on the *Deepwater Horizon* -- and  
20 I think you started on the *Deepwater Horizon* as -- in what  
21 position in '01?

22 A. Driller.

23 Q. Driller.

24 So you start as a driller, went to toolpusher, and  
25 then senior pusher, and that's where you were --



## MILES RANDAL EZELL - DIRECT

1 A. Yes, sir.

2 Q. -- throughout that time period.

3 Was it your understanding that you, as a driller,  
4 toolpusher, and a senior pusher, had to follow -- know and  
5 follow BP's rules, if any, on how to drill a deepwater well?

6 A. Well, it was their location and, you know, they had hired  
7 the rig, so we followed their operational procedures.

8 Q. And was there a manual that you referenced in order to  
9 make sure you were following their operational procedures?

10 A. They had a well prognosis for each well, that had the well  
11 pretty well laid out from section to section and described what  
12 activities they wanted to happen in each section.

13 Q. All right. And you would be provided a copy of that well  
14 prognosis?

15 A. Yes, sir.

16 Q. Beyond the well -- and was one provided for Macondo?

17 A. Yes, sir.

18 Q. So when the *Deepwater Horizon* -- my understanding is the  
19 *Deepwater Horizon* replaced the *Marianas* after a hurricane. Is  
20 that correct?

21 A. Yes, sir, it is.

22 Q. So you would have come with the ship, with the vessel?

23 A. With the --

24 Q. In other words, when the *Deepwater Horizon* got to Macondo,  
25 you, your drill crew, whoever was on duty at that point, you

## MILES RANDAL EZELL - DIRECT

1 came with it?

2 A. We did.

3 Q. And that's when you first started handling the Macondo--  
4 you picked up for the *Marianas*, if you will?

5 A. We did come behind the *Marianas*, yes.

6 Q. And at that time, you were given a copy of this well plan  
7 that you referenced?

8 A. Yes, sir.

9 Q. Did the well plan include a plan to set production casing  
10 at Macondo?

11 A. To the best of my knowledge, I don't remember that being a  
12 part of the plan.

13 Q. Did you get anything other than a well plan? And by that,  
14 I mean did you receive a manual that gave you the rules, the BP  
15 rules? Not just for a particular well plan, but how they  
16 wanted you to drill the well procedurally?

17 A. Not to my knowledge, no.

18 Q. Was Transocean's well control handbook the guide for  
19 yourself and anybody on the drill crew on how to go about  
20 drilling and managing a well?

21 A. Yes, sir, it was.

22 Q. So if you had a question or a driller had a question or  
23 any floorhands had questions, you would reference that manual,  
24 correct, the Transocean manual?

25 A. Yes, sir.

## MILES RANDAL EZELL - DIRECT

1 Q. And I'm assuming nobody ever told you or discussed with  
2 you whether or not BP had additional rules or different rules  
3 that you needed to make sure you knew and follow with respect  
4 to how the well was drilled?

5 A. No, sir, I wasn't aware of any BP regulations like that.

6 Q. All right. I want to take you now, Mr. Ezell, to what  
7 would have been your final hitch.

8 A. Okay.

9 Q. Do you recall when your hitch started relative to  
10 April 20th?

11 A. Not exactly. It was a few days prior to that, for sure.  
12 I can't remember the exact amount of days.

13 Q. All right. You had been on at least a few days?

14 A. Yes, sir.

15 Q. By the same token, you weren't at the end, getting ready  
16 to go home either?

17 A. No, sir, I wasn't.

18 Q. My understanding is you were working 21 and 21 at this  
19 point?

20 A. Yes, sir, we were.

21 Q. Who did you relieve? Who was the senior toolpusher on the  
22 hitch opposite you?

23 A. His name was Beau Botau (phonetic).

24 Q. When you arrived at the rig and he was leaving the rig,  
25 did you all meet to talk about what had gone on while you were

## MILES RANDAL EZELL - DIRECT

1 gone?

2 A. Yes, sir. When you're getting ready to leave the rig or  
3 when you arrive, you typically have some time to talk while the  
4 helicopter is refueling outside.

5 Q. All right. So that's a meeting -- we'll call it a  
6 meeting, but it's a discussion outside near the helipad?

7 A. Yes, sir.

8 Q. When that meeting occurred prior to the last hitch before  
9 the incident, do you have a specific recollection of what he  
10 told you about what had gone on the previous 21 days?

11 A. No, sir. That's been about three years. I don't think I  
12 recall anything that stands out today.

13 Q. And that's what I was going to ask you. There's nothing  
14 that sticks in your mind about an event or a warning or  
15 anything?

16 A. Nothing that I can remember.

17 Q. Okay. Fair enough.

18 And there's no documentation? You don't take notes  
19 or turn in a report about a meeting like that, do you?

20 A. Not a meeting like that. But we have handover notes that  
21 were actually typed up, and they were in the toolpusher's  
22 office that we -- once we got in, we changed clothes and all,  
23 we were able to read the handover report from your relief.

24 Q. Okay. And once you come on, your hitch begins, do you  
25 recall where you were? And I say "you." I mean the crew and

## MILES RANDAL EZELL - DIRECT

1 BP in terms of the life of the well. What stage of this well  
2 were you in when you got there for your last hitch?

3 A. I believe it was -- I believe it was in the area of the  
4 logging of the well, somewhere in that area.

5 Q. So drilling had stopped?

6 A. I think so.

7 Q. If we were to look at an IADC daily drill report, I'm  
8 assuming that could give us some information on exactly what  
9 we're talking about.

10 A. Yes, sir, it would.

11 Q. Because those reports are completed every day; correct?

12 A. Correct.

13 Q. And those reports are intended to log the activity, in  
14 pretty substantial detail, about what happens every 24-hour  
15 period?

16 A. Yes, sir, that's right.

17 Q. All right. And it also lists the persons aboard every  
18 24 hours?

19 A. Yes, sir.

20 Q. So if we wanted to know exactly where they were when you  
21 got there, we just have to check the IADC for the day you got  
22 there, and we take it from there?

23 A. Yes, sir.

24 Q. All right. During the logging period -- first of all,  
25 explain, what do you mean, when you were "logging the well"?

## MILES RANDAL EZELL - DIRECT

1 What exactly does that mean?

2 A. Well, of course, that's BP's program, but they may have a  
3 series of different wireline runs that they want to make to  
4 evaluate the well, basically.

5 Q. And does the drill crew play any role in accomplishing  
6 that evaluation?

7 A. We just assist at times, helping the wireline company with  
8 their tools, you know, make them up.

9 Q. Make them up?

10 A. Yeah.

11 Q. Make them up on deck.

12 Now, how do the tools get into the hole?

13 A. From a wireline unit.

14 Q. All right. And is that operated by whatever wireline  
15 company is out there at that time?

16 A. Yes, whatever company it happens to be, they operate it.

17 Q. And in terms of the drill crew, if you're not actively  
18 drilling and you don't need to help them make up their tools  
19 and you're not operating, putting the tools downhole to collect  
20 the data, is there anything that you would typically do -- the  
21 drill crew would do during this logging period?

22 A. It's hard to say for sure. But, of course, there's always  
23 maintenance to be done. There's always cleaning to be done.  
24 There's always some type of task that will keep all the crews  
25 busy.

## MILES RANDAL EZELL - DIRECT

1 Q. Do you have any recollection of any specific maintenance  
2 project that was undertaken or was continuing during this  
3 logging period between the end of drilling and temporary  
4 abandonment?

5 A. No, sir, I can't remember anything.

6 Q. So whatever it was, it was nothing out of the ordinary  
7 that you can recall?

8 A. That would be fair.

9 Q. All right. Now, once the logging is done and the data is  
10 collected, is that data shared with the OIM or you as the  
11 senior toolpusher?

12 A. I don't know that it's actually shared. We might get some  
13 of the highlights, but that's really proprietary information  
14 for BP.

15 Q. That's what I was going to ask you.

16 A. Yes, sir.

17 Q. To the extent that they feel like they have to share it  
18 with you, for whatever reason, they may? Is that a fair  
19 statement?

20 A. That's a fair statement.

21 Q. But there's no obligation that you know of and typically  
22 it's not done; correct?

23 A. That's correct.

24 Q. Again, let me ask you -- and I know we're taking you back  
25 a few years, but do you recall anyone from BP sharing any well

## MILES RANDAL EZELL - DIRECT

1 data at Macondo prior to the temporary abandonment procedure  
2 beginning?

3 A. I'm sorry. That's kind of broad.

4 Q. Let me rephrase it.

5 Do you recall having a meeting with anyone -- and I'm  
6 assuming it would be the well-site leaders, the company men?

7 A. Yeah.

8 Q. Do you recall who the two company men were before you got  
9 there for your last hitch?

10 A. I think Ronnie Sepulvado was there, but then he had to  
11 leave. Don Vidrine is the only other name that comes to mind.

12 Q. And do you remember Mr. Kaluza replacing Ronnie?

13 A. I do.

14 Q. Had you had the opportunity to work with Ronnie Sepulvado  
15 over an extended period of time?

16 A. Yes, sir, a long time.

17 Q. You got to know him pretty well?

18 A. Very well.

19 Q. You got along okay?

20 A. Yeah. It was his way on everything; but, yes, we got  
21 along good.

22 Q. But that's not unusual?

23 A. No, that's not unusual.

24 Q. And you don't say that as a criticism. That's the way  
25 it's been; correct?



## MILES RANDAL EZELL - DIRECT

1 A. No, it's not a criticism. That's just his character.

2 Q. And, in fact, in terms of his abilities as a company man,  
3 I think you've expressed this opinion before, that you thought  
4 he was very good at his job?

5 A. Yes, sir. I would definitely trust his decisions.

6 Q. Had you ever met or had any interactions with Mr. Kaluza  
7 before he replaced Mr. Sepulvado on this last hitch?

8 A. A little bit, but not a whole lot.

9 Q. And I'm assuming you didn't have a lot of time to interact  
10 with him and get to know him prior to April 20th, 2010?

11 A. Well, he had been on the rig once before many, many years  
12 ago and I basically knew him; but we weren't, like, real close,  
13 you know.

14 Q. Was he familiar with the rig and the rig systems?

15 A. All I can tell you is -- I couldn't answer that. But he  
16 had been on the rig before in the early days when we started.  
17 I can't remember exactly what year it was.

18 Q. All right. And you had the opportunity to work with  
19 Mr. Vidrine for a period of time before this last hitch?

20 A. Yes, sir, for a short period of time.

21 Q. Short period of time as well.

22 Other than Ronnie Sepulvado, had you worked with  
23 Murray Sepulvado, too, his brother?

24 A. Yes, sir, I had.

25 Q. Again, for an extended period of time?

## MILES RANDAL EZELL - DIRECT

1 A. Yes, sir.

2 Q. Who was another -- can you name another one or two  
3 well-site leaders like the Sepulvado brothers that you had the  
4 opportunity to work with over an extended period of time?

5 A. Yes, sir. If you'll give me just a second, I'm trying to  
6 recall. Teddy Reed was one that was with us a long time, and  
7 he had retired. And Dwight Nunley was another well-site leader  
8 that we had for an extended period of time, but he was  
9 relocated to another BP facility or something.

10 Q. All right. Do you remember working with Earl Lee?

11 A. Oh, Earl Lee, yes.

12 Q. Had you worked with him for an extended period of time or  
13 not?

14 A. Well, I wouldn't -- yeah, I guess it had been a pretty  
15 good period of time, but not as long as like the people I just  
16 named.

17 Q. On the date of the incident and for the few days prior  
18 when the production casing was set and the abandonment  
19 procedures began, Kaluza and Vidrine were the two well-site  
20 leaders on the rig; right?

21 A. They were.

22 Q. The other gentlemen that you just talked to me about that  
23 you had worked with for an extended period of time were not  
24 there?

25 A. They were not there.

## MILES RANDAL EZELL - DIRECT

1 Q. You had your normal crew, though? Mr. Harrell was there?

2 A. Yes, sir.

3 Q. You were there, obviously?

4 A. Yes, sir.

5 Q. Mr. Wheeler and Mr. Anderson, who you had worked with for  
6 a long time; correct?

7 A. Yes, sir.

8 Q. Were there any new members or new hires of your drill crew  
9 that you can recall working this last hitch, or was it the team  
10 that you had worked with for some period of time?

11 A. It was a team that I had worked with for a good period of  
12 time.

13 Q. So you knew these fellows?

14 A. Yes, sir, I did.

15 Q. And in your opinion, they were all very good at what they  
16 did?

17 A. Yes, sir, that's exactly right.

18 Q. And you had no trouble trusting your safety and your  
19 wellbeing and your life, in fact?

20 A. I trust them with my life.

21 Q. With your life?

22 A. I did.

23 Q. That would include Mr. Wheeler, if he happened to be on  
24 tower?

25 A. Yes, sir.

## MILES RANDAL EZELL - DIRECT

1 Q. That would include Mr. Anderson if he were on tower?

2 A. Especially him.

3 Q. And if Jimmy Harrell made decisions that could affect  
4 safety, you trusted him as well?

5 A. I trusted Jimmy very much.

6 Q. And if Dewey Revette were sitting in the driller's chair,  
7 you had no doubt in your mind that he knew what he was doing  
8 and would do it to the best of his capability; correct?

9 A. That's correct.

10 Q. Now, on the night of April 20 --

11 THE COURT: Mr. Sterbcow, is this a good  
12 transitioning point?

13 MR. STERBCOW: It probably is, Judge.

14 THE COURT: Let's stop the witness' testimony right  
15 here.

16 I'm sorry, Mr. Ezell, but we won't finish you  
17 today for sure. We'll resume at 8:00 in the morning. Okay?

18 (WHEREUPON, the proceedings were concluded.)

19 \*\*\*\*\*

20 CERTIFICATE

21 I, Jodi Simcox, RMR, FCRR, Official Court Reporter  
22 for the United States District Court, Eastern District of  
23 Louisiana, do hereby certify that the foregoing is a true and  
24 correct transcript, to the best of my ability and  
25 understanding, from the record of the proceedings in the  
above-entitled and numbered matter.

*s/Jodi Simcox, RMR, FCRR*  
Jodi Simcox, RMR, FCRR  
Official Court Reporter

	1331 [1] 1503/12 140 degrees [1] 1556/9 14271 [1] 1500/25 149 degrees [2] 1610/12 1611/22 15 [3] 1530/9 1537/10 1537/12 15 ppg [1] 1610/13 15,000 [1] 1530/15 15-minute [1] 1627/8 150 [1] 1612/7 150 degrees [1] 1611/3 1500 [1] 1526/3 1532 [1] 1603/23 1533 [1] 1604/4 160 [2] 1515/18 1586/7 1601 [1] 1499/3 1665 [1] 1503/12 17 [1] 1629/11 17,000 [2] 1525/11 1606/22 17,750 [2] 1600/10 1600/16 17,750 feet [1] 1570/5 1700 [1] 1503/9 17750 [1] 1600/3 18 [1] 1536/25 18,360 [1] 1600/12 1885 [1] 1501/12 1893 [1] 1507/2 18th of [1] 1538/3 19 [1] 1622/5 1969 [1] 1622/18 1977 [3] 1512/15 1631/19 1633/19 1980s [1] 1559/19 1981 [2] 1512/17 1512/23 1982 [2] 1513/7 1514/9 1986 [1] 1513/14 1990 [1] 1513/17 1996 [3] 1553/20 1622/16 1622/17 1997 [1] 1625/2 1998 [3] 1548/16 1594/2 1625/2 19th [1] 1511/18	2013 [2] 1498/6 1505/2 20133 [1] 1538/25 20th [4] 1602/18 1602/19 1644/10 1650/10 20th that [1] 1586/2 21 [4] 1622/21 1644/18 1644/18 1645/10 2179 [1] 1498/3 22 [2] 1544/12 1622/21 2211 [1] 1502/20 2216 [1] 1500/9 22944 [1] 1532/9 22nd [1] 1499/10 23 [1] 1622/21 23451 [1] 1499/10 236 [1] 1565/5 24 [4] 1544/13 1545/24 1546/6 1622/21 24 hours [1] 1646/18 24-hour [1] 1646/14 2457 [1] 1521/11 2458 [2] 1523/22 1536/9 2466 [2] 1555/8 1567/7 248 degrees [2] 1556/11 1565/8 25 [1] 1547/16 2500 [1] 1538/25 25th [1] 1564/15 25th of [1] 1564/15 26 [1] 1633/7 2615 [1] 1499/6 26th [1] 1564/15 27 [3] 1582/21 1582/22 1582/24 2701 [2] 1508/14 1508/18	
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1 1.4 [1] 1613/19 1.5 [1] 1616/1 1.7 [2] 1540/5 1613/12 1.7 grams [1] 1610/13 1/2 [1] 1542/23 10 [3] 1538/4 1538/11 1607/9 10 million [1] 1607/9 10 percent [1] 1562/13 10,000 [4] 1570/5 1607/9 1611/4 1612/8 10-CV-02771 [1] 1498/6 10-CV-4536 [1] 1498/9 10-MD-2179 [1] 1498/3 100 [4] 1499/16 1524/19 1524/24 1538/13 100 meters [2] 1525/6 1525/16 100-meter [1] 1525/15 1000 [2] 1502/17 1503/16 1001 [1] 1502/10 101 [1] 1499/19 1015 [1] 1603/13 1016 [1] 1603/22 11 [4] 1568/17 1597/12 1599/3 1599/11 11 1/2 [1] 1525/24 11,000 [7] 1522/6 1522/15 1555/21 1555/25 1583/14 1591/7 1616/6 11,000-plus [1] 1616/5 1100 [1] 1502/6 1110 [1] 1502/20 115 [1] 1613/11 117 [4] 1564/3 1566/15 1568/10 1615/4 117 degrees [9] 1563/24 1565/11 1567/13 1568/8 1612/23 1612/24 1614/1 1614/25 1615/17 12 [1] 1581/14 12.1 [1] 1581/14 12.6 ppg [1] 1615/24 120 [9] 1556/7 1557/11 1559/2 1566/16 1566/20 1566/21 1593/23 1613/21 1614/14 120 degrees [6] 1556/11 1558/22 1559/1 1560/22 1565/8 1567/13 120,000 [3] 1522/19 1539/23 1540/2 120-degree [2] 1562/7 1581/22 1201 [2] 1502/3 1503/9 1221 [1] 1503/5 125 [2] 1622/22 1622/25 13 [1] 1592/22 1308 [1] 1499/22	5 5,000 [1] 1516/19 5,000 feet [1] 1547/6 5-minute [1] 1545/16 5.2 [3] 1536/18 1537/19 1537/21 50 [3] 1617/9 1641/4 1641/5 50/50 [1] 1617/9 500 [3] 1498/19 1501/9 1503/19 5000 [1] 1501/19 504 [1] 1503/20		

<b>5</b>	1605/1 1638/24 1645/23 able-bodied [1] 1638/24 aboard [9] 1631/10 1631/25 1634/8 1635/7 1636/6 1637/8 1637/15 1639/22 1646/17 about [136] 1506/17 1506/20 1509/18 1510/14 1510/16 1512/8 1512/10 1514/11 1515/22 1516/18 1518/16 1518/20 1519/6 1519/21 1521/8 1521/17 1522/12 1523/16 1523/19 1524/3 1524/13 1524/19 1525/11 1525/14 1525/24 1526/3 1526/13 1527/19 1529/13 1532/2 1532/15 1534/12 1537/6 1537/12 1538/1 1538/19 1538/20 1539/18 1540/14 1541/11 1541/24 1542/10 1543/15 1544/15 1544/24 1545/16 1546/10 1547/2 1552/17 1552/18 1554/1 1556/9 1557/9 1559/12 1560/10 1560/13 1560/24 1561/12 1561/14 1561/15 1561/25 1562/13 1563/2 1563/11 1563/14 1564/11 1564/17 1566/3 1566/19 1567/13 1571/14 1572/1 1572/8 1572/10 1575/21 1576/1 1579/5 1579/24 1580/7 1582/5 1585/4 1586/1 1588/11 1588/11 1588/12 1589/15 1590/16 1594/9 1596/19 1599/9 1603/1 1603/25 1604/24 1606/6 1607/25 1608/8 1608/22 1608/24 1609/15 1610/5 1611/13 1613/9 1613/19 1614/6 1614/17 1614/20 1615/25 1616/19 1616/21 1619/2 1621/8 1621/13 1621/17 1622/22 1623/19 1625/2 1625/7 1625/14 1626/2 1627/17 1632/7 1632/18 1633/20 1633/25 1635/5 1636/20 1641/1 1643/19 1644/25 1645/10 1645/11 1645/14 1645/19 1646/9 1646/14 1651/22 above [19] 1530/11 1535/7 1557/18 1558/13 1559/2 1561/1 1562/5 1565/15 1567/13 1568/7 1568/7 1568/9 1593/19 1595/8 1611/22 1613/11 1614/14 1618/17 1653/23 above-entitled [1] 1653/23 Abramson [1] 1499/5 absence [3] 1583/1 1583/11 1584/3 absolute [1] 1612/2 absolutely [20] 1518/13 1519/12 1535/18 1536/2 1541/9 1548/24 1554/14 1563/12 1569/9 1571/1 1574/19 1592/7 1601/25 1602/16 1614/24 1616/25 1621/7 1621/19 1624/15 1625/18 abundance [1] 1543/12 academia [1] 1516/4 academic [4] 1510/22 1514/9 1515/15 1592/25 academically [1] 1518/22 accelerated [1] 1527/6 acceptable [2] 1509/7 1509/8 accepted [1] 1593/14 access [1] 1599/24 accident [1] 1600/19 accomplishing [1] 1647/5 according [2] 1524/11 1639/8 accounts [1] 1552/5 accumulation [3] 1529/3 1557/14 1559/8 accurate [5] 1534/20 1554/21 1575/5 1582/15 1604/14 achievements [1] 1516/10 acknowledge [2] 1589/3 1623/10 acknowledged [5] 1588/24 1600/18 1612/5 1624/7 1625/24 acquaintances [1] 1620/1 acquire [2] 1552/11 1611/21 acquired [4] 1548/10 1549/2 1551/18 1602/25 acquisition [3] 1548/21 1548/22 1552/9 across [3] 1528/21 1556/6 1561/23 actively [2] 1530/10 1647/17 activities [3] 1626/9 1636/25 1642/12	activity [4] 1543/12 1554/20 1608/23 1646/13 actual [10] 1547/21 1549/14 1595/25 1600/9 1602/2 1602/22 1604/10 1605/10 1615/9 1615/16 actually [58] 1508/1 1513/10 1518/21 1519/7 1521/22 1522/3 1523/18 1524/20 1525/5 1531/15 1532/15 1532/22 1534/9 1534/14 1534/18 1535/23 1537/22 1539/11 1545/23 1545/25 1549/22 1550/6 1550/11 1553/2 1554/5 1557/20 1559/18 1561/24 1568/25 1569/10 1569/20 1569/23 1570/12 1572/7 1573/15 1579/21 1580/12 1583/12 1591/15 1591/19 1593/4 1595/19 1601/17 1601/23 1602/14 1608/4 1608/6 1612/1 1612/3 1614/13 1614/19 1617/7 1618/6 1628/21 1633/4 1634/14 1645/21 1648/12 add [2] 1530/3 1600/8 added [3] 1524/1 1528/11 1546/17 additional [2] 1593/16 1644/2 additionally [1] 1626/1 address [1] 1593/22 adjacent [5] 1541/14 1546/23 1547/24 1549/4 1550/12 admission [1] 1571/6 admit [2] 1510/14 1630/13 admitted [3] 1507/9 1509/1 1626/25 adopt [2] 1610/20 1613/16 adopted [1] 1612/24 advised [1] 1505/21 affect [1] 1653/3 afraid [2] 1603/16 1635/16 Africa [1] 1634/16 after [19] 1505/15 1522/17 1549/2 1564/17 1565/4 1570/16 1587/6 1598/18 1599/15 1600/18 1602/18 1602/19 1625/9 1629/8 1629/9 1632/6 1632/12 1632/25 1642/19 afternoon [8] 1498/13 1505/1 1508/13 1576/19 1576/20 1627/6 1631/5 1631/8 again [15] 1511/24 1517/19 1524/4 1548/16 1550/6 1565/1 1578/5 1598/13 1604/7 1609/19 1610/4 1613/7 1614/15 1648/24 1650/25 against [1] 1581/16 age [10] 1513/3 1522/9 1525/12 1525/14 1532/22 1532/23 1533/2 1579/7 1579/15 1579/16 agenda [1] 1591/14 ago [9] 1518/15 1525/11 1525/24 1544/25 1572/8 1606/22 1607/5 1627/21 1650/12 agree [16] 1519/24 1520/5 1534/3 1580/14 1580/22 1588/9 1588/17 1588/19 1605/23 1609/12 1609/25 1610/20 1612/18 1614/10 1640/3 1640/7 agreement [2] 1508/1 1610/5 ah [1] 1623/23 ahead [4] 1532/12 1628/8 1629/9 1629/14 aided [1] 1503/23 al [2] 1498/8 1498/10 Alabama [6] 1499/4 1501/7 1501/8 1501/10 1522/2 1576/14 Alan [3] 1509/5 1516/24 1552/17 Alaska [1] 1632/18 Albertin [1] 1564/21 ALEX [1] 1503/4 algorithms [2] 1591/20 1594/4 all [119] 1505/4 1505/6 1505/10 1505/21 1506/1 1506/24 1507/7 1508/3 1508/11 1508/25 1509/4 1509/10 1509/21 1509/23 1509/24 1510/18 1511/17 1511/23 1512/11 1515/8 1517/11 1518/13 1519/8 1519/20 1520/6 1520/20 1520/22 1521/24 1522/7 1522/11 1522/14 1522/22 1523/2 1523/9
<b>6</b>	6 kilometers [1] 1530/8 60 [7] 1557/1 1557/11 1558/21 1566/20 1581/21 1593/23 1594/15 60 degrees [8] 1556/7 1556/8 1557/18 1557/24 1558/4 1560/22 1593/19 1593/19 60 million [1] 1523/5 600 [3] 1499/10 1499/13 1502/17 601 [1] 1499/6 60654 [1] 1501/24 618 [1] 1500/3 66 feet [1] 1524/13 68 [1] 1597/9	
<b>7</b>	7-5395 [1] 1500/13 70 degrees [2] 1562/1 1562/5 701 [2] 1501/16 1501/19 70113 [1] 1498/23 70130 [6] 1499/7 1499/13 1500/10 1501/17 1502/24 1503/19 70139 [1] 1501/20 70163 [1] 1502/7 70360 [1] 1499/20 70458 [1] 1499/23 70501 [1] 1502/18 70502 [1] 1498/20 70801 [1] 1500/4 70804 [1] 1501/13 75 [1] 1519/15 7500 [1] 1581/13 7500.23.1 [1] 1610/7 7500.25.1 [1] 1612/13 7506.4.1 [1] 1588/25 7508.1.1 [1] 1610/22 75270 [1] 1503/10 7611 [1] 1500/19 77002 [2] 1502/10 1503/17 77006 [1] 1500/7 77010 [2] 1503/5 1503/13 77098 [1] 1502/21 7780 [1] 1503/20 78257 [1] 1499/17	
<b>8</b>	820 [1] 1498/23 8:00 in [1] 1653/17 8th of [2] 1544/2 1544/2	
<b>9</b>	9,000 [1] 1600/16 9,000 feet [1] 1600/3 90 percent [3] 1557/9 1578/17 1579/1 90071 [1] 1502/14 93 percent [1] 1557/9 94005 [1] 1501/13 94102 [1] 1500/14 9th [2] 1499/13 1602/17	
<b>A</b>	A-N-D-R-E-W [1] 1511/12 abandonment [3] 1648/4 1649/1 1651/18 Aberdeen [2] 1514/15 1514/17 abilities [1] 1650/2 ability [2] 1568/23 1653/22 able [7] 1524/22 1561/18 1570/22 1573/3	

<p><b>A</b></p> <p>all... [85] 1525/15 1525/20 1526/1 1527/11 1527/19 1527/20 1542/24 1546/7 1547/2 1548/11 1550/10 1555/19 1555/24 1559/5 1559/14 1560/3 1561/16 1561/24 1566/3 1567/11 1570/15 1573/16 1573/23 1577/19 1577/23 1579/13 1583/8 1583/15 1586/25 1596/21 1600/8 1600/10 1601/24 1602/2 1602/3 1606/17 1606/20 1607/11 1608/6 1611/16 1615/7 1616/4 1618/5 1620/23 1625/14 1625/17 1626/23 1627/5 1627/7 1627/8 1627/10 1627/12 1627/13 1627/20 1628/15 1629/18 1632/13 1634/2 1634/17 1635/4 1637/3 1637/16 1639/7 1639/16 1639/23 1640/17 1640/19 1640/20 1641/5 1642/13 1644/6 1644/13 1644/25 1645/5 1645/22 1646/17 1646/24 1646/24 1647/14 1647/24 1648/9 1650/15 1650/18 1651/10 1652/15</p> <p>ALLAN [2] 1501/15 1508/16</p> <p>allow [4] 1511/24 1576/1 1576/6 1628/2</p> <p>allows [3] 1543/15 1585/9 1593/22</p> <p>alluding [1] 1552/16</p> <p>almost [2] 1530/13 1538/4</p> <p>alone [3] 1544/11 1549/23 1605/19</p> <p>along [8] 1524/16 1527/3 1529/2 1539/11 1550/2 1560/22 1649/19 1649/21</p> <p>alongside [1] 1528/13</p> <p>already [8] 1512/6 1537/15 1543/2 1578/18 1584/10 1584/10 1626/25 1634/11</p> <p>also [36] 1506/3 1507/20 1507/21 1507/23 1514/18 1514/22 1516/4 1519/7 1520/7 1523/2 1523/4 1523/23 1525/1 1528/12 1552/8 1553/19 1553/21 1560/1 1562/24 1563/7 1564/5 1570/1 1579/8 1579/10 1581/7 1605/15 1622/14 1623/2 1624/24 1626/8 1632/21 1636/2 1637/3 1638/25 1640/7 1646/17</p> <p>alternative [2] 1508/20 1591/23</p> <p>although [2] 1520/20 1572/23</p> <p>always [7] 1519/1 1519/4 1556/20 1556/22 1647/22 1647/23 1647/24</p> <p>am [8] 1506/19 1534/19 1536/6 1560/16 1588/5 1590/21 1593/8 1634/4</p> <p>AMERICA [11] 1498/9 1500/12 1500/16 1500/22 1501/3 1501/19 1501/22 1502/3 1519/25 1590/16 1634/7</p> <p>American [9] 1516/7 1516/12 1516/14 1516/23 1521/21 1524/13 1524/14 1591/8 1592/3</p> <p>among [2] 1598/1 1624/10</p> <p>amongst [2] 1592/15 1598/10</p> <p>amount [3] 1527/3 1559/20 1644/12</p> <p>analysis [5] 1520/7 1564/6 1564/20 1600/24 1600/25</p> <p>analysts [1] 1589/8</p> <p>analytical [3] 1513/4 1579/5 1590/3</p> <p>analyze [1] 1542/25</p> <p>analyzed [1] 1602/23</p> <p>anchor [1] 1549/11</p> <p>and/or [1] 1588/6</p> <p>Anderson [3] 1636/18 1652/5 1653/1</p> <p>ANDREW [6] 1501/22 1511/4 1511/7 1511/11 1626/25 1628/16</p> <p>Angeles [1] 1502/14</p> <p>angle [1] 1524/20</p> <p>animation [1] 1507/22</p> <p>annual [2] 1591/9 1591/10</p> <p>anomalously [7] 1539/7 1539/8 1541/8 1541/9 1541/10 1542/13 1575/12</p> <p>another [14] 1516/6 1525/18 1528/7 1550/15 1557/13 1581/20 1623/25 1628/9 1637/15</p>	<p>1639/17 1651/2 1651/2 1651/7 1651/9</p> <p>answer [16] 1519/2 1541/17 1541/21 1570/16 1570/21 1570/22 1573/10 1584/8 1584/23 1592/11 1596/16 1597/10 1597/14 1602/8 1637/1 1650/15</p> <p>answered [2] 1584/11 1584/14</p> <p>answering [1] 1597/6</p> <p>answers [1] 1592/21</p> <p>ANTHONY [1] 1500/9</p> <p>anticipation [1] 1628/21</p> <p>Antonio [1] 1499/17</p> <p>any [76] 1506/8 1506/16 1507/7 1508/3 1508/9 1508/24 1515/6 1515/19 1518/18 1520/9 1522/23 1525/13 1541/19 1541/19 1542/15 1548/25 1549/12 1551/15 1551/15 1551/19 1552/24 1553/11 1562/8 1562/20 1568/6 1569/6 1576/24 1577/3 1577/5 1577/12 1577/14 1579/18 1580/10 1580/16 1581/8 1582/10 1583/11 1583/18 1584/3 1584/25 1586/22 1587/10 1590/8 1590/15 1594/24 1595/5 1596/9 1596/13 1596/23 1597/4 1599/22 1608/13 1611/11 1617/14 1617/17 1618/23 1625/8 1627/21 1630/12 1634/22 1634/23 1635/23 1638/22 1639/25 1639/25 1640/11 1641/14 1642/5 1643/23 1644/5 1647/5 1648/1 1648/1 1648/25 1650/6 1652/8</p> <p>anybody [2] 1506/8 1643/19</p> <p>anymore [1] 1580/7</p> <p>anyone [6] 1507/7 1518/8 1532/17 1608/17 1648/25 1649/5</p> <p>anything [21] 1521/18 1532/19 1533/11 1549/18 1550/21 1559/12 1559/14 1568/20 1570/25 1573/8 1576/10 1585/6 1585/13 1601/21 1634/23 1634/25 1643/13 1645/12 1645/15 1647/20 1648/5</p> <p>anyway [3] 1562/14 1629/5 1629/5</p> <p>anywhere [1] 1575/16</p> <p>Apart [1] 1585/2</p> <p>APLC [1] 1501/18</p> <p>apologies [1] 1578/1</p> <p>apologize [2] 1508/17 1584/12</p> <p>apparent [1] 1570/9</p> <p>apparently [1] 1629/7</p> <p>appear [1] 1556/15</p> <p>Appearances [6] 1498/16 1499/1 1500/1 1501/1 1502/1 1503/1</p> <p>appears [1] 1563/23</p> <p>Appendix [1] 1507/3</p> <p>Appendix H [1] 1507/3</p> <p>applies [2] 1498/5 1603/14</p> <p>apply [2] 1514/12 1594/7</p> <p>applying [4] 1543/2 1581/9 1582/11 1623/17</p> <p>appreciate [3] 1508/10 1512/25 1629/2</p> <p>approach [3] 1554/25 1570/17 1601/1</p> <p>approaches [2] 1508/20 1563/10</p> <p>approaching [1] 1633/7</p> <p>appropriate [1] 1506/17</p> <p>approximate [1] 1562/15</p> <p>approximately [9] 1526/2 1527/23 1529/16 1547/6 1562/5 1578/16 1586/7 1610/13 1612/23</p> <p>APRIL [15] 1498/4 1536/25 1538/1 1538/3 1551/17 1586/2 1602/17 1602/17 1602/19 1602/19 1606/11 1631/14 1644/10 1650/10 1653/10</p> <p>April 18 [1] 1536/25</p> <p>April 20 [1] 1653/10</p> <p>April 2010 [1] 1631/14</p> <p>April 20th [3] 1602/19 1644/10 1650/10</p> <p>April 20th was [1] 1606/11</p> <p>April 9th and [1] 1602/19</p> <p>aqueous [2] 1559/4 1608/7</p>	<p>aquirdads [2] 1530/22 1589/12</p> <p>archeological [1] 1549/12</p> <p>are [184]</p> <p>area [50] 1518/3 1518/7 1523/20 1526/8 1527/23 1527/24 1528/9 1529/15 1529/16 1529/20 1529/23 1531/9 1531/10 1538/1 1542/21 1542/21 1543/13 1544/19 1544/20 1544/24 1545/5 1546/12 1546/22 1547/2 1549/9 1550/8 1550/8 1550/10 1550/20 1551/16 1552/20 1553/23 1554/18 1554/20 1574/1 1575/3 1579/12 1579/13 1585/6 1605/21 1606/7 1606/21 1607/8 1608/24 1615/4 1618/24 1621/1 1639/18 1646/3 1646/4</p> <p>areas [6] 1525/10 1543/7 1548/15 1549/8 1550/10 1550/21</p> <p>arguments [1] 1581/16</p> <p>around [13] 1523/17 1524/19 1526/3 1529/18 1537/4 1541/13 1549/14 1571/24 1573/6 1580/11 1602/9 1602/11 1636/8</p> <p>Arrell [1] 1502/19</p> <p>arrive [1] 1645/3</p> <p>arrived [1] 1644/24</p> <p>article [14] 1510/22 1587/3 1589/2 1619/15 1621/23 1622/11 1622/16 1622/18 1623/14 1623/21 1623/23 1623/24 1624/1 1624/7</p> <p>articles [17] 1515/15 1515/17 1574/21 1574/22 1586/7 1586/19 1586/22 1586/23 1586/25 1587/5 1587/13 1588/24 1619/17 1619/18 1621/13 1621/16 1624/1</p> <p>artifacts [1] 1549/12</p> <p>artificially [1] 1546/17</p> <p>as [123] 1505/19 1508/8 1510/6 1511/4 1511/8 1512/24 1513/3 1514/4 1514/16 1516/8 1516/20 1517/9 1517/15 1518/22 1520/5 1521/1 1522/5 1522/9 1523/1 1523/7 1523/12 1524/16 1525/8 1528/25 1529/14 1529/17 1530/12 1530/23 1531/11 1532/4 1532/5 1532/23 1534/24 1538/9 1538/9 1540/18 1544/11 1544/16 1548/17 1549/2 1549/2 1549/18 1549/22 1550/21 1550/24 1550/24 1551/7 1552/13 1555/5 1555/22 1556/17 1557/1 1557/1 1558/21 1561/19 1561/25 1562/3 1562/6 1563/9 1564/3 1564/3 1569/7 1569/18 1569/21 1570/25 1571/22 1571/22 1572/11 1573/4 1573/15 1578/11 1580/3 1580/9 1583/13 1584/2 1585/9 1585/11 1588/23 1589/8 1592/23 1592/25 1594/12 1596/18 1598/17 1600/21 1603/11 1606/21 1608/12 1608/12 1610/16 1611/7 1611/23 1614/21 1615/15 1618/13 1620/24 1624/8 1625/2 1627/1 1630/9 1630/11 1630/20 1631/20 1632/20 1632/24 1633/19 1635/5 1635/13 1636/14 1636/22 1640/4 1640/13 1640/14 1641/20 1641/24 1642/3 1648/10 1649/24 1650/2 1650/21 1651/15 1651/15 1653/4</p> <p>Asbill [1] 1502/8</p> <p>ascribe [2] 1589/21 1589/23</p> <p>ask [26] 1506/4 1512/7 1519/21 1554/7 1555/9 1573/25 1582/6 1582/24 1584/17 1584/19 1591/3 1592/20 1593/11 1594/20 1595/22 1598/17 1609/8 1609/15 1611/11 1613/25 1614/4 1614/10 1635/4 1645/13 1648/15 1648/24</p> <p>asked [11] 1509/6 1517/24 1518/16 1545/22 1584/10 1584/19 1596/12 1596/18 1597/4 1603/25 1626/1</p> <p>asking [5] 1546/9 1553/7 1554/10 1596/18 1613/25</p> <p>aspects [2] 1569/5 1591/11</p> <p>assessing [1] 1634/22</p> <p>assessment [4] 1543/23 1544/1 1547/18</p>
---	--	---

<p><b>A</b></p> <p>assessment... [1] 1551/15  assessments [1] 1544/7  ASSET [1] 1498/7  assign [1] 1607/21  assigned [4] 1615/18 1634/12 1639/22 1641/10  assist [3] 1521/15 1555/9 1647/7  assistant [1] 1633/15  associated [5] 1527/18 1551/12 1566/3 1586/15 1620/16  Association [6] 1515/24 1516/8 1516/14 1521/21 1591/8 1592/3  assuming [5] 1507/15 1644/1 1646/8 1649/6 1650/9  assured [1] 1638/8  attached [3] 1511/22 1547/18 1638/1  Attachment [1] 1577/9  attachments [1] 1511/15  attain [1] 1514/21  attempt [3] 1510/19 1585/24 1586/1  attempted [1] 1515/4  attention [2] 1505/18 1568/17  Attorney [2] 1501/7 1501/11  audit [1] 1587/14  August [1] 1511/18  August 19th [1] 1511/18  author [4] 1586/22 1587/1 1588/23 1607/16  authority [2] 1623/20 1637/9  authors [1] 1587/15  automated [1] 1549/3  AUV [2] 1549/4 1549/8  available [13] 1518/8 1518/10 1519/9 1519/20 1522/8 1554/12 1555/1 1575/13 1601/11 1601/12 1601/14 1601/15 1639/9  Avenue [5] 1498/23 1500/13 1501/9 1502/3 1502/14  average [7] 1539/16 1539/24 1540/7 1543/1 1561/24 1562/2 1562/5  avoided [1] 1549/13  award [7] 1516/6 1516/8 1516/10 1516/11 1516/12 1592/2 1592/5  awarded [2] 1515/25 1516/1  awards [2] 1515/19 1515/23  aware [13] 1553/21 1554/9 1579/18 1580/1 1580/4 1581/8 1581/9 1582/11 1590/8 1590/11 1608/13 1624/17 1644/5  away [6] 1526/4 1534/16 1536/4 1551/10 1571/19 1641/11  awesome [1] 1587/16  awful [1] 1524/25  axis [2] 1560/6 1560/21</p>	<p>based [13] 1510/7 1514/1 1539/22 1567/11 1576/5 1578/16 1585/4 1585/8 1585/12 1591/20 1594/10 1615/9 1623/24  basically [11] 1533/1 1533/2 1545/8 1548/4 1594/2 1594/4 1600/8 1624/6 1639/2 1647/4 1650/12  basin [8] 1526/5 1544/18 1588/4 1588/6 1588/18 1588/21 1589/4 1623/11  basis [2] 1599/9 1625/2  bathymetric [2] 1524/7 1524/8  Baton [2] 1500/4 1501/13  be [150] 1505/5 1506/6 1506/13 1506/20 1510/8 1514/12 1516/12 1519/3 1519/6 1521/10 1524/22 1525/23 1528/4 1529/12 1529/17 1530/12 1532/25 1533/9 1533/12 1533/21 1534/22 1534/23 1534/25 1534/25 1535/4 1535/6 1535/17 1535/25 1538/2 1538/18 1538/24 1538/25 1539/6 1539/7 1541/11 1542/5 1545/19 1546/23 1547/3 1547/16 1549/6 1549/12 1549/13 1550/20 1551/3 1551/4 1551/6 1551/10 1551/11 1551/25 1552/6 1552/8 1552/8 1552/16 1552/18 1554/2 1555/11 1558/2 1558/13 1560/3 1561/18 1563/5 1563/7 1563/10 1564/20 1565/25 1566/5 1566/7 1566/17 1566/24 1567/1 1568/3 1568/17 1569/23 1570/11 1570/21 1571/15 1571/21 1574/5 1574/6 1574/8 1575/18 1578/21 1578/24 1579/1 1579/5 1579/12 1579/24 1582/15 1583/3 1584/6 1585/3 1585/18 1588/12 1590/9 1591/18 1592/18 1593/17 1596/8 1596/10 1596/15 1597/6 1602/3 1603/4 1603/21 1605/3 1606/25 1607/5 1607/12 1608/8 1611/23 1612/24 1614/1 1614/14 1614/18 1614/23 1615/3 1615/13 1616/18 1617/24 1618/4 1622/6 1625/22 1627/13 1628/12 1629/5 1630/3 1631/6 1633/22 1634/24 1637/11 1637/11 1637/12 1638/2 1638/5 1638/13 1638/13 1639/3 1639/12 1639/13 1639/14 1641/14 1641/18 1642/13 1647/16 1647/23 1647/23 1648/8 1649/6 1652/23  Beach [1] 1499/10  bear [1] 1522/23  bearing [1] 1565/14  Beau [1] 1644/23  became [4] 1514/13 1526/1 1628/14 1633/10  because [57] 1506/4 1506/12 1507/21 1509/21 1510/21 1515/10 1519/6 1521/17 1525/3 1525/6 1525/15 1526/1 1526/9 1526/24 1528/24 1530/2 1533/10 1537/20 1543/9 1550/19 1553/4 1554/24 1556/17 1557/3 1557/5 1557/18 1558/11 1558/23 1565/25 1568/4 1570/12 1572/5 1573/10 1579/8 1579/15 1579/23 1580/9 1580/25 1583/21 1592/17 1595/19 1601/10 1602/7 1604/17 1605/6 1606/22 1610/18 1611/17 1611/24 1615/1 1617/7 1624/25 1628/1 1628/16 1634/18 1635/2 1646/11  Beck [5] 1503/2 1503/3 1506/25 1507/12 1507/20  become [11] 1512/21 1513/11 1528/4 1531/5 1531/6 1558/11 1558/21 1558/24 1578/24 1590/11 1599/13  becomes [1] 1562/17  becoming [1] 1558/16  been [60] 1511/7 1511/25 1512/6 1513/22 1515/19 1516/23 1516/25 1517/2 1519/5 1527/5 1527/22 1530/3 1545/2 1545/22 1551/24 1554/19 1562/25 1566/3 1568/11 1571/8 1579/11 1587/16 1587/25 1588/1 1588/13 1588/21 1590/8 1591/13 1591/22 1591/23 1594/11 1601/15 1603/10 1607/17</p>	<p>1608/13 1617/5 1624/24 1625/2 1625/14 1626/25 1627/19 1627/20 1628/23 1629/16 1630/19 1633/5 1633/14 1633/14 1633/14 1633/15 1633/15 1636/17 1638/23 1644/7 1644/13 1645/11 1649/25 1650/11 1650/16 1651/14  before [31] 1498/14 1510/8 1516/21 1516/23 1516/25 1519/19 1521/22 1537/1 1544/8 1546/1 1546/9 1553/1 1574/9 1588/13 1590/5 1591/16 1601/20 1601/22 1616/4 1620/3 1622/2 1625/17 1628/14 1631/10 1645/8 1649/8 1650/3 1650/7 1650/11 1650/16 1650/19  Beg [1] 1561/13  began [3] 1512/23 1512/25 1651/19  begin [3] 1512/22 1514/9 1571/22  beginning [1] 1649/2  begins [1] 1645/24  behalf [7] 1507/19 1510/5 1511/3 1578/5 1629/1 1630/7 1631/6  behave [2] 1560/14 1588/7  behaved [1] 1543/15  behind [4] 1551/10 1559/17 1587/13 1643/5  being [13] 1507/14 1517/19 1531/19 1540/22 1541/7 1596/12 1597/4 1617/10 1635/2 1635/5 1635/7 1639/25 1643/11  belief [1] 1565/3  believe [25] 1505/25 1507/21 1519/15 1525/7 1525/23 1548/10 1549/8 1552/24 1554/20 1555/3 1568/6 1580/21 1582/15 1586/6 1590/9 1593/3 1600/14 1600/23 1602/21 1621/11 1621/23 1628/20 1631/19 1646/3 1646/3  believed [1] 1602/6  believes [1] 1572/14  Bellows [1] 1544/5  below [20] 1521/5 1525/6 1526/23 1527/1 1528/1 1530/6 1530/8 1530/21 1535/8 1542/21 1542/24 1548/12 1549/25 1551/4 1556/15 1562/13 1562/15 1565/21 1568/7 1611/15  Ben [2] 1501/5 1507/23  besides [1] 1638/22  best [12] 1519/9 1551/18 1555/11 1563/24 1568/9 1575/13 1632/15 1639/21 1640/13 1643/11 1653/8 1653/22  better [5] 1544/14 1558/23 1592/19 1594/6 1601/3  between [17] 1529/25 1530/7 1543/11 1555/20 1556/6 1557/11 1561/17 1566/19 1573/13 1593/20 1600/19 1602/1 1602/17 1620/17 1625/10 1641/2 1648/3  beyond [2] 1594/16 1642/16  big [9] 1520/10 1550/24 1560/3 1561/12 1561/14 1561/15 1572/1 1594/18 1629/21  bigger [3] 1524/18 1525/18 1620/11  bind [2] 1572/4 1572/5  Binh [2] 1544/4 1564/23  bit [16] 1512/10 1517/18 1521/8 1522/2 1522/25 1548/1 1550/19 1560/8 1561/23 1571/6 1597/2 1614/14 1620/7 1630/24 1632/7 1650/8  bits [2] 1544/17 1546/19  Bjorkum [1] 1622/13  black [9] 1534/5 1539/16 1547/5 1550/5 1550/21 1561/22 1574/15 1616/4 1618/6  Bldg [1] 1500/13  blink [1] 1607/1  blow [2] 1536/3 1560/8  blown [1] 1560/18  blowout [5] 1586/2 1587/6 1598/18 1606/10 1631/9  blows [1] 1571/19</p>
<p><b>B</b></p> <p>Bachelor [1] 1512/14  back [33] 1522/21 1523/16 1525/2 1526/25 1529/18 1536/5 1536/8 1545/17 1546/4 1546/5 1546/7 1559/16 1559/24 1567/6 1568/16 1583/20 1583/22 1612/6 1620/11 1620/25 1624/16 1626/19 1627/9 1627/22 1628/2 1631/17 1631/23 1632/25 1633/19 1634/20 1635/13 1635/17 1648/24  background [6] 1512/8 1512/11 1512/14 1518/1 1521/18 1591/6  backwards [1] 1571/13  bag [3] 1534/5 1534/10 1534/12  ballpark [1] 1641/1  bar [1] 1548/2  BARBIER [2] 1498/14 1517/6  barge [1] 1632/6  barges [1] 1632/14  base [3] 1565/15 1565/21 1616/22</p>		



<p><b>B</b></p> <p>blue [4] 1524/7 1524/15 1524/25 1525/5  blues [1] 1523/2  Bly [5] 1507/2 1507/3 1507/22 1508/19 1509/5  Bly's [1] 1505/11  board [1] 1592/24  boat [3] 1509/21 1640/11 1640/12  Bockius [1] 1503/14  bodied [1] 1638/24  BOEMRE [1] 1522/7  Bondurant [2] 1544/4 1564/23  BOP [9] 1507/4 1507/5 1638/1 1639/12 1639/17 1639/21 1640/2 1640/3 1640/5  borehole [22] 1540/21 1540/22 1540/22 1541/1 1541/2 1541/14 1549/5 1567/3 1571/23 1571/24 1572/2 1573/7 1602/7 1602/9 1602/9 1602/11 1603/2 1611/21 1611/23 1618/13 1618/14 1618/17  boreholes [2] 1522/5 1611/17  bosun [1] 1638/24  Botau [1] 1644/23  both [6] 1505/13 1535/7 1559/20 1563/4 1578/11 1579/6  bottom [5] 1530/19 1539/11 1560/23 1610/8 1617/2  Boulevard [1] 1500/6  bounce [1] 1583/22  bound [1] 1641/14  boundaries [1] 1593/8  Bounds [1] 1499/2  BOWMAN [1] 1503/8  box [11] 1498/20 1500/13 1500/19 1500/25 1501/13 1502/17 1611/6 1613/7 1613/16 1613/23 1616/10  BP [60] 1498/10 1501/18 1501/19 1501/20 1501/21 1501/22 1501/23 1502/2 1502/3 1502/4 1506/10 1508/5 1510/5 1518/12 1519/25 1534/20 1543/23 1544/20 1544/21 1544/22 1547/2 1551/8 1552/10 1552/25 1553/11 1553/18 1553/24 1563/19 1564/6 1569/7 1577/24 1578/5 1583/9 1595/5 1595/16 1595/19 1595/23 1597/22 1598/5 1599/9 1601/16 1604/14 1612/24 1619/8 1621/11 1623/8 1624/17 1625/9 1625/11 1640/23 1641/6 1641/9 1641/14 1643/14 1644/2 1644/5 1646/1 1648/14 1648/25 1651/9  BP's [17] 1509/6 1550/23 1554/8 1568/22 1595/10 1598/20 1599/22 1603/13 1603/25 1604/10 1604/15 1605/1 1605/13 1615/9 1641/15 1642/5 1647/2  BPOs [1] 1638/23  BRAD [2] 1502/13 1509/2  brake [1] 1635/25  brakes [1] 1635/14  Branch [3] 1500/12 1500/22 1501/3  brand [1] 1574/18  brand-new [1] 1574/18  Brazil [1] 1634/7  break [1] 1546/10  Breit [2] 1499/8 1499/9  Brennan [1] 1502/8  BRIAN [2] 1502/13 1509/2  bridge [1] 1638/13  brief [3] 1506/6 1518/1 1618/4  briefly [3] 1514/11 1516/24 1555/9  bright [1] 1544/17  bring [4] 1505/17 1506/4 1609/24 1610/22  Britain [1] 1517/2  British [1] 1560/16  brittle [4] 1558/21 1558/24 1578/24 1579/4</p>	<p>broad [1] 1649/3  broader [1] 1620/7  broadly [1] 1559/18  BROCK [1] 1502/3  brother [1] 1650/23  brothers [1] 1651/3  brought [4] 1531/17 1532/2 1532/3 1534/11  BRUCE [1] 1503/8  Bryan [1] 1564/23  building [2] 1499/16 1575/15  builds [2] 1530/21 1530/23  built [2] 1624/1 1640/13  bulk [1] 1616/13  bunch [1] 1624/10  bundle [3] 1506/3 1506/22 1509/20  bundles [10] 1627/18 1627/19 1627/20 1627/22 1628/3 1628/3 1628/3 1629/16 1629/17 1629/20  burial [2] 1542/21 1542/24  Burling [1] 1502/2  bushing [2] 1600/7 1600/8  business [1] 1546/7  busy [1] 1647/25</p>	<p>1554/18 1574/1 1575/3 1583/2 1583/12 1584/5 1584/18 1585/6 1585/16 1606/7 1606/21 1608/24 1618/25 1619/3 1619/4 1619/7 1626/4 1626/10  capability [1] 1653/8  capacity [1] 1514/5  Cape [2] 1634/16 1634/17  Cape Town [2] 1634/16 1634/17  captain [2] 1638/18 1638/22  capture [2] 1548/25 1551/19  care [4] 1543/2 1552/5 1552/22 1632/23  career [3] 1512/22 1512/23 1514/9  careful [8] 1535/4 1535/6 1541/11 1552/16 1552/18 1563/7 1575/6 1605/6  CARL [2] 1498/14 1517/6  Carondelet [2] 1499/13 1502/23  CARRIE [1] 1501/22  carried [1] 1549/4  carry [1] 1609/6  cartoon [1] 1557/16  case [21] 1517/25 1524/14 1532/20 1542/4 1552/7 1563/4 1572/15 1572/18 1573/5 1573/16 1577/16 1585/1 1585/4 1585/20 1585/23 1588/3 1593/12 1602/21 1603/8 1630/3 1640/16  cases [2] 1519/8 1639/10  casing [4] 1588/15 1601/22 1643/9 1651/18  catastrophe [1] 1633/20  cause [1] 1572/22  caused [3] 1537/9 1551/19 1586/2  causes [3] 1527/2 1527/2 1530/24  caution [2] 1543/5 1552/23  CD [1] 1507/21  CD-ROM [1] 1507/21  Celsius [17] 1556/7 1556/7 1556/11 1557/11 1557/19 1557/25 1558/4 1562/1 1563/25 1593/19 1593/20 1594/15 1610/12 1611/3 1611/22 1612/8 1612/23  cement [6] 1572/4 1572/4 1572/5 1572/6 1572/24 1572/24  cementing [4] 1520/18 1572/9 1572/10 1572/12  center [2] 1568/13 1634/7  Centigrade [3] 1565/8 1566/20 1568/8  centimeter [3] 1540/6 1610/13 1616/1  central [1] 1524/2  CERNICH [1] 1500/17  certain [1] 1611/18  certainly [8] 1529/1 1530/13 1541/12 1546/13 1547/4 1582/17 1589/20 1606/4  CERTIFICATE [1] 1653/20  certify [1] 1653/22  chair [1] 1653/6  CHAKERES [1] 1500/19  challenges [5] 1574/2 1574/5 1574/6 1574/25 1575/2  challenging [2] 1575/17 1597/17  chance [3] 1506/16 1562/25 1617/9  CHANG [1] 1500/18  change [8] 1606/14 1606/16 1606/17 1611/18 1611/19 1639/25 1640/1 1640/2  change-out [2] 1639/25 1640/2  changed [5] 1505/22 1581/3 1628/15 1634/24 1645/22  changes [4] 1526/22 1551/19 1556/17 1557/25  changing [1] 1629/7  character [1] 1650/1  characteristic [1] 1558/3  characteristics [1] 1565/20  characterizes [1] 1534/6  Charles [2] 1529/11 1544/4  chart [9] 1555/17 1586/24 1609/14 1610/24</p>
	<p><b>C</b></p> <p>CALDWELL [1] 1501/12  California [7] 1500/14 1502/14 1514/1 1530/5 1532/23 1533/1 1534/6  California-based [1] 1514/1  caliper [5] 1602/15 1603/5 1603/7 1603/9 1603/11  call [21] 1505/11 1505/18 1511/4 1526/22 1528/15 1528/23 1535/15 1540/19 1548/16 1552/21 1557/12 1557/13 1593/9 1619/12 1621/10 1626/24 1627/14 1628/4 1630/16 1639/14 1645/5  call-outs [2] 1505/11 1626/24  called [16] 1524/20 1530/22 1544/20 1558/5 1602/14 1603/4 1609/17 1617/8 1617/24 1622/24 1624/25 1624/25 1631/23 1632/22 1633/3 1637/16  calls [1] 1620/8  came [3] 1574/13 1581/4 1643/1  Cameron [4] 1502/22 1503/2 1506/25 1617/14  Camp [1] 1501/16  can [80] 1509/23 1510/17 1512/10 1515/22 1519/24 1524/6 1524/24 1525/1 1525/23 1526/17 1528/3 1532/4 1534/9 1535/13 1535/17 1535/20 1535/25 1536/5 1538/23 1544/15 1544/16 1545/17 1547/12 1547/18 1547/25 1550/16 1555/16 1555/21 1556/4 1556/5 1556/8 1559/24 1560/3 1560/5 1560/8 1561/16 1561/19 1563/8 1565/1 1567/6 1568/19 1569/14 1570/20 1570/21 1570/23 1572/17 1578/21 1587/2 1591/6 1593/16 1597/3 1597/11 1601/3 1601/23 1603/4 1603/18 1603/19 1604/4 1606/14 1609/9 1614/4 1614/5 1614/7 1620/7 1620/11 1620/11 1621/10 1622/4 1622/11 1623/23 1624/6 1627/7 1627/14 1628/4 1635/13 1645/16 1648/7 1650/15 1651/2 1652/9  can't [15] 1515/10 1515/10 1529/18 1534/1 1547/4 1547/13 1570/23 1594/2 1604/15 1615/23 1618/9 1634/10 1644/12 1648/5 1650/17  cannot [1] 1530/20  canyon [47] 1518/3 1518/7 1525/3 1525/4 1525/20 1525/25 1527/1 1527/4 1528/9 1528/16 1529/15 1530/1 1531/9 1534/22 1536/17 1537/18 1537/19 1537/21 1538/5 1538/21 1542/17 1542/20 1543/4 1543/13 1544/20 1546/12 1551/17 1553/17 1553/18</p>	

<b>C</b>		
chart... [5] 1610/25 1611/1 1611/10 1616/24 1617/2	commercial [4] 1501/3 1575/24 1578/13 1578/17	CONRAD [1] 1499/19
charts [1] 1613/4	committee [6] 1505/8 1511/3 1517/25 1627/16 1627/23 1631/7	consider [4] 1511/25 1559/24 1560/1 1579/10
check [1] 1646/21	common [7] 1527/11 1528/21 1565/20 1579/15 1579/16 1601/17 1605/4	considerations [1] 1612/15
cheese [1] 1508/20	commonly [3] 1528/14 1565/20 1589/8	considered [2] 1534/21 1593/17
chemical [2] 1559/11 1579/8	communication [2] 1545/14 1553/24	considering [1] 1560/1
chemicals [1] 1632/23	communicators [1] 1601/6	consistent [2] 1604/17 1616/20
Chicago [1] 1501/24	community [1] 1582/1	constant [2] 1556/18 1638/9
Chuck [1] 1564/23	compaction [14] 1557/21 1581/21 1587/21 1587/22 1587/23 1588/20 1589/10 1589/23 1591/21 1593/15 1593/18 1593/24 1594/2 1594/15	constantly [1] 1592/20
Cindy [1] 1506/19	companies [8] 1518/11 1580/12 1583/2 1584/4 1584/18 1604/23 1606/1 1633/9	constitutes [1] 1610/5
circle [1] 1529/13	company [20] 1501/20 1501/23 1502/4 1513/20 1514/2 1548/23 1554/9 1574/6 1583/11 1631/23 1631/24 1632/17 1633/3 1633/8 1647/7 1647/15 1647/16 1649/6 1649/8 1650/2	constraints [1] 1593/5
circular [1] 1527/23	compare [4] 1505/13 1557/7 1605/1 1605/13	contact [2] 1536/3 1545/13
circulate [1] 1509/12	comparing [1] 1583/8	contain [1] 1535/5
circulation [1] 1544/4	competent [1] 1574/5	contained [1] 1507/3
circumstances [1] 1573/19	compiled [2] 1582/25 1584/2	containing [1] 1567/2
citation [2] 1582/9 1622/22	COMPLAINT [1] 1498/7	contains [3] 1605/20 1605/23 1605/24
citations [1] 1623/19	complete [1] 1506/12	contended [1] 1620/13
cite [5] 1574/20 1574/20 1587/13 1588/24 1589/2	completed [2] 1512/16 1646/11	contest [1] 1604/19
cited [3] 1586/25 1588/23 1612/12	completely [4] 1520/5 1526/14 1572/2 1616/20	context [17] 1506/5 1526/7 1531/10 1541/23 1554/17 1554/19 1562/8 1565/12 1566/8 1574/23 1575/14 1582/5 1605/14 1619/20 1621/3 1621/8 1630/4
Civil [2] 1500/12 1500/22	components [3] 1589/12 1611/17 1611/19	continental [2] 1514/5 1524/21
civilization [1] 1519/3	composition [1] 1555/18	continuing [2] 1515/12 1648/2
clarify [1] 1627/16	computer [1] 1503/23	continuously [1] 1633/5
class [7] 1533/24 1533/24 1596/13 1596/14 1597/5 1625/5 1636/2	computer-aided [1] 1503/23	contour [1] 1525/7
classes [3] 1596/9 1596/19 1596/20	computerized [1] 1635/17	contours [7] 1524/6 1524/7 1524/7 1524/8 1524/17 1525/5 1525/6
classification [1] 1611/16	concept [18] 1555/6 1555/12 1559/18 1559/23 1573/18 1574/21 1578/12 1579/19 1580/1 1580/5 1580/17 1580/22 1581/21 1582/1 1594/12 1604/21 1609/11 1622/23	contract [1] 1577/4
classroom [1] 1560/15	concepts [6] 1555/10 1581/10 1582/12 1624/12 1624/18 1625/15	contractor [1] 1577/7
clay [2] 1558/1 1592/13	conceptual [1] 1567/5	contrast [1] 1545/11
clays [1] 1559/17	concern [2] 1562/8 1571/13	contributes [1] 1529/22
clean [2] 1505/15 1507/25	concerned [1] 1563/10	contributing [1] 1624/8
cleaning [1] 1647/23	concerns [2] 1551/7 1562/11	contribution [1] 1516/3
clear [5] 1533/9 1541/13 1545/22 1561/17 1581/7	conceive [1] 1555/11	control [5] 1505/20 1507/4 1512/13 1632/24 1643/18
clearly [1] 1529/25	conclude [2] 1563/22 1582/25	controlled [1] 1557/23
CLERK [2] 1511/9 1630/21	concluded [1] 1653/18	controls [1] 1580/12
CLINGMAN [2] 1502/9 1628/19	conclusion [2] 1582/23 1583/5	convened [1] 1553/16
clip [3] 1506/7 1507/22 1630/3	conclusions [2] 1583/6 1583/7	convention [3] 1516/17 1516/18 1592/18
clips [1] 1507/21	condemning [1] 1571/1	conventional [1] 1635/2
clock [1] 1636/8	condition [1] 1579/14	convert [1] 1615/25
close [7] 1553/23 1557/1 1565/10 1566/20 1567/23 1613/24 1650/12	conditions [15] 1535/13 1578/13 1578/20 1579/6 1583/3 1584/6 1585/5 1591/23 1601/23 1607/8 1607/17 1609/22 1612/14 1620/16 1635/19	converted [1] 1552/9
closer [5] 1532/8 1562/7 1568/13 1583/25 1630/24	conduct [3] 1605/1 1605/1 1605/13	cooler [1] 1566/12
closest [1] 1523/3	conducted [1] 1590/14	cope [2] 1563/8 1572/22
closing [1] 1562/9	conducting [1] 1540/20	copied [1] 1508/22
clothes [1] 1645/22	conductor [1] 1601/22	copies [3] 1507/11 1507/15 1509/6
coast [10] 1522/1 1523/1 1525/14 1525/19 1528/19 1529/5 1529/7 1529/10 1544/16 1558/3	conference [3] 1521/23 1591/13 1591/22	copy [3] 1509/5 1642/13 1643/6
coastline [3] 1524/6 1544/16 1545/2	confident [1] 1570/19	COREY [1] 1501/8
coauthors [1] 1624/2	confining [6] 1527/19 1527/20 1528/2 1528/2 1537/15 1575/11	Corporate [1] 1499/19
coincidence [1] 1526/9	confirmation [2] 1581/8 1582/2	Corporation [2] 1502/23 1503/3
coincident [1] 1536/21	conflict [1] 1593/14	correct [280]
coined [1] 1555/14	confusion [2] 1510/23 1510/23	corrected [1] 1627/20
cold [1] 1526/2	congregation [1] 1522/22	correctly [2] 1593/15 1603/11
collapsed [2] 1526/1 1526/1	conjuncture [2] 1506/2 1598/20	correspondence [1] 1508/1
collect [1] 1647/19	connected [2] 1541/7 1615/12	corresponds [1] 1613/13
collected [2] 1523/16 1648/10	connection [10] 1511/13 1512/8 1512/18 1520/13 1522/22 1542/13 1551/13 1564/5 1603/7 1607/21	could [37] 1508/7 1509/19 1522/19 1527/20 1536/8 1542/25 1551/6 1554/7 1564/3 1572/15 1573/8 1573/14 1578/23 1582/21 1582/24 1583/20 1590/14 1591/1 1594/20 1598/8 1598/14 1603/23 1607/8 1607/8 1607/17 1609/24 1610/22 1611/10 1612/21 1613/1 1617/22 1617/24 1619/12 1640/4 1641/17 1646/8 1653/3
color [1] 1524/25		couldn't [2] 1584/23 1650/15
colors [2] 1546/11 1546/11		counsel [7] 1509/6 1531/17 1594/8 1614/12 1619/8 1621/11 1623/8
combination [1] 1589/11		counsel's [1] 1625/25
combine [1] 1596/24		counselor [1] 1593/4
come [17] 1505/22 1522/20 1523/7 1524/16 1528/8 1531/21 1534/15 1539/18 1559/24 1574/12 1585/20 1627/9 1628/23 1632/25 1642/22 1643/5 1645/24		counted [1] 1519/15
comes [4] 1534/5 1540/20 1624/3 1649/11		counter [1] 1506/11
coming [3] 1525/19 1550/16 1582/24		countries [1] 1609/22
comment [2] 1609/6 1628/18		country [1] 1523/6
comments [2] 1571/2 1630/4		

<p><b>C</b></p> <p>couple [5] 1505/9 1516/19 1569/20 1583/20 1607/5</p> <p>coupled [3] 1552/7 1608/9 1608/18</p> <p>course [14] 1506/14 1512/1 1532/13 1542/19 1559/9 1563/17 1565/25 1581/6 1605/3 1605/3 1607/9 1637/22 1647/2 1647/22</p> <p>courses [3] 1515/2 1515/5 1596/3</p> <p>court [26] 1498/1 1503/18 1505/8 1505/15 1505/19 1506/4 1506/15 1506/17 1507/23 1509/8 1517/14 1519/19 1521/16 1533/18 1539/20 1545/18 1578/20 1582/7 1610/11 1627/11 1630/2 1630/9 1637/20 1653/21 1653/21 1653/25</p> <p>Court's [4] 1505/18 1505/20 1602/6 1627/1</p> <p>courtroom [5] 1516/23 1516/25 1517/2 1517/7 1626/18</p> <p>covered [1] 1548/15</p> <p>Covington [1] 1502/2</p> <p>crack [1] 1527/2</p> <p>Craft [1] 1499/15</p> <p>Craig [1] 1564/24</p> <p>crane [1] 1636/25</p> <p>crazy [1] 1625/21</p> <p>create [2] 1514/21 1530/17</p> <p>created [2] 1522/18 1552/3</p> <p>creates [2] 1531/1 1589/19</p> <p>creating [3] 1583/3 1583/13 1584/5</p> <p>creator [1] 1520/11</p> <p>crew [24] 1637/8 1637/10 1637/13 1637/15 1637/16 1637/20 1637/21 1637/22 1637/23 1638/3 1638/6 1638/15 1639/3 1639/7 1640/11 1641/9 1642/25 1643/19 1645/25 1647/5 1647/17 1647/21 1652/1 1652/8</p> <p>crews [1] 1647/24</p> <p>criticism [2] 1649/24 1650/1</p> <p>cross [13] 1507/2 1509/5 1517/12 1517/13 1531/24 1532/4 1550/5 1576/17 1576/22 1578/3 1578/7 1593/8 1631/6</p> <p>cross-examination [10] 1507/2 1509/5 1517/12 1517/13 1531/24 1576/17 1576/22 1578/3 1578/7 1631/6</p> <p>cross-state [1] 1550/5</p> <p>crosses [4] 1524/2 1528/12 1536/12 1618/6</p> <p>crucial [1] 1589/12</p> <p>crust [1] 1568/14</p> <p>crystal [1] 1530/4</p> <p>cubic [5] 1526/3 1526/3 1540/6 1610/13 1616/1</p> <p>Cunningham [2] 1499/2 1499/3</p> <p>curated [1] 1522/7</p> <p>Curaçao [1] 1634/17</p> <p>curriculum [1] 1511/21</p> <p>curve [2] 1567/22 1600/2</p> <p>curving [1] 1617/9</p> <p>cutting [1] 1525/2</p> <p>CV [4] 1498/6 1498/9 1511/23 1512/6</p>	<p>darker [1] 1546/19</p> <p>dashed [2] 1527/22 1539/15</p> <p>data [65] 1518/8 1518/10 1518/13 1521/18 1522/6 1522/7 1522/9 1522/19 1523/15 1523/16 1539/14 1548/8 1548/9 1548/10 1548/13 1548/15 1548/16 1549/2 1551/18 1552/9 1552/11 1555/22 1556/5 1557/6 1557/7 1561/16 1561/24 1563/19 1567/11 1569/11 1575/13 1576/4 1583/14 1584/25 1587/10 1587/14 1594/21 1595/10 1595/17 1595/20 1595/25 1596/2 1598/1 1601/1 1601/6 1601/11 1601/11 1601/14 1601/15 1602/25 1604/11 1605/25 1611/21 1614/19 1616/5 1618/13 1618/14 1618/19 1618/20 1619/3 1635/1 1647/20 1648/9 1648/10 1649/1</p> <p>database [3] 1522/5 1522/18 1539/23</p> <p>date [6] 1509/20 1543/25 1631/9 1633/19 1641/3 1651/17</p> <p>dated [2] 1511/17 1564/14</p> <p>dates [1] 1528/12</p> <p>Daubert [2] 1510/7 1510/13</p> <p>Dauphin [1] 1499/3</p> <p>DAVID [3] 1503/3 1503/3 1506/25</p> <p>day [9] 1498/13 1508/9 1516/24 1516/25 1520/1 1559/19 1631/23 1646/11 1646/21</p> <p>days [8] 1635/13 1635/17 1644/11 1644/12 1644/13 1645/10 1650/16 1651/17</p> <p>deal [13] 1519/11 1561/12 1561/14 1561/15 1579/16 1586/9 1586/14 1596/9 1596/14 1596/14 1596/23 1597/5 1628/5</p> <p>dealing [1] 1595/6</p> <p>DEANNA [1] 1500/18</p> <p>decade [1] 1513/23</p> <p>decide [1] 1510/10</p> <p>decided [2] 1553/2 1557/12</p> <p>decision [1] 1506/2</p> <p>decisions [2] 1650/5 1653/3</p> <p>deck [5] 1636/25 1639/11 1639/14 1639/18 1647/11</p> <p>decked [1] 1639/13</p> <p>decomposes [1] 1558/5</p> <p>decrease [2] 1558/7 1558/9</p> <p>deem [1] 1506/17</p> <p>deemed [1] 1552/8</p> <p>deep [4] 1521/2 1526/5 1530/4 1546/23</p> <p>deeper [12] 1523/1 1524/17 1551/4 1556/18 1556/20 1561/3 1561/6 1565/24 1566/1 1568/12 1615/3 1615/15</p> <p>deepest [1] 1567/12</p> <p>deepwater [34] 1498/4 1502/6 1502/7 1502/9 1502/10 1502/13 1502/13 1502/17 1502/17 1502/20 1502/21 1507/5 1586/3 1595/2 1633/24 1634/8 1635/6 1635/6 1635/18 1636/12 1637/8 1637/15 1639/2 1639/22 1640/9 1640/15 1640/23 1641/10 1641/19 1641/20 1642/5 1642/18 1642/19 1642/24</p> <p>Deepwater Horizon [1] 1507/5</p> <p>defensible [1] 1592/25</p> <p>define [4] 1522/20 1604/25 1610/10 1620/16</p> <p>defined [1] 1609/21</p> <p>definitely [2] 1520/23 1650/5</p> <p>definition [19] 1609/17 1610/1 1610/15 1610/16 1610/17 1610/19 1610/20 1611/2 1611/7 1611/13 1611/15 1612/1 1612/7 1612/11 1613/8 1613/15 1613/15 1616/7 1616/11</p> <p>definitional [1] 1608/3</p> <p>definitions [4] 1609/20 1610/9 1610/12 1620/20</p> <p>degrade [1] 1571/25</p> <p>deGravelles [2] 1500/2 1500/3</p> <p>degree [8] 1512/14 1512/14 1524/23 1552/22</p>	<p>1552/23 1562/7 1573/20 1581/22</p> <p>degrees [35] 1556/7 1556/7 1556/8 1556/9 1556/11 1556/11 1557/1 1557/18 1557/24 1558/4 1558/22 1559/1 1559/2 1560/22 1560/22 1562/1 1562/5 1563/24 1565/8 1565/8 1565/11 1567/13 1567/13 1568/8 1593/19 1593/19 1610/12 1611/3 1611/22 1612/7 1612/23 1612/24 1614/1 1614/25 1615/17</p> <p>DELEMARRE [1] 1500/23</p> <p>deliberately [1] 1557/7</p> <p>deliver [1] 1593/24</p> <p>delta [4] 1522/2 1524/4 1524/5 1525/17</p> <p>demonstrate [2] 1521/11 1531/14</p> <p>demonstrating [1] 1620/8</p> <p>demonstrative [14] 1521/12 1523/22 1528/7 1531/15 1532/10 1536/9 1536/12 1538/23 1545/22 1555/7 1555/8 1567/7 1621/11 1621/13</p> <p>demonstratives [3] 1505/11 1521/10 1626/23</p> <p>DENISE [1] 1503/15</p> <p>dense [1] 1561/9</p> <p>department [5] 1500/11 1500/15 1500/21 1501/2 1513/12</p> <p>depends [1] 1611/14</p> <p>depiction [1] 1507/5</p> <p>depo [1] 1630/7</p> <p>deposited [1] 1523/10</p> <p>deposition [16] 1506/3 1506/7 1533/5 1579/22 1579/25 1580/15 1580/18 1581/4 1590/12 1596/12 1597/4 1597/9 1599/15 1608/12 1629/15 1629/23</p> <p>depositions [2] 1577/12 1577/15</p> <p>depth [14] 1520/1 1522/24 1524/8 1524/16 1530/9 1530/13 1539/10 1547/7 1561/4 1567/12 1570/3 1600/7 1600/12 1615/18</p> <p>DEPUTY [2] 1511/9 1630/21</p> <p>derrickman [1] 1633/14</p> <p>described [7] 1578/11 1578/20 1578/23 1579/3 1581/10 1581/16 1642/11</p> <p>describes [1] 1541/18</p> <p>describing [1] 1581/20</p> <p>description [4] 1507/3 1564/12 1624/5 1637/20</p> <p>descriptions [2] 1534/20 1535/10</p> <p>design [1] 1595/6</p> <p>designations [2] 1506/11 1506/12</p> <p>designed [4] 1540/21 1541/4 1572/21 1640/12</p> <p>designing [1] 1543/6</p> <p>destabilizes [1] 1571/20</p> <p>destruction [1] 1537/9</p> <p>detail [5] 1530/3 1547/4 1584/20 1588/3 1646/14</p> <p>detailed [1] 1547/20</p> <p>Detection [1] 1604/6</p> <p>determine [1] 1563/19</p> <p>determines [1] 1520/3</p> <p>develop [1] 1513/4</p> <p>developed [4] 1548/7 1590/8 1592/23 1608/13</p> <p>developing [5] 1552/22 1575/14 1579/20 1580/5 1590/2</p> <p>development [6] 1535/22 1552/14 1587/20 1589/4 1623/10 1624/12</p> <p>devices [1] 1621/4</p> <p>Dewey [1] 1653/6</p> <p>Dexter [1] 1501/9</p> <p>diagram [13] 1528/11 1529/12 1539/9 1539/14 1549/7 1550/4 1550/5 1555/16 1555/21 1557/15 1560/23 1561/22 1613/14</p> <p>dialogue [1] 1597/17</p> <p>did [93] 1505/22 1506/5 1512/15 1512/18</p>
<p><b>D</b></p> <p>D-2003 [2] 1613/1 1617/25</p> <p>D-2457 [1] 1521/11</p> <p>D-2500 [1] 1538/25</p> <p>D-4213 [1] 1507/4</p> <p>D-4368 [1] 1586/24</p> <p>D.C [4] 1500/20 1500/25 1501/6 1502/4</p> <p>daily [4] 1606/18 1636/3 1636/22 1646/7</p> <p>Dallas [2] 1503/10 1505/24</p> <p>damage [2] 1538/19 1541/14</p> <p>dangerous [1] 1592/18</p> <p>DANIEL [1] 1501/4</p> <p>dark [5] 1545/10 1546/11 1546/16 1546/22 1550/22</p>		

<b>D</b>		
did... [89] 1512/22 1513/2 1513/7 1513/8 1513/11 1513/24 1514/3 1514/9 1514/10 1514/24 1515/6 1516/7 1518/25 1519/7 1540/11 1545/19 1563/21 1563/22 1569/6 1574/12 1582/3 1582/4 1582/13 1582/14 1582/15 1582/17 1582/18 1582/24 1583/5 1583/9 1584/25 1586/5 1587/10 1587/13 1587/18 1587/19 1591/3 1592/23 1594/21 1594/23 1594/24 1595/2 1595/4 1595/5 1595/10 1595/13 1595/23 1599/9 1599/10 1599/21 1603/7 1603/8 1604/10 1604/14 1604/17 1605/12 1615/23 1625/20 1631/20 1631/21 1631/22 1632/5 1632/11 1632/16 1632/20 1632/21 1632/25 1633/1 1633/2 1634/8 1634/11 1634/22 1635/9 1636/22 1637/20 1637/21 1638/6 1639/7 1639/9 1643/2 1643/5 1643/9 1643/13 1643/14 1644/21 1644/25 1652/14 1652/16 1652/22	1537/6 1537/17 1538/19 1538/22 1541/13 1541/25 1545/15 1545/15 1545/15 1552/24 1554/20 1555/11 1568/6 1570/21 1570/23 1570/23 1575/2 1576/4 1582/4 1582/10 1585/24 1586/1 1586/13 1587/1 1587/16 1587/17 1590/3 1591/19 1592/3 1594/3 1595/16 1595/19 1596/3 1596/9 1596/12 1596/13 1596/19 1596/19 1596/20 1597/4 1597/13 1597/15 1597/20 1598/17 1599/10 1600/4 1600/6 1601/3 1602/7 1602/14 1602/18 1604/21 1604/23 1605/16 1606/7 1606/9 1607/25 1609/4 1611/16 1612/1 1612/3 1613/2 1614/11 1614/12 1614/14 1616/4 1617/17 1618/25 1619/16 1620/7 1622/12 1624/17 1630/10 1632/20 1634/1 1634/22 1637/18 1638/6 1638/15 1638/22 1639/7 1640/11 1641/1 1641/5 1644/9 1645/9 1645/19 1645/24 1646/25 1647/12 1647/20 1647/21 1648/1 1648/25 1649/5 1649/8 1649/12 1649/13 1651/10 1653/8 1653/22	1593/19 1600/10 1616/7 1617/2 1618/17 1629/22 1637/13 downhole [1] 1647/19 downside [1] 1558/15 DOYEN [1] 1502/12 dozen [2] 1625/12 1625/13 Dr. [18] 1540/12 1540/14 1540/18 1541/17 1553/5 1563/14 1573/20 1578/6 1578/9 1581/14 1583/8 1585/3 1598/11 1598/17 1599/2 1604/15 1606/10 1614/10 Dr. Huffman [5] 1540/12 1540/14 1540/18 1563/14 1573/20 Dr. Hurst [12] 1553/5 1578/6 1578/9 1581/14 1583/8 1585/3 1598/11 1598/17 1599/2 1604/15 1606/10 1614/10 Dr. Hurst's [1] 1541/17 dramatically [1] 1568/2 draw [1] 1556/6 Drescher [1] 1499/8 drill [40] 1513/21 1535/13 1540/23 1543/16 1553/2 1554/23 1555/1 1562/21 1570/2 1570/7 1575/4 1576/6 1583/9 1600/2 1600/9 1603/14 1605/12 1619/8 1636/23 1637/8 1637/10 1637/13 1637/21 1637/22 1638/3 1638/15 1639/7 1640/4 1640/9 1640/14 1641/8 1642/5 1642/25 1643/16 1643/19 1646/7 1647/5 1647/17 1647/21 1652/8 drilled [18] 1527/22 1537/2 1552/6 1574/2 1575/4 1588/13 1590/6 1599/22 1599/23 1602/12 1605/21 1617/5 1640/17 1640/23 1640/23 1641/2 1641/6 1644/4 driller [12] 1633/15 1633/15 1635/2 1635/3 1635/5 1635/7 1635/24 1641/22 1641/23 1641/24 1642/3 1643/22 driller's [1] 1653/6 drillers [2] 1636/9 1637/12 drilling [83] 1502/6 1502/9 1502/13 1502/17 1502/20 1518/6 1520/3 1520/4 1520/8 1520/14 1520/24 1521/2 1535/1 1535/14 1541/2 1543/2 1543/6 1551/25 1552/16 1552/18 1558/10 1559/10 1561/20 1562/8 1562/17 1562/21 1563/2 1563/14 1563/15 1569/8 1573/25 1574/23 1575/9 1575/18 1575/25 1577/6 1580/23 1584/20 1585/13 1585/15 1585/22 1585/24 1586/9 1586/14 1586/15 1586/19 1590/20 1596/4 1596/4 1596/5 1596/6 1596/9 1596/10 1596/14 1596/15 1597/5 1597/6 1601/4 1601/5 1601/6 1601/8 1601/11 1601/12 1601/21 1602/18 1602/19 1612/14 1612/15 1623/17 1631/23 1632/14 1632/17 1633/21 1633/23 1636/24 1637/23 1638/2 1638/6 1641/15 1643/20 1646/5 1647/18 1648/3 drillings [1] 1577/4 drive [3] 1499/16 1499/19 1630/9 driven [2] 1559/22 1579/9 dropoff [1] 1545/5 dry [1] 1555/19 due [2] 1570/8 1623/10 DUKE [1] 1499/19 duly [2] 1511/7 1630/19 duplicates [1] 1505/14 during [26] 1505/11 1507/1 1509/4 1527/6 1541/2 1557/24 1561/20 1584/20 1586/18 1596/10 1596/15 1597/6 1601/12 1604/6 1626/24 1630/3 1634/23 1636/6 1636/19 1636/20 1639/5 1639/7 1639/12 1646/24 1647/21 1648/2 duties [1] 1636/22 duty [1] 1642/25 Dwight [1] 1651/7 dynamic [3] 1590/9 1638/10 1638/20
didn't [19] 1505/20 1537/4 1539/2 1541/19 1565/24 1570/13 1576/24 1577/3 1577/12 1577/14 1587/16 1587/17 1599/23 1615/21 1623/5 1634/24 1635/17 1640/11 1650/9	Docket [3] 1498/3 1498/6 1498/9 Doctor [5] 1512/22 1513/24 1518/25 1536/23 1615/7 doctoral [4] 1512/16 1512/18 1512/20 1515/5 document [20] 1543/19 1544/11 1544/21 1544/22 1548/13 1548/14 1551/14 1559/21 1598/11 1598/13 1598/15 1599/23 1603/16 1603/21 1603/25 1604/1 1604/7 1605/15 1605/18 1606/5 documentation [1] 1645/18 documented [1] 1525/21 documents [10] 1507/1 1577/13 1577/15 1595/24 1597/22 1597/25 1598/1 1598/4 1599/22 1615/9 does [36] 1505/23 1513/21 1521/7 1522/23 1523/20 1523/21 1526/7 1526/24 1531/3 1532/16 1532/19 1539/18 1540/4 1544/14 1548/9 1548/13 1550/17 1552/20 1556/20 1557/3 1559/23 1563/2 1565/12 1573/25 1573/25 1574/14 1576/9 1583/12 1587/19 1594/6 1605/10 1605/13 1620/20 1621/15 1647/1 1647/5 doesn't [6] 1510/21 1528/24 1541/18 1591/21 1593/24 1594/16 doing [3] 1594/14 1601/16 1653/7 domain [4] 1518/8 1518/14 1605/14 1632/24 Domengeaux [1] 1498/18 domes [2] 1550/10 1550/14 dominantly [1] 1589/10 Dominion [1] 1499/16 DON [3] 1501/19 1509/11 1649/11 don't [36] 1508/6 1510/23 1513/10 1520/9 1526/25 1527/1 1529/7 1529/10 1533/8 1547/9 1550/11 1569/21 1570/11 1573/7 1577/5 1579/9 1581/12 1586/23 1596/5 1597/15 1603/16 1605/23 1609/6 1611/20 1614/19 1618/23 1619/6 1622/14 1638/5 1639/25 1643/11 1645/11 1645/18 1647/18 1648/12 1649/24 DONALD [1] 1503/7 done [17] 1514/16 1514/25 1520/6 1548/25 1551/24 1559/15 1575/19 1583/14 1595/14 1602/22 1603/4 1633/16 1638/10 1647/23 1647/23 1648/9 1648/22 dot [1] 1529/19 dots [5] 1521/24 1522/3 1522/23 1616/4 1618/19 dotted [2] 1529/13 1539/15 doubt [1] 1653/7 DOUGLAS [1] 1501/16 down [16] 1524/25 1525/8 1525/24 1526/5 1559/5 1560/6 1560/21 1561/23 1561/25	
differ [3] 1589/18 1601/23 1620/20		
difference [6] 1532/16 1542/16 1573/13 1600/19 1602/1 1602/4		
differences [1] 1635/9		
different [23] 1518/17 1545/7 1548/15 1594/14 1596/7 1596/25 1596/25 1597/11 1601/13 1601/14 1606/17 1606/20 1609/21 1609/21 1609/22 1610/19 1615/13 1621/5 1635/7 1635/20 1635/22 1644/2 1647/3		
difficult [4] 1549/7 1558/17 1569/24 1605/7		
dimensional [1] 1567/4		
dinosaur [1] 1523/6		
direct [16] 1512/4 1519/13 1519/18 1543/11 1581/8 1582/2 1586/6 1594/18 1598/4 1599/4 1601/6 1605/16 1606/7 1607/20 1612/21 1631/3		
directed [1] 1518/5		
directly [3] 1542/6 1636/15 1637/6		
disability [1] 1509/18		
disagree [1] 1609/25		
disappeared [1] 1631/24		
disaster [1] 1518/3		
disciplines [2] 1573/1 1596/25		
discover [1] 1552/13		
discovered [1] 1527/25		
discoveries [3] 1578/17 1579/2 1579/13		
discussed [5] 1554/17 1591/24 1626/24 1630/9 1644/1		
discussion [5] 1519/19 1547/11 1606/13 1627/17 1645/6		
discussions [2] 1558/10 1624/21		
disequilibrium [1] 1589/10		
disintegrate [1] 1572/23		
disintegrated [3] 1573/7 1602/7 1602/10		
dissenting [2] 1519/7 1519/8		
distance [2] 1600/9 1600/10		
distinct [1] 1525/10		
distinguished [1] 1516/9		
distributed [1] 1509/6		
DISTRICT [5] 1498/1 1498/2 1498/15 1653/21 1653/21		
divergence [1] 1593/20		
Division [2] 1500/12 1500/22		
do [130] 1506/13 1506/23 1506/23 1508/8 1509/21 1509/22 1510/13 1512/20 1513/2 1513/9 1513/22 1514/3 1514/24 1517/11 1517/12 1517/24 1518/6 1518/9 1518/25 1520/9 1521/19 1523/14 1529/4 1531/13 1532/19 1533/24 1533/24 1535/15 1537/5		

<p><b>E</b>  E-Z-E-L-L [1] 1631/2  each [6] 1539/10 1555/25 1555/25 1604/24 1642/10 1642/12  Earl [2] 1651/10 1651/11  earlier [8] 1516/10 1537/18 1548/16 1571/17 1590/1 1614/22 1616/21 1624/1  early [4] 1555/14 1559/18 1627/6 1650/16  earth [6] 1521/6 1556/16 1556/18 1557/25 1568/13 1576/3  earth's [5] 1530/6 1532/25 1551/5 1557/3 1559/7  earthquake [31] 1528/13 1530/15 1530/17 1531/2 1536/15 1536/19 1536/23 1536/25 1537/6 1537/7 1537/18 1537/20 1537/22 1537/25 1538/3 1538/6 1538/7 1538/17 1551/12 1551/17 1551/20 1551/21 1551/22 1552/21 1553/1 1553/12 1553/17 1553/20 1553/20 1606/11 1607/18  earthquakes [27] 1528/16 1528/17 1528/18 1528/19 1528/25 1528/25 1529/4 1529/7 1529/10 1529/23 1530/2 1530/3 1535/19 1535/23 1536/13 1536/16 1537/8 1543/12 1552/3 1553/17 1575/12 1606/6 1606/13 1606/14 1606/16 1609/11 1626/9  easier [1] 1597/13  easily [3] 1528/2 1530/21 1534/16  EASTERN [2] 1498/2 1653/21  easy [1] 1538/24  edge [11] 1544/19 1547/25 1548/7 1550/10 1566/2 1566/10 1566/11 1566/13 1566/20 1567/18 1574/24  edges [1] 1550/4  educational [2] 1512/11 1533/21  educationally [1] 1624/24  educator [1] 1516/9  Edwards [1] 1498/18  effect [4] 1537/14 1558/6 1566/4 1612/2  Ehrenberg [4] 1521/21 1522/16 1591/5 1591/15  either [7] 1567/24 1587/17 1607/14 1627/2 1627/6 1632/13 1644/16  elastomers [1] 1611/18  elastometric [1] 1621/3  electrical [1] 1611/19  electronic [1] 1621/3  elements [1] 1606/20  elevated [3] 1562/24 1567/25 1620/14  ELIZABETH [1] 1501/5  Ellis [1] 1501/21  Elm [1] 1503/9  else [5] 1507/11 1529/23 1570/25 1573/8 1609/24  elucidate [1] 1523/18  eminent [1] 1624/11  employee [1] 1577/15  employees [2] 1553/16 1620/6  encounter [3] 1528/24 1562/19 1565/19  encountered [6] 1522/5 1583/3 1584/6 1596/10 1596/15 1597/6  encountering [1] 1562/25  end [7] 1508/9 1509/25 1510/1 1567/15 1623/21 1644/15 1648/3  Energy [2] 1503/7 1503/11  Enforcement [1] 1500/16  engineer [3] 1520/14 1520/16 1590/20  engineering [2] 1516/3 1596/5  engineers [3] 1515/24 1563/16 1593/7  enlist [1] 1606/2  enough [3] 1529/19 1637/18 1645/17  entire [8] 1528/21 1540/7 1540/8 1542/14 1599/9 1609/8 1618/7 1618/21</p>	<p>entirely [3] 1568/7 1568/9 1610/4  entitled [1] 1653/23  environment [3] 1500/16 1533/5 1591/22  Environmental [1] 1500/16  epicenter [1] 1537/8  epicenters [1] 1528/15  equals [2] 1556/8 1556/11  equation [1] 1520/11  equipment [8] 1549/13 1612/3 1632/24 1635/25 1636/1 1639/10 1640/1 1640/4  equivalent [1] 1610/14  error [1] 1554/24  escape [6] 1527/4 1530/19 1530/20 1531/7 1541/1 1558/17  Especially [1] 1653/2  ESQ [58] 1498/19 1498/22 1499/3 1499/6 1499/9 1499/12 1499/15 1499/19 1499/22 1500/3 1500/6 1500/9 1500/12 1500/17 1500/17 1500/18 1500/18 1500/19 1500/22 1500/23 1500/23 1500/24 1500/24 1501/4 1501/4 1501/5 1501/8 1501/8 1501/9 1501/12 1501/15 1501/16 1501/19 1501/22 1501/22 1501/23 1502/3 1502/6 1502/9 1502/9 1502/12 1502/13 1502/13 1502/16 1502/20 1502/23 1503/3 1503/3 1503/4 1503/4 1503/7 1503/8 1503/8 1503/9 1503/12 1503/15 1503/15 1503/16  essence [4] 1516/9 1553/7 1608/23 1609/5  essential [1] 1640/3  essentially [4] 1540/24 1572/22 1633/20 1638/3  established [1] 1572/8  establishing [1] 1623/15  estimate [5] 1563/24 1568/9 1612/22 1612/24 1641/1  estimates [2] 1564/1 1564/2  et [2] 1498/8 1498/10  European [2] 1515/24 1516/10  evaluate [1] 1647/4  evaluation [2] 1568/22 1647/6  even [12] 1523/6 1529/10 1537/16 1542/25 1543/7 1552/3 1564/1 1569/23 1570/19 1581/9 1589/23 1592/24  evening [1] 1509/12  event [5] 1527/6 1570/16 1607/7 1639/23 1645/14  events [10] 1527/17 1528/25 1529/3 1530/1 1530/2 1530/4 1530/5 1530/6 1535/19 1551/12  eventual [1] 1626/11  eventually [2] 1538/2 1580/10  ever [14] 1516/20 1516/23 1516/25 1517/2 1548/18 1548/20 1570/20 1588/13 1608/13 1608/17 1639/25 1641/13 1644/1 1650/6  every [13] 1525/6 1525/7 1554/23 1575/5 1575/22 1575/22 1583/22 1633/20 1640/22 1641/6 1646/11 1646/14 1646/17  everybody [3] 1508/22 1609/24 1627/5  everybody's [2] 1506/22 1507/15  everyone [6] 1505/5 1506/20 1507/11 1521/25 1627/13 1628/2  everything [5] 1520/9 1550/3 1555/20 1637/25 1649/20  evidence [18] 1505/10 1505/16 1507/24 1508/14 1508/18 1508/23 1511/14 1511/24 1512/7 1553/11 1553/14 1553/15 1569/6 1569/9 1575/20 1607/20 1626/23 1627/1  evolve [1] 1588/7  exact [2] 1634/10 1644/12  exactly [15] 1510/16 1526/19 1532/22 1532/22 1536/21 1542/3 1549/8 1557/8 1637/7 1644/11 1646/8 1646/20 1647/1 1650/17 1652/17</p>	<p>exam [3] 1598/5 1599/4 1605/16  examination [18] 1507/2 1509/5 1512/4 1517/12 1517/13 1531/24 1569/4 1576/17 1576/22 1578/3 1578/7 1594/18 1605/6 1606/8 1612/21 1617/19 1631/3 1631/6  examine [4] 1531/21 1594/21 1594/24 1605/12  examined [2] 1518/10 1569/5  example [6] 1518/11 1524/9 1530/5 1546/20 1572/3 1591/5  exceed [1] 1562/12  exception [4] 1549/3 1581/1 1640/24 1640/25  excerpt [1] 1630/7  excess [2] 1641/4 1641/5  excessive [1] 1536/1  excited [1] 1550/19  excuse [13] 1526/14 1526/15 1536/23 1541/10 1545/10 1551/22 1560/16 1566/9 1566/9 1571/11 1583/23 1611/14 1634/13  exhibit [25] 1511/15 1521/11 1523/23 1532/9 1536/12 1538/25 1543/18 1545/23 1545/24 1547/15 1547/16 1555/8 1564/8 1567/8 1568/16 1568/18 1582/22 1610/7 1612/13 1617/21 1619/13 1621/21 1623/7 1623/7 1623/8  Exhibit 03375.11 [1] 1568/18  Exhibit 20003.103 [1] 1567/8  Exhibit No [1] 1543/18  exhibited [2] 1603/9 1603/10  exhibits [5] 1505/10 1509/3 1509/13 1626/23 1627/2  existence [1] 1626/8  exists [2] 1610/2 1626/3  expect [9] 1533/4 1551/23 1566/4 1567/24 1567/25 1568/1 1568/3 1579/16 1611/22  expected [4] 1506/12 1534/23 1552/4 1571/15  expecting [3] 1535/7 1535/8 1550/19  experience [6] 1554/3 1602/2 1606/1 1631/15 1635/24 1637/18  experienced [1] 1600/20  expert [23] 1510/14 1510/20 1510/21 1513/3 1516/20 1517/9 1517/21 1518/18 1519/19 1520/13 1520/18 1520/23 1550/23 1563/15 1563/23 1572/8 1572/9 1572/12 1572/23 1572/24 1580/15 1607/15 1619/22  expertise [5] 1512/9 1521/1 1521/5 1541/23 1621/5  explain [6] 1538/22 1555/16 1592/7 1592/8 1607/16 1646/25  explained [1] 1612/10  explaining [2] 1521/15 1555/9  explanation [3] 1541/19 1542/3 1606/14  explanatory [1] 1542/7  exploration [15] 1498/10 1501/18 1501/21 1502/2 1514/4 1518/1 1518/5 1520/9 1521/19 1548/8 1575/22 1581/8 1582/1 1582/10 1583/17  explore [3] 1513/21 1517/17 1585/9  exploring [6] 1513/22 1514/5 1514/23 1522/12 1526/8 1530/10  explosion [3] 1564/17 1565/4 1586/3  exponentially [1] 1562/6  exposure [1] 1520/20  express [1] 1586/1  expressed [3] 1585/11 1589/18 1650/3  expulsion [3] 1559/3 1567/20 1581/22  extended [6] 1649/15 1650/25 1651/4 1651/8 1651/12 1651/23  extensive [2] 1519/14 1582/18  extensively [1] 1593/25  extent [3] 1554/1 1627/21 1648/17</p>
--	--	---

<p><b>E</b></p> <p>external [1] 1624/4  extreme [2] 1543/5 1619/6  extremely [5] 1528/10 1528/22 1554/23  1605/7 1618/24  eye [1] 1607/1  Ezell [13] 1628/12 1628/17 1628/22 1629/1  1629/8 1629/13 1630/17 1630/18 1630/19  1630/23 1631/5 1644/6 1653/16</p>	<p>find [19] 1529/4 1529/7 1529/10 1531/11  1532/14 1533/4 1535/7 1535/9 1535/13  1539/25 1542/25 1569/6 1574/16 1575/24  1579/6 1587/18 1587/19 1590/15 1615/6  finding [1] 1571/14  fine [4] 1509/10 1510/1 1544/11 1550/1  finger [2] 1534/18 1614/5  fingers [1] 1534/15  finish [2] 1629/4 1653/16  finished [2] 1536/5 1578/10  fire [1] 1586/3  Firm [2] 1499/21 1500/8  first [27] 1509/13 1512/11 1514/14 1517/4  1517/6 1519/21 1527/20 1537/18 1555/22  1559/15 1569/10 1569/13 1581/19 1587/3  1601/22 1608/24 1611/11 1615/7 1616/4  1623/23 1633/18 1634/8 1634/15 1638/18  1638/23 1643/3 1646/24  fishing [1] 1640/12  fit [1] 1565/12  fitting [1] 1543/13  five [1] 1625/10  flash [1] 1630/8  flat [2] 1550/8 1550/20  flat-lying [1] 1550/8  flattered [1] 1625/25  flattering [1] 1516/13  floats [1] 1549/14  floor [12] 1499/13 1502/14 1525/9 1526/5  1527/4 1530/8 1544/18 1600/9 1632/12  1636/8 1636/23 1637/2  floorhand [3] 1632/20 1632/21 1633/14  floorhands [1] 1643/23  Florida [2] 1527/13 1529/7  flow [1] 1593/6  FLOYD [1] 1503/8  fluid [6] 1530/21 1562/4 1562/5 1563/9  1571/10 1571/11  fluids [12] 1527/4 1530/18 1531/7 1557/21  1558/17 1559/3 1559/4 1559/5 1563/8 1588/7  1608/6 1608/6  foci [1] 1528/15  focus [1] 1528/15  fold [2] 1581/20 1581/25  follow [6] 1583/2 1584/5 1584/18 1642/4  1642/5 1644/3  followed [1] 1642/7  following [4] 1507/1 1570/1 1628/16 1642/9  follows [3] 1511/8 1580/25 1630/20  foregoing [1] 1653/22  foresight [1] 1570/24  forever [1] 1528/5  forgive [1] 1599/5  form [1] 1585/24  formal [1] 1635/23  formally [1] 1508/2  formation [5] 1520/2 1563/11 1571/23  1572/23 1573/6  formations [17] 1521/9 1527/18 1528/1  1530/14 1531/10 1535/20 1540/9 1541/14  1551/19 1552/1 1552/4 1552/18 1575/11  1575/17 1586/15 1586/20 1626/2  forming [2] 1558/23 1591/1  forth [5] 1554/2 1577/1 1583/13 1600/24  1635/14  fortunate [1] 1514/12  forward [4] 1519/2 1519/4 1597/19 1601/2  found [7] 1538/21 1542/16 1569/9 1586/18  1607/20 1608/16 1618/24  foundation [1] 1533/9  founded [1] 1573/11  four [5] 1569/13 1632/7 1632/9 1632/18  1632/18</p>	<p>frac [1] 1605/11  fracture [29] 1527/3 1527/18 1530/24  1530/25 1535/11 1535/11 1535/20 1540/19  1540/24 1541/6 1543/10 1554/21 1558/18  1560/2 1562/12 1562/15 1563/5 1563/6  1563/10 1567/23 1567/24 1568/23 1569/11  1571/25 1578/24 1579/4 1603/15 1604/16  1625/4  fractured [4] 1535/17 1536/1 1563/1 1602/6  fractures [4] 1527/3 1535/22 1541/2 1571/19  fracturing [1] 1558/25  fragile [20] 1528/1 1528/5 1528/10 1531/10  1531/14 1532/21 1532/21 1534/21 1536/3  1537/15 1537/16 1540/9 1543/5 1552/1  1552/4 1552/19 1560/2 1571/17 1571/18  1575/11  fragility [1] 1534/17  fragmented [1] 1531/6  frame [3] 1509/22 1636/19 1636/20  framework [6] 1522/20 1522/21 1576/4  1594/7 1594/13 1625/1  Francisco [1] 1500/14  Franklin [1] 1501/5  frankly [1] 1534/2  Fraud [1] 1501/3  free [1] 1522/8  Frilot [1] 1502/5  fringe [4] 1592/5 1592/13 1625/20 1625/24  Frugé [1] 1500/2  fudge [2] 1570/14 1600/21  fudging [1] 1570/15  Fugro [5] 1548/10 1548/17 1548/20 1548/21  1606/4  full [4] 1511/9 1534/14 1592/12 1630/21  functioning [2] 1611/16 1640/5  FUNDERBURK [1] 1503/16  further [8] 1523/7 1524/16 1527/14 1577/18  1602/18 1602/19 1617/13 1626/15</p>
<p><b>F</b></p> <p>face [2] 1553/7 1600/15  facility [1] 1651/9  fact [37] 1518/20 1519/14 1521/1 1522/18  1523/10 1529/17 1529/22 1534/19 1536/20  1537/23 1538/23 1550/24 1552/7 1554/19  1559/14 1559/15 1567/20 1570/17 1573/20  1574/20 1575/10 1590/19 1596/8 1600/18  1602/1 1617/11 1619/6 1620/23 1623/23  1624/16 1624/17 1626/6 1626/7 1626/10  1626/13 1650/2 1652/19  factor [1] 1528/8  facts [2] 1619/21 1626/14  Fahrenheit [4] 1556/9 1556/11 1565/5  1565/8  fail [3] 1558/21 1562/16 1562/17  failure [1] 1531/1  fair [16] 1519/10 1519/16 1531/8 1585/3  1606/15 1607/10 1607/11 1607/24 1622/24  1633/18 1633/22 1640/9 1645/17 1648/8  1648/18 1648/20  fairly [3] 1514/4 1534/10 1593/25  fall [2] 1534/18 1614/6  falling [2] 1534/9 1534/13  familiar [9] 1525/2 1532/17 1558/2 1588/4  1602/17 1619/24 1620/1 1633/23 1650/14  Fannin [1] 1502/10  far [5] 1549/2 1562/20 1626/9 1626/10  1635/13  farther [1] 1568/13  fashion [1] 1606/22  faster [1] 1628/22  fault [1] 1551/2  faults [2] 1551/11 1551/11  FCRR [4] 1503/18 1653/21 1653/24 1653/25  fear [2] 1572/1 1572/2  feature [3] 1525/1 1550/24 1588/21  features [3] 1527/14 1551/4 1565/19  February [1] 1536/16  fed [1] 1594/12  Federal [1] 1500/13  feel [2] 1592/17 1648/17  feeling [2] 1548/1 1548/3  feet [11] 1524/13 1530/9 1530/15 1537/10  1537/12 1542/22 1547/6 1548/12 1570/5  1570/5 1600/3  fell [1] 1526/4  fellows [1] 1652/13  felt [2] 1519/6 1634/24  few [15] 1512/8 1516/10 1518/15 1523/15  1523/17 1529/1 1595/24 1609/15 1617/18  1621/9 1625/12 1644/11 1644/13 1648/25  1651/17  field [9] 1515/17 1515/20 1517/9 1517/21  1572/12 1590/24 1615/3 1631/13 1631/15  Fig [1] 1570/2  figure [3] 1547/17 1569/13 1629/6  figures [1] 1603/10  fill [1] 1527/1  filling [1] 1633/17  final [2] 1629/7 1644/7  Finally [1] 1609/14</p>	<p><b>G</b></p> <p>G-201 [1] 1582/21  Galina [1] 1564/24  GANNAWAY [1] 1503/4  gas [13] 1530/10 1555/18 1555/19 1557/10  1559/5 1559/25 1575/24 1575/24 1576/3  1579/2 1585/10 1608/4 1620/13  Gate [1] 1500/13  gathered [2] 1595/16 1618/19  gauge [1] 1635/25  gauges [1] 1635/21  gave [5] 1509/5 1580/15 1626/2 1626/8  1643/14  GAVIN [1] 1503/9  general [7] 1501/7 1501/11 1565/7 1585/4  1585/12 1585/21 1637/20  generally [8] 1515/3 1515/4 1518/10 1529/4  1554/12 1567/10 1594/16 1595/2  generate [1] 1587/10  generation [2] 1530/1 1589/11  genetic [1] 1529/25  gentle [1] 1524/23  gentlemen [2] 1619/24 1651/22  Geo [2] 1601/6 1601/12  Geo Tap [1] 1601/6  GEOFFREY [1] 1503/4  geographic [1] 1522/3  geologic [3] 1533/3 1579/7 1585/4  geological [20] 1553/21 1569/5 1572/6  1574/2 1578/12 1585/5 1585/12 1585/21  1586/15 1593/5 1596/6 1596/22 1606/17  1606/25 1607/7 1607/17 1612/15 1620/23  1621/4 1621/17  geologist [13] 1513/11 1514/4 1518/6</p>	

**G**  
geologist... [10] 1531/11 1531/19 1534/25  
1535/2 1540/18 1549/19 1551/2 1551/7  
1569/18 1570/25  
geologists [12] 1516/8 1516/15 1518/11  
1521/21 1522/13 1528/23 1550/18 1552/24  
1567/4 1591/8 1592/3 1624/17  
geology [20] 1512/15 1517/9 1517/22  
1520/11 1526/21 1529/4 1543/9 1559/13  
1590/24 1591/11 1592/6 1592/13 1593/9  
1596/6 1606/14 1606/16 1606/20 1612/3  
1624/20 1625/20  
geophysicist [1] 1540/19  
geophysicists [2] 1552/25 1553/18  
geoscience [5] 1514/14 1514/16 1516/3  
1517/10 1517/22  
geoscientific [1] 1624/20  
geoscientist [2] 1513/14 1549/19  
geoscientists [3] 1515/24 1522/13 1625/6  
get [44] 1505/14 1519/2 1523/7 1524/17  
1524/19 1524/24 1527/3 1532/8 1538/16  
1545/17 1546/4 1548/2 1550/18 1550/20  
1556/20 1556/22 1557/24 1559/6 1559/6  
1559/7 1562/7 1563/10 1564/4 1565/25  
1569/13 1570/16 1573/2 1580/10 1583/24  
1592/21 1593/1 1597/1 1600/21 1601/23  
1603/1 1608/21 1611/8 1615/15 1627/5  
1634/18 1643/13 1647/12 1648/12 1650/10  
gets [4] 1523/1 1530/23 1557/4 1558/20  
getting [10] 1507/15 1544/17 1546/5 1553/4  
1567/23 1583/22 1601/13 1639/4 1644/15  
1645/2  
give [14] 1507/11 1510/9 1541/4 1541/18  
1557/17 1581/4 1582/4 1582/10 1594/6  
1606/2 1630/9 1637/19 1646/8 1651/5  
given [6] 1534/7 1622/1 1624/14 1628/12  
1637/18 1643/6  
gives [1] 1614/17  
giving [2] 1602/7 1636/5  
glaciation [1] 1523/10  
glad [1] 1560/13  
global [4] 1522/18 1539/16 1540/9 1548/21  
globally [1] 1522/20  
globo [1] 1627/2  
GmbH [1] 1498/8  
go [45] 1513/24 1523/1 1523/11 1525/7  
1525/8 1532/12 1536/5 1536/8 1538/23  
1556/18 1556/21 1557/4 1558/21 1561/3  
1561/3 1561/6 1561/6 1561/21 1562/23  
1567/6 1571/16 1572/20 1582/21 1587/13  
1588/25 1598/14 1610/7 1612/6 1612/21  
1620/11 1620/25 1623/23 1624/6 1624/16  
1625/11 1628/2 1628/8 1629/9 1629/14  
1632/5 1632/16 1633/2 1635/13 1643/19  
1644/16  
goal [1] 1514/19  
goals [1] 1514/22  
Godwin [4] 1503/7 1503/7 1503/11 1509/11  
goes [1] 1510/25  
going [52] 1505/10 1505/14 1506/3 1506/4  
1508/8 1511/24 1512/24 1517/14 1517/17  
1519/13 1519/18 1522/12 1523/16 1524/3  
1531/4 1535/8 1543/5 1551/11 1551/25  
1552/8 1552/12 1552/13 1553/3 1560/6  
1561/19 1561/22 1562/13 1562/24 1562/24  
1563/13 1565/19 1570/13 1571/18 1575/18  
1575/24 1588/12 1601/2 1608/20 1608/21  
1609/22 1615/1 1625/9 1626/17 1628/6  
1628/12 1630/8 1631/6 1635/4 1636/20  
1639/8 1645/13 1648/15  
gold [1] 1574/15  
Golden [58] 1500/13 1555/5 1555/10

1555/12 1557/12 1557/13 1559/23 1560/22  
1565/7 1565/15 1565/21 1565/21 1566/2  
1567/15 1567/20 1568/5 1569/7 1574/9  
1574/14 1574/17 1574/21 1574/23 1574/24  
1578/10 1578/21 1578/23 1579/8 1579/14  
1579/19 1580/2 1580/5 1580/22 1581/10  
1581/16 1581/21 1582/11 1588/20 1589/3  
1589/21 1593/12 1593/22 1594/6 1594/9  
1594/12 1616/22 1621/9 1622/24 1623/2  
1623/9 1623/10 1623/15 1624/5 1624/14  
1624/18 1624/23 1624/25 1625/1 1625/14  
gone [5] 1536/18 1635/2 1644/25 1645/1  
1645/10  
good [34] 1507/17 1508/13 1509/14 1517/16  
1535/10 1544/10 1546/20 1549/22 1549/24  
1557/16 1558/11 1559/22 1564/3 1568/19  
1576/19 1576/20 1580/10 1592/16 1605/18  
1605/19 1614/12 1617/12 1623/15 1626/19  
1631/5 1631/8 1635/4 1636/7 1649/21 1650/4  
1651/15 1652/11 1652/15 1653/11  
got [29] 1512/12 1524/1 1528/20 1539/9  
1545/7 1560/6 1565/5 1565/16 1575/17  
1593/2 1615/9 1620/8 1634/12 1634/14  
1634/16 1634/18 1634/20 1641/3 1641/9  
1641/12 1642/24 1645/22 1646/2 1646/21  
1646/21 1649/8 1649/17 1649/19 1649/20  
gotta [1] 1583/24  
GP [2] 1603/13 1603/22  
gradient [24] 1524/23 1535/11 1540/5  
1540/24 1554/22 1560/25 1560/25 1561/1  
1562/1 1562/10 1562/12 1562/13 1562/15  
1562/16 1563/6 1563/10 1567/23 1567/24  
1568/23 1569/12 1604/16 1605/11 1611/4  
1612/8  
gradients [5] 1556/15 1556/23 1556/25  
1610/14 1625/4  
graduating [1] 1625/9  
grain [1] 1532/23  
grains [2] 1534/15 1557/22  
grams [3] 1540/6 1610/13 1616/1  
Grand [1] 1502/14  
graphs [1] 1532/4  
gravity [5] 1540/6 1610/14 1613/12 1613/19  
1615/25  
great [8] 1515/23 1517/2 1530/24 1543/2  
1554/24 1579/16 1585/15 1625/8  
greater [2] 1561/10 1562/25  
green [7] 1529/19 1536/17 1537/18 1537/19  
1537/21 1538/5 1553/17  
greens [1] 1523/3  
ground [4] 1557/4 1601/21 1605/4 1618/18  
group [3] 1499/18 1513/15 1522/17  
Grover [1] 1516/8  
grow [2] 1558/5 1562/6  
grows [1] 1562/6  
Guerra [1] 1499/15  
guess [4] 1510/22 1559/11 1573/12 1651/14  
guide [1] 1643/18  
GULF [57] 1498/4 1513/21 1518/2 1519/21  
1521/9 1521/19 1522/1 1522/15 1525/9  
1525/14 1527/11 1528/21 1528/23 1529/2  
1529/5 1529/23 1531/9 1540/7 1540/8  
1542/14 1542/17 1543/1 1543/3 1544/16  
1554/18 1556/4 1557/7 1558/3 1561/16  
1579/12 1579/19 1579/24 1580/4 1580/17  
1583/15 1588/2 1591/7 1595/3 1605/11  
1608/5 1611/12 1616/5 1616/6 1617/6 1618/7  
1618/21 1619/9 1623/18 1626/4 1632/1  
1632/25 1634/12 1634/18 1634/20 1640/17  
1640/19 1640/20  
guy [1] 1557/11  
GZ [1] 1589/3

**H**  
H-U-R-S-T [1] 1511/12  
had [75] 1505/22 1506/22 1520/20 1522/14  
1528/1 1537/15 1538/3 1538/18 1542/25  
1553/23 1560/18 1563/18 1571/15 1581/5  
1597/16 1607/20 1608/13 1608/17 1624/2  
1625/8 1627/17 1627/19 1627/23 1628/9  
1628/13 1628/16 1628/16 1629/7 1629/8  
1631/13 1632/21 1635/2 1635/11 1635/14  
1635/18 1636/4 1636/5 1636/14 1636/24  
1639/9 1639/21 1642/4 1642/6 1642/10  
1642/10 1643/22 1643/22 1643/23 1644/2  
1644/13 1644/25 1645/10 1646/5 1649/10  
1649/14 1649/14 1650/6 1650/6 1650/11  
1650/16 1650/18 1650/22 1650/24 1651/3  
1651/7 1651/8 1651/12 1651/14 1651/23  
1652/1 1652/5 1652/10 1652/11 1652/18  
1653/7  
Hafler [1] 1544/4  
half [3] 1569/13 1572/8 1632/19  
Halliburton [5] 1503/7 1503/11 1509/12  
1577/20 1577/21  
hand [7] 1505/19 1547/25 1548/14 1555/16  
1557/15 1563/7 1632/12  
handbook [1] 1643/18  
handle [1] 1639/12  
handled [1] 1510/7  
handling [1] 1643/3  
handover [2] 1645/20 1645/23  
hands [1] 1615/1  
HANKEY [1] 1500/18  
happen [5] 1537/4 1572/15 1573/14 1579/10  
1642/12  
happened [12] 1525/23 1526/9 1542/4  
1542/7 1572/14 1572/18 1573/8 1573/15  
1573/21 1584/20 1638/2 1652/23  
happening [1] 1597/1  
happens [11] 1521/8 1527/1 1530/14 1531/4  
1532/25 1559/1 1571/16 1573/18 1573/19  
1646/14 1647/16  
happy [5] 1531/20 1571/7 1583/6 1593/8  
1641/18  
hard [4] 1596/2 1618/20 1623/15 1647/22  
HARIKLI [2] 1501/22 1508/5  
Harrell [5] 1637/4 1637/9 1639/3 1652/1  
1653/3  
HARTLEY [1] 1503/8  
has [34] 1507/7 1512/6 1519/19 1526/9  
1531/17 1537/5 1537/8 1540/8 1550/23  
1552/6 1552/18 1553/5 1555/18 1563/5  
1565/22 1572/20 1573/20 1576/3 1579/19  
1581/3 1584/13 1585/15 1588/21 1590/8  
1591/8 1594/8 1594/11 1600/1 1610/4  
1610/20 1620/13 1627/6 1628/23 1628/23  
hasn't [1] 1533/11  
HAUSER [1] 1501/4  
have [221]  
haven't [6] 1514/25 1518/18 1518/19  
1548/19 1566/16 1614/20  
having [7] 1511/7 1520/10 1572/13 1573/16  
1592/13 1630/19 1649/5  
HAYCRAFT [1] 1501/19  
Hayward [1] 1506/6  
hazard [7] 1541/7 1543/22 1544/7 1547/18  
1550/23 1551/14 1568/1  
hazardous [1] 1618/24  
hazards [9] 1520/3 1543/22 1543/25 1549/25  
1554/17 1574/3 1574/25 1575/8 1605/15  
HB [1] 1503/19  
HB-406 [1] 1503/19  
he [42] 1505/19 1505/22 1505/23 1505/24  
1506/13 1511/5 1511/6 1517/19 1519/25

<p><b>H</b></p> <p>he... [33] 1527/25 1531/17 1531/18 1541/17 1541/18 1541/19 1541/23 1545/20 1553/5 1555/14 1572/14 1584/13 1589/8 1596/18 1607/20 1613/16 1628/14 1629/2 1637/6 1644/24 1645/9 1649/10 1650/4 1650/7 1650/11 1650/14 1650/15 1651/7 1651/8 1652/23 1653/1 1653/7 1653/7</p> <p>he'll [1] 1629/5</p> <p>he's [2] 1510/16 1589/15</p> <p>hear [2] 1510/15 1584/23</p> <p>heard [9] 1509/17 1518/15 1540/11 1548/18 1548/20 1560/24 1560/24 1563/13 1620/3</p> <p>heavier [2] 1609/4 1609/5</p> <p>heavy [3] 1534/6 1549/13 1561/5</p> <p>held [6] 1522/6 1522/6 1534/4 1589/8 1633/12 1633/20</p> <p>helicopter [1] 1645/4</p> <p>helipad [1] 1645/6</p> <p>help [7] 1510/17 1510/18 1514/21 1586/24 1601/8 1617/22 1647/18</p> <p>helpful [1] 1608/8</p> <p>helping [1] 1647/7</p> <p>her [4] 1505/13 1634/11 1634/12 1634/22</p> <p>here [71] 1510/16 1512/13 1513/22 1522/3 1523/5 1523/13 1524/4 1524/5 1524/11 1524/19 1524/25 1525/2 1525/5 1525/19 1526/5 1529/13 1529/18 1534/11 1536/18 1536/20 1539/9 1539/15 1539/24 1544/16 1544/18 1545/6 1545/7 1548/1 1548/7 1549/6 1549/9 1550/7 1550/8 1550/13 1550/14 1550/16 1554/24 1555/19 1556/6 1559/5 1560/5 1560/6 1561/23 1562/14 1564/21 1568/19 1572/13 1573/4 1573/21 1600/24 1608/12 1609/24 1611/6 1614/1 1614/1 1615/2 1615/2 1616/7 1616/13 1616/24 1617/2 1617/9 1618/23 1620/8 1620/12 1620/13 1621/1 1628/9 1628/10 1629/5 1653/15</p> <p>hereby [1] 1653/22</p> <p>Herman [3] 1498/22 1498/22 1498/22</p> <p>high [37] 1536/2 1550/9 1550/10 1552/22 1552/23 1561/20 1565/17 1571/18 1571/23 1572/20 1593/13 1593/13 1595/6 1595/6 1609/18 1609/18 1609/20 1609/20 1610/2 1610/2 1610/5 1610/6 1611/20 1612/4 1612/4 1617/4 1617/10 1617/11 1620/9 1620/9 1621/5 1621/6 1635/3 1635/10 1636/1 1636/2 1636/4</p> <p>high-pressure [9] 1593/13 1609/18 1609/20 1610/2 1610/6 1612/4 1617/10 1617/11 1620/9</p> <p>high-tech [4] 1635/3 1635/10 1636/1 1636/2</p> <p>high-temperature [8] 1593/13 1609/18 1609/20 1610/2 1610/5 1612/4 1617/4 1620/9</p> <p>higher [14] 1546/23 1561/3 1561/6 1562/20 1564/1 1564/2 1566/13 1566/25 1570/2 1570/9 1593/23 1600/2 1614/24 1614/24</p> <p>higher-temperature [1] 1566/25</p> <p>highest [1] 1637/9</p> <p>highlight [2] 1620/12 1620/25</p> <p>highlights [1] 1648/13</p> <p>highs [1] 1546/18</p> <p>HILL [1] 1503/9</p> <p>him [18] 1505/21 1506/4 1510/15 1517/12 1531/17 1531/20 1553/8 1572/11 1624/9 1626/17 1629/4 1649/17 1650/10 1650/10 1650/12 1651/12 1653/2 1653/4</p> <p>himself [1] 1629/2</p> <p>hindsight [1] 1570/23</p> <p>hired [3] 1513/3 1514/17 1642/6</p> <p>hires [1] 1652/8</p>	<p>his [22] 1505/22 1506/3 1506/7 1506/11 1511/14 1539/22 1541/23 1554/2 1554/2 1572/9 1573/14 1584/13 1629/1 1629/1 1644/23 1649/20 1650/1 1650/2 1650/4 1650/5 1650/23 1653/8</p> <p>historically [1] 1588/20</p> <p>history [2] 1612/15 1621/16</p> <p>hit [1] 1562/24</p> <p>hitch [10] 1644/7 1644/9 1644/22 1645/8 1645/24 1646/2 1649/9 1650/7 1650/19 1652/9</p> <p>hitches [1] 1636/6</p> <p>hold [3] 1506/22 1528/3 1529/19</p> <p>Holdings [5] 1502/5 1502/8 1502/12 1502/16 1502/19</p> <p>holds [1] 1557/20</p> <p>hole [3] 1588/15 1601/23 1647/12</p> <p>holistic [1] 1597/1</p> <p>Holthaus [1] 1500/2</p> <p>home [1] 1644/16</p> <p>honest [1] 1519/11</p> <p>honor [64] 1505/7 1506/25 1507/10 1507/13 1507/18 1508/5 1508/12 1508/13 1508/17 1509/2 1509/11 1509/12 1509/25 1510/2 1510/5 1510/8 1510/19 1511/1 1511/2 1511/3 1511/13 1511/19 1512/2 1517/8 1517/17 1526/15 1531/16 1531/18 1531/19 1533/8 1534/15 1541/16 1541/22 1542/5 1545/21 1553/3 1553/25 1569/16 1572/7 1572/11 1573/9 1573/17 1575/22 1576/8 1576/13 1576/15 1577/18 1577/22 1577/25 1578/1 1598/22 1613/2 1617/13 1617/16 1619/12 1622/7 1625/8 1626/16 1626/22 1627/15 1628/18 1628/20 1630/1 1630/6</p> <p>HONORABLE [1] 1498/14</p> <p>honored [1] 1515/23</p> <p>hope [2] 1514/25 1532/17</p> <p>hopefully [1] 1510/15</p> <p>horizon [20] 1498/4 1507/5 1555/18 1586/3 1631/11 1634/9 1635/7 1635/18 1636/12 1637/9 1637/15 1639/2 1639/22 1640/23 1641/10 1641/19 1641/20 1642/18 1642/19 1642/24</p> <p>horizontally [1] 1556/6</p> <p>hotter [5] 1557/5 1565/25 1567/2 1568/12 1574/24</p> <p>Houma [1] 1499/20</p> <p>hour [3] 1509/3 1572/8 1646/14</p> <p>hours [1] 1646/18</p> <p>housekeeping [1] 1505/9</p> <p>Houston [7] 1500/7 1502/10 1502/21 1503/5 1503/13 1503/17 1636/2</p> <p>how [40] 1509/23 1509/24 1510/17 1510/24 1512/20 1515/17 1516/14 1516/17 1528/2 1528/5 1542/22 1543/14 1543/15 1572/10 1573/7 1579/10 1588/6 1595/2 1595/13 1596/19 1596/21 1606/14 1607/21 1622/12 1624/5 1624/20 1625/3 1625/3 1625/7 1629/10 1631/13 1635/24 1639/9 1639/12 1641/1 1642/5 1643/15 1643/19 1644/4 1647/12</p> <p>however [5] 1541/23 1591/21 1610/10 1620/14 1623/14</p> <p>HPHT [11] 1609/20 1610/1 1610/14 1611/8 1611/13 1612/7 1612/14 1613/7 1616/7 1620/16 1620/21</p> <p>Huffman [7] 1516/24 1540/12 1540/14 1540/18 1552/17 1563/14 1573/20</p> <p>Huffman's [1] 1560/24</p> <p>huge [2] 1527/3 1559/20</p> <p>HUGH [1] 1503/15</p> <p>Hughes [1] 1502/19</p> <p>hundreds [2] 1574/20 1623/1</p>	<p>hurricane [1] 1642/19</p> <p>Hurst [27] 1511/4 1511/5 1511/7 1511/11 1511/12 1511/14 1512/6 1517/9 1553/5 1576/11 1576/19 1576/23 1578/5 1578/6 1578/9 1581/14 1583/8 1585/3 1598/11 1598/17 1599/2 1604/15 1606/10 1614/10 1622/18 1626/25 1628/17</p> <p>Hurst's [1] 1541/17</p> <p>hydraulic [3] 1527/18 1562/1 1567/24</p> <p>hydraulically [2] 1531/1 1558/18</p> <p>hydrocarbon [5] 1559/4 1578/17 1582/1 1608/9 1608/18</p> <p>hydrocarbons [6] 1521/19 1558/12 1558/13 1578/13 1608/7 1608/7</p> <p>hydrostatic [2] 1560/25 1561/1</p> <p>HYMEL [1] 1502/16</p> <p>hypercenters [1] 1528/14</p> <p>hypothesis [6] 1575/21 1575/22 1575/23 1575/23 1575/25 1609/12</p> <p>hypotheticals [1] 1573/18</p>
<b>I</b>		
<p>I'd [17] 1508/9 1512/7 1519/21 1523/12 1531/23 1541/20 1544/12 1555/7 1557/6 1568/16 1578/9 1582/6 1584/19 1592/8 1609/15 1610/7 1614/11</p> <p>I'll [11] 1510/14 1517/13 1523/14 1542/2 1559/24 1597/19 1609/6 1609/9 1613/2 1618/4 1641/18</p> <p>I'm [75] 1507/13 1507/15 1508/8 1508/16 1511/23 1512/24 1515/23 1517/17 1519/12 1519/13 1519/18 1520/25 1524/2 1525/21 1526/14 1531/3 1531/19 1532/12 1532/14 1533/20 1537/12 1540/10 1544/13 1545/12 1553/3 1553/21 1554/10 1560/10 1560/11 1560/13 1562/13 1566/17 1572/13 1572/19 1572/23 1572/24 1573/13 1573/16 1576/1 1576/21 1580/7 1580/9 1583/6 1584/23 1593/14 1603/11 1603/16 1608/20 1608/20 1608/21 1609/4 1610/4 1615/1 1617/20 1620/1 1623/5 1623/6 1623/7 1624/19 1625/25 1629/6 1631/5 1633/7 1633/7 1634/6 1634/6 1635/16 1641/17 1644/1 1646/7 1649/3 1649/5 1650/9 1651/5 1653/16</p> <p>I've [24] 1509/6 1510/13 1514/25 1515/4 1518/13 1518/16 1520/6 1520/22 1523/25 1524/1 1545/14 1545/21 1555/5 1583/14 1584/10 1603/21 1624/24 1625/2 1627/20 1633/14 1633/14 1633/14 1633/15 1633/15</p> <p>IADC [2] 1646/7 1646/21</p> <p>ice [4] 1525/12 1525/13 1525/13 1525/14</p> <p>idea [4] 1580/10 1604/20 1607/12 1627/23</p> <p>ideas [1] 1519/8</p> <p>identical [1] 1532/24</p> <p>identify [1] 1580/16</p> <p>identifying [1] 1543/9</p> <p>ignorance [1] 1599/5</p> <p>Illinois [1] 1501/24</p> <p>illite [1] 1558/5</p> <p>illustrate [2] 1533/17 1538/24</p> <p>illustrates [1] 1547/19</p> <p>illustrations [1] 1511/16</p> <p>image [1] 1546/17</p> <p>images [1] 1545/9</p> <p>imagine [3] 1526/18 1565/18 1627/4</p> <p>immediate [1] 1607/13</p> <p>immediately [4] 1547/24 1549/4 1549/25 1607/8</p> <p>impact [1] 1607/7</p> <p>impacted [1] 1607/17</p> <p>impermeable [1] 1530/20</p> <p>implemented [1] 1589/9</p> <p>implications [1] 1597/11</p>		



<p><b>I</b></p> <p>implicitly [1] 1581/25</p> <p>importance [4] 1520/6 1522/21 1557/15 1559/21</p> <p>important [19] 1519/10 1541/23 1543/15 1554/22 1554/23 1554/24 1557/24 1558/1 1558/9 1558/11 1563/4 1569/18 1569/21 1575/17 1583/17 1589/3 1599/7 1611/15 1623/9</p> <p>impression [1] 1534/19</p> <p>Imprevento [1] 1499/8</p> <p>improve [2] 1514/18 1594/4</p> <p>improving [1] 1594/4</p> <p>inappropriate [1] 1551/1</p> <p>INC [16] 1498/10 1501/19 1501/22 1502/3 1502/6 1502/7 1502/9 1502/10 1502/13 1502/13 1502/17 1502/17 1502/20 1502/21 1503/7 1503/12</p> <p>inches [1] 1583/21</p> <p>incident [3] 1510/17 1645/9 1651/17</p> <p>include [4] 1522/9 1643/9 1652/23 1653/1</p> <p>included [2] 1571/8 1590/10</p> <p>includes [2] 1590/9 1595/20</p> <p>including [2] 1511/16 1595/23</p> <p>income [2] 1514/18 1552/14</p> <p>incorporating [1] 1580/12</p> <p>incorrect [3] 1597/8 1597/10 1597/10</p> <p>increase [3] 1558/22 1565/16 1568/2</p> <p>increased [5] 1539/13 1562/18 1565/12 1565/13 1573/15</p> <p>increases [3] 1561/4 1562/3 1615/15</p> <p>indeed [11] 1520/19 1521/7 1523/9 1525/8 1529/9 1542/19 1548/9 1556/25 1566/7 1566/22 1619/5</p> <p>independent [1] 1514/2</p> <p>indicate [2] 1550/17 1608/17</p> <p>indicated [3] 1547/3 1549/6 1618/5</p> <p>indicates [3] 1540/5 1544/3 1546/18</p> <p>indicating [2] 1548/2 1550/6</p> <p>indication [4] 1551/15 1565/3 1582/10 1618/23</p> <p>indications [2] 1546/10 1618/6</p> <p>indicators [1] 1601/5</p> <p>indices [1] 1582/10</p> <p>individual [3] 1579/6 1583/18 1623/25</p> <p>indulge [1] 1584/12</p> <p>industry [34] 1514/19 1514/20 1554/13 1570/18 1581/9 1582/11 1587/19 1587/24 1587/25 1592/22 1593/2 1600/25 1604/17 1604/19 1604/21 1604/23 1605/5 1605/6 1605/9 1605/10 1605/12 1610/3 1610/4 1610/8 1610/12 1610/16 1610/18 1611/2 1611/6 1611/7 1611/13 1612/7 1620/5 1620/13</p> <p>industrywide [1] 1620/15</p> <p>inform [1] 1508/8</p> <p>information [13] 1522/11 1522/14 1554/1 1563/17 1594/9 1599/13 1603/1 1605/25 1606/3 1615/8 1635/3 1646/8 1648/13</p> <p>informed [1] 1641/14</p> <p>inherently [1] 1618/14</p> <p>injectables [1] 1592/14</p> <p>injectites [1] 1592/16</p> <p>inland [2] 1632/6 1632/13</p> <p>inside [1] 1616/10</p> <p>inssofar [1] 1640/4</p> <p>installations [1] 1537/21</p> <p>instance [1] 1608/25</p> <p>instantaneous [1] 1571/21</p> <p>instantly [1] 1579/10</p> <p>institute [2] 1553/21 1553/22</p> <p>instructions [1] 1627/1</p>	<p>integral [1] 1623/2</p> <p>integrated [1] 1515/9</p> <p>integrity [3] 1563/11 1571/24 1572/3</p> <p>intellectually [2] 1519/10 1519/11</p> <p>intended [1] 1646/13</p> <p>intent [2] 1505/18 1634/2</p> <p>interact [3] 1593/7 1637/3 1650/9</p> <p>interactions [1] 1650/6</p> <p>interest [6] 1549/21 1551/10 1570/25 1593/3 1599/7 1602/4</p> <p>interested [1] 1551/3</p> <p>interesting [4] 1518/20 1523/2 1537/20 1550/13</p> <p>interestingly [1] 1622/25</p> <p>interests [1] 1592/15</p> <p>interfering [1] 1546/14</p> <p>international [3] 1502/22 1503/2 1514/20</p> <p>internationally [1] 1594/11</p> <p>interpretation [2] 1551/1 1551/8</p> <p>interpreted [1] 1550/24</p> <p>interrelationship [1] 1620/17</p> <p>interrupt [2] 1540/10 1623/5</p> <p>intersected [2] 1565/14 1567/3</p> <p>interval [5] 1530/9 1530/9 1530/13 1570/8 1570/9</p> <p>introduce [2] 1505/10 1517/6</p> <p>investigate [4] 1518/5 1563/18 1593/1 1593/2</p> <p>investigation [5] 1549/8 1550/25 1551/15 1551/24 1598/21</p> <p>investment [2] 1552/12 1552/15</p> <p>invited [1] 1514/12</p> <p>involve [2] 1515/6 1596/20</p> <p>involved [4] 1514/6 1575/8 1619/24 1633/23</p> <p>involves [1] 1515/8</p> <p>involving [1] 1562/9</p> <p>ironically [1] 1513/3</p> <p>Irpino [2] 1500/8 1500/9</p> <p>irregular [1] 1525/1</p> <p>is [467]</p> <p>islands [1] 1562/7</p> <p>isn't [3] 1523/6 1539/4 1556/18</p> <p>issue [4] 1505/17 1563/14 1567/7 1623/2</p> <p>issued [1] 1580/14</p> <p>issues [2] 1508/9 1566/3</p> <p>it [298]</p> <p>it's [121] 1506/20 1509/7 1510/20 1511/20 1511/21 1516/2 1520/1 1520/10 1523/25 1524/22 1525/4 1526/16 1526/18 1527/8 1528/5 1528/22 1528/24 1529/6 1530/17 1530/24 1532/17 1532/21 1532/21 1533/2 1533/5 1533/8 1534/5 1534/5 1534/9 1534/10 1534/13 1534/14 1536/20 1536/21 1538/4 1538/11 1539/7 1539/12 1542/3 1542/7 1544/3 1544/11 1544/15 1544/16 1544/19 1546/22 1547/4 1547/5 1548/5 1548/7 1549/7 1551/1 1551/2 1551/25 1554/5 1554/6 1554/11 1554/23 1555/13 1557/9 1558/11 1558/16 1559/4 1559/4 1559/14 1560/10 1561/18 1561/23 1564/14 1565/10 1565/18 1567/10 1568/4 1571/6 1574/11 1574/15 1575/16 1578/12 1579/18 1579/22 1581/13 1582/24 1583/6 1584/2 1584/23 1587/25 1588/1 1588/13 1588/16 1590/18 1591/3 1592/18 1597/10 1597/12 1598/10 1601/19 1601/20 1602/3 1603/19 1603/20 1605/7 1606/22 1610/25 1612/3 1613/24 1615/12 1615/25 1619/8 1622/17 1623/9 1623/17 1624/24 1624/25 1627/24 1639/8 1645/6 1647/22 1648/12 1648/22 1649/25 1650/1</p> <p>its [16] 1522/21 1525/12 1534/5 1553/7 1557/20 1567/12 1572/3 1576/3 1583/9 1595/5 1599/10 1600/15 1616/17 1616/18</p>	<p>1630/3 1634/15</p> <p>itself [5] 1519/22 1528/3 1535/9 1544/23 1574/23</p> <p><b>J</b></p> <p>jack [3] 1631/25 1632/14 1633/24</p> <p>jack-up [3] 1631/25 1632/14 1633/24</p> <p>JAMES [2] 1498/19 1501/12</p> <p>January [1] 1587/8</p> <p>Jason [1] 1636/18</p> <p>Jasper [1] 1544/5</p> <p>Jefferson [2] 1498/19 1502/17</p> <p>JEFFREY [1] 1499/9</p> <p>JERRY [1] 1503/12</p> <p>JESSICA [2] 1500/22 1500/23</p> <p>jettied [1] 1601/22</p> <p>JIMMY [4] 1500/6 1637/4 1653/3 1653/5</p> <p>job [9] 1594/3 1614/13 1633/12 1635/6 1635/7 1638/16 1638/22 1639/5 1650/4</p> <p>Jodi [5] 1503/18 1503/20 1653/21 1653/24 1653/25</p> <p>JOHN [4] 1500/3 1502/20 1503/16 1630/1</p> <p>JONES [1] 1503/3</p> <p>Jonothan [1] 1544/5</p> <p>JR [4] 1499/12 1503/8 1503/8 1511/2</p> <p>judge [10] 1498/15 1506/21 1509/15 1517/6 1518/15 1531/14 1532/6 1545/13 1617/18 1653/13</p> <p>June [3] 1544/2 1544/2 1551/14</p> <p>just [81] 1505/12 1506/14 1506/18 1506/21 1509/19 1509/22 1510/10 1515/10 1517/12 1520/10 1521/25 1522/25 1524/24 1527/8 1529/17 1531/23 1532/14 1532/25 1533/9 1533/11 1533/17 1536/11 1540/10 1541/16 1544/15 1545/21 1547/25 1554/7 1554/10 1556/8 1560/5 1560/18 1565/15 1566/3 1566/17 1572/7 1573/13 1574/10 1574/11 1578/1 1578/9 1582/6 1583/20 1584/23 1588/10 1592/12 1593/16 1603/25 1604/12 1604/13 1605/7 1608/3 1609/9 1612/10 1613/7 1613/13 1613/25 1614/22 1615/4 1615/21 1616/21 1617/18 1618/13 1619/8 1621/8 1621/9 1622/25 1624/6 1625/23 1629/6 1630/2 1633/20 1637/19 1641/17 1643/15 1646/21 1647/7 1650/1 1651/5 1651/15 1651/22</p> <p>justice [5] 1500/11 1500/15 1500/21 1501/2 1609/4</p> <p><b>K</b></p> <p>Kaluza [3] 1649/12 1650/6 1651/19</p> <p>Kanner [3] 1501/15 1501/15 1508/16</p> <p>KARIS [3] 1501/22 1505/12 1508/5</p> <p>Katz [1] 1498/22</p> <p>KC [1] 1548/18</p> <p>keep [2] 1571/22 1647/24</p> <p>keeping [3] 1594/3 1637/24 1637/25</p> <p>keeps [1] 1629/7</p> <p>KELLEY [1] 1501/4</p> <p>kelly [3] 1564/23 1600/7 1600/8</p> <p>KERRY [2] 1502/6 1576/21</p> <p>kicks [2] 1594/24 1595/3</p> <p>kilometer [3] 1526/10 1526/11 1526/13</p> <p>kilometers [7] 1526/3 1528/1 1530/6 1530/8 1539/10 1542/21 1542/24</p> <p>Kinchen [3] 1502/19 1502/20 1630/1</p> <p>kind [5] 1512/24 1535/15 1547/10 1578/9 1649/3</p> <p>kinetic [1] 1579/9</p> <p>Kingdom [1] 1514/5</p> <p>Kirkland [1] 1501/21</p> <p>knew [5] 1553/11 1644/3 1650/12 1652/13 1653/7</p>
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<b>K</b>	learn [2] 1635/1 1641/15 LEASING [1] 1498/8 least [4] 1527/7 1531/6 1542/8 1644/13 leave [2] 1645/2 1649/11 leaving [1] 1644/24 lecture [1] 1622/1 Lee [2] 1651/10 1651/11 left [10] 1513/17 1513/24 1522/17 1528/3 1539/13 1547/25 1548/14 1551/9 1555/16 1632/16 left-hand [3] 1547/25 1548/14 1555/16 leg [1] 1634/15 legal [1] 1533/9 legend [1] 1548/14 Leger [7] 1499/12 1499/12 1510/17 1511/2 1572/8 1581/15 1617/17 length [2] 1606/6 1637/19 less [6] 1523/5 1524/23 1526/21 1534/21 1558/23 1594/15 let [18] 1517/6 1521/25 1573/25 1584/17 1585/18 1588/10 1593/11 1595/22 1598/17 1603/23 1609/8 1611/11 1613/25 1614/4 1614/10 1615/7 1648/24 1649/4 let's [14] 1545/16 1546/21 1554/15 1560/14 1576/16 1621/8 1622/5 1627/5 1627/8 1628/4 1628/8 1629/9 1629/14 1653/14 level [6] 1515/5 1525/16 1530/15 1530/16 1533/1 1556/15 levels [1] 1615/13 lever [1] 1635/25 levers [1] 1635/14 Lewis [5] 1499/5 1501/18 1503/7 1503/11 1503/14 LI [1] 1502/13 liaise [1] 1514/20 lies [1] 1617/11 life [5] 1606/18 1646/1 1652/19 1652/20 1652/21 lifted [2] 1550/11 1639/16 light [8] 1538/6 1545/10 1546/16 1546/18 1546/23 1552/20 1557/10 1575/10 lights [2] 1546/11 1629/21 like [64] 1506/5 1507/1 1507/20 1510/21 1510/22 1511/18 1512/7 1516/12 1516/16 1518/12 1519/21 1522/13 1523/12 1525/3 1526/18 1528/4 1530/4 1531/13 1531/15 1531/18 1531/22 1532/18 1533/7 1533/20 1539/11 1540/19 1544/12 1546/22 1549/19 1550/14 1550/21 1552/15 1554/12 1555/2 1555/7 1557/6 1568/16 1570/20 1571/16 1572/16 1578/9 1578/21 1582/6 1592/7 1592/8 1593/9 1601/12 1604/19 1604/24 1609/15 1610/7 1614/11 1619/8 1631/16 1634/24 1634/25 1636/24 1644/5 1645/19 1645/20 1648/17 1650/12 1651/3 1651/15 liked [1] 1634/24 likely [5] 1530/7 1562/19 1570/2 1600/2 1612/25 limit [2] 1565/7 1612/14 line [21] 1521/5 1523/11 1524/15 1529/14 1539/15 1539/15 1539/16 1539/24 1540/4 1540/5 1550/14 1561/22 1597/12 1600/1 1608/5 1611/6 1612/14 1617/8 1617/8 1617/9 1617/11 lines [6] 1550/5 1553/15 1556/6 1556/14 1569/2 1569/13 link [3] 1529/25 1530/18 1543/11 liquids [1] 1559/5 Liskow [1] 1501/18 list [19] 1505/13 1507/20 1508/8 1508/22 1509/3 1577/10 1597/23 1601/10 1603/18 1619/17 1622/9 1627/2 1628/11 1628/11 1628/16 1628/16 1628/21 1629/7 1629/8	listed [1] 1603/19 listen [1] 1516/24 lists [3] 1505/15 1507/14 1646/17 literally [4] 1536/3 1571/19 1603/5 1608/25 literature [11] 1519/16 1539/19 1559/20 1582/18 1586/5 1586/18 1587/18 1590/13 1608/16 1623/3 1623/20 lithostatic [4] 1560/25 1562/10 1562/13 1562/15 litigation [2] 1501/3 1518/18 little [33] 1512/10 1517/18 1518/16 1520/10 1521/8 1522/2 1522/21 1522/25 1523/18 1524/1 1525/1 1532/8 1532/18 1536/12 1536/17 1550/19 1555/24 1560/5 1560/8 1575/20 1579/5 1582/5 1583/22 1594/19 1594/19 1597/2 1614/14 1618/6 1620/7 1628/22 1630/24 1632/7 1650/8 live [7] 1505/19 1505/23 1506/4 1506/13 1506/15 1628/9 1628/10 lives [1] 1505/24 LLC [13] 1498/18 1498/22 1499/2 1499/18 1501/15 1502/5 1502/6 1502/9 1502/12 1502/16 1502/20 1502/22 1503/14 LLP [8] 1499/15 1500/2 1501/21 1502/2 1502/8 1502/12 1502/19 1503/2 load [1] 1526/17 loaded [1] 1526/21 local [1] 1551/12 locate [2] 1523/13 1561/20 located [2] 1558/14 1595/18 locating [1] 1518/6 location [20] 1536/22 1536/24 1544/15 1547/20 1547/21 1547/22 1549/5 1553/19 1566/4 1575/7 1575/9 1575/9 1579/7 1626/10 1637/24 1638/1 1638/8 1638/15 1639/4 1642/6 locations [2] 1522/4 1527/13 log [6] 1602/15 1603/5 1603/7 1603/9 1603/11 1646/13 logging [9] 1601/4 1602/22 1611/24 1646/4 1646/24 1646/25 1647/21 1648/3 1648/9 London [1] 1514/2 long [11] 1522/17 1571/22 1579/10 1627/21 1629/10 1631/13 1640/13 1649/16 1651/6 1651/15 1652/6 longer [1] 1531/5 look [30] 1506/16 1510/21 1518/1 1525/10 1532/4 1532/18 1533/7 1534/1 1535/8 1541/19 1541/25 1543/18 1563/19 1584/25 1595/2 1595/5 1595/10 1595/13 1595/23 1597/12 1599/22 1603/7 1604/10 1604/17 1615/21 1615/23 1621/20 1622/25 1623/1 1646/7 looked [16] 1510/12 1510/13 1533/11 1533/14 1533/15 1549/25 1560/3 1564/5 1564/9 1577/9 1596/1 1596/2 1597/22 1599/6 1599/17 1619/20 looking [21] 1523/22 1529/20 1534/25 1545/23 1546/1 1546/2 1546/3 1549/10 1549/11 1549/12 1559/17 1561/15 1567/11 1571/13 1571/17 1583/17 1585/21 1587/20 1599/21 1621/5 1625/5 looks [5] 1510/21 1511/18 1525/3 1544/14 1549/16 looser [1] 1534/21 Los [1] 1502/14 lose [1] 1545/19 loses [2] 1557/20 1572/2 losses [2] 1594/22 1595/3 lost [2] 1545/14 1641/17 lot [15] 1524/25 1549/21 1552/11 1563/16 1591/19 1593/3 1593/7 1601/15 1602/25 1619/3 1633/25 1635/1 1635/7 1650/8 1650/9
<b>L</b>	L-shape [1] 1550/15 laboratory [2] 1513/4 1590/2 Lacy [1] 1506/6 laed.uscourts.gov [1] 1503/20 Lafayette [3] 1498/20 1502/18 1529/10 Lafleur [1] 1502/16 laid [1] 1642/11 Lake [1] 1529/11 Lamar [2] 1503/12 1519/25 land [2] 1521/3 1525/15 landslide [1] 1527/16 LANGAN [1] 1501/22 large [5] 1523/13 1525/18 1527/25 1614/23 1615/4 largest [1] 1527/15 Lasalle [1] 1501/23 last [21] 1505/21 1506/21 1516/7 1523/10 1525/14 1536/14 1540/12 1541/16 1546/3 1573/10 1582/9 1607/5 1617/21 1628/1 1628/21 1645/8 1646/2 1649/9 1650/7 1650/19 1652/9 late [3] 1505/21 1559/16 1631/17 later [9] 1507/25 1510/10 1522/21 1549/1 1603/10 1627/6 1628/5 1633/5 1633/9 Law [3] 1499/18 1499/21 1500/8 LAWRENCE [1] 1500/24 lawyer [2] 1570/11 1576/21 layered [1] 1531/5 laymen's [1] 1528/14 lead [2] 1513/14 1624/12 leader [1] 1651/7 leaders [4] 1641/9 1649/6 1651/3 1651/20 leading [1] 1525/20 leak [31] 1527/21 1535/12 1538/21 1539/8 1539/14 1539/16 1539/24 1540/7 1540/14 1540/17 1540/20 1540/21 1540/25 1541/4 1541/8 1541/10 1541/18 1541/25 1542/14 1542/16 1542/25 1543/4 1543/9 1543/11 1552/2 1563/5 1575/12 1595/10 1595/13 1595/16 1595/21 leak-off [31] 1527/21 1535/12 1538/21 1539/8 1539/14 1539/16 1539/24 1540/7 1540/14 1540/17 1540/20 1540/21 1540/25 1541/4 1541/8 1541/10 1541/18 1541/25 1542/14 1542/16 1542/25 1543/4 1543/9 1543/11 1552/2 1563/5 1575/12 1595/10 1595/13 1595/16 1595/21	

<p><b>L</b></p> <p>lots [1] 1537/20</p> <p>LOUISIANA [28] 1498/2 1498/5 1498/20 1498/23 1499/7 1499/13 1499/20 1499/23 1500/4 1500/10 1501/11 1501/12 1501/13 1501/15 1501/17 1501/20 1502/7 1502/18 1502/24 1503/16 1503/19 1508/17 1528/19 1529/11 1545/4 1557/2 1576/15 1653/22</p> <p>low [22] 1524/20 1527/19 1527/20 1528/2 1528/2 1530/25 1537/15 1538/21 1539/8 1541/8 1541/10 1542/13 1543/4 1550/9 1552/2 1558/16 1570/8 1575/11 1575/12 1589/11 1617/4 1617/10</p> <p>low-confining [6] 1527/19 1527/20 1528/2 1528/2 1537/15 1575/11</p> <p>low-pressure [2] 1617/4 1617/10</p> <p>lower [18] 1542/25 1564/3 1566/11 1566/13 1566/15 1566/24 1567/15 1567/18 1568/11 1571/3 1571/4 1571/14 1572/21 1611/24 1612/11 1612/14 1613/19 1613/21</p> <p>lows [1] 1546/19</p> <p>LUIS [1] 1502/13</p> <p>lunatic [5] 1592/5 1592/13 1593/9 1625/20 1625/24</p> <p>LUTHER [1] 1501/8</p> <p>LWD [2] 1601/4 1601/12</p> <p>lyng [1] 1550/8</p>	<p>making [2] 1592/4 1634/14</p> <p>MALINDA [1] 1500/24</p> <p>Maloney [1] 1557/11</p> <p>man [1] 1650/2</p> <p>manage [1] 1597/17</p> <p>manageable [1] 1550/1</p> <p>managers [1] 1555/13</p> <p>managing [1] 1643/20</p> <p>manual [5] 1560/4 1642/8 1643/14 1643/23 1643/24</p> <p>manually [1] 1635/14</p> <p>many [18] 1515/17 1516/14 1516/17 1532/4 1542/22 1544/9 1558/7 1573/1 1574/22 1578/24 1580/11 1591/13 1595/2 1595/13 1624/20 1641/1 1650/11 1650/11</p> <p>map [9] 1522/3 1524/7 1524/17 1536/21 1544/15 1548/7 1548/11 1555/22 1591/7</p> <p>mapped [1] 1527/24</p> <p>maps [2] 1525/2 1532/5</p> <p>March [2] 1498/6 1505/2</p> <p>margin [4] 1528/23 1528/24 1563/14 1600/1</p> <p>margins [3] 1541/13 1554/24 1563/15</p> <p>Marianas [3] 1642/19 1643/4 1643/5</p> <p>marine [6] 1637/16 1637/20 1637/23 1638/6 1638/20 1638/23</p> <p>mark [3] 1507/2 1525/15 1544/4</p> <p>marked [3] 1539/12 1544/17 1593/20</p> <p>markers [1] 1550/22</p> <p>Marty [1] 1564/21</p> <p>massive [3] 1623/3 1623/3 1626/2</p> <p>masters [1] 1515/4</p> <p>mate [2] 1638/18 1638/23</p> <p>material [5] 1557/19 1557/22 1558/5 1571/19 1589/17</p> <p>material-scientific [1] 1589/17</p> <p>materials [5] 1553/5 1554/3 1577/10 1577/13 1603/19</p> <p>matrix [1] 1508/19</p> <p>Matt [2] 1510/5 1578/5</p> <p>matter [3] 1554/11 1623/2 1653/23</p> <p>matters [2] 1505/9 1591/23</p> <p>MATTHEW [1] 1501/23</p> <p>maximum [1] 1525/12</p> <p>may [27] 1505/7 1510/8 1510/15 1519/13 1530/12 1540/10 1542/5 1543/18 1554/2 1563/5 1564/8 1564/15 1564/16 1571/21 1585/18 1586/16 1596/10 1596/14 1597/5 1598/18 1603/9 1603/21 1615/13 1621/21 1628/18 1647/2 1648/18</p> <p>maybe [8] 1510/17 1597/2 1597/12 1609/6 1615/24 1617/22 1632/7 1640/24</p> <p>MAZE [1] 1501/8</p> <p>McAughan [1] 1564/23</p> <p>McCLELLAN [1] 1500/22</p> <p>McGee [1] 1607/22</p> <p>McKay [1] 1519/25</p> <p>McKinney [1] 1503/5</p> <p>MD [1] 1498/3</p> <p>MDT [2] 1601/6 1601/12</p> <p>me [60] 1509/7 1510/18 1510/22 1514/25 1515/25 1517/6 1517/19 1518/20 1521/25 1525/21 1526/14 1526/15 1536/23 1539/22 1541/10 1545/10 1551/22 1560/10 1560/16 1566/9 1566/9 1569/16 1571/11 1572/16 1573/25 1580/14 1582/4 1583/23 1584/10 1584/12 1584/17 1585/18 1588/10 1592/7 1593/11 1595/22 1596/18 1596/18 1598/13 1598/17 1603/16 1603/23 1609/8 1611/11 1611/14 1613/25 1614/4 1614/10 1614/15 1615/7 1617/24 1634/13 1634/18 1640/3 1640/7 1641/17 1648/24 1649/4 1651/5 1651/22</p> <p>mean [14] 1538/22 1546/1 1566/10 1574/14</p>	<p>1585/25 1591/3 1591/21 1604/20 1623/5 1625/20 1643/14 1645/25 1646/25 1647/1</p> <p>meaning [2] 1566/13 1636/12</p> <p>means [11] 1524/15 1526/20 1528/2 1541/11 1541/12 1541/19 1546/22 1550/22 1558/16 1558/18 1572/3</p> <p>meant [2] 1539/8 1571/9</p> <p>measure [1] 1602/11</p> <p>measured [1] 1527/22</p> <p>measurement [1] 1603/12</p> <p>measurements [2] 1601/7 1615/9</p> <p>measures [1] 1603/5</p> <p>mechanical [9] 1503/22 1557/21 1589/9 1591/20 1591/21 1593/18 1593/24 1594/1 1594/15</p> <p>Medal [3] 1515/25 1516/1 1516/2</p> <p>media [1] 1593/7</p> <p>meet [1] 1644/25</p> <p>meeting [9] 1591/9 1591/10 1591/12 1645/5 1645/6 1645/8 1645/19 1645/20 1649/5</p> <p>meetings [1] 1591/16</p> <p>members [2] 1516/14 1652/8</p> <p>memo [1] 1600/21</p> <p>memorandum [10] 1564/6 1564/9 1564/11 1569/5 1598/5 1598/10 1598/18 1599/2 1599/12 1624/3</p> <p>men [2] 1649/6 1649/8</p> <p>mentioned [2] 1519/6 1590/1</p> <p>mentor [1] 1636/9</p> <p>mentored [1] 1636/3</p> <p>mess [1] 1573/2</p> <p>met [1] 1650/6</p> <p>meter [2] 1525/7 1525/15</p> <p>meters [7] 1524/11 1524/12 1524/16 1524/24 1525/6 1525/7 1525/16</p> <p>methane [1] 1555/19</p> <p>methodology [2] 1575/14 1593/15</p> <p>methods [4] 1569/24 1592/20 1592/23 1592/24</p> <p>metric [1] 1526/14</p> <p>MEXICO [52] 1498/4 1513/21 1518/2 1519/21 1521/9 1521/20 1522/1 1522/15 1525/9 1527/12 1528/21 1528/23 1529/2 1529/5 1529/24 1531/9 1540/7 1540/8 1542/15 1542/18 1543/1 1543/3 1554/19 1556/5 1557/7 1561/16 1579/12 1579/19 1579/24 1580/4 1580/17 1583/15 1588/2 1591/7 1595/3 1605/11 1608/5 1611/12 1616/5 1616/6 1617/6 1618/7 1618/21 1619/10 1623/18 1626/4 1632/1 1632/25 1634/20 1640/18 1640/19 1640/20</p> <p>mic [1] 1546/14</p> <p>MICHAEL [2] 1500/12 1502/12</p> <p>MICHELLE [1] 1500/23</p> <p>microphone [3] 1512/12 1583/20 1630/24</p> <p>mid [1] 1559/18</p> <p>mid/early [1] 1559/18</p> <p>middle [6] 1550/7 1616/13 1616/18 1617/5 1617/7 1617/8</p> <p>might [10] 1521/19 1532/18 1551/4 1552/4 1586/24 1606/18 1607/1 1607/5 1614/12 1648/12</p> <p>MIKAL [1] 1499/15</p> <p>MIKE [10] 1502/3 1505/18 1507/18 1509/20 1627/18 1628/13 1629/8 1629/15 1629/24 1630/7</p> <p>mile [3] 1526/16 1539/10 1548/1</p> <p>miles [7] 1526/4 1526/13 1542/22 1542/23 1548/2 1630/19 1630/23</p> <p>mill [1] 1619/8</p> <p>MILLER [2] 1502/6 1576/21</p> <p>million [3] 1523/5 1607/5 1607/9</p> <p>mind [4] 1505/22 1645/14 1649/11 1653/7</p>
<p><b>M</b></p> <p>M-I [1] 1503/14</p> <p>M-I-L-E-S [2] 1630/23 1631/2</p> <p>M56 [1] 1615/21</p> <p>Macaé [1] 1634/6</p> <p>Macondo [82] 1518/3 1523/13 1523/14 1523/17 1529/17 1529/20 1530/12 1533/10 1533/16 1534/21 1536/22 1536/24 1537/1 1537/4 1538/2 1541/25 1542/20 1543/24 1544/19 1547/3 1547/21 1547/22 1548/11 1550/7 1550/12 1553/2 1553/19 1553/23 1555/2 1563/20 1564/13 1564/17 1565/12 1565/14 1565/22 1565/23 1567/1 1567/11 1568/6 1568/24 1569/6 1569/12 1574/1 1575/3 1575/10 1584/19 1584/20 1584/25 1585/5 1585/7 1585/16 1585/25 1594/22 1595/11 1595/18 1599/11 1602/20 1605/21 1607/17 1612/22 1613/23 1613/25 1614/1 1614/6 1614/21 1614/22 1614/23 1616/3 1616/17 1616/17 1616/21 1616/23 1617/11 1619/2 1619/6 1626/11 1641/3 1642/16 1642/24 1643/3 1643/10 1649/1</p> <p>Macondo-specific [1] 1584/25</p> <p>made [8] 1535/20 1583/16 1599/14 1600/21 1601/20 1625/19 1637/1 1653/3</p> <p>Magazine [1] 1500/9</p> <p>maginitude [1] 1538/3</p> <p>magnitude [8] 1536/18 1536/25 1537/17 1538/4 1538/6 1538/9 1538/12 1558/8</p> <p>magnitudes [2] 1528/13 1528/13</p> <p>Mahtook [1] 1502/16</p> <p>mailed [1] 1507/16</p> <p>main [2] 1500/3 1559/2</p> <p>mainly [1] 1620/6</p> <p>maintenance [3] 1639/10 1647/23 1648/1</p> <p>major [3] 1527/8 1527/18 1634/15</p> <p>majority [1] 1640/17</p> <p>make [28] 1505/15 1506/16 1506/22 1521/25 1532/16 1536/11 1537/9 1537/14 1543/15 1545/22 1559/9 1560/20 1569/24 1576/2 1581/7 1588/10 1592/19 1607/21 1627/5 1635/4 1638/14 1642/9 1644/3 1647/3 1647/8 1647/9 1647/11 1647/18</p> <p>makes [2] 1535/2 1609/3</p>	<p>Marty [1] 1564/21</p> <p>massive [3] 1623/3 1623/3 1626/2</p> <p>masters [1] 1515/4</p> <p>mate [2] 1638/18 1638/23</p> <p>material [5] 1557/19 1557/22 1558/5 1571/19 1589/17</p> <p>material-scientific [1] 1589/17</p> <p>materials [5] 1553/5 1554/3 1577/10 1577/13 1603/19</p> <p>matrix [1] 1508/19</p> <p>Matt [2] 1510/5 1578/5</p> <p>matter [3] 1554/11 1623/2 1653/23</p> <p>matters [2] 1505/9 1591/23</p> <p>MATTHEW [1] 1501/23</p> <p>maximum [1] 1525/12</p> <p>may [27] 1505/7 1510/8 1510/15 1519/13 1530/12 1540/10 1542/5 1543/18 1554/2 1563/5 1564/8 1564/15 1564/16 1571/21 1585/18 1586/16 1596/10 1596/14 1597/5 1598/18 1603/9 1603/21 1615/13 1621/21 1628/18 1647/2 1648/18</p> <p>maybe [8] 1510/17 1597/2 1597/12 1609/6 1615/24 1617/22 1632/7 1640/24</p> <p>MAZE [1] 1501/8</p> <p>McAughan [1] 1564/23</p> <p>McCLELLAN [1] 1500/22</p> <p>McGee [1] 1607/22</p> <p>McKay [1] 1519/25</p> <p>McKinney [1] 1503/5</p> <p>MD [1] 1498/3</p> <p>MDT [2] 1601/6 1601/12</p> <p>me [60] 1509/7 1510/18 1510/22 1514/25 1515/25 1517/6 1517/19 1518/20 1521/25 1525/21 1526/14 1526/15 1536/23 1539/22 1541/10 1545/10 1551/22 1560/10 1560/16 1566/9 1566/9 1569/16 1571/11 1572/16 1573/25 1580/14 1582/4 1583/23 1584/10 1584/12 1584/17 1585/18 1588/10 1592/7 1593/11 1595/22 1596/18 1596/18 1598/13 1598/17 1603/16 1603/23 1609/8 1611/11 1611/14 1613/25 1614/4 1614/10 1614/15 1615/7 1617/24 1634/13 1634/18 1640/3 1640/7 1641/17 1648/24 1649/4 1651/5 1651/22</p> <p>mean [14] 1538/22 1546/1 1566/10 1574/14</p>	<p>1585/25 1591/3 1591/21 1604/20 1623/5 1625/20 1643/14 1645/25 1646/25 1647/1</p> <p>meaning [2] 1566/13 1636/12</p> <p>means [11] 1524/15 1526/20 1528/2 1541/11 1541/12 1541/19 1546/22 1550/22 1558/16 1558/18 1572/3</p> <p>meant [2] 1539/8 1571/9</p> <p>measure [1] 1602/11</p> <p>measured [1] 1527/22</p> <p>measurement [1] 1603/12</p> <p>measurements [2] 1601/7 1615/9</p> <p>measures [1] 1603/5</p> <p>mechanical [9] 1503/22 1557/21 1589/9 1591/20 1591/21 1593/18 1593/24 1594/1 1594/15</p> <p>Medal [3] 1515/25 1516/1 1516/2</p> <p>media [1] 1593/7</p> <p>meet [1] 1644/25</p> <p>meeting [9] 1591/9 1591/10 1591/12 1645/5 1645/6 1645/8 1645/19 1645/20 1649/5</p> <p>meetings [1] 1591/16</p> <p>members [2] 1516/14 1652/8</p> <p>memo [1] 1600/21</p> <p>memorandum [10] 1564/6 1564/9 1564/11 1569/5 1598/5 1598/10 1598/18 1599/2 1599/12 1624/3</p> <p>men [2] 1649/6 1649/8</p> <p>mentioned [2] 1519/6 1590/1</p> <p>mentor [1] 1636/9</p> <p>mentored [1] 1636/3</p> <p>mess [1] 1573/2</p> <p>met [1] 1650/6</p> <p>meter [2] 1525/7 1525/15</p> <p>meters [7] 1524/11 1524/12 1524/16 1524/24 1525/6 1525/7 1525/16</p> <p>methane [1] 1555/19</p> <p>methodology [2] 1575/14 1593/15</p> <p>methods [4] 1569/24 1592/20 1592/23 1592/24</p> <p>metric [1] 1526/14</p> <p>MEXICO [52] 1498/4 1513/21 1518/2 1519/21 1521/9 1521/20 1522/1 1522/15 1525/9 1527/12 1528/21 1528/23 1529/2 1529/5 1529/24 1531/9 1540/7 1540/8 1542/15 1542/18 1543/1 1543/3 1554/19 1556/5 1557/7 1561/16 1579/12 1579/19 1579/24 1580/4 1580/17 1583/15 1588/2 1591/7 1595/3 1605/11 1608/5 1611/12 1616/5 1616/6 1617/6 1618/7 1618/21 1619/10 1623/18 1626/4 1632/1 1632/25 1634/20 1640/18 1640/19 1640/20</p> <p>mic [1] 1546/14</p> <p>MICHAEL [2] 1500/12 1502/12</p> <p>MICHELLE [1] 1500/23</p> <p>microphone [3] 1512/12 1583/20 1630/24</p> <p>mid [1] 1559/18</p> <p>mid/early [1] 1559/18</p> <p>middle [6] 1550/7 1616/13 1616/18 1617/5 1617/7 1617/8</p> <p>might [10] 1521/19 1532/18 1551/4 1552/4 1586/24 1606/18 1607/1 1607/5 1614/12 1648/12</p> <p>MIKAL [1] 1499/15</p> <p>MIKE [10] 1502/3 1505/18 1507/18 1509/20 1627/18 1628/13 1629/8 1629/15 1629/24 1630/7</p> <p>mile [3] 1526/16 1539/10 1548/1</p> <p>miles [7] 1526/4 1526/13 1542/22 1542/23 1548/2 1630/19 1630/23</p> <p>mill [1] 1619/8</p> <p>MILLER [2] 1502/6 1576/21</p> <p>million [3] 1523/5 1607/5 1607/9</p> <p>mind [4] 1505/22 1645/14 1649/11 1653/7</p>

**M**  
mine [2] 1568/25 1569/3  
mineral [2] 1561/9 1561/9  
mineralogy [3] 1512/15 1558/6 1592/14  
minerals [5] 1557/25 1558/1 1558/2 1561/10 1623/1  
minimum [3] 1540/22 1541/1 1541/5  
minute [7] 1506/21 1545/16 1566/9 1566/10 1627/8 1628/1 1641/17  
minutes [1] 1629/11  
Miocene [2] 1532/23 1533/1  
missing [1] 1536/15  
Mississippi [44] 1518/3 1518/7 1522/2 1522/2 1524/4 1525/4 1525/17 1525/19 1528/9 1528/16 1528/22 1529/14 1529/18 1531/9 1534/22 1535/1 1538/21 1542/17 1542/20 1543/3 1543/13 1544/20 1546/12 1551/16 1553/22 1554/18 1574/1 1575/2 1583/2 1583/12 1584/5 1584/18 1585/6 1585/16 1606/6 1606/21 1608/24 1618/24 1619/3 1619/4 1619/7 1626/3 1626/10 1628/23  
mistake [1] 1596/24  
misunderstand [1] 1570/11  
misunderstood [1] 1627/17  
mixed [1] 1632/23  
mixture [4] 1555/20 1561/8 1589/15 1601/10  
MMS [1] 1522/6  
Mobile [1] 1499/4  
model [7] 1508/21 1519/9 1570/10 1570/13 1608/9 1608/13 1608/18  
modelers [1] 1589/5  
modeling [13] 1575/4 1575/6 1575/6 1588/4 1588/6 1588/18 1588/21 1590/5 1593/13 1604/11 1621/18 1624/13 1624/21  
models [3] 1580/13 1590/10 1623/11  
modern [4] 1522/1 1524/5 1525/18 1529/18  
molecules [1] 1559/5  
moment [4] 1528/8 1567/6 1577/25 1591/6  
moments [2] 1518/15 1621/9  
money [1] 1559/10  
monitor [1] 1635/18  
monitoring [2] 1635/22 1638/9  
Montgomery [1] 1501/10  
month [2] 1564/17 1634/10  
moon [2] 1639/14 1639/18  
more [48] 1513/22 1515/18 1522/5 1522/18 1523/19 1524/25 1525/13 1525/13 1525/16 1526/10 1528/5 1528/14 1531/10 1534/21 1537/16 1538/4 1538/13 1538/14 1539/23 1540/8 1540/8 1543/7 1543/10 1552/3 1555/22 1556/19 1557/9 1558/16 1558/21 1558/24 1558/24 1561/9 1562/24 1576/7 1579/5 1580/11 1582/5 1583/16 1584/12 1585/18 1593/14 1595/22 1597/2 1599/13 1623/1 1635/10 1637/24 1641/13  
Morgan [1] 1503/14  
morning [5] 1506/11 1509/9 1509/13 1627/7 1653/17  
Morris [2] 1596/17 1597/3  
most [12] 1530/7 1555/15 1556/5 1557/25 1559/2 1559/7 1559/9 1570/2 1589/4 1600/2 1608/6 1612/24  
motion [3] 1510/7 1510/11 1510/13  
move [16] 1508/14 1508/22 1519/4 1541/20 1541/22 1547/12 1553/25 1554/15 1572/9 1573/9 1573/9 1583/20 1584/15 1597/19 1637/13 1639/2  
moved [2] 1514/2 1527/9  
moves [1] 1609/3  
moving [3] 1508/18 1608/25 1628/22  
Mr [6] 1507/2 1508/19 1583/19 1617/22

1629/13 1652/5  
Mr. [51] 1505/11 1505/21 1506/6 1506/6 1507/12 1507/20 1507/22 1508/8 1508/9 1509/5 1509/5 1509/17 1509/19 1510/17 1572/8 1578/5 1581/15 1587/3 1587/5 1588/23 1589/2 1591/2 1596/17 1597/3 1610/19 1610/20 1610/24 1612/12 1612/17 1617/17 1628/7 1628/12 1628/22 1629/1 1629/8 1629/9 1630/18 1631/5 1637/9 1639/3 1644/6 1649/12 1650/6 1650/7 1650/19 1652/1 1652/5 1652/23 1653/1 1653/11 1653/16  
Mr. Alan [1] 1509/5  
Mr. Anderson [2] 1652/5 1653/1  
Mr. Beck [2] 1507/12 1507/20  
Mr. Bly [2] 1507/22 1509/5  
Mr. Bly's [1] 1505/11  
Mr. Ezell [7] 1628/22 1629/1 1629/8 1630/18 1631/5 1644/6 1653/16  
Mr. Harrell [3] 1637/9 1639/3 1652/1  
Mr. Hayward [1] 1506/6  
Mr. Hurst [1] 1578/5  
Mr. Kaluza [2] 1649/12 1650/6  
Mr. Lacy [1] 1506/6  
Mr. Leger [4] 1510/17 1572/8 1581/15 1617/17  
Mr. Morris [2] 1596/17 1597/3  
Mr. Nadeau [7] 1587/3 1587/5 1588/23 1589/2 1610/19 1610/20 1612/17  
Mr. Nadeau's [2] 1610/24 1612/12  
Mr. Randy [1] 1628/12  
Mr. Regan [1] 1591/2  
Mr. Roberts [1] 1509/17  
Mr. Ronnie [1] 1629/9  
Mr. Sepulvado [1] 1650/7  
Mr. Sterbcow [2] 1508/8 1653/11  
Mr. Underhill [1] 1508/9  
Mr. Vidrine [1] 1650/19  
Mr. Wheeler [1] 1652/23  
Mr. Williams [2] 1505/21 1509/19  
Mr. Williams' [1] 1628/7  
Ms. [1] 1505/12  
Ms. Karis [1] 1505/12  
much [15] 1509/23 1509/24 1525/18 1532/22 1532/24 1547/4 1558/20 1571/3 1571/4 1571/8 1614/20 1626/20 1635/10 1639/9 1653/5  
mud [19] 1512/20 1536/1 1536/2 1541/1 1541/5 1541/11 1541/13 1558/1 1563/7 1571/18 1571/23 1572/20 1572/21 1572/22 1575/10 1594/21 1595/3 1608/5 1632/22  
mudstone [1] 1558/1  
multicolored [1] 1613/13  
Munger [1] 1502/12  
Murray [3] 1516/8 1595/24 1650/23  
mush [1] 1572/6  
mushy [1] 1626/3  
must [2] 1624/9 1628/15  
my [75] 1506/10 1511/11 1512/14 1512/20 1512/23 1514/8 1514/19 1515/8 1515/10 1516/2 1516/3 1518/1 1521/17 1532/17 1534/19 1536/6 1536/17 1544/14 1546/21 1550/25 1551/10 1551/18 1554/5 1555/5 1555/11 1559/15 1562/14 1563/23 1573/6 1573/12 1576/21 1579/22 1579/25 1580/11 1580/18 1581/2 1582/25 1583/14 1584/8 1584/9 1585/2 1585/8 1585/8 1585/15 1586/4 1590/11 1591/14 1592/11 1593/4 1593/5 1593/25 1597/2 1597/12 1599/5 1599/24 1601/2 1614/21 1615/1 1615/19 1616/4 1616/21 1620/22 1631/5 1631/9 1631/15 1631/19 1632/15 1632/24 1634/19 1642/18 1643/11 1643/17 1644/18 1652/20 1653/22

**N**  
Nadeau [20] 1524/1 1527/24 1539/21 1542/25 1587/1 1587/3 1587/5 1588/23 1589/2 1589/7 1610/19 1610/20 1612/13 1612/17 1621/14 1621/24 1622/2 1623/25 1624/2 1624/8  
Nadeau's [3] 1610/24 1612/12 1613/15  
name [12] 1511/9 1523/20 1557/13 1574/10 1574/11 1574/12 1576/21 1624/13 1630/21 1644/23 1649/11 1651/2  
name's [2] 1511/11 1631/5  
named [1] 1651/16  
names [1] 1564/21  
narrow [2] 1519/18 1597/2  
NATHANIEL [1] 1500/19  
national [2] 1513/20 1514/20  
native [1] 1588/16  
natural [4] 1500/16 1527/5 1550/4 1608/4  
naturally [4] 1541/2 1558/19 1562/16 1562/17  
nature [5] 1520/2 1535/17 1555/2 1556/14 1573/19  
near [7] 1523/1 1527/13 1529/5 1595/17 1595/18 1595/20 1645/6  
nearer [1] 1567/20  
necessarily [3] 1542/9 1593/14 1596/8  
need [14] 1506/23 1509/21 1509/22 1509/24 1535/10 1541/12 1558/12 1561/18 1563/17 1570/9 1570/11 1576/4 1627/16 1647/18  
needed [5] 1549/13 1634/24 1638/15 1641/15 1644/3  
neighbor [2] 1595/17 1595/20  
never [2] 1603/13 1634/17  
new [24] 1498/5 1498/23 1499/7 1499/13 1500/10 1501/17 1501/20 1502/7 1502/24 1503/19 1514/23 1538/18 1558/5 1559/12 1559/14 1574/18 1583/4 1584/6 1592/20 1592/20 1592/21 1624/13 1652/8 1652/8  
next [17] 1505/6 1510/4 1511/4 1523/11 1523/18 1538/23 1547/12 1547/15 1576/16 1623/6 1627/14 1628/4 1628/12 1630/16 1637/11 1639/4 1639/11  
Nguyen [2] 1544/4 1564/23  
nice [1] 1516/12  
night [2] 1586/2 1653/10  
nine [1] 1641/8  
Ninth [1] 1499/22  
no [92] 1507/9 1511/15 1516/22 1517/1 1517/3 1518/19 1520/10 1521/1 1527/13 1529/2 1531/5 1532/13 1532/13 1533/14 1533/15 1534/23 1534/23 1537/5 1537/5 1538/11 1539/4 1539/4 1543/18 1545/23 1547/15 1549/2 1551/18 1554/10 1556/17 1557/23 1559/14 1560/12 1563/16 1563/16 1569/3 1569/9 1574/19 1576/7 1576/14 1576/15 1576/25 1577/18 1577/21 1579/21 1580/7 1580/9 1582/2 1586/11 1588/15 1596/2 1596/8 1596/16 1596/20 1597/7 1597/8 1602/18 1602/19 1604/20 1607/11 1607/14 1607/20 1610/25 1610/25 1610/25 1613/24 1615/18 1617/15 1619/1 1620/15 1626/14 1626/15 1627/23 1627/25 1628/11 1632/12 1634/6 1634/14 1635/20 1638/5 1639/14 1640/2 1643/17 1644/5 1644/17 1645/11 1645/18 1648/5 1648/21 1649/23 1650/1 1652/18 1653/7  
nobody [1] 1644/1  
none [4] 1576/12 1586/9 1586/13 1586/14  
nongeologist [1] 1532/15  
NONJURY [1] 1498/14  
noon [1] 1509/3

<p><b>N</b></p> <p>Norfolk [1] 1502/20  normal [1] 1652/1  normally [1] 1593/2  north [4] 1501/12 1505/24 1556/23 1557/1  northeast [1] 1550/16  northeast/southwest [1] 1550/16  northern [5] 1527/11 1528/22 1529/2 1529/5 1540/8  Norway [1] 1513/20  Norwegian [2] 1622/14 1622/15  not [176]  note [3] 1506/10 1510/11 1549/18  noted [2] 1527/17 1579/22  notes [2] 1645/18 1645/20  nothing [9] 1537/5 1545/25 1572/4 1572/5 1608/16 1617/13 1645/13 1645/16 1648/6  notice [2] 1506/14 1538/8  notify [1] 1630/2  November [1] 1580/21  November 2011 [1] 1580/21  now [77] 1506/20 1508/2 1517/11 1519/13 1520/13 1522/7 1522/22 1523/11 1523/22 1525/20 1525/23 1527/17 1536/5 1537/1 1537/17 1538/20 1539/18 1542/13 1543/18 1544/12 1544/12 1544/23 1545/23 1546/1 1546/9 1547/17 1548/18 1550/13 1552/24 1554/1 1554/25 1555/7 1556/8 1556/14 1556/22 1560/14 1560/17 1563/18 1564/5 1566/8 1568/16 1568/16 1570/11 1571/9 1571/21 1574/23 1580/12 1582/21 1583/22 1598/10 1599/25 1600/12 1611/10 1618/21 1619/12 1619/15 1620/11 1621/8 1621/13 1621/16 1621/20 1624/12 1625/19 1626/1 1627/20 1627/22 1628/2 1628/2 1628/7 1631/24 1633/4 1634/5 1637/15 1644/6 1647/12 1648/9 1653/10  nowhere [1] 1529/23  number [4] 1527/25 1565/11 1565/11 1617/20  numbered [1] 1653/23  numerical [1] 1589/9  numerous [1] 1519/15  Nunley [1] 1651/7  NW [1] 1502/3</p>	<p>occurring [2] 1551/4 1596/22  occurs [1] 1555/15  ocean [1] 1525/9  oceanographic [1] 1553/22  off [39] 1526/18 1527/21 1528/19 1529/4 1529/7 1529/10 1535/12 1538/21 1539/8 1539/14 1539/16 1539/24 1540/7 1540/14 1540/17 1540/20 1540/21 1540/25 1541/4 1541/8 1541/10 1541/18 1541/25 1542/14 1542/16 1542/25 1543/4 1543/9 1543/11 1547/11 1552/2 1563/5 1575/12 1595/10 1595/13 1595/16 1595/21 1634/18 1635/23  off-the-rig [1] 1635/23  offer [15] 1505/10 1505/16 1506/3 1507/1 1507/24 1508/2 1509/8 1509/13 1511/14 1517/8 1518/23 1518/23 1576/3 1626/23 1630/7  offered [4] 1512/7 1514/13 1517/19 1533/17  offering [3] 1509/4 1572/11 1573/17  Offhand [1] 1586/23  office [6] 1498/20 1500/19 1500/25 1501/13 1502/17 1645/22  officers [1] 1638/20  Official [3] 1503/18 1653/21 1653/25  offset [2] 1595/17 1595/23  offshore [9] 1502/6 1502/9 1502/12 1502/16 1502/20 1521/19 1523/1 1523/7 1548/18  often [2] 1532/14 1597/16  oh [10] 1511/5 1515/14 1516/18 1528/20 1535/18 1536/2 1538/18 1542/22 1613/9 1651/11  oil [42] 1498/3 1498/3 1513/20 1514/2 1514/19 1518/11 1522/10 1526/8 1530/10 1534/4 1534/6 1534/14 1535/5 1535/7 1535/9 1537/21 1555/15 1555/18 1555/19 1557/10 1559/5 1559/25 1565/14 1567/2 1568/3 1574/6 1575/24 1576/3 1579/2 1583/1 1583/11 1584/4 1584/17 1585/9 1592/22 1593/2 1604/23 1608/4 1610/18 1620/13 1631/13 1631/15  oil-bearing [1] 1565/14  oil-containing [1] 1567/2  oilfield [1] 1552/13  OIM [4] 1633/16 1634/5 1637/4 1648/10  okay [47] 1506/8 1506/20 1506/24 1507/17 1509/14 1510/3 1510/25 1511/23 1517/16 1531/15 1533/19 1542/2 1542/11 1545/20 1546/5 1546/15 1554/15 1560/14 1576/9 1577/11 1579/18 1583/23 1584/15 1587/17 1588/17 1589/17 1590/1 1597/11 1598/23 1603/21 1607/24 1610/9 1612/20 1616/2 1617/14 1626/17 1626/21 1629/21 1630/5 1630/18 1635/23 1641/18 1644/8 1645/17 1645/24 1649/19 1653/17  old [2] 1523/4 1635/25  oldest [1] 1523/4  Olson [1] 1502/12  on-site [1] 1638/7  once [6] 1584/12 1638/1 1645/22 1645/24 1648/9 1650/11  one [80] 1521/18 1522/16 1524/9 1527/13 1527/14 1527/15 1536/15 1536/16 1536/20 1537/7 1537/22 1538/4 1539/10 1539/22 1539/25 1546/1 1546/2 1546/3 1550/15 1552/4 1552/17 1553/15 1553/19 1555/13 1555/25 1558/3 1559/3 1560/3 1562/11 1563/4 1565/22 1569/21 1571/2 1571/16 1577/25 1581/22 1585/18 1586/25 1587/23 1588/1 1588/18 1588/24 1589/21 1590/2 1591/15 1597/25 1598/4 1598/11 1599/21 1599/25 1600/1 1602/5 1602/14 1603/4 1604/11 1604/13 1609/3 1609/4 1611/2 1613/4 1614/8 1614/22 1615/4 1615/5</p>	<p>1617/25 1619/17 1620/7 1625/5 1629/19 1636/7 1639/4 1639/17 1640/14 1640/24 1640/25 1641/6 1641/13 1642/16 1651/2 1651/6  ongoing [1] 1527/8  only [10] 1511/20 1535/4 1552/12 1575/25 1605/14 1612/1 1621/16 1624/23 1640/7 1649/11  onset [1] 1624/21  open [1] 1534/7  operate [2] 1611/20 1647/16  operated [3] 1549/9 1640/13 1647/14  operates [1] 1624/5  operating [6] 1583/2 1583/12 1584/4 1584/18 1588/1 1647/19  operation [4] 1518/9 1545/17 1638/3 1641/15  operational [3] 1633/21 1642/7 1642/9  operations [4] 1520/23 1586/19 1604/6 1636/25  operator [4] 1548/21 1574/6 1579/18 1580/4  operators [6] 1580/1 1580/16 1588/1 1605/2 1606/2 1611/12  opinion [13] 1515/10 1567/11 1572/9 1573/4 1573/6 1573/10 1577/16 1586/1 1601/3 1620/20 1620/22 1650/3 1652/15  opinions [14] 1518/21 1518/22 1518/23 1519/11 1576/25 1577/5 1584/3 1585/1 1585/3 1585/8 1585/11 1585/20 1591/1 1619/21  opportunity [10] 1506/23 1508/7 1509/6 1522/14 1563/18 1593/1 1628/25 1649/14 1650/18 1651/4  opposed [3] 1573/15 1618/13 1620/24  opposing [1] 1531/17  opposite [1] 1644/22  optimal [1] 1580/23  optimum [1] 1535/13  order [8] 1506/15 1538/4 1539/19 1548/25 1557/17 1576/4 1628/16 1642/8  orders [1] 1558/7  ordinary [2] 1638/24 1648/6  organic [1] 1623/2  original [2] 1587/10 1601/16  Originally [1] 1628/13  Orleans [11] 1498/5 1498/23 1499/7 1499/13 1500/10 1501/17 1501/20 1502/7 1502/24 1503/19 1538/18  other [52] 1506/5 1506/5 1510/6 1516/24 1518/18 1519/16 1520/1 1525/12 1525/13 1525/21 1527/13 1528/11 1528/25 1529/2 1542/10 1543/7 1550/13 1559/21 1562/19 1563/6 1564/1 1565/11 1573/19 1573/21 1580/1 1580/3 1580/4 1580/16 1584/17 1587/5 1589/23 1591/11 1592/15 1596/22 1598/1 1599/21 1604/24 1605/25 1608/25 1615/3 1623/20 1624/10 1627/4 1627/19 1627/19 1638/22 1641/6 1642/24 1643/13 1649/11 1650/22 1651/22  others [4] 1556/19 1589/23 1595/24 1601/13  otherwise [3] 1511/16 1519/2 1579/24  our [13] 1505/10 1505/18 1508/22 1509/12 1511/4 1519/18 1545/19 1558/9 1570/13 1578/1 1594/4 1606/18 1629/17  ours [3] 1505/13 1505/16 1627/19  out [27] 1506/18 1514/25 1523/12 1523/15 1524/5 1525/19 1527/24 1534/5 1540/2 1549/4 1557/6 1559/6 1578/2 1581/15 1601/8 1603/11 1623/6 1626/18 1629/6 1634/11 1639/17 1639/25 1640/2 1642/11 1645/12 1647/15 1648/6  outlier [2] 1616/23 1617/1  outlined [1] 1518/21</p>
<p><b>O</b></p> <p>O'Keefe [1] 1498/23  O'ROURKE [1] 1500/17  object [3] 1541/16 1553/3 1573/9  objection [10] 1507/9 1508/3 1508/6 1508/24 1508/25 1533/9 1542/2 1554/4 1560/12 1584/13  objections [5] 1505/14 1506/8 1507/7 1511/24 1630/12  objects [1] 1627/23  obligation [1] 1648/21  observation [1] 1585/21  observations [4] 1585/4 1585/13 1605/20 1634/23  obtuse [1] 1570/12  obvious [1] 1550/14  obviously [10] 1510/13 1524/6 1551/8 1557/4 1558/16 1568/10 1571/7 1579/23 1629/4 1652/3  occasion [2] 1641/13 1641/13  occur [6] 1530/7 1530/7 1557/10 1562/2 1578/13 1578/18  occurred [7] 1518/4 1527/7 1536/17 1563/5 1570/3 1573/5 1645/8  occurrence [4] 1551/16 1552/21 1608/22 1609/10</p>		

<p><b>O</b></p> <p>outs [2] 1505/11 1626/24</p> <p>outside [8] 1511/5 1541/17 1553/4 1593/5 1604/11 1629/3 1645/4 1645/6</p> <p>over [21] 1505/20 1509/3 1524/24 1527/11 1536/18 1536/20 1544/14 1555/19 1559/1 1595/8 1607/9 1608/25 1609/3 1616/13 1616/24 1632/7 1636/24 1638/3 1639/1 1649/15 1651/4</p> <p>overburden [1] 1609/5</p> <p>overhead [2] 1548/4 1548/5</p> <p>overnight [1] 1509/7</p> <p>overpressure [9] 1563/8 1586/16 1586/20 1589/4 1589/11 1589/13 1589/19 1617/10 1623/10</p> <p>overrule [1] 1542/2</p> <p>oversimplification [2] 1590/18 1591/4</p> <p>overview [1] 1636/24</p> <p>own [2] 1568/22 1630/3</p>	<p>Penrod [7] 1631/23 1632/2 1632/6 1632/8 1632/9 1632/13 1633/19</p> <p>Penrod's [1] 1631/25</p> <p>people [21] 1520/22 1530/9 1533/24 1554/12 1559/9 1559/21 1564/20 1570/19 1576/2 1580/10 1591/10 1591/19 1591/22 1601/7 1609/21 1620/3 1620/5 1624/11 1627/4 1638/13 1651/15</p> <p>per [4] 1540/6 1610/13 1616/1 1627/1</p> <p>perceive [1] 1520/5</p> <p>percent [5] 1557/9 1557/9 1562/13 1578/17 1579/1</p> <p>perfect [2] 1569/15 1637/25</p> <p>perfectly [1] 1593/19</p> <p>performance [1] 1571/7</p> <p>perhaps [1] 1589/23</p> <p>period [24] 1531/6 1533/3 1557/24 1632/12 1632/18 1634/23 1640/22 1642/2 1646/15 1646/24 1647/21 1648/3 1649/15 1650/19 1650/20 1650/21 1650/25 1651/4 1651/8 1651/12 1651/15 1651/23 1652/10 1652/11</p> <p>permeability [5] 1513/5 1558/7 1558/9 1558/16 1589/12</p> <p>permeable [3] 1530/25 1531/7 1558/23</p> <p>permeametry [2] 1592/14 1593/6</p> <p>permitted [1] 1506/6</p> <p>person [1] 1637/6</p> <p>personal [1] 1620/1</p> <p>personnel [1] 1641/14</p> <p>persons [1] 1646/17</p> <p>perspective [2] 1620/24 1621/4</p> <p>pertinent [1] 1542/6</p> <p>PETITION [1] 1498/7</p> <p>petroleum [19] 1513/15 1516/3 1516/8 1516/15 1517/9 1517/21 1518/11 1520/16 1521/21 1522/13 1531/11 1534/24 1549/19 1551/7 1569/18 1570/25 1591/8 1592/3 1625/6</p> <p>Ph.D [1] 1512/15</p> <p>phase [1] 1639/5</p> <p>phases [1] 1527/7</p> <p>phenomena [1] 1596/22</p> <p>phenomenon [1] 1579/3</p> <p>PHILLIP [1] 1502/23</p> <p>phonetic [1] 1644/23</p> <p>photograph [1] 1531/16</p> <p>phrase [5] 1555/14 1594/18 1600/20 1604/19 1611/7</p> <p>physical [1] 1526/22</p> <p>physically [4] 1567/13 1567/15 1568/11 1603/5</p> <p>physicists [1] 1593/7</p> <p>physics [1] 1593/6</p> <p>picked [1] 1643/4</p> <p>picture [11] 1520/10 1520/10 1532/6 1549/20 1557/9 1581/3 1594/19 1594/19 1594/19 1618/2 1620/11</p> <p>pictures [1] 1549/16</p> <p>piece [1] 1640/4</p> <p>pieces [4] 1534/9 1534/13 1534/18 1612/2</p> <p>Pigman [1] 1502/22</p> <p>pile [1] 1528/4</p> <p>pipeline [2] 1550/2 1550/3</p> <p>place [20] 1506/15 1519/3 1520/3 1521/2 1521/5 1529/2 1549/24 1557/17 1559/3 1565/16 1565/18 1572/10 1578/18 1594/22 1594/24 1597/1 1606/11 1606/23 1607/8 1607/9</p> <p>places [2] 1526/10 1556/18</p> <p>plaintiff's [2] 1511/3 1628/22</p> <p>plaintiffs [20] 1498/18 1498/22 1499/2 1499/5 1499/8 1499/12 1499/15 1499/18</p>	<p>1499/21 1500/2 1500/5 1500/8 1505/6 1505/8 1517/24 1626/22 1627/14 1627/16 1627/23 1631/7</p> <p>plan [8] 1535/1 1576/2 1643/6 1643/9 1643/9 1643/12 1643/13 1643/15</p> <p>planned [2] 1547/3 1552/10</p> <p>planning [3] 1555/1 1599/22 1599/23</p> <p>plastic [2] 1526/24 1534/11</p> <p>plate [4] 1544/13 1544/13 1547/16 1547/17</p> <p>platform [3] 1537/23 1632/2 1632/14</p> <p>platforms [2] 1537/21 1537/22</p> <p>plausible [2] 1608/9 1608/17</p> <p>play [6] 1506/6 1628/6 1628/8 1629/9 1629/14 1647/5</p> <p>played [1] 1629/24</p> <p>playing [3] 1506/15 1629/12 1630/3</p> <p>PLC [3] 1501/20 1501/23 1502/4</p> <p>please [8] 1505/5 1505/7 1511/9 1515/22 1609/23 1620/25 1627/13 1630/21</p> <p>plenty [3] 1565/24 1568/3 1568/4</p> <p>plot [3] 1522/3 1547/23 1560/5</p> <p>plots [2] 1532/4 1618/5</p> <p>plotted [3] 1539/9 1539/15 1561/24</p> <p>plottings [1] 1536/11</p> <p>plus [1] 1616/5</p> <p>pockets [1] 1561/20</p> <p>point [22] 1517/8 1520/10 1523/12 1523/15 1524/20 1551/1 1557/6 1567/12 1568/1 1590/2 1603/11 1614/22 1617/12 1617/12 1626/22 1630/6 1631/15 1635/4 1637/4 1642/25 1644/19 1653/12</p> <p>pointed [1] 1581/15</p> <p>pointer [1] 1546/21</p> <p>points [10] 1519/18 1522/6 1522/19 1523/17 1546/23 1549/11 1550/9 1555/22 1556/5 1583/15</p> <p>Pole [3] 1556/23 1556/24 1557/1</p> <p>pool [2] 1639/15 1639/18</p> <p>poor [1] 1585/18</p> <p>pore [64] 1514/6 1515/7 1515/8 1515/11 1522/10 1530/18 1530/21 1530/23 1554/21 1559/24 1560/1 1561/17 1561/18 1561/25 1562/1 1562/3 1562/3 1562/5 1562/9 1562/11 1562/20 1562/24 1563/8 1563/9 1565/17 1567/22 1567/25 1568/23 1569/22 1570/2 1570/17 1570/20 1571/9 1571/11 1572/21 1575/4 1575/5 1579/20 1580/5 1580/13 1583/9 1587/20 1588/9 1588/11 1588/17 1590/5 1590/16 1591/10 1591/13 1591/15 1596/19 1596/21 1599/10 1600/2 1601/9 1603/13 1603/14 1604/1 1604/6 1604/10 1604/15 1605/11 1621/18 1625/4</p> <p>porosity [6] 1513/5 1522/10 1532/24 1535/12 1557/20 1559/25</p> <p>porous [1] 1593/7</p> <p>portion [2] 1629/15 1629/23</p> <p>position [5] 1514/13 1554/8 1580/16 1633/21 1641/21</p> <p>positioning [2] 1638/10 1638/20</p> <p>positions [2] 1633/12 1638/22</p> <p>possibilities [1] 1551/6</p> <p>possible [1] 1531/14</p> <p>possibly [4] 1505/13 1551/2 1581/25 1606/21</p> <p>post [7] 1498/20 1500/19 1500/25 1501/13 1502/17 1564/12 1565/4</p> <p>post-explosion [1] 1565/4</p> <p>post-well [1] 1564/12</p> <p>potential [1] 1518/2</p> <p>power [2] 1505/20 1537/25</p> <p>powerful [1] 1538/9</p> <p>Poydras [4] 1499/6 1501/19 1502/6 1503/19</p> <p>ppg [2] 1610/13 1615/24</p>
<p><b>P</b></p> <p>P50 [2] 1617/8 1617/9</p> <p>package [1] 1560/3</p> <p>page [20] 1504/2 1544/12 1545/24 1546/6 1547/16 1568/17 1581/14 1581/14 1582/21 1582/22 1582/24 1597/9 1598/14 1599/3 1599/11 1622/5 1622/21 1623/7 1623/8 1627/25</p> <p>page 12.1 [1] 1581/14</p> <p>page 24 [1] 1545/24</p> <p>Palmintier [1] 1500/2</p> <p>paper [6] 1521/20 1534/7 1591/6 1591/16 1606/5 1612/5</p> <p>papers [2] 1539/22 1574/20</p> <p>paragraph [12] 1569/19 1582/9 1598/11 1599/3 1599/11 1599/16 1599/21 1600/1 1604/12 1604/13 1620/12 1623/9</p> <p>parameter [1] 1596/23</p> <p>parameters [1] 1601/5</p> <p>pardon [1] 1561/13</p> <p>part [23] 1510/22 1510/24 1514/8 1515/9 1524/5 1526/4 1542/17 1543/8 1565/23 1566/25 1575/23 1586/4 1588/18 1591/14 1606/7 1609/3 1609/4 1609/5 1610/18 1622/4 1623/2 1638/25 1643/12</p> <p>particular [24] 1513/5 1515/19 1521/1 1522/23 1523/20 1527/21 1541/7 1549/18 1549/20 1551/13 1553/17 1554/18 1562/8 1568/20 1574/25 1578/12 1579/11 1585/5 1599/6 1599/7 1624/2 1635/8 1636/17 1643/15</p> <p>particularly [17] 1516/4 1516/11 1518/2 1521/9 1523/14 1544/10 1546/11 1552/20 1552/22 1559/16 1562/21 1569/23 1574/24 1575/3 1575/6 1575/9 1575/16</p> <p>parties [2] 1507/23 1507/25</p> <p>parts [6] 1565/24 1566/23 1567/1 1608/25 1609/1 1615/3</p> <p>party [1] 1627/22</p> <p>passive [2] 1528/23 1528/24</p> <p>pattern [1] 1545/7</p> <p>PAUL [8] 1499/6 1523/25 1527/24 1587/1 1621/13 1623/25 1627/15 1631/5</p> <p>pause [1] 1588/10</p> <p>PC [3] 1499/9 1503/7 1503/11</p> <p>pedal [1] 1635/25</p> <p>pedal/lever [1] 1635/25</p> <p>peer [2] 1519/16 1623/20</p> <p>peer-reviewed [2] 1519/16 1623/20</p> <p>Peijs [1] 1544/5</p> <p>pending [2] 1510/7 1510/11</p> <p>penetrates [1] 1565/23</p>		

<p><b>P</b></p> <p>practical [3] 1592/25 1594/7 1623/17  practically [1] 1624/23  practice [1] 1580/23  pre [10] 1570/2 1570/7 1575/4 1583/9  1599/22 1599/23 1600/2 1603/14 1605/12  1619/8  pre-drill [7] 1570/2 1570/7 1575/4 1583/9  1600/2 1603/14 1605/12  pre-drilled [2] 1599/22 1599/23  preceded [1] 1597/15  precipitated [1] 1606/11  precise [1] 1595/22  predict [10] 1535/6 1561/19 1568/23  1569/11 1570/20 1570/22 1596/21 1621/18  1625/3 1625/3  predictability [1] 1543/8  predictable [2] 1574/7 1574/8  predicted [4] 1570/8 1571/3 1571/4 1572/21  predicting [6] 1535/5 1566/5 1575/14  1580/13 1588/12 1590/16  prediction [29] 1513/5 1514/6 1515/7 1515/8  1522/20 1554/21 1570/7 1570/18 1579/20  1583/10 1588/9 1588/11 1588/17 1591/11  1591/16 1591/20 1596/20 1596/23 1599/10  1600/19 1601/18 1601/20 1601/24 1602/2  1603/14 1603/14 1604/1 1604/11 1604/16  predictions [8] 1543/15 1569/24 1570/23  1570/24 1580/6 1593/20 1599/14 1605/12  predictive [1] 1594/12  predictor [1] 1569/22  predominant [1] 1588/21  predrill [1] 1514/6  prefer [1] 1569/16  preference [1] 1510/9  preparation [1] 1569/8  prepare [2] 1590/14 1639/10  prepared [10] 1507/22 1509/3 1521/12  1523/23 1544/3 1555/8 1581/4 1583/10  1598/18 1613/4  preparing [3] 1534/25 1604/2 1604/7  presence [3] 1535/5 1559/25 1626/9  present [4] 1559/19 1563/8 1574/2 1591/10  presentations [2] 1516/19 1590/15  presented [9] 1521/22 1531/16 1575/7  1591/15 1591/23 1594/8 1607/20 1619/21  1624/2  president [1] 1519/25  pressure [115] 1515/7 1515/9 1515/11  1522/11 1530/21 1530/23 1535/11 1535/12  1539/12 1539/13 1539/14 1539/16 1540/7  1540/17 1540/20 1540/25 1540/25 1541/1  1541/4 1541/5 1541/5 1541/18 1554/21  1558/20 1559/24 1560/1 1560/23 1561/18  1561/18 1561/20 1561/25 1562/2 1562/3  1562/4 1562/6 1562/9 1562/10 1562/12  1563/6 1563/9 1567/23 1568/23 1569/11  1569/22 1570/2 1570/7 1570/9 1570/17  1570/20 1571/10 1571/11 1571/18 1572/21  1575/4 1575/5 1579/20 1580/5 1580/13  1583/10 1587/20 1588/9 1588/11 1588/16  1588/17 1590/16 1591/10 1591/14 1591/15  1593/13 1595/6 1595/10 1595/13 1595/17  1596/19 1596/21 1598/1 1599/10 1600/2  1601/5 1601/6 1603/13 1604/1 1604/6  1604/10 1604/16 1605/11 1609/18 1609/20  1610/2 1610/6 1611/3 1612/2 1612/4 1612/8  1613/12 1613/19 1614/3 1614/17 1614/18  1614/19 1614/20 1614/24 1615/20 1616/18  1616/23 1617/4 1617/10 1617/10 1617/11  1619/7 1620/9 1620/17 1621/6 1621/18  1625/4</p>	<p>pressures [34] 1514/7 1527/21 1538/21  1539/8 1539/12 1539/24 1540/14 1540/20  1541/8 1541/10 1542/1 1542/14 1542/16  1543/1 1543/4 1543/9 1543/10 1543/12  1552/2 1562/20 1562/24 1565/12 1565/17  1567/25 1571/3 1571/9 1571/14 1575/12  1590/5 1601/9 1601/13 1603/15 1609/15  1620/14  prestigious [1] 1516/11  presumably [1] 1604/13  presume [1] 1641/8  pretty [15] 1532/22 1532/24 1538/16  1548/22 1550/14 1554/11 1614/12 1620/5  1620/22 1641/9 1641/12 1642/11 1646/14  1649/17 1651/14  prevails [1] 1527/19  previous [4] 1567/7 1580/25 1635/24  1645/10  previously [3] 1627/21 1630/9 1635/11  primary [3] 1552/14 1639/5 1640/8  principle [2] 1541/25 1625/7  principles [5] 1569/22 1574/17 1576/5  1589/15 1621/17  prior [12] 1518/6 1543/23 1601/11 1627/1  1631/13 1635/5 1635/6 1644/11 1645/8  1649/1 1650/10 1651/17  privilege [1] 1625/9  privy [1] 1599/13  probability [1] 1558/22  probably [18] 1516/18 1516/19 1523/15  1524/14 1530/7 1540/18 1540/19 1564/3  1566/17 1581/1 1583/16 1596/24 1597/8  1597/10 1615/5 1625/6 1629/2 1653/13  probe [2] 1592/14 1593/6  problem [1] 1572/13  problems [7] 1552/1 1593/23 1596/10  1596/14 1597/5 1623/17 1627/25  procedurally [1] 1643/16  procedure [1] 1649/1  procedures [7] 1583/1 1584/4 1604/16  1641/15 1642/7 1642/9 1651/19  proceed [2] 1510/4 1630/15  proceedings [3] 1503/22 1653/18 1653/23  process [3] 1527/5 1541/3 1559/2  processes [4] 1557/16 1559/11 1559/12  1596/25  produced [3] 1548/7 1551/14 1608/17  produces [1] 1535/23  production [13] 1498/10 1501/19 1501/19  1501/22 1501/22 1502/3 1502/3 1514/14  1552/9 1581/9 1582/11 1643/9 1651/18  professional [5] 1512/22 1512/23 1514/14  1554/3 1590/15  professor [72] 1511/4 1511/5 1511/14  1512/6 1512/10 1514/16 1515/12 1516/6  1516/20 1517/9 1517/24 1518/15 1519/13  1521/13 1522/22 1523/11 1524/9 1527/17  1529/22 1530/14 1531/8 1532/2 1536/5  1536/8 1537/6 1537/17 1538/20 1539/2  1542/13 1543/18 1543/19 1543/25 1544/7  1544/12 1544/13 1544/23 1546/9 1547/17  1551/13 1551/23 1554/17 1555/4 1555/7  1559/11 1560/9 1560/14 1560/17 1563/3  1563/9 1563/13 1563/18 1564/5 1567/10  1568/17 1568/20 1569/4 1569/19 1573/25  1576/11 1576/19 1576/23 1593/11 1618/5  1620/18 1621/6 1621/24 1622/2 1624/8  1625/17 1626/1 1626/15 1626/25  Professor Andrew [1] 1626/25  Professor Hurst [1] 1576/23  Professor Nadeau [3] 1621/24 1622/2  1624/8  professor's [1] 1533/17</p>	<p>profile [1] 1514/19  prognosis [11] 1535/2 1576/2 1583/3  1583/13 1583/15 1583/18 1584/5 1585/24  1601/16 1642/10 1642/14  program [3] 1552/16 1637/23 1647/2  programs [4] 1513/4 1514/21 1543/6 1590/3  progress [1] 1628/25  progressively [1] 1523/8  project [1] 1648/2  promoted [3] 1513/9 1513/10 1513/14  promotion [1] 1513/7  prone [3] 1558/24 1578/24 1579/4  pronounce [1] 1622/12  proper [1] 1533/8  properly [1] 1594/3  properties [4] 1526/23 1535/7 1535/11  1611/18  property [2] 1558/17 1611/19  proponents [1] 1594/1  proposal [1] 1612/12  proposed [2] 1547/20 1616/11  proprietary [1] 1648/13  prospect [1] 1548/11  proud [1] 1515/20  provide [1] 1563/16  provided [6] 1539/22 1543/23 1624/4  1635/23 1642/13 1642/16  providers [1] 1605/4  provides [2] 1521/18 1557/16  provoked [1] 1573/12  prudent [2] 1574/6 1606/2  PSC [1] 1630/7  psi [1] 1612/8  public [4] 1518/8 1518/14 1592/9 1605/14  publically [1] 1522/8  publication [1] 1523/25  publications [4] 1553/19 1586/9 1586/14  1594/10  published [12] 1521/20 1553/16 1559/18  1564/6 1587/6 1587/7 1587/7 1591/17 1594/1  1594/11 1621/25 1624/3  pull [9] 1586/24 1603/23 1604/4 1613/1  1620/11 1621/21 1627/22 1628/3 1630/24  pullback [1] 1627/24  pulled [1] 1639/13  purple [5] 1523/8 1523/9 1613/16 1613/23  1616/10  purpose [3] 1640/8 1640/8 1640/14  purposes [1] 1608/3  Purvis [1] 1628/23  pusher [4] 1636/14 1636/22 1641/25 1642/4  pushers [2] 1636/14 1637/12  put [20] 1506/5 1506/21 1507/5 1536/21  1549/24 1562/14 1572/24 1589/17 1592/17  1598/8 1601/21 1609/14 1611/17 1614/5  1616/3 1616/17 1619/17 1629/13 1630/8  1631/17  puts [1] 1630/4  putting [2] 1619/20 1647/19</p> <p><b>Q</b></p> <p>quality [1] 1625/3  question [18] 1553/4 1553/7 1554/6 1573/3  1573/13 1577/18 1580/25 1584/9 1584/10  1585/18 1595/22 1597/2 1597/12 1597/14  1613/25 1637/1 1643/22 1643/22  questioning [1] 1631/6  questions [18] 1510/14 1510/16 1512/8  1517/11 1576/7 1576/14 1576/15 1577/21  1592/20 1594/20 1596/17 1597/16 1602/6  1609/15 1617/14 1617/15 1626/15 1643/23  quick [2] 1505/9 1545/5  quicker [1] 1557/5</p>
---	--	---

<p><b>Q</b></p> <p>quickly [4] 1531/7 1556/19 1609/10 1613/2 quite [10] 1519/14 1519/14 1529/18 1533/21 1537/20 1549/21 1581/25 1591/19 1597/16 1615/4 quote [4] 1592/4 1592/12 1597/10 1610/8</p>	<p><b>Read</b> [1] 1651/6 refer [8] 1522/16 1527/20 1544/12 1564/8 1587/22 1593/25 1607/12 1610/16 reference [8] 1559/15 1563/23 1570/1 1576/24 1577/3 1619/18 1622/4 1643/23 referenced [4] 1563/21 1577/13 1642/8 1643/7 references [4] 1519/15 1622/9 1622/11 1622/22 referred [10] 1518/13 1553/20 1555/5 1569/7 1583/14 1585/2 1595/9 1595/19 1599/25 1607/15 referring [7] 1529/14 1574/15 1579/25 1607/22 1607/25 1608/3 1625/25 refers [3] 1593/4 1600/6 1600/15 reflect [3] 1548/13 1618/19 1625/23 refresh [1] 1615/24 refueling [1] 1645/4 refute [1] 1519/7 REGAN [6] 1501/23 1510/5 1578/5 1583/19 1591/2 1617/22 regarding [3] 1532/19 1620/20 1626/8 regards [1] 1622/1 region [1] 1575/15 regional [3] 1535/22 1608/9 1608/18 regularly [2] 1591/9 1637/3 regulating [1] 1605/9 regulations [2] 1604/24 1644/5 regulator [1] 1590/22 related [1] 1606/13 relates [2] 1510/17 1510/24 relating [1] 1543/10 relation [1] 1596/21 relationship [3] 1522/23 1551/3 1561/17 relative [7] 1527/15 1531/8 1542/15 1546/18 1552/21 1619/9 1644/9 relatively [9] 1523/15 1523/17 1527/14 1536/13 1537/15 1538/6 1550/8 1594/9 1632/4 relevance [5] 1519/8 1519/9 1523/19 1542/19 1585/15 relevant [5] 1519/5 1542/3 1542/5 1599/13 1605/20 reliance [4] 1553/5 1554/3 1577/10 1603/19 relied [9] 1587/5 1587/14 1587/15 1598/11 1599/2 1599/6 1604/2 1605/25 1613/4 relief [2] 1550/22 1645/23 relieve [1] 1644/21 relocated [1] 1651/9 rely [1] 1577/14 remain [1] 1639/13 remarkable [1] 1526/9 remember [18] 1513/10 1565/22 1581/12 1586/23 1590/3 1596/19 1607/25 1612/12 1615/23 1634/10 1635/13 1643/11 1644/12 1645/16 1648/5 1649/12 1650/17 1651/10 remind [3] 1540/10 1540/17 1598/13 removal [3] 1526/11 1526/17 1526/20 removed [1] 1526/10 render [1] 1577/16 repeat [1] 1584/8 rephrase [2] 1641/18 1649/4 replaced [2] 1642/19 1650/7 replacing [1] 1649/12 report [90] 1507/3 1510/12 1510/14 1510/21 1510/21 1511/15 1511/15 1511/17 1511/20 1511/21 1512/6 1518/16 1518/21 1519/14 1519/19 1539/19 1541/17 1543/22 1549/22 1549/23 1550/23 1550/25 1553/4 1554/2 1554/5 1554/6 1554/7 1555/5 1559/16 1563/23 1568/25 1571/2 1576/23 1576/24 1577/1 1577/3 1577/6 1577/9 1578/12 1580/15 1581/2 1581/5 1581/7 1581/10</p>	<p>1581/13 1581/14 1581/16 1582/3 1582/6 1582/13 1582/19 1582/22 1582/23 1582/25 1582/25 1583/5 1583/10 1583/13 1583/14 1584/2 1585/2 1585/15 1586/4 1586/5 1587/11 1590/12 1590/14 1597/23 1599/6 1599/16 1599/24 1603/10 1603/18 1604/2 1604/8 1605/19 1607/15 1607/16 1608/8 1610/7 1610/11 1611/7 1612/6 1612/13 1619/22 1619/25 1620/2 1645/19 1645/23 1646/7 reported [3] 1537/23 1636/14 1637/6 reporter [4] 1503/18 1578/7 1653/21 1653/25 reports [9] 1518/17 1518/18 1534/20 1549/16 1585/2 1593/25 1595/8 1646/11 1646/13 represent [5] 1508/15 1536/13 1555/25 1603/20 1615/7 representing [2] 1524/8 1533/12 reputable [2] 1548/22 1620/5 request [1] 1506/14 require [4] 1543/5 1575/4 1575/5 1575/6 requires [3] 1575/5 1605/5 1609/12 research [7] 1514/18 1514/18 1514/21 1516/4 1578/16 1584/3 1594/10 reserves [2] 1514/22 1514/23 reservoir [37] 1513/11 1522/4 1522/10 1522/10 1558/13 1561/21 1563/24 1565/3 1565/15 1565/23 1565/24 1567/2 1568/7 1568/11 1571/3 1571/9 1571/12 1571/14 1571/22 1572/20 1573/7 1579/6 1611/3 1612/8 1614/22 1614/23 1615/1 1615/2 1615/5 1615/12 1615/14 1615/22 1615/25 1618/13 1618/15 1618/18 1625/3 reservoirs [17] 1514/22 1522/4 1522/5 1522/15 1523/2 1523/9 1530/11 1530/12 1556/2 1558/13 1562/21 1591/7 1612/4 1616/6 1617/5 1618/10 1618/12 Resources [1] 1500/16 respect [58] 1514/19 1533/11 1533/14 1538/20 1541/20 1541/20 1558/10 1565/13 1576/25 1577/6 1578/10 1578/12 1579/3 1579/12 1579/14 1579/20 1581/7 1582/21 1583/8 1583/9 1584/17 1584/19 1585/20 1587/18 1587/20 1589/18 1590/1 1590/13 1592/2 1594/20 1594/21 1595/6 1595/25 1596/3 1597/3 1597/22 1599/10 1601/21 1603/22 1605/10 1605/11 1605/21 1606/5 1607/15 1607/18 1608/20 1608/22 1608/23 1609/8 1609/14 1614/18 1615/8 1615/12 1615/16 1615/20 1617/1 1619/2 1644/3 response [1] 1602/5 responsibilities [2] 1577/4 1577/6 responsible [6] 1589/10 1637/12 1637/22 1637/24 1638/14 1639/3 responsive [1] 1630/3 rest [5] 1531/8 1542/15 1557/8 1619/9 1623/14 resubmission [1] 1627/25 resubmit [1] 1628/3 resulted [1] 1586/2 results [1] 1583/16 resume [1] 1653/17 retired [1] 1651/7 revert [1] 1560/5 Revette [1] 1653/6 review [10] 1508/7 1509/7 1518/7 1566/8 1582/18 1584/19 1586/5 1586/18 1590/13 1608/16 reviewed [8] 1519/16 1539/19 1576/23 1578/16 1597/25 1603/13 1604/7 1623/20 revised [3] 1613/15 1613/15 1616/11 revisions [1] 1509/22</p>
<p><b>R</b></p> <p>R-A-N-D-A-L [1] 1631/2 RACHEL [3] 1500/18 1502/9 1628/18 raised [1] 1511/25 ramp [1] 1561/23 RANDAL [2] 1630/19 1630/23 Randy [3] 1628/12 1628/17 1630/17 range [1] 1601/13 rapid [1] 1565/16 rate [1] 1556/17 rather [5] 1520/2 1571/1 1585/6 1585/13 1585/21 re [3] 1498/3 1498/7 1628/3 re-pull [1] 1628/3 reach [3] 1550/11 1585/1 1618/12 reached [2] 1566/16 1618/18 reactions [3] 1557/23 1559/22 1579/9 read [6] 1569/12 1569/14 1569/16 1597/13 1624/9 1645/23 reading [2] 1512/16 1534/19 ready [6] 1510/4 1523/11 1630/14 1639/11 1644/15 1645/2 real [3] 1532/7 1552/12 1650/12 reality [1] 1593/21 realizes [1] 1521/25 really [15] 1514/20 1518/6 1518/8 1520/1 1521/18 1533/17 1535/10 1541/11 1552/15 1557/16 1570/12 1614/20 1625/20 1634/18 1648/13 reason [9] 1514/17 1521/17 1528/10 1552/24 1568/6 1592/17 1611/11 1639/1 1648/18 reasonable [2] 1601/1 1601/2 reasons [2] 1536/20 1575/7 reboot [1] 1545/15 recall [17] 1587/1 1592/4 1596/12 1597/4 1602/7 1605/16 1606/7 1639/25 1644/9 1645/12 1645/25 1648/7 1648/25 1649/5 1649/8 1651/6 1652/9 receive [2] 1516/12 1643/14 received [4] 1516/6 1516/7 1592/2 1628/21 receiving [1] 1592/4 recent [5] 1536/13 1552/21 1554/20 1592/2 1594/9 recently [2] 1516/6 1590/11 recess [4] 1545/16 1545/18 1627/8 1627/11 recipient [1] 1515/19 recognition [1] 1516/2 recognize [4] 1598/17 1598/24 1603/17 1619/15 recognized [1] 1582/1 recollection [6] 1591/14 1615/19 1615/24 1639/21 1645/9 1648/1 record [17] 1510/10 1511/10 1530/5 1532/9 1534/11 1545/21 1547/11 1592/12 1604/14 1606/16 1622/6 1625/23 1627/17 1629/20 1630/22 1634/23 1653/23 recorded [2] 1503/22 1531/2 recovering [1] 1514/22 red [6] 1523/8 1523/8 1524/1 1528/12 1540/4 1540/5 Redden [1] 1503/2 redefining [2] 1612/11 1612/14 redirect [2] 1617/17 1617/19 redistributed [1] 1526/5 redo [2] 1627/22 1628/3</p>	<p>referred [10] 1518/13 1553/20 1555/5 1569/7 1583/14 1585/2 1595/9 1595/19 1599/25 1607/15 referring [7] 1529/14 1574/15 1579/25 1607/22 1607/25 1608/3 1625/25 refers [3] 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1608/8 1610/7 1610/11 1611/7 1612/6 1612/13 1619/22 1619/25 1620/2 1645/19 1645/23 1646/7 reported [3] 1537/23 1636/14 1637/6 reporter [4] 1503/18 1578/7 1653/21 1653/25 reports [9] 1518/17 1518/18 1534/20 1549/16 1585/2 1593/25 1595/8 1646/11 1646/13 represent [5] 1508/15 1536/13 1555/25 1603/20 1615/7 representing [2] 1524/8 1533/12 reputable [2] 1548/22 1620/5 request [1] 1506/14 require [4] 1543/5 1575/4 1575/5 1575/6 requires [3] 1575/5 1605/5 1609/12 research [7] 1514/18 1514/18 1514/21 1516/4 1578/16 1584/3 1594/10 reserves [2] 1514/22 1514/23 reservoir [37] 1513/11 1522/4 1522/10 1522/10 1558/13 1561/21 1563/24 1565/3 1565/15 1565/23 1565/24 1567/2 1568/7 1568/11 1571/3 1571/9 1571/12 1571/14 1571/22 1572/20 1573/7 1579/6 1611/3 1612/8 1614/22 1614/23 1615/1 1615/2 1615/5 1615/12 1615/14 1615/22 1615/25 1618/13 1618/15 1618/18 1625/3 reservoirs [17] 1514/22 1522/4 1522/5 1522/15 1523/2 1523/9 1530/11 1530/12 1556/2 1558/13 1562/21 1591/7 1612/4 1616/6 1617/5 1618/10 1618/12 Resources [1] 1500/16 respect [58] 1514/19 1533/11 1533/14 1538/20 1541/20 1541/20 1558/10 1565/13 1576/25 1577/6 1578/10 1578/12 1579/3 1579/12 1579/14 1579/20 1581/7 1582/21 1583/8 1583/9 1584/17 1584/19 1585/20 1587/18 1587/20 1589/18 1590/1 1590/13 1592/2 1594/20 1594/21 1595/6 1595/25 1596/3 1597/3 1597/22 1599/10 1601/21 1603/22 1605/10 1605/11 1605/21 1606/5 1607/15 1607/18 1608/20 1608/22 1608/23 1609/8 1609/14 1614/18 1615/8 1615/12 1615/16 1615/20 1617/1 1619/2 1644/3 response [1] 1602/5 responsibilities [2] 1577/4 1577/6 responsible [6] 1589/10 1637/12 1637/22 1637/24 1638/14 1639/3 responsive [1] 1630/3 rest [5] 1531/8 1542/15 1557/8 1619/9 1623/14 resubmission [1] 1627/25 resubmit [1] 1628/3 resulted [1] 1586/2 results [1] 1583/16 resume [1] 1653/17 retired [1] 1651/7 revert [1] 1560/5 Revette [1] 1653/6 review [10] 1508/7 1509/7 1518/7 1566/8 1582/18 1584/19 1586/5 1586/18 1590/13 1608/16 reviewed [8] 1519/16 1539/19 1576/23 1578/16 1597/25 1603/13 1604/7 1623/20 revised [3] 1613/15 1613/15 1616/11 revisions [1] 1509/22</p>



<b>R</b>		
RICHARD [1] 1502/16 riches [1] 1576/2 ridges [1] 1550/20 ridiculously [1] 1523/13 rig [27] 1498/3 1505/19 1507/5 1600/9 1632/2 1633/17 1633/24 1634/14 1634/16 1634/17 1635/23 1636/3 1636/8 1636/17 1637/1 1637/24 1639/6 1641/11 1642/7 1644/24 1644/24 1645/2 1650/11 1650/14 1650/14 1650/16 1651/20 right [98] 1505/6 1506/1 1506/24 1507/7 1508/3 1508/11 1508/25 1509/10 1509/23 1511/17 1511/20 1517/11 1519/2 1524/10 1524/15 1534/13 1539/13 1540/1 1544/5 1545/5 1545/6 1546/1 1546/7 1546/9 1549/15 1554/13 1557/15 1561/5 1561/5 1561/8 1566/2 1566/20 1568/1 1570/5 1570/6 1570/16 1571/5 1571/6 1572/18 1573/23 1577/19 1577/23 1578/14 1583/8 1583/25 1588/18 1598/12 1600/1 1600/8 1600/22 1606/17 1611/4 1611/6 1613/5 1613/8 1613/12 1613/17 1613/21 1614/1 1615/16 1616/18 1616/19 1616/24 1617/5 1617/7 1617/7 1620/12 1626/17 1627/8 1627/13 1628/7 1629/18 1629/20 1632/6 1634/2 1635/4 1636/10 1637/3 1637/7 1639/7 1639/16 1640/18 1640/24 1640/25 1642/13 1644/6 1644/13 1645/5 1646/16 1646/17 1646/24 1647/14 1648/9 1650/18 1651/10 1651/20 1652/17 1653/14 right-hand [1] 1557/15 rightly [2] 1591/19 1594/8 rigs [3] 1631/25 1632/14 1632/14 rise [3] 1505/4 1627/10 1627/12 riser [1] 1638/1 rises [1] 1556/19 risk [5] 1508/19 1562/18 1562/19 1573/15 1596/6 risks [11] 1563/2 1575/8 1583/17 1586/15 1596/4 1596/5 1596/6 1596/6 1596/9 1596/13 1597/4 Ritchie [1] 1564/24 river [3] 1525/18 1526/2 1575/3 RMR [4] 1503/18 1653/21 1653/24 1653/25 ROBERT [2] 1499/3 1502/3 ROBERTS [3] 1502/9 1503/4 1509/17 rock [50] 1512/21 1527/19 1528/3 1530/14 1531/14 1531/17 1531/17 1531/20 1531/24 1532/6 1532/19 1532/21 1532/21 1532/21 1532/23 1532/24 1532/24 1533/4 1533/10 1533/10 1533/16 1533/22 1534/4 1534/7 1534/11 1534/17 1534/20 1535/5 1535/6 1535/10 1535/15 1535/15 1535/17 1535/21 1535/25 1535/25 1536/6 1536/7 1540/22 1541/5 1557/20 1559/2 1561/2 1562/12 1562/20 1563/6 1571/16 1571/18 1572/25 1578/20 rock's [1] 1528/5 rocks [51] 1520/7 1523/4 1523/4 1523/7 1526/20 1526/23 1526/24 1527/2 1528/9 1530/11 1530/17 1530/20 1530/22 1530/24 1530/25 1531/4 1532/15 1532/18 1533/12 1533/14 1533/15 1534/1 1537/9 1537/14 1537/14 1541/9 1543/4 1543/11 1543/14 1558/7 1558/11 1558/12 1558/15 1558/18 1558/20 1558/22 1559/3 1560/2 1561/7 1561/8 1562/16 1562/25 1567/25 1571/24 1575/11 1578/23 1579/3 1579/10 1579/15 1602/9 1602/11 rode [1] 1634/17 role [1] 1647/5	rolls [1] 1597/16 ROM [1] 1507/21 Ronnie [5] 1629/9 1649/10 1649/12 1649/14 1650/22 room [2] 1503/19 1609/24 rotated [1] 1641/11 rotation [1] 1634/19 Rouge [2] 1500/4 1501/13 rough [1] 1609/4 roughly [1] 1550/15 rounds [1] 1637/1 roustabout [4] 1631/20 1631/25 1632/11 1633/19 routine [1] 1514/8 routinely [1] 1580/23 Roy [2] 1498/18 1498/19 rules [5] 1642/5 1643/14 1643/15 1644/2 1644/2 run [1] 1619/8 run-pre-drill-the-mill [1] 1619/8 running [2] 1550/2 1550/15 runs [3] 1566/19 1602/22 1647/3 Rusnak [1] 1500/5	1593/5 1594/5 1621/8 1621/17 1623/4 1623/15 scientific [10] 1543/10 1570/15 1575/13 1576/5 1585/12 1589/17 1594/7 1594/10 1600/21 1623/20 scientifically [3] 1554/25 1570/13 1592/25 scientist [1] 1519/12 scientists [6] 1522/17 1525/21 1542/17 1547/2 1553/24 1624/10 SCOFIELD [1] 1503/15 scope [2] 1541/17 1553/4 SCOTT [1] 1500/17 scrape [1] 1534/14 screen [7] 1507/6 1544/14 1545/25 1546/4 1546/5 1565/1 1597/13 scribbles [1] 1568/25 sea [7] 1514/4 1515/5 1525/15 1530/8 1530/19 1530/19 1639/17 seafloor [15] 1524/22 1546/18 1547/23 1548/5 1549/1 1549/11 1549/24 1549/25 1550/11 1550/12 1553/23 1605/20 1608/5 1608/25 1609/3 seals [4] 1530/22 1558/11 1558/23 1621/3 seamen [2] 1638/24 1638/25 seated [3] 1505/5 1545/19 1627/13 second [4] 1505/17 1527/15 1547/17 1651/5 Secrest [1] 1503/2 section [10] 1498/4 1500/16 1501/3 1569/10 1581/15 1582/23 1599/6 1642/11 1642/11 1642/12 secure [1] 1552/15 secured [1] 1639/18 Sedco [1] 1632/17 sediment [8] 1526/4 1526/11 1526/12 1526/17 1526/20 1551/10 1557/19 1626/3 sedimentary [2] 1557/19 1557/19 sedimented [1] 1527/9 sediments [1] 1588/6 see [36] 1510/25 1524/6 1524/22 1524/24 1525/1 1532/16 1534/5 1534/9 1534/15 1542/11 1544/15 1544/16 1545/16 1547/4 1547/25 1549/7 1550/16 1555/21 1556/4 1556/5 1561/16 1565/1 1573/7 1576/16 1576/24 1577/3 1577/12 1591/7 1597/13 1597/14 1600/4 1601/24 1603/19 1609/9 1622/5 1622/11 seeing [2] 1518/17 1605/16 seems [3] 1533/20 1564/20 1620/22 seen [10] 1518/18 1543/19 1544/7 1553/11 1553/14 1564/1 1575/19 1588/13 1599/23 1603/21 seep [3] 1608/6 1608/6 1608/7 seepage [6] 1527/5 1607/25 1608/2 1608/4 1608/10 1608/18 segment [1] 1560/6 seismic [21] 1527/17 1530/1 1530/2 1530/4 1531/1 1535/19 1543/12 1548/8 1548/9 1548/13 1548/16 1548/17 1548/21 1548/22 1551/12 1554/20 1605/25 1606/2 1607/7 1608/23 1626/9 seismically [1] 1551/16 seismicity [3] 1552/3 1608/23 1609/10 self [1] 1605/9 self-regulating [1] 1605/9 semisubmersible [1] 1633/24 senior [9] 1513/11 1631/10 1633/16 1636/14 1636/22 1641/25 1642/4 1644/21 1648/11 sense [1] 1549/23 sensitive [1] 1540/8 sent [2] 1506/18 1506/20 sentence [6] 1569/10 1570/1 1571/8 1581/19 1582/9 1600/15 sentences [1] 1599/25
<b>S</b>		
s/Jodi [1] 1653/24 safe [7] 1541/13 1563/14 1563/15 1580/23 1622/18 1622/22 1623/19 safely [2] 1543/16 1576/6 safety [2] 1652/18 1653/4 said [13] 1505/12 1542/14 1549/22 1586/6 1589/8 1600/18 1600/24 1610/11 1612/21 1614/21 1620/23 1625/24 1628/12 salt [2] 1550/10 1550/14 same [27] 1508/7 1509/11 1509/21 1518/22 1519/11 1532/22 1532/23 1533/2 1533/2 1533/3 1533/5 1553/24 1554/4 1556/15 1557/8 1558/17 1558/24 1561/8 1582/22 1591/22 1603/22 1611/20 1611/23 1618/2 1639/21 1639/24 1644/15 sample [1] 1615/4 sampled [1] 1615/2 samples [1] 1603/1 San [2] 1499/17 1500/14 sand [4] 1512/20 1528/4 1592/14 1592/16 sandstone [3] 1535/16 1536/3 1571/17 sandstones [1] 1513/6 sat [1] 1592/5 saturated [1] 1526/1 saw [4] 1506/10 1595/8 1613/13 1628/11 1523/4 1531/4 1531/8 1531/23 1533/1 1537/11 1543/8 1552/23 1566/10 1568/7 1570/4 1570/7 1572/17 1581/19 1583/6 1585/3 1586/19 1591/18 1591/21 1594/2 1599/5 1604/15 1605/4 1607/1 1612/7 1622/18 1622/22 1623/12 1623/19 1625/10 1629/19 1633/18 1633/22 1645/25 1647/22 1649/24 saying [7] 1566/21 1570/13 1572/17 1572/19 1593/16 1612/13 1625/19 says [3] 1524/9 1548/7 1620/13 scale [13] 1524/11 1536/21 1548/1 1548/1 1548/3 1555/17 1555/18 1602/3 1606/18 1606/18 1606/20 1608/9 1608/18 scar [2] 1551/9 1551/9 Scherschel [1] 1564/24 Schlumberger [6] 1610/15 1610/18 1612/4 1613/14 1620/6 1620/8 Schlumberger's [2] 1610/25 1611/1 scholarly [1] 1515/15 science [15] 1512/14 1519/1 1519/3 1576/5 1585/8 1585/9 1585/11 1592/18 1592/19		

<p><b>S</b></p> <p>September [1] 1587/7</p> <p>Sepulvado [7] 1629/9 1649/10 1649/14 1650/7 1650/22 1650/23 1651/3</p> <p>series [1] 1647/3</p> <p>serious [1] 1552/5</p> <p>Services [2] 1503/7 1503/12</p> <p>SESSION [2] 1498/13 1505/1</p> <p>sessions [2] 1591/9 1591/13</p> <p>set [10] 1509/20 1541/12 1548/16 1554/2 1577/1 1583/13 1600/24 1636/10 1643/9 1651/18</p> <p>several [4] 1596/17 1624/1 1625/13 1637/1</p> <p>shade [1] 1546/17</p> <p>Shakespeare [1] 1539/4</p> <p>shale [2] 1558/1 1589/12</p> <p>shallow [20] 1521/2 1523/3 1525/11 1535/23 1537/7 1537/8 1537/11 1537/23 1543/22 1543/22 1543/25 1544/7 1547/18 1549/25 1550/23 1551/14 1565/23 1605/15 1632/3 1632/4</p> <p>shallower [1] 1525/16</p> <p>shallowest [2] 1522/25 1615/5</p> <p>shape [2] 1526/25 1550/15</p> <p>share [1] 1648/17</p> <p>shared [4] 1589/4 1623/11 1648/10 1648/12</p> <p>sharing [1] 1648/25</p> <p>SHARON [1] 1500/24</p> <p>shattered [1] 1531/5</p> <p>Shaw [1] 1499/12</p> <p>she [4] 1505/12 1505/12 1634/11 1634/20</p> <p>shelf [6] 1514/5 1524/21 1525/11 1544/16 1544/17 1544/23</p> <p>shell [3] 1514/14 1550/3 1632/23</p> <p>shift [1] 1607/12</p> <p>ship [1] 1642/22</p> <p>shipyard [2] 1634/11 1634/15</p> <p>shook [1] 1537/22</p> <p>shore [1] 1523/3</p> <p>short [3] 1632/12 1650/20 1650/21</p> <p>should [15] 1512/12 1519/6 1530/3 1566/5 1566/7 1570/21 1574/5 1574/6 1574/8 1575/16 1584/8 1590/9 1593/16 1596/8 1614/14</p> <p>show [12] 1529/19 1531/18 1531/20 1533/24 1550/21 1555/7 1556/14 1593/4 1603/16 1603/18 1609/23 1611/10</p> <p>showed [4] 1549/23 1555/23 1598/4 1623/8</p> <p>shown [5] 1595/25 1599/3 1604/12 1604/13 1605/15</p> <p>shows [7] 1543/11 1548/14 1557/18 1561/22 1561/25 1569/10 1611/2</p> <p>shuckers [1] 1632/23</p> <p>SHUTLER [1] 1500/24</p> <p>side [9] 1548/14 1553/18 1555/17 1557/15 1616/24 1617/11 1633/21 1638/20 1638/23</p> <p>signal [1] 1531/1</p> <p>significance [2] 1526/7 1560/17</p> <p>significant [3] 1528/8 1538/16 1574/2</p> <p>Silver [1] 1505/25</p> <p>Silver Springs [1] 1505/25</p> <p>Simcox [5] 1503/18 1503/20 1653/21 1653/24 1653/25</p> <p>similar [4] 1516/9 1533/6 1605/2 1605/2</p> <p>similarities [1] 1605/3</p> <p>similarity [1] 1579/17</p> <p>simply [6] 1525/22 1557/21 1589/17 1593/24 1611/24 1628/1</p> <p>simulators [1] 1589/9</p> <p>since [7] 1559/18 1599/14 1624/21 1625/1 1628/24 1633/6 1633/12</p> <p>SINCLAIR [1] 1501/9</p>	<p>single [5] 1511/20 1511/21 1580/4 1583/18 1596/23</p> <p>sir [80] 1520/25 1576/24 1577/3 1577/5 1577/9 1577/14 1580/21 1583/6 1630/25 1631/1 1631/12 1631/19 1632/4 1632/10 1632/12 1632/15 1632/21 1633/1 1633/7 1633/11 1633/22 1634/4 1634/6 1634/14 1634/21 1635/20 1635/22 1636/7 1636/11 1636/16 1636/19 1636/21 1636/24 1637/5 1637/17 1638/5 1638/12 1638/19 1638/24 1639/14 1639/24 1640/2 1640/10 1640/19 1640/21 1641/4 1641/11 1641/12 1642/1 1642/15 1642/17 1642/21 1643/8 1643/21 1643/25 1644/5 1644/14 1644/17 1644/20 1645/2 1645/7 1645/11 1646/10 1646/16 1646/19 1646/23 1648/5 1648/16 1649/16 1650/5 1650/20 1650/24 1651/1 1651/5 1652/2 1652/4 1652/7 1652/14 1652/17 1652/25</p> <p>sit [3] 1592/12 1604/23 1608/12</p> <p>site [8] 1523/13 1529/20 1638/7 1641/9 1649/6 1651/3 1651/7 1651/19</p> <p>sited [1] 1585/17</p> <p>sitting [1] 1653/6</p> <p>situations [1] 1605/2</p> <p>sixth [1] 1539/10</p> <p>size [1] 1532/23</p> <p>Skripnikova [1] 1564/24</p> <p>slide [7] 1523/18 1523/23 1523/25 1524/2 1547/12 1547/15 1591/6</p> <p>Slidell [1] 1499/23</p> <p>slides [1] 1575/11</p> <p>slight [2] 1590/18 1591/3</p> <p>slightly [3] 1538/18 1562/15 1566/12</p> <p>slope [9] 1524/20 1525/8 1525/11 1525/24 1526/4 1544/18 1547/5 1550/6 1626/3</p> <p>slopes [1] 1550/9</p> <p>sloping [1] 1524/22</p> <p>slotted [1] 1628/14</p> <p>slower [1] 1570/8</p> <p>slower-than-predicted [1] 1570/8</p> <p>slump [4] 1550/24 1551/2 1551/9 1551/9</p> <p>slumped [1] 1551/10</p> <p>slumping [5] 1527/6 1527/7 1527/11 1575/10 1626/2</p> <p>small [1] 1527/14</p> <p>smectite [1] 1558/4</p> <p>smiling [1] 1625/23</p> <p>so [155] 1506/2 1506/13 1506/16 1507/24 1509/8 1514/19 1518/5 1522/9 1522/13 1522/19 1523/5 1523/8 1525/7 1525/10 1525/15 1526/20 1529/4 1529/19 1530/20 1530/24 1531/7 1532/16 1534/14 1534/17 1535/10 1535/12 1536/14 1537/4 1537/8 1538/4 1538/6 1538/16 1539/10 1539/24 1540/8 1540/9 1541/4 1541/7 1541/13 1541/20 1542/23 1542/24 1543/2 1543/4 1543/4 1546/17 1546/20 1547/25 1548/2 1548/4 1548/5 1548/15 1550/3 1550/7 1550/9 1550/23 1554/24 1555/18 1555/24 1556/8 1558/20 1558/21 1559/20 1561/3 1561/9 1561/11 1561/19 1562/3 1562/17 1562/23 1563/9 1564/17 1565/11 1565/18 1566/2 1566/2 1566/15 1567/10 1568/10 1569/1 1570/13 1570/22 1576/1 1578/24 1579/1 1581/22 1583/8 1587/16 1588/15 1591/18 1591/19 1593/5 1593/7 1593/8 1594/14 1594/19 1596/8 1596/23 1599/2 1600/8 1600/14 1600/15 1600/23 1601/13 1601/15 1602/1 1605/1 1606/25 1607/7 1609/23 1610/10 1611/6 1611/19 1611/21 1612/1 1613/7 1613/11 1615/3 1615/12 1616/3 1616/6 1618/14 1618/17 1619/2 1619/6</p>	<p>1622/6 1623/3 1624/6 1625/4 1625/5 1625/12 1627/5 1628/25 1629/5 1631/17 1633/18 1633/23 1635/3 1635/13 1635/14 1635/16 1639/16 1641/5 1641/8 1641/24 1642/7 1642/18 1642/22 1643/22 1645/5 1646/5 1646/6 1646/20 1648/6 1652/13</p> <p>soaking [1] 1635/3</p> <p>society [1] 1590/15</p> <p>software [4] 1503/23 1590/1 1590/5 1590/8</p> <p>sole [2] 1599/16 1640/8</p> <p>solely [1] 1639/3</p> <p>solid [4] 1534/10 1540/5 1594/10 1632/23</p> <p>some [65] 1505/14 1506/5 1507/21 1509/21 1510/6 1510/14 1510/15 1518/21 1518/22 1524/1 1524/25 1530/2 1530/11 1530/11 1530/20 1534/7 1539/18 1548/3 1556/18 1558/2 1559/14 1563/19 1564/2 1564/2 1565/19 1565/20 1566/4 1566/23 1567/25 1571/1 1573/20 1579/8 1590/2 1592/23 1594/1 1594/19 1601/10 1601/11 1603/10 1605/23 1605/23 1605/24 1606/6 1606/22 1607/1 1609/12 1615/3 1616/6 1616/10 1616/13 1616/15 1624/11 1624/16 1627/4 1631/10 1633/16 1635/3 1635/9 1639/10 1641/11 1645/3 1646/8 1647/24 1648/12 1652/10</p> <p>somebody [3] 1546/5 1632/22 1636/5</p> <p>someone [3] 1509/23 1526/18 1600/21</p> <p>something [19] 1516/16 1535/23 1539/11 1551/2 1555/13 1568/10 1579/22 1593/9 1593/16 1596/1 1601/17 1605/5 1605/7 1606/22 1614/5 1619/20 1624/9 1627/16 1651/9</p> <p>sometime [1] 1622/2</p> <p>somewhat [1] 1510/20</p> <p>somewhere [5] 1526/2 1529/17 1529/18 1567/12 1646/4</p> <p>Sonat [4] 1633/3 1633/5 1633/9 1633/13</p> <p>sorry [17] 1507/13 1508/16 1531/3 1532/12 1533/20 1540/10 1544/13 1545/12 1584/23 1611/1 1613/9 1623/5 1623/6 1623/7 1641/17 1649/3 1653/16</p> <p>sort [14] 1527/23 1530/8 1537/10 1539/12 1547/23 1550/5 1550/8 1550/15 1550/18 1552/17 1562/14 1565/18 1610/4 1611/3</p> <p>sorts [1] 1522/11</p> <p>sound [2] 1576/5 1576/5</p> <p>sounds [2] 1554/12 1572/16</p> <p>source [1] 1552/14</p> <p>sources [1] 1587/14</p> <p>south [5] 1524/17 1556/24 1557/2 1634/7 1634/16</p> <p>South Africa [1] 1634/16</p> <p>Southeastern [1] 1632/17</p> <p>southwest [1] 1550/16</p> <p>space [2] 1506/14 1600/15</p> <p>speak [2] 1622/14 1622/15</p> <p>speaking [1] 1583/21</p> <p>special [1] 1591/9</p> <p>specialize [1] 1515/4</p> <p>specialized [1] 1602/25</p> <p>specific [14] 1583/1 1583/11 1584/3 1584/25 1585/6 1585/13 1610/14 1613/11 1613/19 1615/18 1615/25 1627/2 1645/9 1648/1</p> <p>specifically [10] 1540/6 1573/21 1573/22 1586/14 1586/19 1596/18 1599/7 1627/18 1635/6 1638/14</p> <p>specifics [2] 1541/24 1585/22</p> <p>speculate [1] 1553/8</p> <p>speech [1] 1622/1</p> <p>spelling [2] 1511/10 1630/22</p> <p>SPILL [1] 1498/3</p> <p>SPIRO [1] 1501/4</p>
--	---	---

<p><b>S</b></p> <p>splitting [2] 1547/21 1547/22</p> <p>spoke [3] 1505/12 1509/19 1616/20</p> <p>spot [1] 1628/14</p> <p>spots [1] 1555/24</p> <p>Springs [1] 1505/25</p> <p>spud [1] 1553/2</p> <p>spudded [1] 1638/7</p> <p>squeezing [1] 1557/22</p> <p>stability [1] 1637/25</p> <p>stack [1] 1507/4</p> <p>stage [2] 1530/23 1646/1</p> <p>stand [4] 1524/21 1544/11 1549/23 1605/19</p> <p>stand-alone [3] 1544/11 1549/23 1605/19</p> <p>standard [6] 1547/23 1587/19 1605/5 1609/17 1609/19 1610/1</p> <p>standards [7] 1604/17 1604/20 1604/21 1604/23 1605/6 1609/21 1620/15</p> <p>stands [2] 1619/2 1645/12</p> <p>star [1] 1523/13</p> <p>start [12] 1522/19 1534/15 1544/17 1557/4 1569/9 1571/22 1571/24 1578/9 1610/8 1631/20 1634/8 1641/24</p> <p>started [11] 1525/14 1625/1 1631/18 1632/2 1633/12 1633/18 1641/2 1641/20 1643/3 1644/9 1650/16</p> <p>starting [5] 1543/23 1557/5 1620/12 1631/19 1633/9</p> <p>starts [5] 1520/6 1520/12 1558/5 1562/6 1622/12</p> <p>state [8] 1501/7 1501/11 1501/15 1508/16 1511/9 1550/5 1582/25 1630/21</p> <p>stated [1] 1565/6</p> <p>statement [7] 1584/7 1584/9 1625/19 1635/12 1640/9 1648/19 1648/20</p> <p>states [14] 1498/1 1498/9 1498/15 1500/11 1500/15 1500/21 1501/2 1507/19 1576/9 1576/12 1582/9 1590/16 1630/8 1653/21</p> <p>static [1] 1612/8</p> <p>Station [1] 1501/5</p> <p>statisticians [1] 1593/8</p> <p>Statoil [22] 1512/25 1513/2 1513/7 1513/12 1513/17 1513/19 1513/20 1513/21 1513/24 1522/17 1527/24 1555/13 1559/17 1559/21 1574/13 1579/23 1580/1 1580/3 1581/1 1624/2 1624/4 1624/7</p> <p>statue [1] 1528/5</p> <p>stay [1] 1638/15</p> <p>stayed [3] 1632/7 1638/8 1638/14</p> <p>steep [2] 1525/8 1525/11</p> <p>steering [6] 1505/8 1511/3 1517/25 1627/16 1627/23 1631/7</p> <p>stenographer [1] 1545/12</p> <p>stenography [1] 1503/22</p> <p>step [1] 1593/4</p> <p>Stephanie [1] 1629/21</p> <p>STEPHEN [2] 1498/22 1521/20</p> <p>steps [2] 1519/2 1595/5</p> <p>Sterbcow [6] 1499/5 1499/6 1508/8 1627/15 1631/5 1653/11</p> <p>STERNBERG [1] 1503/12</p> <p>STEVEN [2] 1500/17 1502/9</p> <p>sticks [1] 1645/14</p> <p>still [5] 1529/19 1568/4 1570/18 1634/2 1635/22</p> <p>Stone [1] 1502/22</p> <p>stop [2] 1611/25 1653/14</p> <p>stopped [1] 1646/5</p> <p>straight [1] 1556/14</p> <p>straightforward [1] 1554/11</p> <p>STRANGE [1] 1501/8</p> <p>strata [1] 1585/5</p>	<p>Street [19] 1498/19 1499/3 1499/6 1499/10 1499/13 1499/22 1500/3 1500/9 1501/12 1501/16 1501/19 1502/6 1502/10 1502/17 1502/23 1503/5 1503/9 1503/16 1503/19</p> <p>strength [2] 1537/25 1540/22</p> <p>stress [5] 1527/19 1527/21 1528/2 1528/2 1575/11</p> <p>stresses [1] 1537/16</p> <p>stretch [1] 1526/25</p> <p>strike [4] 1541/21 1553/25 1572/9 1573/10</p> <p>structure [2] 1528/6 1567/2</p> <p>students [6] 1515/2 1515/5 1624/20 1625/7 1625/8 1625/11</p> <p>studied [1] 1530/3</p> <p>studies [2] 1512/19 1512/20</p> <p>study [7] 1512/16 1512/18 1515/9 1515/11 1522/14 1551/13 1565/4</p> <p>studying [1] 1553/22</p> <p>stunt [1] 1533/20</p> <p>subject [3] 1511/24 1585/22 1587/11</p> <p>submarine [18] 1518/3 1518/7 1525/4 1525/20 1525/25 1527/4 1527/16 1528/9 1528/16 1542/20 1543/3 1543/13 1544/18 1553/18 1583/2 1583/12 1584/18 1585/16</p> <p>submission [1] 1509/20</p> <p>submit [3] 1507/22 1627/2 1627/7</p> <p>submitted [13] 1507/14 1512/7 1553/5 1553/6 1581/5 1582/7 1582/15 1582/19 1587/6 1599/15 1627/19 1627/21 1629/17</p> <p>subpoena [1] 1505/20</p> <p>subsea [2] 1537/12 1639/13</p> <p>subsections [1] 1591/12</p> <p>subsequently [1] 1603/21</p> <p>substance [1] 1592/4</p> <p>substantial [1] 1646/14</p> <p>subsurface [2] 1515/10 1564/12</p> <p>subtract [1] 1641/6</p> <p>success [1] 1535/14</p> <p>successful [1] 1569/23</p> <p>successfully [3] 1576/6 1585/9 1597/17</p> <p>such [7] 1522/9 1524/23 1527/8 1528/25 1530/12 1590/10 1608/13</p> <p>suddenly [2] 1526/21 1527/1</p> <p>suffer [1] 1595/3</p> <p>sufficient [2] 1560/8 1560/10</p> <p>suggest [5] 1509/24 1538/19 1575/8 1575/13 1612/11</p> <p>suggesting [1] 1619/9</p> <p>suggestion [2] 1612/17 1627/24</p> <p>suggestions [1] 1506/17</p> <p>suggests [3] 1612/13 1613/16 1623/9</p> <p>Suite [14] 1498/19 1499/6 1499/10 1499/16 1499/19 1501/19 1502/6 1502/10 1502/17 1502/20 1503/5 1503/9 1503/12 1503/16</p> <p>SULLIVAN [1] 1500/23</p> <p>sum [1] 1592/4</p> <p>summaries [1] 1627/25</p> <p>summarize [1] 1620/22</p> <p>summarizing [1] 1525/22</p> <p>summary [2] 1539/21 1568/22</p> <p>supply [1] 1640/12</p> <p>support [7] 1553/6 1580/23 1581/5 1582/19 1622/23 1623/4 1623/21</p> <p>supporting [1] 1574/21</p> <p>suppose [2] 1531/24 1634/1</p> <p>supposed [3] 1533/21 1539/6 1539/7</p> <p>sure [28] 1505/15 1506/22 1509/16 1512/3 1521/25 1534/19 1536/11 1554/14 1560/19 1560/21 1580/7 1580/8 1580/9 1588/10 1603/11 1608/20 1610/4 1617/20 1624/19 1627/5 1630/5 1638/14 1641/18 1642/9 1644/3 1644/11 1647/22 1653/17</p> <p>surface [7] 1521/5 1530/6 1532/25 1548/12</p>	<p>1551/5 1556/16 1559/7</p> <p>surprised [2] 1566/5 1566/7</p> <p>Surprisingly [1] 1522/25</p> <p>surrounded [1] 1550/9</p> <p>surrounding [1] 1574/17</p> <p>surveys [1] 1549/4</p> <p>suspect [1] 1588/3</p> <p>sustain [1] 1584/13</p> <p>Sustained [1] 1553/9</p> <p>Sutherland [1] 1502/8</p> <p>swap [1] 1578/1</p> <p>Swedish [1] 1622/14</p> <p>swinging [1] 1561/23</p> <p>Swiss [1] 1508/20</p> <p>sworn [2] 1511/7 1630/20</p> <p>synthesis [1] 1601/4</p> <p>system [2] 1507/4 1638/11</p> <p>systems [3] 1634/22 1635/18 1650/14</p> <p><b>T</b></p> <p>table [1] 1528/3</p> <p>take [24] 1510/9 1517/12 1517/13 1517/14 1519/1 1545/16 1552/5 1557/16 1588/10 1597/3 1603/1 1607/8 1607/8 1612/17 1615/21 1616/17 1627/8 1634/11 1635/24 1636/23 1638/3 1644/6 1645/18 1646/22</p> <p>taken [6] 1578/18 1592/24 1615/10 1615/17 1629/16 1639/17</p> <p>takes [4] 1521/2 1521/5 1549/16 1572/10</p> <p>taking [4] 1526/18 1559/3 1597/1 1648/24</p> <p>talk [14] 1521/17 1524/3 1542/10 1563/13 1563/14 1588/11 1604/24 1608/8 1608/24 1619/2 1621/8 1636/20 1644/25 1645/3</p> <p>talked [6] 1538/20 1539/18 1559/12 1607/25 1621/17 1651/22</p> <p>talking [22] 1510/16 1523/5 1529/16 1534/12 1537/12 1538/1 1541/24 1544/24 1552/17 1554/1 1560/10 1566/3 1566/19 1575/21 1576/1 1579/24 1588/11 1588/12 1589/15 1606/6 1611/13 1646/9</p> <p>talks [1] 1621/13</p> <p>TANNER [1] 1503/15</p> <p>Tap [2] 1601/6 1601/12</p> <p>task [2] 1587/16 1647/24</p> <p>taught [4] 1515/2 1624/21 1625/6 1625/14</p> <p>teach [5] 1515/12 1596/3 1596/5 1597/5 1625/6</p> <p>teaching [7] 1515/6 1515/6 1515/8 1516/5 1532/15 1596/3 1625/2</p> <p>team [3] 1506/11 1652/9 1652/11</p> <p>teams [1] 1578/2</p> <p>tech [5] 1613/7 1635/3 1635/10 1636/1 1636/2</p> <p>technical [10] 1564/6 1564/9 1564/11 1569/5 1598/5 1598/10 1598/18 1599/2 1599/11 1624/3</p> <p>technology [7] 1512/12 1513/15 1592/19 1605/4 1613/8 1616/7 1636/4</p> <p>tectonic [2] 1528/24 1607/12</p> <p>Teddy [1] 1651/6</p> <p>tell [12] 1512/10 1514/11 1515/22 1517/19 1519/24 1521/8 1532/2 1540/17 1547/18 1563/2 1583/24 1650/15</p> <p>temperature [62] 1555/17 1556/15 1556/17 1556/19 1556/20 1556/23 1556/25 1557/3 1557/5 1560/6 1560/21 1561/12 1561/14 1561/15 1561/17 1562/3 1563/20 1563/24 1565/4 1566/14 1566/15 1566/25 1567/3 1568/8 1569/21 1574/16 1579/9 1579/11 1590/9 1590/17 1593/12 1593/13 1593/23 1595/7 1598/1 1609/14 1609/18 1609/20 1610/2 1610/5 1612/2 1612/4 1612/12 1612/22 1613/11 1613/21 1614/17 1614/21</p>
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<p><b>T</b></p> <p>temperature... [14] 1614/24 1615/8 1615/8 1615/14 1615/15 1615/16 1615/19 1616/18 1617/1 1617/4 1619/7 1620/9 1620/17 1621/6</p> <p>temperature-driven [1] 1579/9</p> <p>temperatures [8] 1565/13 1611/18 1611/20 1611/22 1611/24 1611/25 1615/5 1620/14</p> <p>temporary [2] 1648/3 1649/1</p> <p>tend [2] 1550/25 1558/18</p> <p>tendency [2] 1560/2 1580/10</p> <p>tender [3] 1513/3 1626/16 1626/17</p> <p>tens [1] 1530/6</p> <p>term [2] 1588/4 1608/2</p> <p>terminology [2] 1566/18 1632/22</p> <p>terms [21] 1506/15 1506/21 1514/22 1516/4 1516/5 1528/15 1533/12 1554/3 1565/8 1576/3 1579/7 1579/7 1603/18 1606/25 1616/23 1619/7 1634/22 1637/8 1646/1 1647/17 1650/2</p> <p>test [3] 1540/21 1541/18 1576/2</p> <p>tested [1] 1575/25</p> <p>testified [8] 1511/8 1516/20 1520/1 1573/20 1599/16 1602/5 1615/20 1630/20</p> <p>testify [2] 1573/4 1573/22</p> <p>testifying [1] 1629/8</p> <p>testimony [24] 1505/11 1506/15 1510/9 1511/14 1517/14 1521/15 1532/20 1533/18 1540/11 1560/24 1567/10 1573/14 1581/4 1583/10 1586/6 1606/10 1614/21 1615/13 1616/21 1626/2 1626/8 1626/24 1629/1 1653/14</p> <p>testing [3] 1575/23 1580/11 1609/12</p> <p>tests [3] 1540/21 1540/24 1595/13</p> <p>Texas [10] 1499/17 1500/7 1502/10 1502/21 1503/5 1503/10 1503/13 1503/17 1505/25 1529/5</p> <p>than [55] 1513/22 1515/18 1518/17 1522/6 1522/19 1523/5 1524/23 1525/13 1525/16 1525/16 1525/18 1525/21 1526/10 1534/21 1538/4 1538/13 1538/14 1539/23 1540/9 1543/1 1543/7 1544/14 1549/1 1552/4 1556/19 1557/9 1561/9 1561/10 1567/3 1567/20 1570/8 1571/3 1571/4 1571/14 1572/21 1580/1 1580/3 1583/17 1585/6 1585/13 1585/21 1594/15 1597/13 1599/21 1600/2 1606/18 1611/24 1614/24 1627/19 1628/22 1635/7 1635/10 1641/13 1643/13 1650/22</p> <p>Thank [15] 1507/10 1507/17 1507/18 1508/12 1509/15 1511/1 1511/2 1573/23 1576/11 1577/11 1577/19 1577/23 1597/21 1617/13 1626/20</p> <p>that [737]</p> <p>that's [168]</p> <p>their [24] 1514/18 1514/21 1525/22 1535/11 1535/11 1535/12 1535/12 1553/16 1553/16 1558/7 1559/10 1565/3 1568/22 1571/7 1579/25 1580/5 1580/13 1601/16 1639/5 1642/6 1642/7 1642/9 1647/8 1647/18</p> <p>them [46] 1507/16 1507/25 1508/2 1508/23 1509/8 1509/13 1511/25 1514/21 1515/22 1522/18 1526/23 1527/2 1527/2 1528/13 1528/15 1528/20 1529/1 1531/7 1534/1 1540/19 1543/10 1558/3 1559/7 1562/17 1569/14 1571/15 1583/16 1585/12 1601/12 1604/18 1606/2 1610/11 1611/25 1625/14 1627/22 1632/18 1632/20 1638/9 1639/11 1640/17 1641/12 1647/8 1647/9 1647/11 1647/18 1652/20</p> <p>themselves [1] 1530/12</p> <p>then [37] 1505/15 1507/4 1509/13 1510/9 1512/15 1545/5 1548/17 1556/4 1561/23</p>	<p>1562/6 1570/4 1570/7 1578/20 1581/22 1583/22 1584/17 1594/11 1608/20 1609/4 1609/6 1612/6 1618/18 1629/12 1632/24 1633/5 1633/9 1633/13 1634/16 1634/20 1637/11 1637/11 1637/12 1637/13 1638/2 1639/2 1641/25 1649/10</p> <p>theories [5] 1518/22 1519/5 1573/14 1589/24 1594/2</p> <p>theory [14] 1569/7 1572/15 1587/21 1587/22 1587/23 1588/20 1593/12 1593/22 1608/22 1609/9 1609/10 1624/22 1626/6 1626/13</p> <p>there [166]</p> <p>there's [47] 1516/16 1522/1 1523/15 1524/4 1524/25 1528/10 1529/25 1536/15 1539/15 1544/18 1545/25 1548/17 1549/21 1550/15 1550/22 1558/15 1558/22 1559/20 1561/17 1565/23 1571/1 1572/4 1572/4 1575/10 1588/15 1602/1 1605/5 1609/5 1611/14 1615/18 1617/9 1619/3 1622/9 1622/11 1622/18 1622/22 1622/25 1623/1 1623/3 1623/19 1625/10 1645/13 1645/18 1647/22 1647/23 1647/24 1648/21</p> <p>thereabouts [1] 1631/18</p> <p>therefore [1] 1561/11</p> <p>thermal [10] 1557/10 1557/23 1559/12 1569/6 1578/18 1580/12 1621/18 1622/23 1624/13 1624/21</p> <p>thermal-controlled [1] 1557/23</p> <p>thermally [2] 1558/4 1559/22</p> <p>thermally-driven [1] 1559/22</p> <p>these [76] 1507/14 1507/15 1508/24 1510/8 1520/22 1521/24 1522/3 1522/7 1522/15 1522/23 1523/2 1523/8 1523/16 1524/7 1524/17 1528/13 1528/15 1529/3 1530/1 1530/2 1530/2 1530/4 1530/6 1530/18 1530/22 1530/25 1533/24 1537/7 1539/10 1543/9 1543/13 1544/17 1544/23 1545/9 1550/5 1550/9 1550/21 1551/11 1553/16 1555/21 1555/24 1556/5 1556/15 1557/6 1557/6 1557/8 1558/2 1558/12 1558/15 1558/20 1559/11 1559/21 1559/23 1560/3 1561/24 1567/4 1568/25 1574/5 1574/6 1575/2 1589/9 1594/9 1594/10 1601/11 1609/11 1611/19 1616/4 1618/5 1618/6 1618/18 1618/20 1618/23 1620/3 1621/16 1630/4 1652/13</p> <p>they [93] 1506/23 1513/22 1514/25 1515/24 1522/18 1522/19 1523/10 1525/7 1526/25 1526/25 1529/12 1530/13 1530/18 1530/20 1531/5 1531/6 1535/19 1550/5 1550/11 1552/11 1552/12 1552/13 1553/1 1553/15 1553/15 1555/24 1558/21 1558/24 1559/6 1560/2 1562/17 1563/17 1564/3 1565/5 1566/10 1566/16 1569/11 1569/21 1569/22 1570/4 1570/7 1570/19 1570/20 1570/20 1570/21 1570/21 1570/22 1570/22 1570/23 1571/6 1571/14 1574/5 1574/8 1574/18 1575/5 1575/6 1579/9 1592/24 1594/2 1594/14 1596/8 1599/14 1601/16 1604/24 1606/5 1618/14 1624/16 1624/19 1625/16 1628/22 1631/24 1632/21 1638/8 1638/21 1638/25 1639/2 1640/19 1642/6 1642/10 1642/12 1643/15 1645/21 1646/20 1647/2 1647/3 1647/16 1648/17 1648/17 1648/18 1651/21 1651/25 1652/15 1652/15</p> <p>they'll [1] 1550/21</p> <p>they're [32] 1522/7 1523/3 1523/3 1523/4 1523/9 1526/24 1527/14 1530/5 1530/7 1531/5 1531/5 1543/5 1548/22 1551/11 1551/11 1558/23 1565/25 1566/12 1566/15 1566/20 1569/3 1569/25 1573/1 1579/15 1579/16 1601/2 1611/14 1618/13 1620/1 1620/5 1620/6 1636/8</p>	<p>they've [2] 1513/22 1550/11</p> <p>thick [1] 1561/22</p> <p>thickness [2] 1526/10 1526/11</p> <p>thing [12] 1509/13 1528/11 1532/7 1534/24 1536/18 1550/13 1559/22 1560/17 1574/9 1605/10 1620/8 1629/19</p> <p>things [25] 1520/20 1522/9 1532/16 1532/16 1533/25 1535/20 1543/14 1550/18 1552/17 1562/23 1563/4 1569/20 1576/1 1592/19 1593/1 1594/14 1596/7 1598/2 1601/7 1601/10 1603/4 1611/17 1611/20 1636/7 1639/8</p> <p>think [75] 1505/13 1506/10 1506/18 1507/25 1509/21 1516/16 1519/7 1527/15 1528/7 1528/14 1531/13 1532/10 1532/14 1537/19 1537/22 1538/24 1539/4 1541/22 1542/14 1544/11 1545/12 1546/9 1547/12 1549/21 1550/3 1550/25 1552/7 1559/22 1564/15 1568/9 1568/19 1569/14 1570/12 1570/20 1571/7 1572/7 1574/15 1577/9 1578/11 1581/2 1581/13 1581/15 1583/21 1584/13 1585/15 1591/16 1596/17 1597/19 1599/7 1600/20 1601/1 1602/5 1603/9 1604/23 1605/5 1605/7 1607/22 1608/15 1611/12 1611/15 1614/12 1617/12 1623/6 1624/9 1625/22 1628/1 1629/1 1638/5 1640/16 1640/23 1641/20 1645/11 1646/6 1649/10 1650/3</p> <p>thinking [1] 1567/5</p> <p>third [2] 1501/12 1587/7</p> <p>this [333]</p> <p>Thornhill [2] 1499/21 1499/22</p> <p>thorough [1] 1552/10</p> <p>those [44] 1507/9 1507/24 1508/25 1519/8 1520/20 1525/2 1527/3 1528/19 1530/22 1548/11 1550/10 1550/18 1551/4 1555/20 1558/11 1558/18 1560/23 1569/2 1577/13 1586/22 1591/12 1591/15 1591/22 1592/23 1593/22 1595/25 1597/23 1597/25 1601/7 1601/15 1609/21 1610/10 1622/11 1623/11 1625/8 1626/14 1627/2 1633/9 1635/17 1641/5 1641/5 1641/9 1646/11 1646/13</p> <p>though [6] 1550/13 1592/24 1597/15 1612/6 1623/14 1652/1</p> <p>thought [11] 1519/9 1519/10 1549/22 1564/3 1581/1 1592/24 1605/18 1627/18 1628/9 1629/7 1650/3</p> <p>thousand [2] 1516/19 1525/24</p> <p>thousands [2] 1544/24 1548/11</p> <p>three [13] 1521/22 1537/1 1553/1 1567/4 1581/20 1581/23 1581/25 1586/18 1586/25 1588/23 1621/13 1625/10 1645/11</p> <p>three-dimensional [1] 1567/4</p> <p>three-fold [2] 1581/20 1581/25</p> <p>through [15] 1512/24 1531/7 1540/23 1552/18 1558/17 1559/19 1562/21 1569/12 1617/9 1618/14 1633/13 1633/19 1636/2 1638/10 1639/23</p> <p>throughout [5] 1571/21 1615/14 1640/22 1641/19 1642/2</p> <p>thrown [1] 1514/25</p> <p>Thus [1] 1558/8</p> <p>tie [1] 1586/19</p> <p>tied [2] 1525/24 1627/18</p> <p>ties [1] 1559/23</p> <p>tightness [1] 1525/5</p> <p>time [70] 1508/7 1509/22 1509/23 1509/24 1514/7 1517/4 1523/10 1525/13 1533/3 1537/4 1558/24 1561/8 1571/13 1576/7 1579/25 1580/14 1580/15 1580/18 1585/19 1590/2 1590/11 1597/18 1597/18 1599/15 1601/24 1606/17 1606/18 1606/20 1624/13 1624/16 1625/5 1627/21 1629/20 1630/14</p>
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<b>T</b>	<p>time... [36] 1631/10 1632/11 1632/12 1633/3 1633/6 1633/18 1634/18 1636/19 1636/20 1637/4 1637/19 1639/9 1639/22 1640/22 1641/2 1641/19 1642/2 1643/6 1645/3 1647/15 1649/15 1649/16 1650/9 1650/19 1650/20 1650/21 1650/25 1651/4 1651/6 1651/8 1651/12 1651/15 1651/23 1652/6 1652/10 1652/12</p> <p>times [9] 1516/4 1538/4 1538/11 1538/13 1544/9 1588/23 1601/14 1641/11 1647/7</p> <p>title [1] 1564/13</p> <p>today [23] 1505/15 1509/24 1515/12 1519/19 1525/16 1525/25 1527/8 1527/9 1532/25 1578/11 1580/3 1580/18 1581/2 1583/17 1599/8 1601/8 1608/12 1627/3 1628/9 1629/5 1634/3 1645/12 1653/17</p> <p>together [13] 1505/14 1506/21 1528/3 1534/4 1543/14 1557/22 1559/23 1562/2 1562/23 1573/1 1573/2 1619/21 1627/5</p> <p>token [1] 1644/15</p> <p>told [4] 1540/14 1592/23 1644/1 1645/10</p> <p>Tolles [1] 1502/12</p> <p>TOM [1] 1499/22</p> <p>tomorrow [4] 1509/8 1627/3 1627/6 1629/5</p> <p>too [13] 1510/18 1518/16 1532/8 1536/2 1540/11 1556/25 1558/20 1570/8 1571/18 1572/20 1614/20 1627/5 1650/23</p> <p>took [9] 1545/18 1546/10 1594/22 1594/24 1595/5 1606/11 1606/22 1627/11 1632/23</p> <p>toolpusher [9] 1631/10 1633/16 1633/16 1636/3 1636/8 1641/24 1642/4 1644/21 1648/11</p> <p>toolpusher's [1] 1645/21</p> <p>tools [7] 1602/25 1611/23 1639/10 1647/8 1647/12 1647/18 1647/19</p> <p>top [4] 1549/16 1583/25 1601/5 1616/15</p> <p>topics [1] 1587/11</p> <p>topographic [2] 1546/18 1546/19</p> <p>topography [1] 1547/23</p> <p>Torts [2] 1500/12 1500/22</p> <p>total [6] 1567/12 1600/12 1631/15 1632/7 1632/9 1640/2</p> <p>touch [2] 1532/16 1534/18</p> <p>toward [1] 1525/20</p> <p>towards [1] 1524/17</p> <p>towels [1] 1534/7</p> <p>tower [2] 1652/24 1653/1</p> <p>Town [2] 1634/16 1634/17</p> <p>training [2] 1634/6 1635/23</p> <p>transcript [4] 1498/14 1630/10 1630/11 1653/22</p> <p>transcription [1] 1503/23</p> <p>transform [1] 1570/10</p> <p>transformation [1] 1558/6</p> <p>transit [4] 1634/23 1639/6 1639/7 1639/12</p> <p>transiting [1] 1639/16</p> <p>transitioning [1] 1653/12</p> <p>translate [1] 1635/25</p> <p>translating [1] 1573/16</p> <p>Transocean [36] 1502/5 1502/6 1502/7 1502/8 1502/9 1502/10 1502/12 1502/12 1502/13 1502/16 1502/16 1502/17 1502/19 1502/20 1502/21 1505/19 1509/2 1576/16 1576/21 1576/24 1576/25 1577/12 1577/13 1577/15 1577/15 1628/19 1629/1 1630/2 1630/2 1633/4 1633/6 1633/10 1633/13 1634/3 1635/24 1643/24</p> <p>Transocean's [2] 1641/16 1643/18</p> <p>transported [1] 1639/18</p> <p>trapped [3] 1525/13 1559/7 1592/18</p> <p>tremendously [1] 1539/21</p>	<p>trend [2] 1539/17 1540/9</p> <p>TREX [11] 1507/2 1508/14 1508/18 1508/19 1532/9 1581/13 1598/7 1598/8 1603/23 1604/4 1622/6</p> <p>TREX 2701 [1] 1508/14</p> <p>TREX-1532 [1] 1603/23</p> <p>TREX-1533 [1] 1604/4</p> <p>TREX-20093.19 [1] 1622/6</p> <p>TREX-3375 [1] 1598/7</p> <p>TREX-3375.11.1 [1] 1598/8</p> <p>TREX-7500 [1] 1581/13</p> <p>trial [18] 1498/14 1510/24 1511/15 1521/11 1523/22 1532/9 1538/25 1547/15 1554/8 1555/8 1564/8 1567/7 1568/16 1568/18 1619/12 1621/21 1623/7 1623/8</p> <p>Trial Exhibit 03375 [2] 1564/8 1568/16</p> <p>tried [1] 1607/16</p> <p>trip [2] 1517/7 1626/19</p> <p>TRITON [1] 1498/7</p> <p>trouble [2] 1573/16 1652/18</p> <p>troughs [1] 1550/20</p> <p>true [14] 1563/9 1576/25 1577/5 1577/14 1579/18 1580/3 1584/2 1584/6 1584/9 1590/14 1598/10 1600/7 1603/22 1653/22</p> <p>trust [2] 1650/5 1652/20</p> <p>trusted [2] 1653/4 1653/5</p> <p>trusting [1] 1652/18</p> <p>try [13] 1507/25 1560/20 1562/14 1570/14 1570/15 1572/3 1585/18 1587/14 1601/8 1608/21 1609/9 1613/2 1614/15</p> <p>trying [15] 1510/24 1519/1 1519/4 1530/18 1543/14 1545/13 1546/4 1551/3 1572/5 1573/13 1594/3 1609/4 1629/6 1635/1 1651/5</p> <p>turn [6] 1568/17 1581/13 1622/4 1622/21 1629/21 1645/19</p> <p>TVDKB [2] 1600/3 1600/6</p> <p>twice [1] 1538/9</p> <p>two [22] 1519/18 1521/22 1525/10 1527/7 1527/13 1536/16 1543/13 1553/15 1556/6 1562/11 1562/23 1581/22 1587/5 1591/16 1596/7 1597/16 1627/25 1633/9 1636/14 1649/8 1651/2 1651/19</p> <p>two-page [1] 1627/25</p> <p>type [17] 1515/2 1518/9 1522/19 1530/13 1533/4 1534/24 1535/19 1535/20 1535/25 1535/25 1551/23 1562/20 1569/10 1570/17 1576/1 1597/20 1647/24</p> <p>typed [1] 1645/21</p> <p>types [6] 1533/25 1548/15 1596/25 1601/7 1601/14 1606/1</p> <p>typically [5] 1639/9 1639/20 1645/3 1647/20 1648/21</p>	<p>1600/6 1601/9 1604/21 1605/8 1637/16</p> <p>understanding [14] 1517/14 1572/14 1580/11 1585/8 1593/15 1596/20 1597/19 1615/20 1625/3 1631/9 1642/3 1642/18 1644/18 1653/23</p> <p>understands [1] 1541/24</p> <p>understated [1] 1525/6</p> <p>Understood [1] 1587/17</p> <p>undertaken [1] 1648/2</p> <p>underwater [1] 1549/3</p> <p>unexpected [1] 1534/22</p> <p>unfortunately [3] 1558/15 1570/18 1571/1</p> <p>unhappy [1] 1538/19</p> <p>unified [1] 1560/3</p> <p>unit [1] 1647/13</p> <p>UNITED [13] 1498/1 1498/9 1498/15 1500/11 1500/15 1500/21 1501/2 1507/19 1514/5 1576/9 1576/12 1590/16 1653/21</p> <p>University [3] 1512/16 1514/15 1514/17</p> <p>unless [3] 1534/1 1568/10 1569/16</p> <p>unloading [5] 1526/22 1526/22 1527/2 1529/25 1609/11</p> <p>unmanned [1] 1549/17</p> <p>unnecessarily [1] 1541/14</p> <p>Unocal [2] 1514/1 1514/3</p> <p>unstable [1] 1558/4</p> <p>until [2] 1641/3 1641/3</p> <p>unusual [7] 1510/20 1528/22 1529/6 1602/2 1602/3 1649/22 1649/23</p> <p>up [49] 1507/5 1507/25 1509/17 1522/2 1524/11 1530/21 1530/23 1534/7 1538/16 1539/2 1546/4 1546/5 1549/16 1550/21 1560/8 1560/18 1582/24 1586/24 1597/3 1598/8 1603/23 1604/4 1609/9 1609/14 1610/22 1613/1 1614/1 1615/2 1616/15 1617/24 1620/11 1621/10 1621/21 1624/12 1631/25 1632/14 1633/19 1633/24 1635/3 1636/10 1636/23 1641/2 1641/3 1643/4 1645/21 1647/8 1647/9 1647/11 1647/18</p> <p>upon [7] 1577/14 1587/15 1592/4 1598/12 1604/2 1605/25 1613/5</p> <p>upper [1] 1565/7</p> <p>us [28] 1505/21 1507/15 1510/18 1512/10 1514/11 1515/22 1519/24 1521/8 1521/15 1532/2 1540/11 1540/14 1540/17 1540/17 1543/15 1547/19 1551/4 1557/17 1560/20 1563/2 1569/14 1585/9 1593/22 1594/6 1597/16 1614/17 1646/8 1651/6</p> <p>use [22] 1521/10 1536/1 1546/21 1552/13 1555/1 1569/21 1569/22 1575/13 1575/16 1587/19 1592/20 1593/18 1595/20 1601/4 1606/18 1611/7 1611/23 1615/1 1621/18 1624/4 1624/12 1625/7</p> <p>used [29] 1505/11 1507/1 1508/19 1509/4 1518/17 1523/25 1548/11 1548/13 1557/7 1569/7 1570/18 1579/19 1579/23 1580/17 1580/23 1581/19 1587/23 1587/25 1588/1 1594/18 1600/20 1600/25 1603/1 1608/2 1610/15 1610/21 1621/11 1626/24 1635/14</p> <p>useful [5] 1521/10 1539/21 1603/12 1624/23 1624/24</p> <p>uses [1] 1580/5</p> <p>using [19] 1503/22 1566/18 1569/11 1569/24 1569/25 1580/1 1585/11 1590/16 1591/20 1593/13 1601/2 1601/8 1604/19 1610/10 1611/12 1611/14 1624/24 1625/1 1635/25</p> <p>usually [3] 1583/24 1596/24 1625/10</p>
<b>U</b>			
	<p>U.S [6] 1500/11 1500/15 1500/21 1501/2 1521/23 1525/14</p> <p>U.S.A [1] 1630/8</p> <p>ultimate [1] 1520/11</p> <p>ultimately [2] 1514/13 1574/1</p> <p>unavailable [2] 1628/2 1628/14</p> <p>unavoidable [2] 1601/19 1601/20</p> <p>unaware [1] 1590/12</p> <p>under [10] 1505/20 1512/12 1534/18 1573/19 1576/22 1579/1 1616/7 1616/10 1631/6 1632/24</p> <p>underestimating [1] 1563/5</p> <p>UNDERHILL [3] 1500/12 1507/19 1508/9</p> <p>underlie [1] 1621/18</p> <p>underlying [1] 1624/4</p> <p>underneath [1] 1526/21</p> <p>understand [18] 1510/8 1510/24 1512/2 1534/1 1536/11 1543/14 1551/3 1556/8 1560/18 1560/20 1561/19 1573/13 1588/6</p>		
		<b>V</b>	
		<p>valley [2] 1525/3 1546/23</p> <p>value [1] 1604/19</p> <p>Van [2] 1544/4 1564/23</p> <p>variety [1] 1519/5</p>	

<p><b>V</b></p> <p>various [2] 1546/10 1639/8  vary [1] 1557/3  vast [1] 1640/16  vehicle [3] 1549/3 1549/14 1549/17  velocity [1] 1570/9  verbatim [1] 1592/14  verifiable [1] 1554/25  verify [1] 1587/14  versus [3] 1637/20 1639/3 1641/15  vertical [3] 1555/17 1560/21 1600/7  very [86] 1508/11 1510/3 1513/3 1514/12  1516/9 1516/13 1523/3 1523/9 1523/9 1524/2  1524/20 1525/1 1525/1 1525/8 1525/8  1525/10 1525/18 1525/21 1527/25 1528/1  1528/8 1529/1 1529/6 1531/6 1532/14 1533/5  1534/16 1535/4 1535/6 1537/7 1537/8  1537/11 1541/12 1546/20 1547/22 1549/7  1549/25 1550/20 1550/25 1551/12 1552/5  1552/10 1552/10 1552/16 1552/16 1552/18  1552/23 1553/23 1555/22 1558/3 1558/11  1558/16 1559/18 1563/10 1565/10 1565/16  1567/23 1569/24 1569/24 1571/7 1575/20  1587/25 1592/16 1592/18 1593/8 1594/8  1596/18 1597/17 1603/12 1603/12 1606/4  1609/9 1611/15 1611/19 1613/24 1617/12  1618/4 1624/11 1624/23 1624/24 1626/20  1633/23 1649/18 1650/4 1652/15 1653/5  vessel [16] 1520/24 1635/8 1635/10 1636/6  1637/19 1638/4 1638/14 1639/4 1639/19  1640/4 1640/8 1640/9 1640/12 1640/16  1641/2 1642/22  vessel's [1] 1638/10  vessels [1] 1635/11  via [1] 1638/1  vicinity [2] 1525/25 1553/1  video [5] 1506/7 1507/21 1628/7 1629/14  1630/3  videos [1] 1506/18  videotaped [1] 1629/23  Vidrine [3] 1649/11 1650/19 1651/19  view [12] 1548/4 1548/5 1549/1 1575/2  1579/1 1579/13 1589/3 1589/7 1589/8  1589/18 1592/5 1597/1  viewed [2] 1600/21 1606/21  views [1] 1589/18  virgin [1] 1588/16  Virginia [2] 1499/10 1499/10  vitae [1] 1511/22  voices [1] 1519/7  volume [1] 1614/23  volumes [2] 1527/8 1575/24  voluminous [1] 1519/14  voluntary [1] 1505/21  VON [1] 1503/12</p>	<p>wanted [10] 1505/12 1505/17 1510/10  1514/18 1552/10 1552/11 1630/2 1642/12  1643/16 1646/20  wanting [1] 1521/17  wants [1] 1627/22  warmer [5] 1556/20 1556/22 1557/4 1557/5  1567/18  warning [1] 1645/14  was [256]  Washington [4] 1500/20 1500/25 1501/6  1502/4  wasn't [12] 1525/17 1554/2 1617/2 1617/4  1617/7 1624/25 1635/8 1640/11 1640/11  1640/12 1644/5 1644/17  watcher [1] 1632/22  water [19] 1520/2 1521/2 1521/2 1522/24  1522/25 1524/8 1524/17 1525/13 1526/2  1547/6 1559/4 1561/1 1561/4 1561/9 1561/9  1561/11 1600/9 1618/17 1632/3  Water's [1] 1561/5  waters [1] 1535/24  Watts [2] 1499/15 1499/15  way [30] 1510/7 1513/19 1519/24 1523/22  1539/2 1544/24 1550/2 1559/16 1559/23  1565/7 1567/5 1569/4 1574/9 1581/20 1588/6  1600/10 1601/2 1609/8 1611/20 1616/24  1617/2 1621/5 1621/10 1624/7 1634/15  1634/17 1636/10 1639/23 1649/20 1649/24  ways [3] 1594/14 1602/11 1602/14  we [188]  we'd [3] 1506/25 1508/22 1526/21  we'll [17] 1505/16 1506/16 1506/22 1509/12  1509/13 1510/25 1517/12 1528/7 1541/22  1542/11 1584/15 1610/7 1627/9 1629/13  1630/13 1645/5 1653/17  we're [34] 1505/14 1508/18 1509/4 1509/21  1518/17 1519/1 1519/4 1523/5 1523/22  1529/16 1529/20 1541/24 1543/2 1545/22  1546/7 1550/19 1553/4 1560/1 1561/19  1562/16 1563/13 1569/1 1570/13 1572/11  1573/17 1575/21 1583/21 1588/10 1594/3  1626/17 1630/8 1636/20 1646/9 1648/24  we've [11] 1510/7 1534/7 1539/9 1539/13  1540/11 1560/6 1565/16 1566/3 1575/7  1595/25 1604/12  wealth [2] 1520/11 1574/16  Wednesday [2] 1628/21 1628/23  week [5] 1505/22 1509/25 1510/1 1540/12  1607/5  Wegener [3] 1515/25 1516/1 1516/2  weight [17] 1510/9 1526/18 1536/1 1536/2  1541/5 1541/11 1557/21 1561/1 1561/3  1561/6 1561/10 1561/10 1563/7 1571/23  1572/20 1572/21 1572/22  weights [1] 1541/13  welcome [2] 1531/21 1626/21  well [218]  well-by-well [1] 1560/4  well-site [5] 1641/9 1649/6 1651/3 1651/7  1651/19  wellbeing [1] 1652/19  wellbore [1] 1552/22  welling [1] 1573/19  wells [32] 1520/18 1527/22 1539/23 1540/2  1542/25 1543/3 1543/16 1575/15 1583/16  1585/16 1590/6 1595/2 1595/17 1595/17  1595/20 1595/23 1596/1 1601/8 1609/18  1610/2 1610/14 1611/13 1618/7 1618/10  1618/12 1618/23 1619/3 1619/4 1640/9  1640/15 1641/1 1641/4  went [8] 1514/1 1618/17 1623/12 1632/6  1632/17 1633/3 1636/2 1641/24  were [111] 1506/4 1508/20 1512/20 1513/9</p>	<p>1513/14 1514/1 1514/6 1517/24 1518/21  1522/6 1522/12 1523/10 1523/16 1524/21  1526/21 1526/21 1528/1 1536/16 1537/15  1540/15 1544/24 1545/23 1546/1 1546/2  1546/3 1549/12 1552/13 1553/16 1555/22  1565/19 1566/10 1571/14 1571/17 1580/16  1581/8 1584/19 1586/22 1586/25 1587/6  1587/6 1587/14 1590/2 1592/24 1592/25  1595/13 1595/24 1596/17 1599/3 1601/16  1602/22 1604/16 1605/15 1606/5 1611/12  1611/24 1615/9 1615/10 1618/19 1618/24  1625/19 1625/20 1625/23 1625/24 1626/1  1627/20 1631/10 1631/25 1634/12 1635/5  1635/23 1637/19 1637/22 1638/1 1638/6  1638/7 1638/20 1638/21 1638/25 1639/8  1639/16 1639/22 1640/14 1640/17 1640/19  1641/2 1641/10 1641/11 1641/25 1642/9  1643/6 1644/18 1644/20 1644/25 1645/21  1645/21 1645/23 1645/25 1646/2 1646/7  1646/20 1646/25 1651/19 1651/21 1651/23  1651/25 1652/3 1652/8 1652/15 1653/1  1653/6 1653/18  weren't [6] 1552/12 1571/7 1594/4 1608/13  1644/15 1650/12  west [2] 1527/14 1553/18  what [197]  what's [17] 1518/20 1523/1 1549/6 1551/9  1560/17 1561/12 1561/14 1565/5 1571/13  1572/1 1588/12 1597/1 1602/14 1603/4  1605/14 1617/8 1622/12  whatever [8] 1555/24 1569/14 1638/2 1639/1  1647/14 1647/16 1648/6 1648/18  Wheeler [3] 1636/18 1652/5 1652/23  when [83] 1507/14 1510/15 1512/22 1513/24  1519/25 1520/8 1523/4 1523/16 1524/24  1525/12 1532/14 1532/15 1533/1 1534/5  1534/17 1534/25 1535/2 1535/12 1537/11  1538/16 1540/25 1543/2 1543/5 1550/20  1551/10 1557/4 1557/24 1558/20 1560/1  1561/19 1561/21 1562/16 1562/16 1566/10  1569/13 1570/21 1570/22 1572/20 1573/19  1575/17 1581/2 1582/15 1583/3 1583/13  1583/17 1583/21 1584/5 1585/16 1588/11  1594/2 1599/5 1599/24 1601/16 1601/22  1610/11 1611/8 1619/2 1625/1 1625/19  1625/23 1627/17 1631/17 1632/16 1634/8  1634/12 1634/12 1634/14 1634/20 1636/3  1639/1 1642/18 1642/24 1643/3 1644/9  1644/24 1645/2 1645/3 1645/8 1646/2  1646/20 1646/25 1650/16 1651/18  where [64] 1505/23 1510/25 1513/24 1518/3  1520/12 1522/12 1525/14 1525/20 1525/25  1529/2 1530/9 1530/24 1535/7 1535/8 1535/8  1544/17 1545/7 1546/17 1546/22 1546/23  1547/2 1549/23 1550/7 1551/25 1552/1  1552/2 1554/7 1558/13 1559/9 1561/19  1565/12 1565/14 1565/16 1565/18 1567/3  1567/22 1567/22 1568/1 1573/16 1574/1  1574/12 1575/3 1578/9 1581/16 1591/10  1591/23 1592/22 1593/23 1597/16 1602/22  1614/6 1614/18 1616/3 1619/2 1620/7 1632/5  1632/16 1635/13 1638/15 1641/13 1641/25  1645/25 1646/20 1649/8  where's [1] 1536/17  WHEREUPON [6] 1511/7 1545/18 1627/11  1629/23 1630/19 1653/18  whether [11] 1521/1 1559/4 1559/4 1560/2  1572/14 1573/4 1582/10 1595/16 1604/15  1609/25 1644/2  which [92] 1507/2 1507/3 1507/4 1508/20  1509/4 1509/22 1512/16 1516/9 1518/21  1520/2 1520/3 1522/6 1524/13 1526/3  1527/18 1527/22 1528/1 1528/11 1530/8</p>
<p><b>W</b></p> <p>wait [12] 1531/23 1547/9 1547/9 1547/9  1547/9 1547/9 1566/9 1566/10 1583/19  1591/2 1591/2 1591/2  waiting [2] 1628/24 1629/2  walk [1] 1512/24  Walker [1] 1499/9  walking [1] 1509/17  wall [3] 1572/2 1602/9 1603/5  WALTER [2] 1499/12 1511/2  Walther [1] 1502/22  want [22] 1505/22 1507/25 1510/23 1517/12  1522/11 1523/14 1536/11 1559/6 1559/6  1569/14 1569/16 1582/4 1591/2 1594/20  1610/10 1611/10 1611/21 1614/15 1616/3  1625/23 1644/6 1647/3</p>	<p>wait [12] 1531/23 1547/9 1547/9 1547/9  1547/9 1547/9 1566/9 1566/10 1583/19  1591/2 1591/2 1591/2  waiting [2] 1628/24 1629/2  walk [1] 1512/24  Walker [1] 1499/9  walking [1] 1509/17  wall [3] 1572/2 1602/9 1603/5  WALTER [2] 1499/12 1511/2  Walther [1] 1502/22  want [22] 1505/22 1507/25 1510/23 1517/12  1522/11 1523/14 1536/11 1559/6 1559/6  1569/14 1569/16 1582/4 1591/2 1594/20  1610/10 1611/10 1611/21 1614/15 1616/3  1625/23 1644/6 1647/3</p>	<p>wait [12] 1531/23 1547/9 1547/9 1547/9  1547/9 1547/9 1566/9 1566/10 1583/19  1591/2 1591/2 1591/2  waiting [2] 1628/24 1629/2  walk [1] 1512/24  Walker [1] 1499/9  walking [1] 1509/17  wall [3] 1572/2 1602/9 1603/5  WALTER [2] 1499/12 1511/2  Walther [1] 1502/22  want [22] 1505/22 1507/25 1510/23 1517/12  1522/11 1523/14 1536/11 1559/6 1559/6  1569/14 1569/16 1582/4 1591/2 1594/20  1610/10 1611/10 1611/21 1614/15 1616/3  1625/23 1644/6 1647/3</p>

**W**  
 which... [73] 1535/12 1536/16 1536/17 1536/18 1536/18 1537/15 1540/21 1541/1 1541/5 1542/22 1545/24 1546/19 1547/5 1547/15 1548/9 1549/4 1550/3 1550/16 1550/22 1552/5 1555/14 1556/17 1557/11 1557/20 1557/25 1558/3 1559/24 1562/12 1563/7 1565/20 1567/18 1568/17 1569/5 1569/22 1571/2 1571/18 1572/3 1572/20 1572/24 1574/15 1576/5 1578/13 1583/15 1587/15 1589/12 1591/13 1591/20 1593/3 1593/9 1594/11 1595/20 1596/20 1599/3 1599/13 1603/5 1603/14 1605/21 1611/15 1613/16 1614/23 1617/8 1618/23 1621/4 1621/17 1622/23 1622/25 1623/2 1624/4 1626/25 1632/22 1633/4 1634/15 1640/14 while [7] 1582/24 1601/4 1624/6 1638/6 1638/6 1644/25 1645/3 white [1] 1545/9 Whiteley [1] 1501/15 who [27] 1508/15 1508/15 1514/1 1518/8 1522/16 1525/2 1540/19 1544/3 1553/22 1560/24 1570/19 1600/21 1606/12 1607/16 1631/22 1632/22 1633/2 1636/5 1636/14 1637/4 1637/12 1638/13 1644/21 1644/21 1649/8 1651/2 1652/5 who's [1] 1532/17 whoever [1] 1642/25 whole [5] 1517/15 1599/6 1623/14 1632/11 1650/8 whose [1] 1564/20 why [8] 1518/25 1532/3 1541/25 1547/5 1558/9 1593/9 1596/21 1609/6 widely [5] 1570/18 1587/25 1588/1 1594/11 1600/25 widespread [4] 1530/24 1530/25 1535/22 1537/9 will [39] 1510/19 1511/25 1519/20 1521/15 1522/20 1523/18 1530/5 1532/2 1534/18 1535/5 1541/1 1541/5 1555/9 1555/11 1558/2 1558/18 1560/24 1562/11 1562/12 1565/25 1567/1 1571/22 1571/24 1572/22 1573/21 1591/10 1591/18 1605/3 1605/4 1615/2 1615/24 1618/1 1627/2 1627/4 1630/3 1635/10 1640/1 1643/4 1647/24 William [1] 1539/4 Williams [10] 1499/18 1499/19 1505/18 1505/21 1509/19 1509/20 1627/18 1628/13 1629/8 1629/24 Williams' [3] 1628/7 1629/15 1630/7 Williamson [2] 1500/5 1500/6 willingness [1] 1593/4 window [3] 1557/10 1557/11 1578/18 WINFIELD [1] 1501/9 wireline [5] 1601/5 1647/3 1647/7 1647/13 1647/14 wise [1] 1568/8 wish [1] 1532/5 wishing [1] 1518/9 within [5] 1527/22 1529/20 1568/4 1578/18 1599/2 without [3] 1508/25 1624/6 1640/5 witness [25] 1505/6 1506/13 1510/4 1511/4 1516/20 1533/10 1545/19 1554/1 1573/18 1577/12 1591/3 1614/4 1614/11 1617/15 1626/16 1627/14 1628/1 1628/4 1628/9 1628/9 1628/10 1628/12 1629/6 1629/8 1630/16 witness' [1] 1653/14 witnesses [6] 1506/5 1510/6 1542/10 1573/20 1573/21 1583/24 Wittmann [2] 1502/22 1502/23

won't [1] 1653/16 word [4] 1539/2 1539/4 1609/19 1610/1 words [5] 1525/12 1578/24 1610/8 1610/10 1642/24 work [34] 1506/13 1513/25 1514/1 1514/8 1518/11 1522/16 1525/22 1544/10 1548/25 1552/12 1559/15 1559/17 1570/13 1570/19 1573/1 1575/22 1579/25 1594/1 1594/7 1594/16 1597/20 1603/8 1607/22 1618/1 1625/9 1631/22 1632/13 1632/20 1633/2 1633/3 1634/22 1649/14 1650/18 1651/4 worked [12] 1520/22 1592/13 1592/22 1631/13 1632/18 1635/11 1650/22 1651/12 1651/23 1652/5 1652/10 1652/11 working [11] 1512/25 1514/4 1522/17 1573/2 1593/6 1611/25 1634/6 1634/8 1644/18 1651/10 1652/9 works [2] 1593/18 1594/15 world [5] 1527/16 1542/15 1557/8 1579/2 1604/22 world's [2] 1555/15 1557/10 worldwide [2] 1539/25 1548/22 worried [1] 1614/20 would [148] 1506/3 1506/13 1506/14 1507/24 1508/13 1509/8 1511/4 1511/14 1514/21 1517/8 1518/6 1519/24 1520/5 1521/8 1521/10 1522/11 1527/5 1528/4 1528/4 1529/12 1529/17 1531/13 1531/18 1533/7 1534/3 1534/22 1534/23 1534/25 1534/25 1536/3 1537/8 1537/14 1538/1 1538/18 1538/19 1538/19 1538/22 1538/24 1538/25 1539/25 1540/17 1540/19 1543/8 1545/2 1546/23 1547/2 1547/15 1549/6 1549/12 1549/19 1550/25 1551/3 1551/10 1551/19 1551/23 1551/24 1552/3 1552/23 1552/25 1565/18 1566/4 1566/24 1567/24 1567/25 1568/1 1568/3 1568/11 1568/17 1572/9 1575/8 1575/12 1579/1 1579/12 1579/14 1579/16 1580/14 1580/22 1585/3 1587/16 1588/9 1588/17 1588/19 1592/7 1601/15 1602/3 1604/19 1604/24 1606/2 1606/25 1607/12 1607/12 1608/8 1609/25 1611/11 1611/22 1611/23 1612/6 1614/1 1614/6 1614/10 1614/18 1614/23 1616/18 1620/12 1620/25 1622/6 1625/10 1626/23 1629/2 1630/6 1631/17 1633/22 1636/17 1636/22 1637/3 1637/5 1637/11 1637/11 1637/12 1637/13 1638/2 1638/5 1638/13 1638/13 1638/23 1639/2 1639/2 1639/10 1639/12 1639/12 1639/13 1639/14 1640/3 1640/7 1641/14 1642/13 1642/22 1643/23 1644/7 1646/10 1647/20 1647/21 1648/8 1649/6 1650/5 1652/23 1653/1 1653/8 wouldn't [10] 1519/3 1524/22 1538/8 1566/17 1571/8 1579/24 1588/3 1593/1 1629/4 1651/14 wow [1] 1516/18 wrap [1] 1609/9 Wright [1] 1498/18 write [5] 1539/2 1571/3 1582/3 1582/13 1583/5 writing [3] 1519/6 1590/12 1619/25 written [12] 1507/20 1515/15 1515/17 1543/23 1564/20 1586/7 1611/15 1621/23 1623/3 1623/24 1630/10 1630/11 wrong [2] 1566/18 1608/21 wrote [8] 1581/2 1582/6 1583/7 1584/2 1589/2 1599/24 1607/16 1610/11 Wyman [1] 1636/17

**X**  
 Xs [1] 1536/13

**Y**  
 yeah [34] 1510/12 1521/17 1524/12 1526/16 1526/16 1527/21 1534/13 1534/13 1534/13 1535/3 1535/22 1537/13 1537/19 1538/3 1538/8 1542/24 1546/16 1548/21 1556/22 1560/19 1560/21 1570/6 1571/6 1574/11 1596/17 1600/7 1601/1 1613/9 1618/13 1625/10 1647/10 1649/7 1649/20 1651/14 year [5] 1516/7 1537/18 1625/11 1631/19 1650/17 years [24] 1516/10 1521/22 1523/5 1525/11 1525/24 1536/14 1537/1 1544/24 1553/1 1591/16 1592/22 1606/22 1607/5 1607/9 1620/14 1631/16 1632/7 1632/9 1632/19 1633/7 1641/8 1645/11 1648/25 1650/11 yellow [2] 1611/6 1613/7 yes [229] Yesterday [2] 1607/2 1607/3 yet [3] 1506/12 1515/1 1542/8 Yoakum [1] 1500/6 you [706] you'd [2] 1531/22 1603/16 you'll [5] 1534/4 1534/5 1584/12 1615/5 1651/5 you're [53] 1509/17 1515/20 1520/2 1520/4 1520/13 1520/13 1520/16 1520/18 1524/22 1531/21 1533/12 1534/12 1535/4 1535/7 1535/8 1535/8 1538/1 1546/14 1551/25 1557/5 1562/20 1562/23 1562/24 1563/14 1566/2 1566/19 1566/21 1572/5 1572/17 1575/18 1575/24 1580/3 1580/8 1583/17 1583/21 1583/25 1588/4 1588/12 1590/22 1601/13 1602/17 1605/1 1607/22 1608/3 1609/22 1619/24 1624/7 1626/21 1630/14 1633/23 1645/2 1647/17 1647/19 you've [16] 1520/20 1528/20 1533/14 1539/19 1554/17 1555/8 1575/17 1575/19 1578/16 1584/10 1585/11 1586/6 1589/18 1620/3 1633/20 1650/3 you-all [2] 1509/24 1628/15 young [4] 1501/5 1523/9 1606/21 1606/25 younger [1] 1523/8 your [231] yours [1] 1569/2 yourself [3] 1522/14 1587/10 1643/19

**Z**  
 zonation [3] 1581/20 1581/25 1622/23 zone [66] 1555/6 1555/10 1555/12 1555/14 1557/12 1557/14 1557/14 1559/8 1559/10 1559/23 1560/22 1565/7 1565/15 1565/21 1565/21 1566/2 1566/19 1566/25 1567/15 1567/20 1567/21 1568/5 1569/7 1574/9 1574/14 1574/17 1574/21 1574/23 1574/24 1578/10 1578/21 1578/23 1579/8 1579/14 1579/19 1580/5 1580/22 1581/10 1581/17 1581/21 1581/21 1581/22 1581/22 1582/11 1588/20 1589/3 1589/21 1593/12 1593/22 1594/6 1594/9 1594/12 1616/22 1621/9 1622/24 1623/3 1623/9 1623/10 1623/15 1624/5 1624/14 1624/18 1624/23 1624/25 1625/1 1625/14 zones [1] 1593/23 zoom [1] 1568/19