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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 7, 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 8, AFTERNOON SESSION  
TRANSCRIPT OF NONJURY TRIAL  
BEFORE THE HONORABLE CARL J. BARBIER  
UNITED STATES DISTRICT JUDGE

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01:40 1 So I went back and redid it to make clear that  
01:40 2 in most cases we're just offering the call-out. So I have a  
01:40 3 new list. It's been e-mailed around. I don't know if  
01:40 4 everyone's had a chance to review it yet. But I wanted to give  
01:40 5 it to the clerk. Our plan is to get it resolved prior to the  
01:40 6 marshaling conference today so Magistrate Shushan can take care  
01:40 7 of it.

01:40 8 **THE COURT:** You just reduced the number of pages, is  
01:40 9 what you did.

01:40 10 **MR. BRIAN:** I did.

01:40 11 **THE COURT:** That's good.

01:40 12 I'll say this one more time. I can't believe  
01:40 13 how much confusion you all have about these exhibits. Because  
01:40 14 I just had another conversation with Judge Shushan during the  
01:40 15 lunch hour. It seems like we keep saying the same thing over  
01:40 16 and over again, as far as I'm concerned.

01:40 17 When you all use a page from an exhibit or  
01:40 18 something, I don't want the entire document in; I want just  
01:41 19 that page and maybe a cover page to explain what the document  
01:41 20 is. I can always -- if I need context, I can always go find  
01:41 21 the entire exhibit later, if I need to. But I don't want to  
01:41 22 clutter up this trial record with voluminous documents if we're  
01:41 23 just really looking at a page or two here or there.

01:41 24 **MR. BRIAN:** That's precisely, Your Honor, the  
01:41 25 protocol that the parties discussed last night and have agreed

01:41 1 to and will present to Magistrate Shushan.

01:41 2 **THE COURT:** Very good.

01:41 3 **MR. BRIAN:** I'm giving the revised list to your  
01:41 4 clerk.

01:41 5 **THE COURT:** For the record, these are Transocean's  
01:41 6 revisions to the list of exhibits relating to Mr. Bly; correct?

01:41 7 **MR. BRIAN:** Correct, Your Honor.

01:41 8 **THE COURT:** Thank you.

01:41 9 **MR. IRPINO:** Anthony Irpino for the PSC, Your Honor.  
01:41 10 We received BP's list of exhibits for Ronnie Sepulvado's  
01:41 11 examination.

01:41 12 **THE COURT:** Sepulvado.

01:41 13 **MR. IRPINO:** Sepulvado, I'm sorry.

01:41 14 There was one exhibit that we had an issue with  
01:41 15 on the entire list. The rest of the list is fine. We e-mailed  
01:42 16 BP, and they said they would get back to us shortly.

01:42 17 **THE COURT:** Okay. Well, we need to get all these  
01:42 18 resolved this afternoon by 5:00. I'd like to get that done.

01:42 19 **MR. IRPINO:** Yes, Your Honor.

01:42 20 **THE COURT:** Anything else on exhibits?

01:42 21 **MR. CERNICH:** Your Honor, Scott Cernich for the  
01:42 22 United States. The marshaling conference, as we understand, is  
01:42 23 the exhibits that have come in through Tuesday for today's  
01:42 24 conference, and the exhibits from Mr. Bengé will be handled at  
01:42 25 the marshaling conference next week. So we need to circulate

01:42 1 our list to the parties.

01:42 2 **THE COURT:** Wait. The marshaling conference is  
01:42 3 through Tuesday?

01:42 4 **MR. UNDERHILL:** Wednesday.

01:42 5 **MR. NOMELLINI:** Through Wednesday, I'm sorry, Your  
01:42 6 Honor.

01:42 7 **THE COURT:** Who decided that?

01:42 8 **MR. STERBCOW:** Judge Shushan.

01:42 9 **THE COURT:** It would be nice if she would tell me  
01:42 10 that or somebody would tell me that so I know what's going on.

01:42 11 **MR. BROCK:** I'm just going to hand up my list for  
01:42 12 Mr. Heenan that I discussed this morning. Your Honor has  
01:42 13 already referenced that those are admitted, but I had not  
01:42 14 handed them up.

01:43 15 **THE DEPUTY CLERK:** This is the one that PSC just said  
01:43 16 you had a problem with; right?

01:43 17 **THE COURT:** No. The PSC is talking about the PSC  
01:43 18 list. This is BP's list regarding Mr. Heenan, did you say?

01:43 19 **MR. BROCK:** Heenan. Yes, Your Honor.

01:43 20 **THE COURT:** Those are admitted.

01:43 21 **MR. MILLER:** Your Honor, Kerry Miller for Transocean.  
01:43 22 I have the exhibits I used during my cross of Mr. Bengé. I've  
01:43 23 handed them out to counsel during the lunch break, and I'm  
01:43 24 prepared to circulate them to Stephanie now. All I have on  
01:43 25 mine are the specific pages that I showed.

01:43 1 What I did, Your Honor, because of the  
01:43 2 correction issue with the testing chart demonstrative, I  
01:43 3 attached that to my list, the one that Mr. Benge corrected in  
01:43 4 his redirect.

01:43 5 **THE COURT:** Okay.

01:43 6 **MR. MILLER:** And made the same change as Mr. Benge --

01:43 7 **THE COURT:** Any objections to these?

01:43 8 **MR. MILLER:** I indicate the one I seek to enter is  
01:43 9 the one as corrected by Mr. Benge in his redirect by DOJ.

01:43 10 **THE COURT:** Any objections to these?

01:43 11 **MR. REGAN:** Your Honor, Matt Regan on behalf of BP.  
01:44 12 I think we'll take a look at it and then Monday morning --  
01:44 13 because we'd love to circulate our list. I think the U.S. has  
01:44 14 to circulate theirs. And we'll get all that in one package for  
01:44 15 you.

01:44 16 **MR. IRPINO:** There's no objection from the PSC, Your  
01:44 17 Honor.

01:44 18 I do want to make clear, for Mr. Sepulvado, that  
01:44 19 PSC's list is fine. BP gave us their list of exhibits for  
01:44 20 Sepulvado, not Heenan. There was one on the BP list of  
01:44 21 Sepulvado exhibits that we have an issue with. We'll get that  
01:44 22 resolved before the conference.

01:44 23 **THE COURT:** You all need to keep track of what lists  
01:44 24 I have ruled on and what list I have not ruled on. Remember to  
01:44 25 bring that up later if we don't admit it right away.

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01:44

1 **MR. IRPINO:** Yes, Your Honor.

01:44

2 **THE COURT:** Okay. Anything else?

01:44

3 Okay. Our next witness.

01:44

4 **MR. BREIT:** Jeffrey Breit, Your Honor, for the PSC.

01:45

5 We would call Gerry Calvert.

01:45

6 (WHEREUPON, **DAVID CALVERT**, having been duly sworn,  
7 testified as follows.)

01:45

01:45

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

01:45

01:45

10 **DIRECT EXAMINATION**

01:45

11 **BY MR. BREIT:**

01:45

12 **Q.** Could you tell us your name, please, for the record.

01:45

13 **A.** David Calvert.

01:45

14 **Q.** Originally in this case, after the explosion of the  
15 *Deepwater Horizon*, who were you retained by?

01:45

16 **A.** Weatherford.

01:45

17 **Q.** Weatherford, the float collar company?

01:45

18 **A.** Yes, sir.

01:45

01:45

19 **THE COURT:** I've got a question. I read

01:45

20 Mr. Calvert's report last night. We're not going to talk about  
21 Weatherford and the float collar and all of that; right?

01:45

22 **MR. BREIT:** Correct, Your Honor.

01:45

23 **THE COURT:** What is Mr. Calvert going to talk about?

01:45

24 **MR. BREIT:** He's a cement expert.

01:45

01:45

25 **THE COURT:** I know, but we just spent a day and a

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01:45 1 half talking about cementing with a cement expert. Why are we  
01:45 2 having a second cement expert --

01:45 3 **MR. BREIT:** Your Honor, it's a very narrow --

01:46 4 **THE COURT:** -- by the same side of the case?

01:46 5 **MR. BREIT:** It's a very narrow area of the cement  
01:46 6 involving the shoe track cement. I'm going to limit my  
01:46 7 testimony to --

01:46 8 **THE COURT:** Is that something that Mr. Benge did not  
01:46 9 testify about?

01:46 10 **MR. BREIT:** There's a difference in the testimony  
01:46 11 from Mr. Benge and Mr. Calvert as it relates to how the shoe  
01:46 12 track cement was prepared by Halliburton. It's a very narrow  
01:46 13 area, and I plan on limiting it to that narrow area.

01:46 14 **THE COURT:** You didn't answer my question.

01:46 15 **MR. BREIT:** I believe it is different, Your Honor.

01:46 16 **THE COURT:** Did Mr. Benge talk about this at all?

01:46 17 **MR. BREIT:** He did not talk about the setup of the  
01:46 18 shoe track cement. He talked about the testing for the cement  
01:46 19 that was primarily used, foam cement, and the annulus. That's  
01:46 20 why I narrowed --

01:46 21 **THE COURT:** I think Mr. Cernich wants to say  
01:46 22 something.

01:47 23 **MR. CERNICH:** Your Honor, Scott Cernich for the  
01:47 24 United States.

01:47 25 Mr. Benge did testify regarding the shoe track

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01:47 1 cement. Mr. Bengé's report clearly addresses the shoe track  
01:47 2 cement. Mr. Bengé and Mr. Calvert both agree that the shoe  
01:47 3 track cement was not set at the time of the negative pressure  
01:47 4 test.

01:47 5 **THE COURT:** Okay. So I'm back to my original  
01:47 6 question: Why are we having another expert if -- no one -- I'm  
01:47 7 not doubting Mr. Calvert is highly qualified; in fact, I think  
01:47 8 Mr. Bengé covered that. But we usually don't have two experts  
01:47 9 coming in on the same side of the case testifying about the  
01:47 10 same thing.

01:47 11 **MR. BREIT:** The very critical testimony from this  
01:47 12 expert, Your Honor, has to do with the transitioning time from  
01:48 13 the point when they put the cement in and before it hardened.  
01:48 14 There is no testimony from Mr. Bengé on that topic.

01:48 15 **THE COURT:** Okay. I'm going to let him testify, but  
01:48 16 I suggest you keep this very short and very narrow. Okay?

01:48 17 **MR. BREIT:** I had planned to do that, Your Honor.

01:48 18 **THE COURT:** Okay. All right.

01:48 19 **BY MR. BREIT:**

01:48 20 **Q.** With that understanding, Mr. Calvert, could you tell the  
01:48 21 Court a little bit about your work experience?

01:48 22 **THE COURT:** You're still getting a lot of -- try  
01:48 23 moving it to your lapel or something on your coat.

01:48 24 So far so good.

25

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01:48 1 **BY MR. BREIT:**

01:48 2 **Q.** Tell us about your work experience, please.

01:48 3 **A.** I've been involved in well cementing since --

01:49 4 **THE COURT:** Get a little bit closer to the  
01:49 5 microphone, sir. Yeah, about 4 or 5 inches away is perfect.  
01:49 6 Thank you.

01:49 7 **THE WITNESS:** -- since 1964 and presently, I'm still  
01:49 8 active. As a matter of fact, I'll be leaving here tonight and  
01:49 9 preparing to go to India this weekend working on a well there.  
01:49 10 Over that period of time, I've been involved in a number of  
01:49 11 different areas in regard to cementing. Been a member of API  
01:49 12 since 1967. Again, still active in that organization.

01:49 13 **BY MR. BREIT:**

01:49 14 **Q.** Do you hold any positions at the API?

01:49 15 **A.** I was committee chairman, I was Committee 10,  
01:49 16 Subcommittee 10 on well cements through the years.

01:49 17 **Q.** Did you work on API committees while you were at API?

01:49 18 **A.** I worked on a number of API committees. I chaired the API  
01:49 19 committee on the adoption of 10-3, which deals with the testing  
01:49 20 and test equipment of -- for deepwater operations. Was the  
01:50 21 technical editor for the API 65 Part 2.

01:50 22 **Q.** Have you been involved with foam cementing?

01:50 23 **A.** Yes.

01:50 24 **Q.** There's a rather large scholarly volume, which is  
01:50 25 TREX-31026, which is the cover called *Well Cementing: Second*



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01:50 1 *Edition.* Is that pretty much the cement bible used by your  
01:50 2 profession?

01:50 3 A. At this particular point in time, it's a well accepted  
01:50 4 document within the industry.

01:50 5 Q. TREX-31026, please. And I believe I have a hard copy of  
01:50 6 it here.

01:50 7 Did you have anything to do with this book and its  
01:50 8 publication?

01:50 9 A. I was asked by the editors of the book to write the  
01:50 10 preface in this book, and I also reviewed some of the chapters  
01:51 11 that are included in the document.

01:51 12 Q. Are you familiar with the experts in this case: Mr. Bengé,  
01:51 13 Sabins, Ravi, and Crook?

01:51 14 A. Yes.

01:51 15 Q. Have you had an opportunity to read their reports?

01:51 16 A. Yes.

01:51 17 Q. Do you also teach and consult with companies involved with  
01:51 18 drilling and cementing?

01:51 19 A. Yes.

01:51 20 Q. Have you been doing that most of your career?

01:51 21 A. Yes.

01:51 22 Q. Have you done work with Halliburton in the past?

01:51 23 A. Yes. I worked with Halliburton and was scheduled to teach  
01:51 24 at Halliburton after I retired and they -- in the cementing  
01:51 25 area. And they joined a company consortium called Petroskills,

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01:51 1 which I'm now a teacher and I teach in that. And most recently  
01:51 2 taught a course coordinated by Halliburton in Russia for  
01:51 3 Lukoil.

01:51 4 Q. Do you have experience with deepwater drilling and  
01:51 5 cementing of same?

01:51 6 A. I have experience in deepwater cementing operations.

01:51 7 Q. And your focus over the last 40 years has been in design,  
01:52 8 testing, selection, and supervision of cementing services?

01:52 9 A. Yes.

01:52 10 MR. BREIT: Your Honor, at this time, I would tender  
01:52 11 Mr. Calvert as an expert in the field of design, testing,  
01:52 12 selection, and supervision of cementing services.

01:52 13 THE COURT: I don't believe there's been any motions  
01:52 14 with respect to him; right?

01:52 15 Okay. He's accepted.

01:52 16 BY MR. BREIT:

01:52 17 Q. Have you had an opportunity to review your CV that was  
01:52 18 presented as part of your report? That would be TREN-22573.

01:52 19 Is that your CV that you prepared for your report?

01:52 20 A. Yes.

01:52 21 MR. BREIT: Your Honor, at this time I would tender  
01:52 22 his CV, TREN-22573.

01:52 23 THE COURT: All right. Without objection, that's  
01:52 24 admitted.

25

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01:52 1 **BY MR. BREIT:**

01:52 2 **Q.** And let me show you the cover of TRES-22761, please.

01:52 3 Is this a report that you prepared for this case on  
01:52 4 October 14th, 2011?

01:53 5 **A.** Yes, sir.

01:53 6 **MR. BREIT:** Your Honor, I tender his expert report at  
01:53 7 this time as well.

01:53 8 **THE COURT:** All right. It's admitted again, subject  
01:53 9 to any -- well, there are no objections that I'm aware of, so  
01:53 10 I'll admit that.

01:53 11 **MR. BREIT:** Okay, Your Honor.

01:53 12 **BY MR. BREIT:**

01:53 13 **Q.** Have you reached an opinion, Mr. Calvert, regarding the  
01:53 14 cement that was used during the temporary abandonment procedure  
01:53 15 at the Macondo well?

01:53 16 **A.** Yes.

01:53 17 **Q.** And do you believe that zonal isolation was achieved by  
01:53 18 the Halliburton cement job?

01:53 19 **A.** I do not.

01:53 20 **Q.** I presume in your work experience over the last 40 years,  
01:53 21 you're familiar with how the contractor, BP, works with a  
01:53 22 contractor specialist in cement, like Halliburton?

01:53 23 **A.** Yes.

01:53 24 **Q.** What is the role of Halliburton as it relates to design  
01:53 25 and recommendation of the cement slurry to be used in a casing

## DAVID CALVERT - DIRECT

01:53 1 cement procedure?

01:53 2 A. The role of Halliburton in regard to --

01:53 3 Q. Working in this kind of fashion with a contractor like BP?

01:54 4 **MR. DOYEN:** Your Honor, I'll lodge an objection.

01:54 5 This is something we spent several hours going over what the  
01:54 6 relationship is between Halliburton as the service contractor  
01:54 7 and BP, the operator.

01:54 8 **MR. BREIT:** And I understand we have, Your Honor.  
01:54 9 But it is the leap to my -- to his opinions.

01:54 10 **THE COURT:** All right. Go ahead and answer, sir.

01:54 11 **THE WITNESS:** The service company -- in this case,  
01:54 12 Halliburton -- is responsible for the slurry design and slurry  
01:54 13 testing at the direction of BP based on well conditions that  
01:54 14 are presented to Halliburton from BP.

01:54 15 **BY MR. BREIT:**

01:54 16 Q. And is the design of the cement slurry primarily with the  
01:54 17 contractor, Halliburton?

01:54 18 A. The actual design of the slurry is with the contractor.

01:54 19 Q. Do you have an opinion as to how the cement job failed to  
01:54 20 achieve zonal isolation on the Macondo well?

01:54 21 A. In my opinion, the --

01:54 22 Q. Do you have an opinion, first of all?

01:54 23 A. Yes.

01:54 24 Q. All right. Let's talk about some of your opinions as they  
01:55 25 relate to the failure of the cement to achieve zonal isolation.

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01:55 1 And if I could, could you explain to the Court --  
01:55 2 while we look at TREN-22761.002, which is Demonstrative 3093,  
01:55 3 could you tell the Court what this is and what is "hydrostatic  
01:55 4 head." And please feel free to use the pointer.

01:55 5 A. Yes. This is an illustration of the pressure transmission  
01:55 6 that is transmitted as the cement is setting. Going from the  
01:55 7 cement in the liquid phase, as the cement goes from a liquid to  
01:55 8 a semiliquid or it semi-thickens, there's a point in time that  
01:55 9 the cement will begin to lose hydrostatic head. As it goes  
01:55 10 from --

01:55 11 Q. I don't think we've explained what hydrostatic head is  
01:55 12 yet. Could you explain that to the Court?

01:55 13 A. The hydrostatic head is a pressure which is applied from  
01:55 14 the column -- that's across the zone of interest -- when we  
01:56 15 place the cement. It's the total column hydrostatic head.

01:56 16 Q. All right. Keep on going.

01:56 17 A. And as that cement begins to transition, it will begin to  
01:56 18 lose that measurable hydrostatic head because the cement slurry  
01:56 19 goes through a stage of volume shrinkage, if you will. And  
01:56 20 then as the cement continues to hydrate and as it begins to  
01:56 21 set, then it makes a hard set, if you will, and that hard set  
01:56 22 could be anywhere from 1 psi to something greater.

01:56 23 Q. Now, you've used the word "transitioning."

01:56 24 MR. BREIT: TREN-22761.003, which is  
01:56 25 Demonstrative 3094, please.

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01:56 1 **BY MR. BREIT:**

01:56 2 **Q.** Now, when you talk about transitioning, what does this  
01:56 3 graph show us?

01:57 4 **A.** What this graph plots is the hydrostatic pressure versus  
01:57 5 time and the overburden pressure that is exerted. As the  
01:57 6 cement goes through its transmission state, it will go below --  
01:57 7 it can go below the formation of gas pressure, as illustrated  
01:57 8 here.

01:57 9           And when it does so, if the formations will flow,  
01:57 10 they're allowed to flow, they drop below the pore pressure of  
01:57 11 the formation.

01:57 12 **Q.** And what is the effect of this transitioning hydrostatic  
01:57 13 pressure as it relates to holding back the hydrocarbons?

01:57 14 **A.** This will allow the formation to come in.

01:57 15 **Q.** Now, in your report, you indicate that there were steps  
01:57 16 that could have been taken to manage the risk during this  
01:57 17 transitioning time. What do you mean by that?

01:57 18 **A.** There are steps that can be taken to allow the cement to  
01:57 19 go through its transition phase; but as it goes through that  
01:58 20 transition phase, if it drops below the pore pressure of the  
01:58 21 formation, it can contain additives that will prevent that  
01:58 22 influx of hydrocarbons and prevent it from any influxing in to  
01:58 23 either the cement or a flow path that's created by that influx.

01:58 24 **Q.** Are these zonal areas where there's hydrocarbon, are they  
01:58 25 particularly vulnerable to allow hydrocarbons to enter the well

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01:58 1 during this time of transition?

01:58 2 A. If there's hydrocarbon interval there or if there's a  
01:58 3 water interval, whatever there is present in the rock, if it  
01:58 4 drops below its pore pressure, then it can be allowed to flow.

01:58 5 Q. Now, is this something that contractors like Halliburton,  
01:58 6 cementers are familiar with this, this period of vulnerability  
01:59 7 during transitioning, generally in your field?

01:59 8 A. This is well published and well documented within the  
01:59 9 cementing industry.

01:59 10 Q. Now, in your report, you say there: "No steps were taken  
01:59 11 in the base slurry design in the shoe track cement to control  
01:59 12 hydrocarbon influx as the cement transitioned from liquid to  
01:59 13 solid."

01:59 14 What do you mean by that?

01:59 15 A. What I mean by that statement is that when the -- if the  
01:59 16 annular cement allows influx of fluid -- and it can move either  
01:59 17 up or down the annulus -- and if it moves down the annulus and  
01:59 18 up through the shoe track, then if that cement that is  
01:59 19 transitioning in the shoe track, if it's not designed to  
01:59 20 control gas migration or hydrocarbon influx, then there's the  
01:59 21 possibility of it forming flow paths either at the cement  
01:59 22 casing interface or through the cement itself.

02:00 23 Q. Cement and the shoe track?

02:00 24 A. Cement and the shoe track, yes, sir.

02:00 25 Q. On page 18 of your report, you mention the composition of

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02:00 1 the base slurry. Did you see things in that slurry that were  
02:00 2 helpful or harmful to manage this risk during the transition?

02:00 3 A. Can I have that question again, please?

02:00 4 Q. On page 18 of your report, you mention the composition of  
02:00 5 the base slurry. Did you see things in your review of this  
02:00 6 base slurry that were either helpful or harmful to manage this  
02:00 7 risk during the transition period?

02:00 8 A. In looking at the slurry design that was used on this  
02:00 9 particular well, it had a base slurry, it had a foam system --  
02:00 10 in the base slurry cap, a foam system, and then a base slurry  
02:00 11 shoe track cement.

02:00 12 Q. And where did that base slurry in the shoe track cement  
02:01 13 sit?

02:01 14 A. That base slurry in the shoe track is in the shoe track  
02:01 15 itself.

02:01 16 Q. And what steps could or should have been taken by  
02:01 17 Halliburton to make that shoe track cement able to withstand  
02:01 18 hydrocarbon influx?

02:01 19 A. The steps that could have been taken was to add an  
02:01 20 additive of some type that controls hydrocarbon influx.

02:01 21 Q. Did you look at the design of this particular shoe track  
02:01 22 cement slurry to see whether any additives were present?

02:01 23 A. My observation of the shoe track cement slurry, which was  
02:01 24 the base slurry, I did not see additives in there that would  
02:01 25 control the influx of hydrocarbons.



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02:01 1 Q. And would that have been the contractor, Halliburton's,  
02:01 2 responsibility to design a slurry with those types of  
02:01 3 additives?

02:01 4 A. That would have been a cumulative, as we've been talking.

02:02 5 Q. Yes, sir.

02:02 6 Now, one of the issues you raised in your report with  
02:02 7 regard to hydrocarbon migration through the shoe track cement  
02:02 8 was resulted either through the reduced hydrostatic head --

02:02 9 THE COURT: Wait a second. I didn't understand that  
02:02 10 last answer. You said that would have been a what?

02:02 11 You asked -- the question was: Would that have  
02:02 12 been the contractor, Halliburton's, responsibility to design a  
02:02 13 slurry with those types of additives?

02:02 14 What was your answer?

02:02 15 THE WITNESS: I said that would have been cumulative  
02:02 16 between Halliburton and the operator to --

02:02 17 BY MR. BREIT:

02:02 18 Q. I think we're having trouble with the word that begins  
02:02 19 with C-U-M.

02:02 20 A. It would be an action between both the contractor and the  
02:02 21 operator.

02:02 22 THE COURT: Okay. What was the word you answered?

02:02 23 THE WITNESS: "Cumulative."

02:02 24 MR. BREIT: Cumulative?

02:02 25 THE WITNESS: That's Oklahoma.

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02:02 1 THE COURT: I think we have a different word for it  
02:02 2 down here. That means they have to work together; right?

02:03 3 THE WITNESS: Yes, sir.

02:03 4 MR. BREIT: We'll add it to the cement words we've  
02:03 5 got.

02:03 6 THE COURT: Okay.

02:03 7 BY MR. BREIT:

02:03 8 Q. Now, one of the issues you raised in your expert report  
02:03 9 with regard to the hydrocarbon migration through the shoe track  
02:03 10 cement was, one, it could have resulted from the hydrostatic  
02:03 11 head transitioning and, two, from mud contamination. And I  
02:03 12 want to address briefly that mud contamination.

02:03 13 Is your opinion relative to the mud contamination  
02:03 14 related to the cement in the shoe track?

02:03 15 A. Yes. That would be one place that we could have mud  
02:03 16 contamination.

02:03 17 Q. Are you familiar with the drilling term "swapping" or  
02:03 18 "inversion"?

02:03 19 A. Yes, sir.

02:03 20 Q. And where does that take place?

02:03 21 MR. BREIT: And if I could have TREN-001.025, which  
02:03 22 is Demonstrative 2024.

02:03 23 BY MR. BREIT:

02:03 24 Q. Feel free to explain to the Court in using this diagram,  
02:04 25 if it would help you to discuss it, where swapping or inversion

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02:04 1 takes place. First, point that out; and then I'll ask you to  
02:04 2 explain it to the Court.

02:04 3 A. In the drawing that you have, we've . . .

02:04 4 Q. You have the reamer shoe. What's below the reamer shoe  
02:04 5 right there?

02:04 6 A. Below the reamer shoe is the rathole, as we refer to. Or  
02:04 7 this rathole is a hole that's drilled and the casing is not run  
02:04 8 to bottom.

02:04 9 Q. And so in this particular --

02:04 10 A. The length of the well.

02:04 11 Q. In this particular well, the Macondo well, there's a  
02:04 12 rathole beneath this area where we have the reamer shoe?

02:04 13 A. That's correct.

02:04 14 Q. Did you see how long that rathole was in this particular  
02:04 15 hole?

02:04 16 A. Approximately 56 feet.

02:04 17 Q. Now, tell the Court what happened -- what was in that  
02:04 18 rathole prior to the cement being pumped down the well?

02:04 19 A. According to the documentation that I looked at, the  
02:05 20 oil-based mud was in that rathole.

02:05 21 Q. Oil-based mud?

02:05 22 A. Oil-based mud that was used to drill the well. And that  
02:05 23 oil-based mud weighed 14 pounds to 14.1 pounds, depending on  
02:05 24 which document you look at.

02:05 25 Q. So the oil-based mud in the rathole is about 14.1 pounds.

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02:05 1 And after we move from the left side of this slide to  
02:05 2 the right side of this slide, the cement inside the well after  
02:05 3 we finish pumping the train of cement down, what cement sits on  
02:05 4 top of the rathole?

02:05 5 A. The cement that sits on top of the rathole is the tail  
02:05 6 cement that's in the shoe track.

02:05 7 Q. And were you able to determine, by looking at some of the  
02:05 8 records, the weight of that tail cement?

02:05 9 A. The weight of that tail cement was 16.7.

02:05 10 Q. Now, when you have tail cement that is 16.7 and rathole  
02:06 11 oil-based mud beneath it, which is 14.1, explain to the Court  
02:06 12 what is the potential to happen with regard to swapping and  
02:06 13 inversion.

02:06 14 A. There is the possibility that swapping can take place.  
02:06 15 The term "swapping" in this particular case indicates that the  
02:06 16 cement that's in the shoe track, being heavier than the  
02:06 17 cement -- or the mud that's in the rathole, there's a  
02:06 18 possibility there can be some movement of those fluids.

02:06 19 Q. And when you say "movement," what do you mean by that?

02:06 20 A. It would mean the tail cement could roll through the mud  
02:06 21 that's in the shoe track.

02:06 22 Q. What happens to the stability of the cement that's in the  
02:06 23 tail cement if there is swapping or inversion with the  
02:07 24 oil-based mud as it relates to the ability of the tail cement  
02:07 25 to hold back hydrocarbons?

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02:07 1 A. If the tail cement and the rathole mud swaps, ropes, then  
02:07 2 there's a chance, possibility of contamination and that would  
02:07 3 possibly lead to a path of flow.

02:07 4 Q. Now, in designing the cement, as a contractor,  
02:07 5 Halliburton, are they supposed to be aware of the different  
02:07 6 types of oil-based muds, locations of those oil-based muds in  
02:07 7 the rathole when designing their cement design for a contractor  
02:07 8 like BP? Is that something that you would expect the  
02:07 9 contractor to know?

02:07 10 A. I would expect the contractor and the operator to converse  
02:07 11 on that particular point also.

02:07 12 Q. And design the --

02:07 13 A. And design --

02:07 14 Q. -- the cement slurry in such a way that it would protect  
02:07 15 from that possibility?

02:07 16 A. In this particular case, the base slurry was designed at  
02:07 17 16.7 to perform the cement job as outlined. That was a cap  
02:08 18 slurry, a foam system, and a tail slurry. And at that point,  
02:08 19 then, you would have to make a decision of what action are you  
02:08 20 going to take in regard to the fluid in the rathole.

02:08 21 Q. Now, was the cement in this shoe track designed as a good  
02:08 22 barrier to hold back hydrocarbons?

02:08 23 A. The cement slurry that's in the shoe track was designed as  
02:08 24 a barrier. It was not designed as a barrier to hold back  
02:08 25 hydrocarbon influx.

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02:08 1 Q. Should it have been designed in such a way that, in the  
02:08 2 event hydrocarbons entered the shoe track, it would be able to  
02:08 3 withstand or hold back those hydrocarbons?

02:08 4 A. If the annular cement had served its purpose, then there  
02:08 5 would have been no flow in the annulus and that hydrocarbon  
02:09 6 flow would not have reached the shoe track.

02:09 7 Q. Are contractors supposed to design or prepare for that  
02:09 8 possibility when designing the cement for areas like the shoe  
02:09 9 track on the Macondo well?

02:09 10 A. Again, as I've stated once and restate now, that if this  
02:09 11 is a known fact, then you would -- you would work together --  
02:09 12 they're a team -- and that would be a point of discussion.

02:09 13 Q. And if additives had been added to the shoe track cement,  
02:09 14 would that have made the shoe track cement capable of  
02:09 15 withstanding the hydrocarbon influx?

02:09 16 A. If the proper additives had been added to the tail slurry  
02:09 17 to control hydrocarbon influx, yes.

02:09 18 MR. BREIT: That's all the questions I have, Your  
02:09 19 Honor.

02:09 20 THE COURT: All right. Thank you.

02:09 21 MR. BREIT: That's as short and as narrow as I can  
02:09 22 make it.

02:09 23 THE COURT: Any questions for the witness by the  
02:09 24 United States?

02:09 25 MR. BREIT: Your Honor, I believe, if I'm not

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02:09 1 mistaken -- and I apologize -- when the Court originally faced  
02:10 2 the issue of Mr. Calvert as being a former Weatherford expert,  
02:10 3 I believe the Court allowed at that time, on motion of both BP  
02:10 4 and the PSC, for Mr. Calvert to be an expert and turned over to  
02:10 5 both BP and the PSC as our joint expert for purposes of direct  
02:10 6 exam.

02:10 7 That's how it was understood when it first  
02:10 8 happened. I'll leave it up to the Court --

02:10 9 **THE COURT:** I have no idea what you're talking about.  
02:10 10 It wasn't this Court that did that. It must have occurred  
02:10 11 before Judge Shushan or something; right?

02:10 12 **MR. BREIT:** There was a motion when the Weatherford  
02:10 13 defendants were --

02:10 14 **THE COURT:** Not in front of me.

02:10 15 **MR. BREIT:** I believe it was in front of  
02:10 16 Judge Shushan. And there was an order entered that allowed the  
02:10 17 PSC as well as BP to adopt Calvert as our joint expert on the  
02:10 18 issue of cement. That's my memory about --

02:11 19 **THE COURT:** Mr. Regan, is that accurate?

02:11 20 **MR. REGAN:** It is. Mr. Calvert is an expert  
02:11 21 testifying for both the PSC BP and BP. In terms of the  
02:11 22 logistics here --

02:11 23 **THE COURT:** Let me ask you: Do you have any  
02:11 24 additional questions for him?

02:11 25 **MR. REGAN:** Yes. Five minutes of questions, that's

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02:11 1 it.

02:11 2 THE COURT: Okay. Let's go.

02:11 3 DIRECT EXAMINATION

02:11 4 BY MR. REGAN:

02:11 5 Q. Good afternoon, Mr. Calvert.

02:11 6 A. Good afternoon.

02:11 7 Q. Understanding that your report is already in evidence, I  
02:11 8 just wanted to ask a couple of questions about the float  
02:11 9 collar.

02:11 10 Your conclusions --

02:11 11 THE COURT: Stephanie, we're having a lot of problems  
02:11 12 with that. Try swapping them out.

02:12 13 UNIDENTIFIED SPEAKER: Four minutes.

02:12 14 THE COURT: I think your time's up.

02:12 15 BY MR. REGAN:

02:12 16 Q. Mr. Calvert, in your report, you have some opinions about  
02:12 17 whether the float collar converted, in your view; is that  
02:12 18 correct?

02:12 19 A. Yes, that's correct.

02:12 20 Q. And it is your opinion that the float collar that was used  
02:12 21 on the well did convert; correct?

02:12 22 A. That's my opinion, yes.

02:12 23 Q. Unless I have --

02:12 24 MR. REGAN: Exhibit 2582, if I could put that up.

02:12 25 And then go to the call-out. And just very briefly if we go --



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02:12 1 I think it's the fourth or the fifth page.

02:13 2 **BY MR. REGAN:**

02:13 3 **Q.** Do you recognize this, Mr. Calvert, what's on the screen?

02:13 4 Do you recognize the pictures that are on the screen?

02:13 5 **A.** Yes, yes.

02:13 6 **Q.** And does this depict kind of four stages of the float  
02:13 7 collar, just for the benefit of the Court? First, when it's  
02:13 8 running in the hole; second, when you're circulating; third,  
02:13 9 conversion and -- flow-activated conversion; and fourth, the  
02:13 10 converted float valve?

02:13 11 **A.** Yes.

02:13 12 **Q.** And based on your review of the evidence in this case,  
02:13 13 Mr. Calvert, it's your opinion that a surge of flow that  
02:13 14 occurred after the attempt to make -- break circulation was  
02:13 15 sufficient to convert the float collar; correct?

02:13 16 **A.** Yes, sir.

02:13 17 **Q.** And the float collar also serves as a landing place for  
02:13 18 the bottom and top plugs; is that right?

02:13 19 **A.** That's correct.

02:13 20 **Q.** And understanding that the Court has already seen  
02:13 21 animations and pictures and everything else about the top and  
02:13 22 bottom plug, it's fair to say it's just -- that's where they  
02:13 23 sit and stop when they're being pumped down a well?

02:13 24 **A.** That's correct.

02:13 25 **Q.** Did you see evidence in this case that both plugs landed

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02:13 1 on that float collar during the cement job?

02:13 2 A. The evidence that I noted was from the job.

02:14 3 Q. And that evidence was consistent with the fact that there  
02:14 4 was a float collar there to serve as a landing spot for both  
02:14 5 the bottom and the top plug; correct?

02:14 6 A. That's correct.

02:14 7 MR. REGAN: No further questions, Your Honor.

02:14 8 THE COURT: Okay. Thank you.

02:14 9 All right. Any questions from the United States  
02:14 10 for this witness?

02:14 11 MR. CERNICH: No questions, Your Honor.

02:14 12 THE COURT: Alabama?

02:14 13 MR. MAZE: No questions, Your Honor.

02:14 14 THE COURT: Louisiana?

02:14 15 MR. KANNER: No questions, Your Honor.

02:14 16 THE COURT: All right. Let's see. Cameron?

02:14 17 MR. BECK: Cameron has no questions.

02:14 18 THE COURT: M-I?

02:14 19 MR. TANNER: No questions, Your Honor.

02:14 20 MR. HILL: Your Honor, does Halliburton get to ask  
02:14 21 questions?

02:14 22 THE COURT: Did I skip over you?

02:14 23 MR. HILL: Yes, Your Honor.

02:14 24 THE COURT: How did you notice that? I'm sorry about  
02:14 25 that. I didn't intend to do it. Everything got out of order

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02:15 1 here.

02:15 2 **CROSS-EXAMINATION**

02:15 3 **BY MR. HILL:**

02:15 4 **Q.** Good afternoon, Mr. Calvert. Gavin Hill for Halliburton,  
02:15 5 and I'll be cross-examining you for just a few minutes.

02:15 6 **A.** Sure.

02:15 7 **Q.** Mr. Calvert, you would agree that one of the purposes of a  
02:15 8 shoe track is to collect contaminated cement; correct?

02:15 9 **A.** If I only run a top plug.

02:15 10 **Q.** Okay. Let me see if I -- I want to make sure we  
02:15 11 understand this. And I guess you're drawing a distinction  
02:15 12 because there was a dual plug system here; correct?

02:16 13 **A.** That's correct.

02:16 14 **Q.** And those plugs have winglets, for lack of a better term,  
02:16 15 on it that go out and touch the wellbores; right -- I'm sorry,  
02:16 16 the casing, inside the casing?

02:16 17 **A.** Yes, sir.

02:16 18 **Q.** As that is pumped down for miles below the surface, there  
02:16 19 is a film that gets scraped off of those blades that gets  
02:16 20 pushed ahead or possibly bypassed and -- well, let's just stick  
02:16 21 with the film that gets pushed ahead of the cement, their  
02:16 22 staging system that had the plugs.

02:16 23 After the plugs bump, that mud would end up in the  
02:16 24 shoe track; correct?

02:16 25 **A.** Only if I run the top plug.

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02:16 1 Q. Well, do you have any opinion as to whether or not that is  
02:16 2 the same if these particular plugs are going through two  
02:16 3 different diameter of casing?

02:16 4 A. The plug systems that was designed for this well were  
02:16 5 designed for the 7-inch by 9-inch --

02:16 6 Q. Do you remember me asking you this question at your  
02:16 7 deposition about whether or not a shoe track is designed -- or  
02:16 8 one of the purposes of a shoe track is to intentionally collect  
02:16 9 contaminated cement?

02:16 10 A. Yes, I remember that.

02:16 11 Q. Do you not remember telling me that, yes, that's one of  
02:17 12 the purposes?

02:17 13 A. Yes.

02:17 14 Q. Is it your testimony here today that cement systems should  
02:17 15 be designed so that the shoe track cement is actually part of  
02:17 16 the primary cement barrier?

02:17 17 A. My comment is that, if the annular cement fails, then the  
02:17 18 shoe track cement is the next barrier for containment of  
02:17 19 hydrocarbon influx.

02:17 20 Q. And I understand that's the answer to the question, but  
02:17 21 just answer my question, which is: Is it your testimony today  
02:17 22 that the shoe track cement should be part of the primary cement  
02:17 23 barrier by design?

02:17 24 A. No.

02:17 25 Q. Now, you keep -- I've heard you say several times that

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02:17 1 there are additives to be added. Are you talking about a  
02:17 2 fluid-loss additive?

02:17 3 A. No, sir.

02:17 4 Q. What kind of additive are you talking about? I just heard  
02:17 5 generic additives.

02:17 6 A. Would you like for me to introduce Halliburton additives  
02:18 7 or industry additives in general?

02:18 8 Q. I'm not asking for proprietary additives. I'm asking:  
02:18 9 What are the types of additives you are talking about so we can  
02:18 10 understand what you're suggesting?

02:18 11 A. Okay. I'm suggesting materials such as Halliburton's  
02:18 12 GasStop, Halliburton's Super CBL, Halliburton's Latex 3000.  
02:18 13 These are all additives that can be added to a cement slurry  
02:18 14 and they will aid in preventing hydrocarbon influx.

02:18 15 Q. Okay. So the point you're talking about, when you're  
02:18 16 talking about trying to restrict hydrocarbon influx, is at the  
02:18 17 very base of the reamer shoe where it connects with the  
02:18 18 rathole; correct?

02:18 19 A. I'm talking about in the shoe track cement.

02:18 20 Q. Okay. And the shoe track cement is inside separated by  
02:18 21 the reamer shoe; correct?

02:18 22 A. Yes, sir.

02:18 23 Q. Because the reamer shoe has three little diameter ports at  
02:18 24 the bottom; right?

02:18 25 A. That's correct.

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02:18 1 Q. And so what you're suggesting is some type of roping that  
02:18 2 goes from the rathole, through those three little holes at the  
02:18 3 bottom of the reamer shoe and up into the 189 feet of shoe  
02:19 4 track cement?

02:19 5 A. No, sir, I'm not suggesting that.

02:19 6 Q. Maybe you can elaborate and tell us what you are  
02:19 7 suggesting.

02:19 8 A. I'm suggesting that the cement that's in the shoe track,  
02:19 9 with the addition of those additives that I just mentioned, can  
02:19 10 be added to that cement slurry to prevent hydrocarbon influx in  
02:19 11 that cement column that's in the shoe track. In this case, I  
02:19 12 believe it was mentioned yesterday that the shoe track is the  
02:19 13 height of approximately a 19-story building.

02:19 14 So the fluid from the wellbore -- the wellbore fluids  
02:19 15 have to move in, if that's the path. They have to move into  
02:19 16 that casing through that reamer shoe, then up the shoe track up  
02:19 17 to the float equipment, through the float equipment, up through  
02:19 18 the casing.

02:19 19 Q. Okay. I think we understand.

02:19 20 Now, let's talk about an instance where you have a  
02:19 21 density differential between the shoe track cement and mud in  
02:19 22 the rathole. I want to focus on that for a minute. Okay?

02:20 23 A. All right, sir.

02:20 24 Q. Now, you said that the mud in the rathole is a 14.0 pound  
02:20 25 per gallon; right?

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02:20 1 A. Yes, sir, 14.

02:20 2 Q. But it's actually more dense than that if you account for  
02:20 3 equivalent downhole density; right?

02:20 4 A. 14.17.

02:20 5 Q. Then you add to that the fact that that mud in the rathole  
02:20 6 doesn't get circulated ahead of any job. It collects in there.  
02:20 7 That's the purpose of the rathole; right?

02:20 8 A. Yes, sir, that's true.

02:20 9 Q. So that mud is going to gel up and have additional gel  
02:20 10 strengths that aren't broken by circulation in the well;  
02:20 11 correct?

02:20 12 A. That's correct.

02:20 13 Q. So it's not true to say that the density -- the  
02:20 14 differential between -- the shoe track cement is set at  
02:20 15 16.74 -- backup. Strike that.

02:20 16 It's not true to say that the density differential is  
02:20 17 the difference between the shoe track density and 14.0 mud, is  
02:20 18 it?

02:20 19 A. Sir, I would like for you to make sure that you understand  
02:20 20 what I say. I said that's a possibility. I did not say it  
02:20 21 did.

02:20 22 Q. Fair enough.

02:21 23 Now, sir, can you explain why it is you think the  
02:21 24 float collar converted?

02:21 25 A. Based on the -- based on a document that I had access to

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02:21 1 and reviewed of testing that was conducted after the job, these  
02:21 2 tests were conducted on like float equipment, not the float  
02:21 3 equipment that was in the Macondo well. It was downhole, has  
02:21 4 not been retrieved as of today and probably will not be. But  
02:21 5 there were like equipment that was supplied through Weatherford  
02:21 6 to BP, and tests were conducted on that equipment to simulate  
02:21 7 what happened, to the best of their ability, in regard to the  
02:22 8 Macondo well. And those tests indicated that it converted.

02:22 9 Q. All right. I want to talk about one last section -- or  
02:22 10 one last piece with you.

02:22 11 So you have the opinion that when the float  
02:22 12 equipment -- actually, this might be helpful to the Court --

02:22 13 MR. HILL: If you bring up D-8015, please.

02:22 14 BY MR. HILL:

02:22 15 Q. I've put a wellbore schematic in front -- or up here.  
02:22 16 This is D-8015. Basically the idea is -- I just want the Court  
02:22 17 to get an understanding of what we're talking about when you  
02:22 18 talk about float collar shoe track.

02:22 19 Right there, it's identified that float collar. And  
02:22 20 the distance between there and the bottom reamer shoe is about  
02:22 21 189 feet; right?

02:23 22 A. Right.

02:23 23 Q. And the little tiny ports that we were talking about at  
02:23 24 the bottom of the reamer shoe are depicted there in those  
02:23 25 little cutouts at the very bottom; correct?



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02:23 1 A. Right.

02:23 2 Q. Do you have a laser? Who's pointing?

02:23 3 A. Me.

02:23 4 Q. Good.

02:23 5 A. I teach for a living, Gavin.

02:23 6 Q. So when this casing is actually run in the hole -- you  
02:23 7 wrote in your report that BP ran it in autofill mode; correct?

02:23 8 A. Correct.

02:23 9 Q. And what that means is the conversion -- the valves that  
02:23 10 are in that float collar are in an open position --

02:23 11 A. Unconverted, yes, sir.

02:23 12 Q. Unconverted. Thank you.

02:23 13 -- and as it's run, that allows mud to actually go up  
02:23 14 through the bottom of the reamer shoe and pass through the  
02:23 15 float collar equipment on up; correct?

02:23 16 A. That's correct.

02:23 17 Q. The purpose of that is just to allow fluid movement  
02:23 18 through the pipe as it's being pushed down to the bottom;  
02:23 19 correct?

02:23 20 A. That's primarily used in a well such as the Macondo, was  
02:23 21 to allow you to prevent surge effects; one of the possible  
02:24 22 reasons for it, yes.

02:24 23 Q. And there's a consequence for that; right? The  
02:24 24 consequence is any debris that's in that mud actually has the  
02:24 25 potential to go up through the reamer shoe and get into the

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02:24 1 float equipment; correct?

02:24 2 A. It could, yes.

02:24 3 Q. In fact, you expressed the opinion that you agree that one  
02:24 4 of the reasons they couldn't circulate mud and actually convert  
02:24 5 the float collar was because there was a blockage somewhere.

02:24 6 A. That's right.

02:24 7 Q. Fair?

02:24 8 A. Yes, sir.

02:24 9 Q. And you opined that it was a blockage either in the float  
02:24 10 collar or in the reamer shoe or both; correct?

02:24 11 A. Yes, sir.

02:24 12 Q. Now, before -- and you just mentioned that this type of  
02:24 13 running casing and open -- or an autofill mode was something  
02:24 14 that's appropriate for production interval?

02:24 15 A. Appropriate for this particular well. It's not run on  
02:24 16 every production string.

02:24 17 Q. Have you ever looked at BP's -- their deep law, their best  
02:24 18 practices for drilling?

02:24 19 A. I reviewed sections of it.

02:24 20 Q. All right.

02:25 21 MR. HILL: Can you bring up TREN-93, please. Please  
02:25 22 go to page Bates ending 7308.

02:25 23 BY MR. HILL:

02:25 24 Q. I'll represent to you that this is a section entitled  
02:25 25 "Well Control Practices."

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02:25 1 MR. HILL: Can you call-out 15.2.15, please.

02:25 2 BY MR. HILL:

02:25 3 Q. In BP's best practices, it says that "autofill float  
02:25 4 equipment shall be tripped prior to running through any  
02:25 5 hydrocarbon-bearing zone."

02:25 6 Did I read that correctly?

02:25 7 A. Yes, sir.

02:25 8 Q. And "trip" means "convert"; right?

02:25 9 A. Trip means convert.

02:25 10 Q. And that's not what happened in this well, is it?

02:25 11 A. That's correct.

02:25 12 MR. HILL: No further questions, Your Honor.

02:25 13 THE COURT: Any redirect?

02:25 14 MR. BREIT: No, sir.

02:25 15 THE COURT: Thank you, Mr. Calvert. You're done.

02:25 16 Where are you heading off to?

02:25 17 THE WITNESS: India.

02:25 18 THE COURT: India.

02:25 19 THE WITNESS: India, yes, sir.

02:25 20 THE COURT: All right. Have a good trip.

02:26 21 THE WITNESS: Thank you.

02:26 22 THE COURT: Plaintiffs can call their next witness.

02:26 23 Let's take about a 10-minute recess.

02:26 24 THE DEPUTY CLERK: All rise.

02:26 25 (WHEREUPON, the Court took a recess.)

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02:40 1 THE DEPUTY CLERK: All rise.

02:40 2 THE COURT: Please be seated, everyone.

02:40 3 Plaintiffs may call their next witness.

02:40 4 MS. CHANG: Good afternoon, Your Honor. Deanna Chang  
02:40 5 for the United States. We would like to call Dr. Rory Davis at  
02:40 6 this time. He's also the final expert witness for the United  
02:40 7 States.

02:40 8 (WHEREUPON, RORY DAVIS, having been duly sworn,  
02:40 9 testified as follows.)

02:40 10 THE DEPUTY CLERK: Please state your full name and  
02:40 11 correct spelling for the record.

02:40 12 THE WITNESS: My name is Rory Davis, R-O-R-Y,  
02:41 13 D-A-V-I-S.

02:41 14 DIRECT EXAMINATION

02:41 15 BY MS. CHANG:

02:41 16 Q. Good afternoon, Dr. Davis. Could you give us a brief  
02:41 17 summary of who you are and your involvement in the case.

02:41 18 A. Sure. My name is Rory Davis. I hold a Ph.D. in  
02:41 19 mechanical engineering from the University of California. I'm  
02:41 20 also a licensed professional mechanical engineer for over  
02:41 21 20 years.

02:41 22 I was called upon to participate in the forensic  
02:41 23 examination activities at Michoud on the blowout preventer in  
02:41 24 November 2010, and I went and supported those activities for a  
02:41 25 six- or seven-month period. I did that with a group of four

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02:41 1 other gentlemen, engineer experts.

02:41 2 And I was also asked by the United States after that  
02:41 3 time to submit a report concerning our opinions on the failure  
02:42 4 of the BOP in the *Deepwater Horizon* accident.

02:42 5 Q. And do you feel that you're qualified to offer opinions  
02:42 6 regarding the causes of the BOP failure?

02:42 7 A. Yes, I am. I spent a long period of time with the  
02:42 8 opportunity to look carefully at all of this hardware, and that  
02:42 9 was during Phase One activities at Michoud, where I spent about  
02:42 10 two man months of time and also in the Phase Two part of the  
02:42 11 activities there, where I spent another one and a half man  
02:42 12 months of time.

02:42 13 MR. MAZE: Your Honor, people in the back aren't able  
02:42 14 to hear the question. I just ask that we make sure that the  
02:42 15 microphone's on.

02:42 16 MS. CHANG: Is that better?

02:42 17 THE COURT: No. Does it shows green?

02:42 18 MS. CHANG: It's green.

02:42 19 THE COURT: Now it's on. Ooh, that's really loud.

02:43 20 MS. CHANG: Is that better?

02:43 21 THE COURT: Yeah.

02:43 22 THE WITNESS: All right. So continuing, yes. So I  
02:43 23 spent three and a half total man months involved in the  
02:43 24 activities at Michoud: disassembly, inspection, testing and  
02:43 25 evaluation of the BOP system.

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02:43 1 I was a member of the technical working group.  
02:43 2 We also called that the "Twig," or the "TWG." And I was one  
02:43 3 member of that group, representing the United States; and that  
02:43 4 group also had representatives from all the other parties.

02:43 5 It was our job to work with DNV to make sure  
02:43 6 that all of our activities were accurate and efficient and also  
02:43 7 evidence-preserving, let's say, to go through that process  
02:43 8 carefully. So we gave recommendations to DNV, and DNV executed  
02:44 9 those recommendations in their own activities. So that was  
02:44 10 extremely important in understanding the blowout preventer and  
02:44 11 what may have happened in the accident, of course.

02:44 12 Now, after that time I also began formulating my  
02:44 13 opinions based on all that information and was ultimately asked  
02:44 14 to submit a report.

02:44 15 **BY MS. CHANG:**

02:44 16 **Q.** So aside from the approximately three and a half man  
02:44 17 months you spent analyzing the BOP, do you have any other  
02:44 18 experience that's relevant to your analysis of the failure of  
02:44 19 the BOP?

02:44 20 **A.** Yes. I've been working as a consulting mechanical  
02:44 21 engineer for over 25 years. I work on a lot of varied and  
02:44 22 sophisticated subjects and have over the years, and I've  
02:45 23 developed a high degree of skill in analyzing and evaluating  
02:45 24 mechanical and structural systems.

02:45 25 So the techniques and skills and tools that I use in

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02:45 1 that work are also applicable here to the BOP system.

02:45 2 Q. What types of methods and skills did you use to reach your  
02:45 3 conclusions regarding the causes of the failure of the BOP?

02:45 4 A. Well, of course, I have the firsthand observation of all  
02:45 5 of the components, and that's very important. I also was able  
02:45 6 to look at all of the test results and inspection results. And  
02:45 7 then I also did some analysis of my own to further evaluate the  
02:45 8 system. All of those things came into play using similar tools  
02:46 9 that I usually use in my regular work.

02:46 10 Q. What types of analyses did you perform?

02:46 11 A. Oh, for example, in the BOP area, I used -- I did analysis  
02:46 12 of drill pipe bending or buckling. I looked at friction of  
02:46 13 blind shear ram blades and drill pipe. I looked at flow rates  
02:46 14 in the well, flow forces that come from those flow rates and so  
02:46 15 forth. And you can see these analyses in my reports.

02:46 16 Q. Are those the same types of analyses that you typically  
02:46 17 perform in your work as a consulting mechanical engineer?

02:46 18 A. Yes, I do. This is the same kind of work that I normally  
02:46 19 do. For example, I've done extensive work on top fuel race  
02:46 20 cars and the bending and buckling of the tubes in those frames  
02:46 21 or chassis. I do work on rocket engines where we have very  
02:46 22 high pressure hydrocarbons being delivered, propellants to the  
02:47 23 engine, combustion process, and a lot of other different  
02:47 24 subjects where I use similar tools.

02:47 25 Q. During the course of your analysis of the *Deepwater*

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02:47 1 *Horizon's* BOP, did you come to any conclusions regarding  
02:47 2 whether it complied with federal regulations?

02:47 3 A. Not exactly, no, because I'm not a lawyer or a judge, and  
02:47 4 I can't make the legal conclusion.

02:47 5 I did use the words "best" and "safest" in my report.  
02:47 6 I provided some technical opinions about what was best and  
02:47 7 safest to help the Court make that determination. But I do not  
02:47 8 intend to make any particular legal conclusion along those  
02:47 9 lines.

02:47 10 Q. Prior to your involvement in this case, had you ever  
02:47 11 worked on a BOP before?

02:47 12 A. No, I had not.

02:47 13 Q. And prior to your involvement in this case, had you ever  
02:48 14 worked in the oil and gas industry before?

02:48 15 A. No, I had not.

02:48 16 Q. Do you believe that experience with the BOP or in the oil  
02:48 17 and gas industry is necessary to arrive at your conclusions?

02:48 18 A. No. Actually, I think it's a good thing that we have at  
02:48 19 least one expert in this case that's from outside the industry,  
02:48 20 because I don't operate under the conventions that everyone  
02:48 21 else in the industry might; and so I might have a different  
02:48 22 look on things, and I might see things that others might not.

02:48 23 Q. And does physics operate on the BOP the same way it does  
02:48 24 on other mechanical systems and structures?

02:48 25 A. Yes. This has come up many times in the hundreds of legal



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02:48 1 cases I've worked on. I have a saying that "physics is  
02:48 2 physics," and everything on earth obeys the same law of  
02:48 3 physics. So these things are applicable to any mechanical or  
02:48 4 structural system, whether it's a rocket engine or a race car  
02:48 5 or a blowout preventer.

02:49 6 MS. CHANG: Could we have TREX-22737, please.

02:49 7 BY MS. CHANG:

02:49 8 Q. Dr. Davis, do you recognize this document?

02:49 9 A. Yes, I do.

02:49 10 Q. And what is it?

02:49 11 A. It's the cover sheet for my first expert report.

02:49 12 MS. CHANG: Could we have TREX-07661, please.

02:49 13 BY MS. CHANG:

02:49 14 Q. Do you recognize this document, Dr. Davis?

02:49 15 A. Yes. That's the cover sheet for my rebuttal report.

02:49 16 Q. And are your opinions relating to the causes of the  
02:49 17 failure of the *Deepwater Horizon's* BOP contained in these two  
02:49 18 reports?

02:49 19 A. Yes, they are.

02:49 20 MS. CHANG: Your Honor, I offer Dr. Rory Davis as an  
02:49 21 expert in mechanical engineering and failure analysis.

02:49 22 MS. KARIS: Your Honor, Hariklia "Carrie" Karis, on  
02:49 23 behalf of BP. We have filed a *Daubert motion*, and to be clear,  
02:50 24 our motion is limited to Dr. Davis's opinions with respect to  
02:50 25 best and safest available technology.

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02:50 1           **THE COURT:** Whether the BOP was in compliance with  
02:50 2 the regulations; right?

02:50 3           **MS. KARIS:** In part, yes, whether it was in  
02:50 4 compliance. But the second part to that is he offers opinions  
02:50 5 based on that regulation regarding what other practical or  
02:50 6 feasible designs should have been incorporated. And yet he  
02:50 7 admits in his deposition -- and I assume here -- that he has  
02:50 8 never conducted any such analysis; and he himself agreed he has  
02:50 9 no prior experience with respect to BOPs.

02:50 10           And on that basis we move to strike any opinions  
02:50 11 with respect to his application of BASP in any capacity.

02:50 12           **THE COURT:** Do you plan to opine on those things here  
02:50 13 today?

02:51 14           **THE WITNESS:** I do plan to opine on what other  
02:51 15 technologies are out there that are better for this  
02:51 16 application, but I do not intend to make any judgments relative  
02:51 17 to the regulations.

02:51 18           **THE COURT:** Let me hear from the other people.

02:51 19           **MR. JONES:** Your Honor, David Jones on behalf of  
02:51 20 Cameron. We also have a *Daubert motion* for Dr. Davis. The  
02:51 21 issues in our motion are, first, his opinions related to  
02:51 22 alternative blind shear ram designs, whether there were  
02:51 23 feasible alternative blind shear ram designs that could have  
02:51 24 been incorporated into this BOP.

02:51 25           Second, his opinions regarding what are

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02:51 1 foreseeable conditions that a BOP might see in deepwater  
02:51 2 drilling.

02:51 3 And lastly, opinions about whether the blind  
02:51 4 shear rams could have sheared and healed under certain assumed  
02:51 5 conditions.

02:51 6 We believe that Dr. Davis doesn't have the  
02:51 7 qualifications to render those opinions. We also believe that  
02:52 8 his methodology with respect to alternative ram design and  
02:52 9 ability to seal is not in compliance with *Daubert*.

02:52 10 **THE COURT:** All right. I think Transocean wants to  
02:52 11 say something.

02:52 12 **MR. DOYEN:** Your Honor, we would join in those  
02:52 13 motions. And then to the extent that we have other challenges,  
02:52 14 which we do, we would be content to illuminate those through  
02:52 15 cross-examination and reserve for the Court's judgment at a  
02:52 16 later time.

02:52 17 **THE COURT:** All right. Very well. I'm going to let  
02:52 18 this witness testify. I think he clearly has great expertise  
02:52 19 as a mechanical engineer and a lot of experience. I don't  
02:52 20 think the fact that he's not previously worked on a blowout  
02:52 21 preventer, on this particular device, means he can't give  
02:52 22 expert testimony about it from a mechanical engineering  
02:52 23 standpoint.

02:52 24 I understand the issue about the regulations and  
02:52 25 all, and I'll consider that. I don't know how far it will go,

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02:53 1 but we'll see how that goes.

02:53 2 **MR. DOYEN:** Thank you.

02:53 3 **MS. KARIS:** Thank you, Your Honor.

02:53 4 **MR. JONES:** Thank you, Your Honor.

02:53 5 **BY MS. CHANG:**

02:53 6 **Q.** Dr. Davis, would you give us a brief description of the  
02:53 7 critical components of the BOP system for your analysis?

02:53 8 **A.** Sure. I think we have a video.

02:53 9 Here we have the BOP stack, and the upper part is  
02:53 10 called the LMRP, lower marine riser package, and it's connected  
02:53 11 to the lower BOP through a large hydraulic connector.

02:53 12 And if you go to the next chart, you can see where  
02:53 13 the yellow pod are and the blue pod are in the LMRP, actually.  
02:53 14 These are electrohydraulic systems, fairly complicated, that  
02:53 15 operate all the hydraulic units on the BOP stack.

02:53 16 Here you can see under normal operation you have  
02:53 17 signals coming down from the rig, and the control pods  
02:54 18 interpret those signals and get -- they basically get commands  
02:54 19 to do certain things in the pod -- or in the blowout preventer,  
02:54 20 such as closing certain rams and so forth.

02:54 21 **THE COURT:** Ms. Chang, I don't think you or the  
02:54 22 witness identified whatever this exhibit is for the record.  
02:54 23 Just so the record will be clear what he's describing.

02:54 24 **MS. CHANG:** My apologies, Your Honor. This is  
02:54 25 D-3550.001.

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02:54 1           **THE COURT:** Okay. Go ahead.

02:54 2           **THE WITNESS:** Okay. So continuing on. Now, we're  
02:54 3 looking at the major hydraulic components in the BOP stack.

02:54 4           First, we have our annular preventers. We have  
02:54 5 an upper and a lower. Those are in the LMRP. Then below that,  
02:54 6 we have the blind shear ram, which is arguably the most  
02:54 7 important component we'll talk about later. And we have the  
02:54 8 casing shear ram below that, which is the ram with the heaviest  
02:55 9 force capability of everything in there.

02:55 10           Then we have two variable bore rams, which I'll  
02:55 11 explain in a minute, and a test ram at the bottom.

02:55 12           Next chart. This is how an annular preventer  
02:55 13 works. We have a big rubber doughnut, and when the blue  
02:55 14 hydraulic ram is pressurized, indicated by the yellow arrows  
02:55 15 down below, then we push upward on the rubber doughnut; and  
02:55 16 then in turn, the rubber contracts around the drill pipe, and  
02:55 17 it seals the annulus in the well.

02:55 18           And what I mean by "annulus" here, I want to be  
02:55 19 clear, is not the same as the annulus you were talking about  
02:55 20 during the cementing. In that case, you were looking down at  
02:55 21 the bottom of the hole, and the space outside the casing was  
02:55 22 also called the annulus. But now when I say annulus, I mean  
02:56 23 between the wellbore and the drill pipe. So it's this area  
02:56 24 here.

02:56 25           So an annular preventer closes off the annulus

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02:56 1 when commanded. So both annular preventers work the same way.

02:56 2 Now, on the next chart, here we have a variable  
02:56 3 bore ram. This is another way of closing the annulus, and it  
02:56 4 does that by closing the two halves around the pipe, and they  
02:56 5 can actually close around different sizes of pipe. And when it  
02:56 6 does close, there's rubber inside, and these are rubber or  
02:56 7 elastomer packers. And the packers are able to completely seal  
02:56 8 all the way around so that you get no annulus flow.

02:56 9 Now, also, these variable bore rams can carry up  
02:56 10 and down forces. It holds the drill pipe pretty strongly up  
02:56 11 and down.

02:57 12 Next chart. Here we have the blind shear ram.  
02:57 13 This is the component that can actually seal off the entire  
02:57 14 well. It has the ability to both close the annulus, using  
02:57 15 these packers and seals, but it can also cut the pipe if the  
02:57 16 pipe is present.

02:57 17 And if you go to the next chart. Here you have  
02:57 18 a piece of pipe. This is a straight blade and this is an  
02:57 19 angled blade, and they come together and shear the pipe off.  
02:57 20 And then once the pipe is sheared off, the lower piece that you  
02:57 21 cannot see now is actually bent over by the rams, and that  
02:57 22 helps to seal the lower piece of pipe.

02:57 23 And then the packers, they're called, these  
02:57 24 elastomer pieces, seal the annulus. So you can completely shut  
02:57 25 off the flow both through the drill pipe and through the

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02:57 1 annulus on the outside of the drill pipe.

02:57 2 Next chart.

02:58 3 **BY MS. CHANG:**

02:58 4 **Q.** What is the automatic mode, or the AMF, function?

02:58 5 **A.** AMF function is an autonomous system that does not require  
02:58 6 human intervention, and it's executed from the pods on the LMRP  
02:58 7 when communication is lost between the rig and the pods.

02:58 8 So if you lose communications, if you lose  
02:58 9 hydraulics, and if you lose electricity, then the AMF function  
02:58 10 will be initiated. And the intention of the AMF function is to  
02:58 11 close the blind shear ram in an emergency situation.

02:58 12 **Q.** And finally, Dr. Davis, what is the autoshear function?

02:58 13 **A.** Autoshear is another emergency mode to close the blind  
02:58 14 shear ram. It's, again, autonomous; it does not require human  
02:58 15 intervention. However, in this case, it has no electronic  
02:58 16 component at all. It only works with hydraulics.

02:59 17 And the autoshear takes place normally when -- if the  
02:59 18 LMRP is suddenly removed from the lower BOP stack, which is an  
02:59 19 emergency procedure. For example, if the rig drifts too far  
02:59 20 off of station, the LMRP will be released and the valve that  
02:59 21 operates the autoshear will be tripped and the blind shear ram  
02:59 22 will be closed by the autoshear function.

02:59 23 **Q.** And the autoshear function does not involve the yellow or  
02:59 24 blue control pods; is that correct?

02:59 25 **A.** That's correct. This is an entirely hydraulic system that

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02:59 1 operates independently of all of the pod details. All the  
02:59 2 electronics are not used.

02:59 3 Q. Dr. Davis, were you able to reach any conclusions  
02:59 4 regarding what caused the *Deepwater Horizon's* BOP to fail?

02:59 5 A. Yes, I reached several conclusions.

02:59 6 In order to explain them, I want to define a couple  
03:00 7 of different times. It is important to specify which time  
03:00 8 we're referring to.

03:00 9 Q. Okay. And this is D-3591.

03:00 10 A. Firstly, we have what I'll call "AMF time." This is  
03:00 11 April 20th, 2010, at the time of the explosion and just a few  
03:00 12 minutes after that. And then we have another time we're going  
03:00 13 to call "autoshear time," which is April 22nd, two days later.

03:00 14 Q. Let's start at AMF time, or April 20th, 2010.

03:00 15 Do you believe that the conditions for AMF were  
03:00 16 satisfied at the time of the explosion or shortly thereafter?

03:00 17 A. Yes, I believe they were. The explosion would have done a  
03:00 18 lot of damage, and the communication to the pods would have  
03:00 19 been lost -- and also electricity and hydraulics, and that  
03:00 20 would have activated the AMF.

03:01 21 Q. And the activation of the AMF should have caused the blind  
03:01 22 shear rams to close at that point?

03:01 23 A. It should have. That would be its normal mode of  
03:01 24 operation. However, we had two problems in the pods that  
03:01 25 prevented the blind shear ram from being activated at that



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03:01 1 time.

03:01 2 Q. Okay. What were those two problems?

03:01 3 A. The first was that we had a dead battery in the blue pod;  
03:01 4 the 27-volt battery was dead, which is critical to operating  
03:01 5 the solenoids.

03:01 6 Then in the yellow pod, we had a miswired solenoid.  
03:01 7 Solenoid 103, it's called, which is the solenoid that tells the  
03:01 8 blind shear ram to close. So it did not function either.

03:01 9 So we were unable to actuate the blind shear ram from  
03:01 10 both the blue pod and the yellow pod.

03:01 11 Q. What's the basis for your opinion that the battery in the  
03:01 12 blue pod was dead?

03:02 13 A. When we checked the battery, the 27-volt battery, in our  
03:02 14 activities at Michoud, we found that it was virtually dead,  
03:02 15 very low voltage.

03:02 16 This was consistent with what was found when the blue  
03:02 17 pod was raised from subsea on the *Discoverer Enterprise*. So  
03:02 18 apparently the battery was not in a condition where it could  
03:02 19 have functioned the solenoids.

03:02 20 Q. Are you aware of other experts' opinion regarding whether  
03:02 21 the condition of the blue pod's 27-volt battery at the time of  
03:02 22 the AMF would have allowed it to function?

03:02 23 A. BP's and Halliburton's experts agree with me that the  
03:02 24 battery would have been insufficient to properly activate the  
03:02 25 blind shear ram in AMF. The only expert that doesn't agree

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03:02 1 with me is Transocean's expert, Mr. Childs.

03:02 2 Q. Why do you disagree with Mr. Childs' opinion?

03:02 3 A. Mr. Childs has a completely different theory, that somehow  
03:03 4 the 27-volt battery in the blue pod was actually charged and  
03:03 5 properly functioned at the time of AMF; but then, because of a  
03:03 6 low 9-volt battery, was subsequently drained of all of its  
03:03 7 charge. So when we found later, it didn't have sufficient  
03:03 8 charge.

03:03 9 The problem is, is when we checked the 9-volt  
03:03 10 batteries at Michoud, we found that there was absolutely no  
03:03 11 problem with the 9-volt batteries in the blue pod. So I must  
03:03 12 discount Mr. Childs' theory.

03:03 13 Q. Were you able to review any of the experiments and test  
03:03 14 results that Mr. Childs bases his theory on?

03:03 15 A. Yes. I reviewed some materials. There were some  
03:03 16 independent tests done by Transocean for Mr. Childs that are  
03:03 17 separate from what we were doing with DNV, with peer-review and  
03:04 18 so forth, on the site. There was a report put out. It's not a  
03:04 19 very good report, unfortunately, and there are a lot of details  
03:04 20 left out.

03:04 21 So I was not -- I could not really use that report to  
03:04 22 any great effect.

03:04 23 Q. Was Transocean provided the opportunity to comment and  
03:04 24 provide feedback on the battery testing that was performed at  
03:04 25 Michoud?

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03:04 1 A. Yes. The TWG included representatives from Transocean.  
03:04 2 There were lots of opportunities to weigh in and discuss  
03:04 3 methods of testing batteries and so forth.

03:04 4 Q. If the 27-volt battery in the blue pod had functioned at  
03:04 5 the time of AMF, do you believe that the blind shear ram would  
03:04 6 have closed?

03:04 7 A. Yes, I do. If that 27-volt battery had been sufficiently  
03:04 8 charged -- I know the AMF function was activated, and it should  
03:04 9 have went ahead and commanded the blind shear ram. It would  
03:05 10 have closed; it would have cut the whole pipe and bent over the  
03:05 11 top of it and sealed the well, like you saw in the video  
03:05 12 earlier.

03:05 13 Q. Is there anything that could have been done to ensure that  
03:05 14 that 27-volt battery in the blue pod was functional at AMF?

03:05 15 A. Yes, there are numerous things. Firstly, given the system  
03:05 16 that was in place, Cameron's recommended replacement schedule  
03:05 17 for those batteries should have been followed. We found that  
03:05 18 they were not. The 27-volt blue pod battery had been in use  
03:05 19 for about two and a half years, and Cameron recommends that it  
03:05 20 be used for up to one year. So that's the first thing.

03:05 21 And then the other thing is that the maintenance  
03:05 22 recording history is very difficult to follow. It's very  
03:05 23 difficult to tell when the batteries were last changed. So,  
03:05 24 therefore, it's difficult to know when the next change should  
03:05 25 take place. So the maintenance history system was

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03:06 1 insufficient.

03:06 2 Q. What about testing? Was there testing that should have  
03:06 3 been performed that would have identified the dead 27-volt  
03:06 4 battery?

03:06 5 A. Yes. Well, the first thing is, whenever your pods are on  
03:06 6 the surface, you can check those battery voltages. So that  
03:06 7 would have been a wise thing to do. But there was no evidence  
03:06 8 ever found that that was done.

03:06 9 Then another thing that you could do while the BOP is  
03:06 10 on the surface is to run the actual AMF sequence to make sure  
03:06 11 it works. And there was also no record that that was ever  
03:06 12 done.

03:06 13 Q. And finally, was there hardware that could have been  
03:06 14 installed that would have detected a depleted 27-volt battery?

03:06 15 A. Yes. The first thing is, is that it makes a lot of sense  
03:06 16 to have a battery voltage monitoring system of some kind. And  
03:06 17 that was not in use on this rig.

03:06 18 And then the other thing is that rechargeable battery  
03:07 19 system could be used where you don't have to worry about your  
03:07 20 batteries ever going dead because they're continuously under  
03:07 21 charge. And that was not in use.

03:07 22 Q. So let's talk now about the yellow pod. Why is it that  
03:07 23 you believe that the yellow pod was unable to function the  
03:07 24 blind shear ram at the time of AMF?

03:07 25 A. Well, the yellow pod was brought up from subsea after the

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03:07 1 accident, on the *Q4000*. Checks were made to the AMF function,  
03:07 2 and they found that that solenoid was not operating; the AMF  
03:07 3 function was not executing from the yellow pod.

03:07 4 And so they took that solenoid out, and they replaced  
03:07 5 it with a new one. And lo and behold, then the AMF function  
03:07 6 worked. So at that point, they knew there was something wrong  
03:07 7 with this original Solenoid 103Y, we call it. So back at  
03:08 8 Michoud, that was one of the solenoids that we disassembled and  
03:08 9 we looked inside. We found that the -- this solenoid that has  
03:08 10 two coils inside that work together had one of those two coils  
03:08 11 reverse-wired, and that was a big problem because that meant  
03:08 12 that the action of the two coils, instead of being  
03:08 13 complementary and adding to the force that you would get from  
03:08 14 your valve, you would get a cancelation. So the valve would  
03:08 15 not shift.

03:08 16 That was essentially the cause of the problem that  
03:08 17 was seen on the *Q4000*, and that's what prevented that solenoid  
03:08 18 from activating the blind shear ram during AMF.

03:08 19 **Q.** Are you aware of any tests performed by Cameron that  
03:08 20 support your opinion that a miswired solenoid would not be able  
03:09 21 to function the blind shear ram?

03:09 22 **A.** I am aware that Cameron did some tests on a similar  
03:09 23 solenoid -- on the same model solenoid with intentional reverse  
03:09 24 wiring. And they came to the same conclusion, that that  
03:09 25 solenoid used in the AMF-type process where you're activating

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03:09 1 both coils at once, it simply would not function.

03:09 2 Q. And are you aware of other experts' opinions regarding  
03:09 3 whether a miswired solenoid could function?

03:09 4 A. Yes. BP and Halliburton experts agree with me that that  
03:09 5 solenoid would not have been functional to activate the AMF,  
03:09 6 the blind shear ram.

03:09 7 On the other hand, Transocean's expert, Mr. Childs,  
03:09 8 disagrees. He believes that, despite the incorrect wiring,  
03:09 9 that somehow that solenoid would have still functioned the AMF.

03:09 10 Q. And why do you disagree with Mr. Childs' opinion?

03:09 11 A. Because of the large amount of testing that we did at  
03:10 12 Michoud. In cooperation with DNV and everyone on the TWG, we  
03:10 13 clearly established that that solenoid would not properly  
03:10 14 function.

03:10 15 There were some other tests done independently by  
03:10 16 Transocean and Mr. Childs. The reporting on those tests is  
03:10 17 woefully inadequate. We can't rely on it, and so we discount  
03:10 18 Mr. Childs' theory in light of the large amount of other  
03:10 19 evidence that we had.

03:10 20 Q. Was Transocean provided the opportunity to comment and  
03:10 21 provide feedback on the testing that was performed on the  
03:10 22 solenoids at Michoud?

03:10 23 A. Yes. Again, they had membership on the TWG. They could  
03:10 24 weigh in and voice any concerns about how we were doing the  
03:10 25 solenoid tests.

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03:10 1           **THE COURT:** Let me just interrupt you for a minute.  
03:10 2 I want to understand. You point out two different problems,  
03:10 3 one with the 27-volt battery that was in the blue pod; right?

03:11 4           **THE WITNESS:** Yes.

03:11 5           **THE COURT:** And then this separate problem. Were  
03:11 6 those problems related?

03:11 7           **THE WITNESS:** No, they really weren't, and it is  
03:11 8 very, very unfortunate that they both occurred at the same time  
03:11 9 because that essentially wiped out the redundancy that was  
03:11 10 there by having two pods.

03:11 11           **THE COURT:** That was going to be my question.

03:11 12           **THE WITNESS:** Yeah.

03:11 13           **THE COURT:** If either of these things had not  
03:11 14 occurred, if either the battery had been charged and/or the  
03:11 15 solenoid had been, in your view, in your opinion, wired  
03:11 16 correctly, the blind shear rams would have worked?

03:11 17           **THE WITNESS:** That is correct.

03:11 18           **THE COURT:** Okay.

03:11 19 **BY MS. CHANG:**

03:11 20 **Q.** Are you aware of anything that could have been done to  
03:11 21 ensure that the solenoid was properly wired?

03:11 22 **A.** Yes. Faulty wiring is very easy to detect. In fact,  
03:11 23 Cameron provides procedures -- written procedures for  
03:12 24 rebuilding or refurbishing solenoids. And once they are  
03:12 25 refurbished, you're supposed to check them with a certain set

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03:12 1 of tests.

03:12 2 And those tests include exciting one coil or two  
03:12 3 coils at the same time. And if you had done two coils at the  
03:12 4 same time, you would have seen that the valve wouldn't work.  
03:12 5 So that would immediately tell you the wiring was bad.

03:12 6 Those same procedures are reflected in some of  
03:12 7 Transocean's required solenoid refurbish and check procedures.

03:12 8 So if any of that -- if either one of those  
03:12 9 procedures would have been followed, the problem with the  
03:12 10 solenoid would have been identified and it never would have  
03:12 11 been put on a blowout preventer.

03:12 12 Q. Okay. So that pretty much summarizes your opinions on  
03:12 13 what happened -- what failed to happen at the time of AMF.

03:12 14 So let's talk now about the autoshear function that  
03:13 15 was attempted on April 22nd, 2010.

03:13 16 Were you able to reach any conclusions regarding the  
03:13 17 functioning of the blind shear ram at that point?

03:13 18 A. Yes, I was. So now we're talking about two whole days  
03:13 19 later. The rig has been drifting around, things have been  
03:13 20 happening down in the BOP that I won't get into right now. So  
03:13 21 the conditions were entirely different.

03:13 22 Now, at this point in time is when I believe the  
03:13 23 autoshear function actually did close the blind shear ram. If  
03:13 24 you look at the hardware involved, the pieces of pipe, you will  
03:13 25 see that the pipe was attempted to be cut in an offset



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03:13 1 position. The pipe was off to the side of the wellbore when  
03:13 2 the blind shear ram closed.

03:13 3 And because of this -- because of the way the ram  
03:13 4 blocks are configured, it was not possible to completely cut  
03:14 5 the pipe. Instead, it was only partially cut; and because of  
03:14 6 the fact that the ram block -- the ram blades could not center  
03:14 7 the pipe hardly at all, then the pipe -- a piece of the pipe  
03:14 8 got stuck in the side, and it kept the blind shear ram from  
03:14 9 closing.

03:14 10 So we wound up with a blind shear ram that wasn't  
03:14 11 completely closed and it was leaking a lot and it had not  
03:14 12 completely closed against the rubber packers, so it could not  
03:14 13 seal the well.

03:14 14 Q. So what is the basis for your opinion that the blind shear  
03:14 15 ram was activated at the time of autoshear?

03:14 16 A. Well, as I said, this was two days later, so the  
03:14 17 conditions were totally different than they were at AMF time.  
03:14 18 I did extensive analysis to consider both -- both of those  
03:14 19 times. Back at AMF time, there was really no mechanism for the  
03:15 20 pipe to be off center as it was when the blind shear ram was  
03:15 21 closed.

03:15 22 So later in the time of autoshear, there were lots of  
03:15 23 reasons why the blade -- why the drill pipe could have been off  
03:15 24 to the side. So it's very strong evidence that it was  
03:15 25 autoshear time when the blind shear ram did close.

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03:15 1 Q. Are you aware of other experts' opinions regarding your  
03:15 2 conclusion -- regarding your conclusion that the blind shear  
03:15 3 ram functioned at autoshear?

03:15 4 A. Yes. Again, BP and Halliburton experts agree with me that  
03:15 5 it was autoshear time when the blind shear ram closed.  
03:15 6 Mr. Childs at Transocean disagrees with me again. He believes  
03:15 7 that the blind shear ram was closed at AMF time.

03:15 8 THE COURT: Just so I'm clear on this, the autoshear  
03:15 9 time, again, to distinguish it from the AMF time, that's what  
03:16 10 is -- what occurs or is intended to occur when the lower marine  
03:16 11 riser package separates for any reason, it disconnects from the  
03:16 12 lower part of the blowout preventer?

03:16 13 THE WITNESS: That's correct.

03:16 14 THE COURT: Okay.

03:16 15 THE WITNESS: That's the normal mode of operation.

03:16 16 THE COURT: And that should happen automatically?

03:16 17 THE WITNESS: It should happen automatically.

03:16 18 THE COURT: That's not relying on any kind of  
03:16 19 electronics?

03:16 20 THE WITNESS: That's right.

03:16 21 THE COURT: It's an hydraulic function, you said.

03:16 22 THE WITNESS: It's only a hydraulic function.

03:16 23 And in this case, it was specially initiated by  
03:16 24 an ROV going to the blowout preventer and actually cutting off  
03:16 25 a piece of the valve plunger.

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03:16 1           **THE COURT:** To simulate that there had been a  
03:16 2 disconnect between the LMRP and the blowout preventer?

03:16 3           **THE WITNESS:** Exactly. Yeah.

03:16 4           **THE COURT:** Okay.

03:16 5           **THE WITNESS:** So it allowed the valve to shift  
03:16 6 without the LMRP actually being removed.

03:17 7           **THE COURT:** Okay. Thank you.

03:17 8           **THE WITNESS:** So that's how the autoshear actually  
03:17 9 took place.

03:17 10                   And then at that time, the pipe had been all  
03:17 11 over the place with the rig drifting around. The pipe wound up  
03:17 12 very far offset, and the blind shear ram could not cut it.

03:17 13 **BY MS. CHANG:**

03:17 14 **Q.** Why do you disagree with Mr. Childs' conclusion that the  
03:17 15 blind shear ram functioned at the time of AMF rather than  
03:17 16 autoshear?

03:17 17 **A.** Well, there's just no evidence to support that theory. If  
03:17 18 you spend a lot of time studying it, you find that at AMF time  
03:17 19 there was no reason for the pipe to be significantly off  
03:17 20 center. So if we find this pipe way off to the side, this is  
03:17 21 not explained by an AMF functioning in the blind shear ram.

03:17 22 **Q.** Did Mr. Childs' opinion rely on any engineering  
03:17 23 calculations?

03:17 24 **A.** Yes. The underlying theory behind the idea that, at AMF  
03:18 25 time, the pipe was offset is based on this theory that there

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03:18 1 was a lot of upward flow forces. So at this point, you know,  
03:18 2 the well was blowing out, and the thought was that there was  
03:18 3 some -- a lot of upward force on the pipe that would cause it  
03:18 4 to buckle or to move off to the side.

03:18 5 However, if you go through in detail the calculations  
03:18 6 to look at that, it turns out that -- and Stress Engineering  
03:18 7 Services, who did some calculations for Mr. Childs in this  
03:18 8 respect, made some fundamental errors when trying to figure out  
03:18 9 what the forces on the pipe was.

03:18 10 And I did my own calculations and I found that the  
03:18 11 forces on the pipe from upward flow were very small compared to  
03:18 12 what they thought they were.

03:18 13 Also, you have to recognize that when the AMF could  
03:18 14 have functioned, one of the variable bore rams had already  
03:19 15 closed, at least one. And so the pipe was being centered by  
03:19 16 that variable bore ram in the wellbore that was helping keep  
03:19 17 the pipe straight.

03:19 18 In addition, the hydrostatic forces, as you close the  
03:19 19 variable bore ram, would cause the pipe to be in tension, not  
03:19 20 in compression. And we also had, at that point in time, maybe  
03:19 21 a little bit of rig drift that would cause the pipe also to be  
03:19 22 in tension. And we see this -- we have corroborating data for  
03:19 23 this in the mud logger data that shows -- if you look carefully  
03:19 24 at it, the hook load and the pressure data does indicate that  
03:19 25 the pipe was in tension at this time with the BOP, not in

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03:19 1 compression.

03:19 2           So that means the pipe was centered closely -- pretty  
03:19 3 close to center within the bore, maybe within an inch of the  
03:20 4 center of the bore at that point in time. And then if that was  
03:20 5 true, that the VBR was closed, you would have no flow to be  
03:20 6 concerned about, the blind shear ram could have readily cut  
03:20 7 pipe, fold it over the top, and completely sealed the well.

03:20 8 Q. And that time that you're talking about right now, that's  
03:20 9 at the time of AMF; correct?

03:20 10 A. That's right. That's right.

03:20 11           And so if AMF had been the time when the blind shear  
03:20 12 ram was closed, you would have seen a centered pipe cut, not an  
03:20 13 offset partial pipe cut like we really saw, which was caused by  
03:20 14 the autoshear time.

03:20 15 Q. And are you aware of anything that could have been done to  
03:20 16 ensure that the blind shear ram could have fully sheared the  
03:20 17 off-centered drill pipe at the time of autoshear?

03:20 18 A. Okay. So still talking about autoshear here, we're  
03:20 19 dealing with the unfortunate fact that we have an offset pipe,  
03:20 20 pretty heavily offset. Now, it turns out that the blind shear  
03:20 21 ram that was in use here was a -- what I call a single-V blade  
03:21 22 ram. It had a V-shaped blade and a straight blade.

03:21 23           It turns out that that design has very little ability  
03:21 24 to center the pipe before it cuts the pipe. It cannot deal  
03:21 25 with significant friction between the pipe and the ram block

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03:21 1 blades. If you use double-V rams -- and there are two  
03:21 2 different models available on the market from Cameron, for  
03:21 3 example. There's the so-called DVS ram and another one called  
03:21 4 the CDVS ram. Both of these use two V-shaped blades. And it  
03:21 5 turns out that this provides drastically more centering  
03:21 6 capability. It can actually move the pipe back to the center  
03:21 7 and then cut it.

03:21 8 And if this kind of ram had been in use, I believe  
03:21 9 that the pipe could have been cut and the well could have been  
03:21 10 sealed even at autoshear time.

03:22 11 Q. Is there any difference in the amount of pressure that the  
03:22 12 double-V ram blades require versus the single ram blades --  
03:22 13 single-V?

03:22 14 A. Yeah. Aside from the centering capability that's much,  
03:22 15 much better for the double-V rams, they also require less  
03:22 16 pressure to cut the same size pipe compared to the existing  
03:22 17 blind shear ram that was in use. It takes 600 to 800 psi less  
03:22 18 hydraulic pressure to cut the same size pipe. So that's also a  
03:22 19 big benefit of using that kind of a ram.

03:22 20 Q. And were the double-V blade rams available for use in the  
03:22 21 *Deepwater Horizon's* BOP?

03:22 22 A. Yes. Both the DVS and the CDVS were on the market. They  
03:22 23 were practical to use. They were actually a plug-and-play  
03:23 24 change-out. So you didn't have to do any engineering. You  
03:23 25 could just take out the ram blocks from the old design and plug

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03:23 1 in the new double-V ram blocks. It did require you to pull the  
03:23 2 bonnets, which is not trivial, but it's not a big deal.

03:23 3 Q. Do you have any other opinions regarding the adequacy of  
03:23 4 the blind shear ram on the *Deepwater Horizon*?

03:23 5 A. Yes, I also have some opinions about that. It turns out  
03:23 6 that the shearing capacity for this blind shear ram was  
03:23 7 marginal at best.

03:23 8 In the case of the 5 1/2-inch pipe, which is what was  
03:23 9 in the BOP at the time of accident, if you go through the  
03:23 10 calculations, considering the depth of the well and the  
03:23 11 pressure inside the well, the required hydraulic pressure to  
03:23 12 cut that pipe exceeded the 3,000-psi main system pressure. So  
03:23 13 you couldn't use the main system to actually cut the pipe.  
03:24 14 Also, the shearing pressure required was too close to the  
03:24 15 4,000-psi limit which is in the high-pressure system.

03:24 16 And so this --

03:24 17 **THE COURT:** Explain to when what you mean by the  
03:24 18 "main system" in a high-pressure system.

03:24 19 **THE WITNESS:** Okay. Yes. 3,000 psi is supplied from  
03:24 20 the rig down piping that goes along with the riser all the way  
03:24 21 down to the blowout preventer. So we have 3,000 psi available  
03:24 22 from the rig to actuate the different hydraulics. And that  
03:24 23 would normally be the way things are actuated under normal  
03:24 24 day-to-day operations.

03:24 25 The normal 4,000-psi system is actually

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03:24 1 contained on the blowout preventer itself and is used for the  
03:24 2 autonomous functions like AMF and autoshear. And -- but it can  
03:24 3 also be controlled from the rig. And that is the highest  
03:25 4 pressure you have available to you to do any of these emergency  
03:25 5 operations is 4,000 psi.

03:25 6           You would like to have the ability to use both.  
03:25 7 So it's not -- I don't consider it very good to even be above  
03:25 8 3,000 psi. But when you're getting up to 4,000 or very close  
03:25 9 to it, that's a problem because now your highest pressure  
03:25 10 system might not even be able to cut the pipe.

03:25 11 **BY MS. CHANG:**

03:25 12 **Q.** So for 6 5/8-inch pipe, was the blind shear ram capable of  
03:25 13 shearing that?

03:25 14 **A.** Yes. 6 5/8 pipe was another size pipe that was used in  
03:25 15 this well. And if you go through calculations for that one,  
03:25 16 you find that the cutting pressures exceed both the 3,000 and  
03:25 17 the 4,000-psi limits. So there could be situations, if you had  
03:25 18 the 6 5/8 pipe across the BOP, you would not be able to cut it  
03:26 19 with this blind shear ram under certain conditions.

03:26 20 **Q.** And it's your understanding that BP was aware that the  
03:26 21 6 5/8-inch pipe was in use at the Macondo well?

03:26 22 **A.** Yes. They were aware of that in the documentation, plans  
03:26 23 for drilling, and so forth, that there would be 6 5/8 pipe  
03:26 24 sometimes used and actually across the blowout preventer.

03:26 25 **THE COURT:** But at the time this incident happened,



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03:26 1 we're talking about the 5 1/2-inch pipe?

03:26 2 **THE WITNESS:** Yes, you are correct. That didn't come  
03:26 3 into play in this particular accident.

03:26 4 **BY MS. CHANG:**

03:26 5 **Q.** And finally, Dr. Davis, during the course of your work,  
03:26 6 did you reach any conclusions regarding the maintenance of the  
03:26 7 BOP?

03:26 8 **A.** Yes, I did. Clearly, there were problems with maintenance  
03:26 9 because we had a dead battery and a miswired solenoid, so  
03:26 10 that's just self-evident that there are maintenance problems.  
03:27 11 They weren't properly executing the maintenance, and I believe  
03:27 12 one of the big reasons why was because the recording for  
03:27 13 maintenance was not adequate. So that's number one, just the  
03:27 14 fact that those two things happened is indicative of poor  
03:27 15 maintenance, and that the history records are just not really  
03:27 16 sufficient.

03:27 17 Now, the other thing is that there were several rig  
03:27 18 audits performed by BP on this rig. It started in 2005, and  
03:27 19 there was another one in 2008 and then a follow-up one in 2009.

03:27 20 **Q.** And who performed these rig audits?

03:27 21 **A.** These were audits actually performed by BP personnel for  
03:27 22 BP, who was, you know, running the rig in the Gulf of Mexico.  
03:27 23 Okay? So it was all BP people.

03:27 24 **Q.** Okay.

03:28 25 **MS. CHANG:** Could we have TRES-3400, please.

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03:28 1 BY MS. CHANG:

03:28 2 Q. This is page 1 of TRES-3400. Is this one of the audits  
03:28 3 that you were referring to, Dr. Davis?

03:28 4 A. Yes. This is the cover sheet for the 2005 audit.

03:28 5 Q. Okay.

03:28 6 MS. CHANG: And if we could go to pages 5 and then 6.  
03:28 7 Okay.

03:28 8 BY MS. CHANG:

03:28 9 Q. What is the significance of the highlighted passages?

03:28 10 A. Well, let's just read the first paragraph up there.

03:28 11 "There is a practice by maintenance personnel to  
03:28 12 close out maintenance work orders even though not all tasks are  
03:28 13 completed. Critical checks and inspections are consequently  
03:28 14 being missed. This was noted on numerous occasions during  
03:28 15 review of the maintenance history files. Maintenance work  
03:28 16 orders assigned to the" -- I don't have to read that last  
03:28 17 half-sentence there. Sorry about that.

03:28 18 And then if you look at the bottom paragraph there:  
03:28 19 "Maintenance history files were generally found to be  
03:29 20 unsatisfactory, although a few were exemplary. Work undertaken  
03:29 21 and measurements requested in the maintenance procedure were  
03:29 22 frequently omitted from the history files. An auditable trail  
03:29 23 of maintenance performed on equipment was often not possible  
03:29 24 from interrogation of the maintenance history."

03:29 25 Q. So from those two excerpts, what does that indicate to

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03:29 1 you?

03:29 2 A. Well, it indicates what I just said, essentially, that the  
03:29 3 recording and tracking of maintenance was quite inadequate and  
03:29 4 there are even some things not being done concerning  
03:29 5 maintenance activities.

03:29 6 For example, it says, "Critical checks and  
03:29 7 inspections are consequently being missed." And a perfect  
03:29 8 example of that is the dead battery. That should have been  
03:29 9 detected.

03:29 10 Q. And so, clearly, BP knew that there were serious  
03:29 11 maintenance issues on the *Deepwater Horizon* at least in 2005?

03:30 12 A. Yes. Starting in 2005, the BP auditors found this and  
03:30 13 they reported that back to the head honchos that were operating  
03:30 14 this rig out in the Gulf of Mexico.

03:30 15 MS. CHANG: Could we have TREN-6166, please?

03:30 16 BY MS. CHANG:

03:30 17 Q. Is this the 2008 rig audit that you were referring to?

03:30 18 A. Yes, this was done in January 2008, the next rig audit by  
03:30 19 BP personnel.

03:30 20 MS. CHANG: If we could have page 9, please.

03:30 21 BY MS. CHANG:

03:30 22 Q. If you could read that highlighted passage for us.

03:30 23 A. "All too frequently, maintenance history notes do not  
03:30 24 indicate the extent of the work performed or record readings  
03:30 25 requested in the maintenance procedure and as such, they are

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03:30 1 all too frequently inconclusive.

03:30 2 "Although raised during previous audits, there is  
03:30 3 still a tendency to close out maintenance routines even though  
03:31 4 not all tasks, or sometimes no tasks, have been completed.  
03:31 5 Ongoing operations are sometimes quoted as the reason for this;  
03:31 6 but in most cases, it comes down to not completing all  
03:31 7 maintenance procedure tasks. And again, critical checks and  
03:31 8 inspections are consequently being missed."

03:31 9 This was three years later, the same problem.

03:31 10 Q. And did you see evidence to confirm these statements when  
03:31 11 you reviewed the BOP?

03:31 12 A. Again, the lack of battery information is a perfect  
03:31 13 example.

03:31 14 MS. CHANG: Let's also go to TREN-3405, please.

03:31 15 BY MS. CHANG:

03:31 16 Q. Is this another one of the audit reports that you were  
03:31 17 referring to?

03:31 18 A. Yes. This is the so-called follow-up rig audit, September  
03:32 19 '09.

03:32 20 MS. CHANG: And if we could go to page 2, please.

03:32 21 BY MS. CHANG:

03:32 22 Q. And if you could read that finding for us.

03:32 23 A. "Closing out of the last audit recommendations had no  
03:32 24 apparent verification by BP. Consequently, a number of the  
03:32 25 recommendations that Transocean had indicated as closed out

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03:32 1 have either deteriorated again or not been suitably addressed  
03:32 2 in the first instance."

03:32 3 So I think what they're referring to here is, back in  
03:32 4 the 2008 audit that wasn't too long ago, they were looking for  
03:32 5 the rectification of the problems that were seen because they  
03:32 6 were there -- three years after the 2005 audit, they were still  
03:32 7 having the same problems. So they were looking for  
03:32 8 rectification by BP to get these things on the straight and  
03:32 9 narrow and working properly.

03:32 10 So that's what they're referring to there, that it  
03:33 11 wasn't happening.

03:33 12 **MS. CHANG:** And if we could flip to page 11, please.

03:33 13 **BY MS. CHANG:**

03:33 14 **Q.** And, again, Dr. Davis, would you read that into the record  
03:33 15 for us?

03:33 16 **A.** "Whilst it is appreciated that attempts are being made to  
03:33 17 improve quality of maintenance reporting, based on observations  
03:33 18 during the audit period, further effort is still required. All  
03:33 19 too frequently, maintenance history was substandard with  
03:33 20 missing information and poor quality reports that lacked  
03:33 21 sufficient detail to convince the reader that the task had  
03:33 22 actually been performed in accordance with the procedure."

03:33 23 **Q.** And is that consistent with what you observed in your  
03:33 24 analysis of the BOP?

03:33 25 **A.** Yeah. Another example is that the activities involving

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03:33 1 our bad Solenoid 103 weren't even in the record. Who had done  
03:33 2 the refurbishment, for example, was not there.

03:34 3 Q. And all three of these audits indicates to you that BP was  
03:34 4 aware of maintenance issues on the BOP?

03:34 5 A. Yes, they were aware of these maintenance issues for  
03:34 6 numerous years and, apparently, the problems were not  
03:34 7 rectified.

03:34 8 Q. Do any of the other experts in this case offer opinions on  
03:34 9 whether the maintenance on the *Deepwater Horizon's* BOP was  
10 adequate?

03:34 11 A. Again, BP and Halliburton experts agree with me that the  
03:34 12 maintenance on the BOP was inadequate and also that the  
03:34 13 maintenance problems contributed to the BOP's failure.

03:34 14 MS. CHANG: Could we switch to the ELMO, please?

03:34 15 BY MS. CHANG:

03:34 16 Q. So in conclusion, Dr. Davis, does this chart accurately  
03:35 17 summarize your opinions and your understanding of the opinions  
03:35 18 of the other BOP experts in this case regarding the causes of  
03:35 19 its failure?

03:35 20 A. Yes, I believe so. So on the left, you have all the  
03:35 21 different opinions. A checkmark indicates an expert that  
03:35 22 agrees with me -- "me" being U.S. -- and then the others being  
03:35 23 BP and Halliburton. Xs indicate a disagreement or a different  
03:35 24 theory. And then blank boxes, I guess, represent no opinion.  
03:35 25 And I think these are accurate.

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03:35 1 MS. CHANG: Thank you very much, Dr. Davis. I don't  
03:35 2 have any further questions.

03:35 3 THE COURT: Okay. Any questions by the PSC?

03:35 4 MR. WILLIAMSON: Yes, Your Honor.

03:35 5 THE COURT: Okay. Ms. Chang, I'm trying to keep the  
03:36 6 record straight here. I don't think you identified that last  
03:36 7 chart.

03:36 8 MS. CHANG: That was D-3592, and we had been using  
03:36 9 blowouts from it throughout his testimony.

03:36 10 THE COURT: Oh, it was all part of the same --

03:36 11 MS. CHANG: Yeah. It was just the whole chart put  
03:36 12 together.

03:36 13 THE COURT: Okay. Thank you.

03:36 14 MS. CHANG: Thank you.

03:36 15 MR. WILLIAMSON: May it please the Court. I'm Jimmy  
03:36 16 Williamson for the PSC.

**CROSS-EXAMINATION**

03:36 17  
03:36 18 **BY MR. WILLIAMSON:**

03:36 19 Q. Dr. Davis, I want to start with you had three colleagues  
03:37 20 who helped you write your report and your rebuttal report. Am  
03:37 21 I right about that?

03:37 22 A. Yes.

03:37 23 Q. Could you tell the Court very briefly -- because he has  
03:37 24 your CV, so he doesn't need it extensive, but very briefly why  
03:37 25 they were qualified to contribute to your report?

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03:37 1 A. Yes. Well, firstly, we had Dr. Neil Robinson, who is a  
03:37 2 very accomplished materials scientist and forensic engineer,  
03:37 3 who was actually a principal at a company called Exponent, Inc.  
03:37 4 at one time in the San Francisco Bay Area, who is well known as  
03:37 5 one of the foremost forensic engineering firms in the country.

03:37 6 Q. All right. Who else?

03:37 7 A. So that's Mr. Robinson.

03:37 8           And then we had Patrick Novak, who is an extremely  
03:37 9 experienced hydraulics mechanical engineer; and he also had  
03:37 10 good familiarity with solenoids and some electronics.

03:38 11 Q. Okay. And Merala, Merala?

03:38 12 A. And then we have Raymond Merala, who was our leader,  
03:38 13 Talas Engineering, and he has many years of experience doing  
03:38 14 forensic engineering and he's a more general mechanical  
03:38 15 engineer, like I am.

03:38 16 Q. Now, generally, let's turn to the subject of the BOP. The  
03:38 17 BOP is a mechanical piece of equipment; correct?

03:38 18 A. Yes, it is.

03:38 19 Q. And so -- and that was kind of how your analysis went,  
03:38 20 right, was that as a mechanical piece of equipment, what its  
03:38 21 limitations were?

03:38 22 A. Yes. I'm primarily a mechanical engineer. I also have  
03:38 23 experience with electronics and such, but -- so my greatest  
03:38 24 interest was: How does the pipe behave? How do the blind  
03:38 25 shear rams behave? What are the flow forces? Things like that



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03:38 1 that are involved in a mechanical system.

03:38 2 Q. And one of the things that you discovered in the course of  
03:39 3 looking at the BOP was that it had various -- it was supposed  
03:39 4 to be redundant; right?

03:39 5 A. Yes. It had a lot of redundancy built into it.

03:39 6 Q. Because after we get past the cement job and after we get  
03:39 7 past the primary barrier, being the column of fluids, and after  
03:39 8 we get past the negative pressure test and the positive  
03:39 9 pressure test, you know, if the blind shear rams are needed, it  
10 will be an emergency?

03:39 11 A. Yes, it probably would be.

03:39 12 Q. Okay. And what -- as an emergency piece of equipment,  
13 would you describe it as "safety-critical"?

03:39 14 A. Absolutely safety-critical.

03:39 15 Q. Is there any doubt in your mind on that, or is there any  
03:39 16 doubt in any of the literature that BP or Transocean have on  
17 this point?

03:39 18 A. No. I mean, that's my opinion, it's definitely  
19 safety-critical.

03:39 20 Q. Sure. And I'm not going to take the time, but if I were  
03:40 21 to pull up an article by Melvyn Whitby, a Cameron director of  
03:40 22 engineering, who says the BOP, when called upon, must function  
23 without fail, would you agree with that?

03:40 24 A. Yes.

03:40 25 Q. Okay. And here we know it did not function?

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03:40 1 A. Unfortunately, it did not.

03:40 2 Q. Right. Let's turn to --

03:40 3 MR. WILLIAMSON: And if I can have up the exhibit  
03:40 4 that I believe counsel had up, 3550.001.

03:40 5 Is that possible? Okay.

03:40 6 BY MR. WILLIAMSON:

03:40 7 Q. I'll just talk to you about it because they'll be a  
03:40 8 minute.

03:40 9 Basically, the BOP -- and the judge has been out to  
03:40 10 look at it at Michoud. It's a massive structure, isn't it?

03:40 11 A. Yes, it's huge.

03:40 12 THE COURT: It's up on the screen.

03:40 13 MR. WILLIAMSON: Thank you, Your Honor.

03:40 14 BY MR. WILLIAMSON:

03:40 15 Q. The BOP bottom stack has five different cavities where  
03:41 16 people can put in different things; correct?

03:41 17 A. That's right.

03:41 18 Q. And one -- these are five different valves that will shut  
03:41 19 off flow, hopefully, in a necessary situation?

03:41 20 MR. DOYEN: Your Honor, objection to the leading  
03:41 21 quality here throughout the examination.

03:41 22 MR. WILLIAMSON: I was trying to get through the  
03:41 23 undisputed portion, Your Honor, but I'll be happy to ask --

03:41 24 THE COURT: That's all right. Keep going.

25

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03:41 1 BY MR. WILLIAMSON:

03:41 2 Q. It has five different cavities; correct?

03:41 3 A. Yes.

03:41 4 Q. And did you examine each of those cavities as they were  
03:41 5 taken apart at Michoud?

03:41 6 A. Yes, and the parts that were in the cavities.

03:41 7 Q. Sure. Let's take the bottom cavity. And is the purpose  
03:41 8 of the five cavities redundancy?

03:41 9 A. Yes. To a great degree, there's redundancy.

03:41 10 Q. The bottom cavity, what was the bottom cavity?

03:41 11 A. Okay. This bottom cavity right here was configured for  
03:41 12 what we call a "test ram." It was actually a variable bore ram  
03:42 13 that had been turned upside down.

03:42 14 Q. And the purpose?

03:42 15 A. And the purpose of that is, instead of sealing the well  
03:42 16 below, it can seal above.

03:42 17 Q. Okay.

03:42 18 A. And so that, that way, the people on the rig can  
03:42 19 pressurize things and see whether they have leaks or whatever.

03:42 20 Q. Okay. And that change had been made after the BOP was  
03:42 21 initially installed in 2001 where someone had converted it to a  
03:42 22 test ram?

03:42 23 A. Yes.

03:42 24 Q. Will the test ram, the bottom cavity, be effective in an  
03:42 25 emergency to help stop the flow of hydrocarbons up into the

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03:42 1 riser?

03:42 2 A. The test ram cannot seal things coming from below.

03:42 3 Q. Okay. So they'd removed it from service as one of the  
03:42 4 redundant pieces of equipment?

03:42 5 A. In effect, it was no longer useful for sealing off the  
03:42 6 well. It had other purposes now.

03:42 7 Q. And have you seen the charts that say what the pressure  
03:43 8 was at the time that the explosion occurred and the data  
03:43 9 transmission was lost? Have you seen what the pressures were  
03:43 10 at that time, the drill pipe pressures?

03:43 11 A. Yes, I've seen that mud log information, if that's what  
03:43 12 you mean.

03:43 13 Q. They were in excess of 5,000 psi at the surface?

03:43 14 A. Yes, I believe they were.

03:43 15 Q. And without going through hydrostatic head calculations,  
03:43 16 that would mean they were even higher at the BOP, which was  
03:43 17 5,000 feet further down?

03:43 18 A. Yes.

03:43 19 Q. Okay. I now want to turn to the lower annular preventer.  
03:43 20 Do you see that component?

03:43 21 A. Yes, that's this component here.

03:43 22 Q. Had the lower annular preventer, after the time the BOP  
03:43 23 was sold, been converted?

03:43 24 A. Yes, it had been changed to a new elastomer doughnut that  
03:43 25 had a limit of, I believe, 5,000 psi working pressure.

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03:43 1 Q. Okay. So the lower annular preventer, who had made that  
03:44 2 change?

03:44 3 A. I believe it was BP that requested that, and it was what  
03:44 4 they call a "stripping annular" so that you could have some  
03:44 5 seal on the well, but still move the pipe up and down.

03:44 6 Q. All right. So we now have a component that will not  
03:44 7 contain -- it is not rated to contain the pressure that a well  
03:44 8 like the Macondo can produce?

03:44 9 A. No, not that particular part.

03:44 10 Q. Okay. So that component has been removed from being a  
03:44 11 redundant piece of equipment that's available in an emergency  
03:44 12 that you could rely upon to seal a well?

03:44 13 A. Yes, that would be true.

03:44 14 Q. And the upper annular preventer, did you examine it at  
03:44 15 Michoud?

03:44 16 A. Yes, that's this piece.

03:44 17 Q. Was it exceptionally seriously eroded?

03:44 18 A. Yes. It was completely destroyed.

03:44 19 Q. As a matter of fact, a piece of drill pipe -- there were  
03:44 20 actually two pieces of drill pipe that had went up through that  
03:45 21 annular, right, at some point in time?

03:45 22 A. Yes. At some point in time, a couple of pieces went up  
03:45 23 through there; and then they got trapped above when the rig  
03:45 24 sank and bent the riser over. This is the riser up here.

03:45 25 **MR. WILLIAMSON:** Yeah. Can I have Exhibit 1164,

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03:45 1 page 80, PDF page 97.

03:45 2 **BY MR. WILLIAMSON:**

03:45 3 **Q.** This is page 80 out of the DNV report and it shows -- this  
03:45 4 one doesn't show it in --

03:45 5 **MR. WILLIAMSON:** Can you enlarge it any? Or do we  
03:45 6 have it in color?

03:45 7 **BY MR. WILLIAMSON:**

03:45 8 **Q.** Do you remember this showing the various positions of the  
03:45 9 pieces of pipe as they were recovered at Michoud?

03:46 10 **A.** Yes. Specifically, this diagram -- there's more than one,  
03:46 11 so I want to be clear. This is the diagram of where the pieces  
03:46 12 were actually found when we did the work at Michoud.

03:46 13 **Q.** And the 30-degree angle that's at the top -- I'm not going  
03:46 14 to go through each one of the reconstructions of the specific  
03:46 15 pieces. But the 30-degree of angle is a graphic representation  
03:46 16 of the kinked riser; correct?

03:46 17 **A.** Yes. The riser was kinked up here just above the flex  
03:46 18 joint. This is the flex joint. And this occurred when the rig  
03:46 19 sank and it bent over the riser as the rig went to the bottom.

03:46 20 **Q.** All right. Let's get a brief time line. April 20th,  
03:46 21 9:49 p.m., the explosion occurs and data transmission on the  
03:46 22 *Horizon* was lost; correct?

03:46 23 **A.** Yes.

03:46 24 **Q.** April 22nd, 7:40 a.m., the autoshear pin is cut,  
03:46 25 simulating autoshear function; correct?

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03:47 1 A. Yes. I can't tell you exactly the time, but I'm sure you  
03:47 2 know what it is.

03:47 3 Q. The record will speak for itself on it.

03:47 4 A. Yeah.

03:47 5 Q. And the rig sinks a few hours after and kinks the riser a  
03:47 6 few hours after that autoshear pin was cut?

03:47 7 A. That's correct.

03:47 8 Q. Okay. Here's my point: There's two pieces of drill pipe  
03:47 9 in that upper annular -- I'm sorry, in the riser; correct?

03:47 10 A. Yes.

03:47 11 Q. What does that tell you about -- forgetting the issue of  
03:47 12 AMF or autoshear, in that 30 hours in between the explosion and  
03:47 13 the time the rig sinks and the riser bends, what does that tell  
03:47 14 you about whether the blind shear rams fired before the rig  
03:47 15 sank?

03:47 16 A. Well, there was definitely blind shear ram cutting, I  
03:47 17 believe, at autoshear time before the rig sank because there's  
03:48 18 all these loose pieces of pipe here.

03:48 19 Q. Yeah. In other words, that piece of pipe couldn't have  
03:48 20 been cut and went up above the upper annular until after the  
03:48 21 blind shear rams fired; correct?

03:48 22 A. That's right.

03:48 23 Q. So the fact that there's two pieces of pipe in the riser  
03:48 24 pretty conclusively shows the blind shear rams fired before the  
03:48 25 rig sank?

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03:48 1 A. Yes, definitely.

03:48 2 Q. Okay. And by the way, that same premise, that there's two  
03:48 3 pieces of pipe in the riser, demonstrate that the upper annular  
03:48 4 was pretty beat up by that time; correct?

03:48 5 A. Yes.

03:48 6 Q. And the upper annular, if it's a doughnut that's sealing  
03:48 7 the way you said it was supposed to, would not allow a second  
03:48 8 piece of pipe past it up above it; correct?

03:48 9 MR. DOYEN: Your Honor, objection, leading.

03:48 10 MR. WILLIAMSON: I'll rephrase.

03:48 11 BY MR. WILLIAMSON:

03:48 12 Q. How could an annular that was properly working and  
03:48 13 properly sealing around a single piece of pipe, allow a second  
03:48 14 piece of pipe to pass through it?

03:49 15 A. If there was already a piece of pipe in there, it would be  
03:49 16 pretty hard unless it was really wiped out.

03:49 17 Q. Okay. And what's your conclusion on that as to, by the  
03:49 18 time that second piece of pipe gets up through that upper  
03:49 19 annular, what kind of condition is the upper annular in?

03:49 20 A. Pretty washed away.

03:49 21 Q. Okay. All right. So we know we have severe erosion on  
03:49 22 the upper annular before the rig sinks; correct?

03:49 23 A. Yes.

03:49 24 Q. We know the lower annular wasn't rated at a high enough  
03:49 25 pressure; correct?



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03:49 1 MR. DOYEN: Objection, leading.

03:49 2 THE COURT: It is leading. Try not to lead the  
03:49 3 witness now. You're getting into more important things.

03:49 4 I have a question for the witness.

03:49 5 You used the term the upper annular was "washed  
03:49 6 out." The question was whether it was eroded, and you used the  
03:50 7 term washed out.

03:50 8 THE WITNESS: Yes.

03:50 9 THE COURT: Is it something you believe happened in  
03:50 10 this accident? Or tell me what you're talking about there.

03:50 11 THE WITNESS: Once things started to leak -- and the  
03:50 12 upper annular actually started to leak even before the  
03:50 13 explosion -- there was high velocity flow between the pipe and  
03:50 14 the rubber doughnut. Over a long period of time, there was  
03:50 15 what I call "washing" or what other people call "erosion" --  
03:50 16 it's the same thing -- where this flow going through that has  
03:50 17 particles in it can wear away the rubber, and it can also wear  
03:50 18 the steel of the drill pipe.

03:50 19 And this happened, actually, gradually over a  
03:50 20 long period of time. Not only the two days before the rig  
03:50 21 sank, but also after that, when we still had flow coming out of  
03:50 22 the well, all this washing was taking place.

03:50 23 THE COURT: When you say "over a long period of  
03:50 24 time," you're not talking about before April 20th?

03:51 25 THE WITNESS: No.

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03:51 1 THE COURT: You're talking about starting with what  
03:51 2 happened on April 20th and afterwards?

03:51 3 THE WITNESS: And subsequent and however -- 70 or  
03:51 4 75 days before the flow was stopped.

03:51 5 THE COURT: Okay.

03:51 6 THE WITNESS: So there was a certain amount of  
03:51 7 erosion there, I'm sure, at autoshear time, and then there was  
03:51 8 additional erosion after that. And when we saw it at Michoud,  
03:51 9 it was really badly damaged.

03:51 10 THE COURT: Okay.

03:51 11 THE WITNESS: There was very little of it left.

03:51 12 BY MR. WILLIAMSON:

03:51 13 Q. All right. Well, let me go back. This BOP was splashed  
03:51 14 on approximately February 6th. February 10th is when it went  
03:51 15 on the well head; right?

03:51 16 A. I don't remember the exact date, but . . .

03:51 17 Q. Okay. And had this well -- do you remember whether or not  
03:51 18 this well had experienced several loss returns and kick events  
03:51 19 in between February, when it splashed, and April 20th, when the  
03:51 20 explosion occurred?

03:51 21 A. I don't have -- I haven't studied that stuff in detail,  
03:52 22 but I do know that some of those things occurred, yes.

03:52 23 Q. Sure.

03:52 24 You were familiar that the upper annular had had  
03:52 25 pipes stripped through it on April 5th, 2010? Do you remember

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03:52 1 that detail?

03:52 2 A. Yes, I'm specifically aware of that.

03:52 3 Q. And that, of course, stripping pipe through the upper  
03:52 4 annular means pulling pipe through it when it's closed?

03:52 5 A. Yes.

03:52 6 Q. Would that have an erosive effect?

03:52 7 A. The upper annular doughnut was not designed for stripping,  
03:52 8 and so it is possible that, if you strip pipe through it, it  
03:52 9 will damage it.

03:52 10 Q. Okay.

03:52 11 A. Probably chunk out some of the rubber.

03:52 12 Q. And do you remember that, on the negative pressure test  
03:52 13 that was run on the evening of April 20th, the upper annular  
03:52 14 was the BOP component that was used to shut in the well?

03:52 15 A. Yes, I understand that.

03:52 16 Q. And do you remember that the upper annular did not seal  
03:52 17 the well and initially it was leaking? Do you remember that  
03:52 18 detail?

03:53 19 A. Yes, I do.

03:53 20 Q. And, in fact, they had to up the pressure on the upper  
03:53 21 annular in order to effect the seal in order to run the  
03:53 22 negative pressure test; correct?

03:53 23 **MR. DOYEN:** Objection, Your Honor. I think we're  
03:53 24 beyond the scope of the report at this point.

03:53 25 **MR. WILLIAMSON:** I think it goes to whether or not --

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03:53 1           **THE COURT:** Wait a minute. Let me ask the witness.

03:53 2                   Is this beyond what you expressed opinions about  
03:53 3 in your report?

03:53 4           **THE WITNESS:** I don't remember exactly what I said  
03:53 5 about the upper annular. I know that it didn't seal at various  
03:53 6 times. So, ultimately, it couldn't control the well. But what  
03:53 7 I'm more interested in is the blind shear ram.

03:53 8           **THE COURT:** Okay. I'll sustain the objection.

03:53 9           **MR. WILLIAMSON:** Fair enough. I'll switch to another  
03:53 10 subject.

03:53 11                   Would you please pull up D-3096.

03:53 12 **BY MR. WILLIAMSON:**

03:53 13 **Q.** Okay. You have talked about the emergency systems that  
03:53 14 were on the *Horizon*; correct?

03:53 15 **A.** Yes.

03:53 16 **Q.** One possibility was an emergency disconnect system, blue  
03:54 17 box in the upper left-hand corner; right?

03:54 18 **A.** Yes. That's another way you can close the blind shear  
03:54 19 ram.

03:54 20 **Q.** The EDS system, emergency disconnect system, how is it  
03:54 21 operated?

03:54 22 **A.** This is one that's actually operated by pushing a button;  
03:54 23 the operator can push a button. So this is not an autonomous  
03:54 24 system like I was talking about for AMF and autoshear.

03:54 25 **Q.** Was the button pushed on the evening of April 20th?

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03:54 1 A. Yes. My understanding is that it was, from the testimony.

03:54 2 Q. Okay. Was the button pushed before or after the  
03:54 3 explosions?

03:54 4 A. It was pushed after the explosions.

03:54 5 Q. What is the effect of pushing the EDS button after the  
03:54 6 explosion?

03:54 7 A. There was no action because the communication between the  
03:54 8 rig and the BOP had been lost.

03:54 9 Q. Okay. So in terms of trying to stop the fire, save the  
03:55 10 rig, seal the well, after the single event -- the explosions,  
03:55 11 EDS is no longer available?

03:55 12 A. That's correct.

03:55 13 MR. DOYEN: Objection, leading.

03:55 14 THE COURT: Try not to lead the witness.

03:55 15 MR. WILLIAMSON: Yes, Your Honor.

03:55 16 BY MR. WILLIAMSON:

03:55 17 Q. And the EDS system is activated -- what's your explanation  
03:55 18 for why the EDS system was lost? Why did we lose operational  
03:55 19 control of the BOP in the explosion?

03:55 20 A. The explosion damaged the cabling that goes down to the  
03:55 21 pods, so we had communication loss; and we also developed  
03:55 22 electricity loss and hydraulic power loss eventually --

03:55 23 Q. Okay.

03:55 24 A. -- in a few minutes after the explosion.

03:55 25 Q. I'm going to come back to AMF for you, but in a second.

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03:55 1 But first I want to say, so your conclusion on the  
03:55 2 EDS system was what in terms of its availability to stop the  
03:55 3 flow of hydrocarbons in the well?

03:55 4 A. After the explosion, when the EDS button was pushed, it  
03:56 5 was too late; the EDS could not function.

03:56 6 Q. All right. I want to go next to the autoshear function.  
03:56 7 That's the blue box on the bottom. Okay?

03:56 8 What is autoshear designed to do? I believe the  
03:56 9 judge said so a while ago.

03:56 10 A. Yes. That is the case where, if the LMRP separates from  
03:56 11 the lower BOP, then the autoshear valve is tripped and the  
03:56 12 blind shear rams are closed to seal off the well.

03:56 13 Q. All right. Literally, a mechanical pin pops out, and that  
03:56 14 mechanical pins starts the hydraulic function?

03:56 15 A. Yes. That mechanical pin is connected to a valve and the  
03:56 16 valve shifts and the pressure goes to the blind shear ram.

03:56 17 Q. Okay. Since the LMRP did not separate from the BOP stack  
03:56 18 in the explosion, was the autoshear an emergency system that  
03:56 19 was available to try to seal the well in this sort of  
03:56 20 catastrophe?

03:56 21 A. Not at that time, no.

03:56 22 Q. So if we're talking about a situation where hydrocarbons  
03:57 23 are going to explode on the rig, in the moon pool, and destroy  
03:57 24 the MUX cables, how many emergency systems do we have on the  
03:57 25 BOP that will try to stop the disaster?

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03:57 1 A. We have the remaining AMF function within the two pods.

03:57 2 Q. Okay. All right. Now, the AMF function is triggered by  
03:57 3 this battery solenoid system that you made reference to?

03:57 4 A. Yes. It uses a computer and electronics, and it activates  
03:57 5 the solenoid that sends pilot pressure to a larger valve, which  
03:57 6 then provides the pressurized fluid to the blind shear ram.

03:57 7 Q. Okay. Blue pod first. We have blue pod, yellow pod. We  
03:57 8 have 9-volt batteries triggering a 27-volt battery triggering a  
03:57 9 solenoid triggering a shuttle valve. That's the meaning I was  
10 trying to get through. Right?

03:58 11 A. You trigger the solenoid, the pilot pressure goes out and  
03:58 12 operates a main valve, I guess you would call it, as opposed to  
03:58 13 a shuttle valve.

03:58 14 Q. What is a solenoid?

03:58 15 A. A solenoid is an electromechanical unit that uses  
03:58 16 electricity to change the direction of flow of hydraulic fluid.

03:58 17 Q. Okay. And how many 27-volt batteries are in the blue pod?

03:58 18 A. We have one 27-volt battery in the blue pod.

03:58 19 Q. Okay. Did you ever find any evidence that the blue pod  
03:58 20 27-volt battery was tested on the surface before they splashed  
03:58 21 the BOP in February of 2010?

03:58 22 A. No. We have not been able to find evidence of any battery  
03:58 23 voltage measurements.

03:58 24 Q. What would be your recommendation as a safety engineer --  
03:58 25 as a mechanical engineer, would you consider the 27-volt

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03:58 1 battery a safety-critical component?

03:59 2 A. I would consider the 27-volt battery as safety-critical,  
03:59 3 yes.

03:59 4 Q. What would be your recommendation on a safety-critical  
03:59 5 component as to whether it should be tested before being  
03:59 6 deployed subsea?

03:59 7 A. Well, if you didn't already have a voltage monitoring  
03:59 8 system, you would want to check it at every opportunity to make  
03:59 9 sure that battery was charged.

03:59 10 Q. Have you reviewed the maintenance records to see if  
03:59 11 Transocean had done that?

03:59 12 A. Yes.

03:59 13 Q. Would you be able to tell from the Transocean records  
03:59 14 whether they had done it or not?

03:59 15 A. No, I found no indication of battery voltages being  
03:59 16 checked.

03:59 17 Q. Now, once the BOP is deployed subsea and it's on the ocean  
03:59 18 floor 5,000 feet below sea level, how do you check the AMF  
03:59 19 safety-critical 27-volt battery?

03:59 20 A. There is no way to check its voltage directly.

03:59 21 Q. As a safety engineer, is that a good idea, to have a  
03:59 22 system where you have a component that you cannot test during a  
03:59 23 period of three months and you're going to maybe rely upon it  
04:00 24 in an emergency?

04:00 25 A. It just makes good engineering sense to have some way of



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04:00 1 sensing the battery voltage at the rig.

04:00 2 Q. Okay. So to take the blue pod battery, one solution is  
04:00 3 absolutely scrupulous maintenance?

04:00 4 MR. DOYEN: Objection, leading.

04:00 5 BY MR. WILLIAMSON:

04:00 6 Q. How would you describe it?

04:00 7 THE COURT: Wait a minute.

04:00 8 MR. WILLIAMSON: I apologize, Your Honor.

04:00 9 THE COURT: You need to stop leading the witness.

04:00 10 Okay?

04:00 11 MR. WILLIAMSON: Yes, Your Honor.

04:00 12 BY MR. WILLIAMSON:

04:00 13 Q. Describe the --

04:00 14 THE COURT: If you're going to do it, don't announce  
04:00 15 it, because then you definitely won't get away with it. Okay?

04:00 16 MR. WILLIAMSON: Thank you, Your Honor. Advice well  
04:00 17 received.

04:00 18 BY MR. WILLIAMSON:

04:00 19 Q. How would you describe the component's importance of  
04:00 20 having a maintenance system where you can track that battery?

04:00 21 A. It didn't take me very long to figure out that the AMF  
04:00 22 function in this system is extremely critical for safety. And  
04:01 23 if I were in charge of this system, operating it, I would make  
04:01 24 sure at all times that those batteries were ready to go.

04:01 25 Whether that meant a lot of maintenance when the unit was on

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04:01 1 the surface, I would do that. If I could use voltage  
04:01 2 monitoring, I would do that so I could always see on the rig  
04:01 3 what those voltages were.

04:01 4 But I would know that those batteries have to be  
04:01 5 sufficiently charged for the system to be safe.

04:01 6 Q. Thank you.

04:01 7 MR. WILLIAMSON: Please bring up Exhibit 3605 -- I'm  
04:01 8 sorry. Please bring up Exhibit 5155. Please give me Call-out  
04:02 9 No. 9.

04:02 10 BY MR. WILLIAMSON:

04:02 11 Q. Okay. This is an e-mail from someone at Transocean  
04:02 12 dated --

04:02 13 THE COURT: Excuse me. What was that number?  
04:02 14 Call-out?

04:02 15 MR. WILLIAMSON: I'm sorry, Your Honor. It's  
04:02 16 TREX-5155, Call-out 9.

04:02 17 THE COURT: 9, okay. Thank you.

04:02 18 BY MR. WILLIAMSON:

04:02 19 Q. Let me see -- let me make sure I have the date on it.  
04:02 20 This is in July 2005, okay, on deepwater.com: "Cameron have  
04:02 21 kept their recommendations for replacement exactly as the older  
04:02 22 type (1 year in use and more than 33 activations), which,  
04:02 23 incidentally, we never believed nor trusted." Okay?

04:03 24 This is Transocean in 2005 describing what they think  
04:03 25 about the Cameron battery system in the BOP.

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04:03 1 Have you seen that e-mail before?

04:03 2 A. No, I haven't.

04:03 3 Q. Okay. Does that indicate to you that Transocean had any  
04:03 4 knowledge that the battery system was safety-critical?

04:03 5 MR. DOYEN: Your Honor, I object. I do think that  
04:03 6 goes beyond the scope of the report. The witness hasn't talked  
04:03 7 about his knowledge in this area.

04:03 8 THE COURT: I'll sustain that objection.

04:03 9 MR. WILLIAMSON: Let's see Exhibit No. 3605.

04:03 10 BY MR. WILLIAMSON:

04:04 11 Q. This is a document called "AMF/Deadman Battery  
04:04 12 Replacement." It's Engineering Bulletin EB 891 D.

04:04 13 MR. WILLIAMSON: Can I see Call-out No. 1. It's  
04:04 14 Exhibit TREX-3605.

04:04 15 BY MR. WILLIAMSON:

04:04 16 Q. "The AMF/Deadman feature provides a means of commanding  
04:04 17 the SEM to initiate an EDS sequence if four circumstances occur  
04:04 18 simultaneously.

04:04 19 "Loss of conduit pressure, loss of hydrostatic head  
04:04 20 pressure, loss of SEM power, loss of communications."

04:04 21 Do you agree with that description? Does that fit  
04:04 22 your description of the AMF battery system?

04:04 23 A. I don't know what they mean exactly there by "loss of  
04:04 24 hydrostatic head." If you're subsea, you would have  
04:04 25 hydrostatic head.

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04:04 1 Q. Okay.

04:04 2 A. The important thing is that the conduit pressure becomes  
04:05 3 the same as the surrounding seawater pressure, and that's what  
04:05 4 triggers it. So it's just a little detail, but that's my  
04:05 5 understanding.

04:05 6 Q. Okay.

04:05 7 MR. WILLIAMSON: Fly-out No. 3. It's TREX-3605.

04:05 8 BY MR. WILLIAMSON:

04:05 9 Q. Cameron is making --

04:05 10 THE COURT: Excuse me. What is the underlying  
04:05 11 document that you're calling these out from?

04:05 12 MR. WILLIAMSON: Sure, Your Honor. This is an  
04:05 13 engineering bulletin by Cameron, September 8th, 2004, EB --  
04:05 14 which stand for engineering bulletin --

04:05 15 THE COURT: Okay. I just need to understand where  
04:05 16 this is coming from. Okay.

04:05 17 BY MR. WILLIAMSON:

04:05 18 Q. "Cameron is making the same recommendations for battery  
04:05 19 replacement.

04:05 20 "It is recommended that the 9-volt and 27-volt  
04:05 21 battery packs be replaced after: one year of on-time  
04:05 22 operation."

04:05 23 Is that true?

04:05 24 A. Yes, that's what it says.

04:05 25 Q. Okay. Did you find that these recommendations were

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04:05 1 followed?

04:06 2 A. No, they were not.

04:06 3 Q. Okay.

04:06 4 MR. WILLIAMSON: Please show me 8048, Fly-out No. 1.

04:06 5 BY MR. WILLIAMSON:

04:06 6 Q. Okay. This -- I'll tell you Mr. Gaude is an engineer --  
04:06 7 hydraulics engineer for Cameron. This is his e-mail dated  
04:06 8 January 31st, 2005.

04:06 9 "The original battery pack design can no longer be  
04:06 10 supplied, as the manufacturer of the batteries discontinued the  
04:06 11 battery. It was a huge effort to get the vendor to come up  
04:06 12 with a new battery pack that had the cycle life and inrush  
04:06 13 capacity as the old batteries. Ray Jahn can expand on what and  
04:06 14 why we planned it out like we did."

04:06 15 My question to you is --

04:06 16 THE COURT: Do you want to object before he asks the  
04:07 17 question or what?

04:07 18 MR. DOYEN: I'll wait and hear the question.

04:07 19 BY MR. WILLIAMSON:

04:07 20 Q. Were you aware that Cameron had come up and redesigned the  
04:07 21 batteries in 2004?

04:07 22 THE COURT: Okay. Now what?

04:07 23 MR. DOYEN: Objection, Your Honor. It's beyond the  
04:07 24 scope of the report. It doesn't discuss this.

04:07 25 MR. WILLIAMSON: I'll change the questions.

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04:07 1 THE COURT: Okay.

04:07 2 BY MR. WILLIAMSON:

04:07 3 Q. When Cameron made its decision, per Exhibit No. 8048, to  
04:07 4 go through a huge effort to get the vendor to come up with a  
04:07 5 new battery pack, in your opinion, should that system have  
04:07 6 included a way of monitoring the batteries?

04:07 7 MR. JONES: Your Honor, same objection as --

04:07 8 THE COURT: I'll sustain it.

04:07 9 BY MR. WILLIAMSON:

04:07 10 Q. Was there another system available that Transocean could  
04:08 11 have purchased that would have provided the ability to monitor  
04:08 12 the batteries?

04:08 13 A. Yes. There was a new system called the Mark III system.  
04:08 14 The system being used on the *Deepwater Horizon* was the Mark II.  
04:08 15 So it was the next generation, and it included the battery  
04:08 16 voltage monitoring.

04:08 17 MR. WILLIAMSON: Can I have TREN-4277, Fly-out 1.

04:08 18 BY MR. WILLIAMSON:

04:08 19 Q. In fact, this is a multiplex BOP control pod, Transocean  
04:08 20 deepwater budgetary quotation?

04:08 21 A. Yes.

04:08 22 MR. WILLIAMSON: Can I have Fly-out No. 2.

04:08 23 BY MR. WILLIAMSON:

04:08 24 Q. "A one atmosphere enclosure containing the rechargeable  
04:08 25 batteries required to power the AMF/Deadman circuits when this

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04:09 1 option is implemented."

04:09 2 Does that support or defeat your opinion that  
04:09 3 rechargeable batteries were available to Transocean, had they  
04:09 4 chosen to implement them?

04:09 5 A. Yes, they were available.

04:09 6 MR. WILLIAMSON: Could I have Fly-out No. 3.

04:09 7 BY MR. WILLIAMSON:

04:09 8 Q. And was this, in fact, the quote to Transocean, as of the  
04:09 9 date of this exhibit, TREX-4277, in 2009, for obtaining a new  
04:09 10 battery that would be rechargeable and monitor-able?

04:09 11 A. Yes. I've seen this document. I've seen this quote.

04:09 12 Q. And, of course, we now know Transocean did not do it?

04:09 13 A. That's right.

04:09 14 Q. Let's turn to solenoids.

04:09 15 MR. WILLIAMSON: May I have Exhibit No. 599,  
04:09 16 fly-out -- let's do Fly-out 1.

04:09 17 BY MR. WILLIAMSON:

04:09 18 Q. Okay. This is a daily report sheet on May 5th, 2010, from  
04:10 19 Cameron. Have you ever seen this document?

04:10 20 A. Yes, I believe I have.

04:10 21 Q. Okay. And this is actually a Cameron document when they  
04:10 22 pulled up the pod, the yellow pod, on -- approximately 15 days  
04:10 23 post-explosion?

04:10 24 A. Yes.

04:10 25 MR. WILLIAMSON: Can I have Fly-out No. 2.

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04:10 1 **BY MR. WILLIAMSON:**

04:10 2 **Q.** "21:46: Simulated deadman test with the correct Solenoid  
04:10 3 Valve No. 103. Electromagnetic pin was held against Solenoid  
04:10 4 Valve 103 was fired. No indications of the valve firing."

04:10 5 Did I read it correctly?

04:10 6 **A.** Yes.

04:10 7 **Q.** Okay. So the first time -- what does this document tell  
04:10 8 you in terms of whether the Solenoid 103Y that was in the  
04:10 9 yellow pod worked or didn't work? What information does this  
10 document give you on that?

04:11 11 **A.** I referred to this earlier, that when the yellow pod was  
04:11 12 brought up on the *Q4000*, they checked the functioning of the  
04:11 13 deadman, and the blind shear ram was not activated properly  
04:11 14 from the yellow pod, and it was with the -- because the  
04:11 15 solenoid valve had the miswiring. This is what we verified at  
04:11 16 Michoud later, that the miswiring was the cause.

04:11 17 **Q.** Okay. Now, do you think this document helps or hurts in  
04:11 18 supporting your argument that Mr. Childs, the Transocean BOP  
04:11 19 expert, is right or wrong?

04:11 20 **A.** Well, it's an obvious malfunction of that Solenoid  
04:11 21 Valve 103, so it hurts Mr. Childs' theory.

04:11 22 **Q.** Okay. And did you all actually look at the solenoid in  
04:12 23 question when you were out at Michoud?

04:12 24 **A.** Yes, I did.

04:12 25 **MR. WILLIAMSON:** Please pull up 7660, Figure No. 1,



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04:12 1 page 5.

04:12 2 **BY MR. WILLIAMSON:**

04:12 3 **Q.** Is that a page out of your report where you're actually  
04:12 4 showing a photograph of the actual solenoid?

04:12 5 **A.** Yes. This is where it's been opened up and you can see  
04:12 6 the wiring connections.

04:12 7 **Q.** Sure.

04:12 8 **MR. WILLIAMSON:** Go to the next one, page 6, Figures  
04:12 9 No. 2, 3, and 4.

04:12 10 **BY MR. WILLIAMSON:**

04:12 11 **Q.** And are these your explanation in your report of why the  
04:12 12 solenoid is miswired?

04:12 13 **A.** Yes.

04:12 14 **Q.** All right. Are you aware of any -- did you determine  
04:13 15 whether or not this solenoid was OEM?

04:13 16 **A.** I've seen documentation that says there was a non-OEM  
04:13 17 connector used with it.

04:13 18 **Q.** Okay.

04:13 19 **A.** And it was also known at this -- at some point it was  
04:13 20 determined that this had been a refurbished solenoid. That's  
04:13 21 also self-evident by the fact that it was miswired.

04:13 22 **Q.** So the fact that it was a refurbished solenoid would mean  
04:13 23 that it was not original OEM new equipment?

04:13 24 **MR. DOYEN:** Objection, leading.

25

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04:13 1 BY MR. WILLIAMSON:

04:13 2 Q. Was this original OEM equipment?

04:13 3 A. It was not original. It had been refurbished.

04:13 4 Q. Are you aware of any requirement that BP has regarding BOP  
04:13 5 parts regarding whether they should be OEM or not?

04:13 6 A. No, I don't know of those requirements.

04:13 7 MR. WILLIAMSON: Pull up Exhibit No. 93, Fly-out 12,  
04:14 8 TREX-0093, page D-12.15.3.7.

04:14 9 BY MR. WILLIAMSON:

04:14 10 Q. I will tell you this comes out of the BP procedures  
04:14 11 manual.

04:14 12 "Only original equipment manufactures' designated  
04:14 13 spares shall be used for blowout preventer equipment  
04:14 14 replacement parts."

04:14 15 MS. KARIS: Your Honor, I have an objection to the  
04:14 16 use of this document. The witness has already testified that  
04:14 17 he doesn't know what BP's requirements are. He has no  
04:14 18 foundation.

04:14 19 MR. WILLIAMSON: May I continue, your Honor?

04:14 20 THE COURT: Well, I don't know what the question  
04:14 21 would be. I mean, I can read it, you can read it; but if the  
04:14 22 witness says he's not aware of it otherwise, I don't know why  
04:14 23 you have to ask him a question.

04:14 24 MR. WILLIAMSON: I'll move on.

04:14 25 THE COURT: Okay.

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04:14 1 MR. WILLIAMSON: All right. Pull up Exhibit 7660,  
04:14 2 Figure 5, page 12.

04:15 3 BY MR. WILLIAMSON:

04:15 4 Q. I'm changing subjects now, Mr. Davis, to the subject of  
04:15 5 off-center pipe, okay?

04:15 6 Do you remember this page -- it's not in color -- out  
04:15 7 of your report?

04:15 8 A. Yes. This is a representation of the laser scans of these  
04:15 9 parts that were done by DNV.

04:15 10 Q. And actually, this is a reproduction of something that the  
04:15 11 DNV did; right?

04:15 12 A. That DNV did? Is that what you said?

04:15 13 Q. Yes.

04:15 14 A. Yes, that's correct.

04:15 15 Q. Were you allowed to do your own?

04:15 16 A. I was not allowed to do my own laser scans or -- no, but I  
04:15 17 was able to look at these parts firsthand.

04:15 18 Q. Right. No one was allowed to actually test them other  
04:15 19 than DNV themselves?

04:15 20 A. Yes.

04:15 21 Q. Does this figure -- it's a very simple question: Does  
04:15 22 this figure support your opinion that, at the time the blind  
04:15 23 shear rams were activated, the drill pipe was off-center?

04:15 24 MR. DOYEN: Objection. Leading.

04:15 25 MR. WILLIAMSON: I didn't think that was leading,

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04:16 1 Judge, but I'll rephrase.

04:16 2 THE COURT: I'll allow him to answer it.

04:16 3 MR. JONES: Your Honor, one more objection to that.  
04:16 4 It also is showing DNV analysis, which I believe violates your  
04:16 5 limine order that only underlying facts, not analysis of DNV,  
04:16 6 can come in at trial.

04:16 7 MR. WILLIAMSON: May I respond to that, Your Honor?

04:16 8 THE COURT: I think it's a different question. He's  
04:16 9 asking the witness whether this confirms his opinion.

04:16 10 You're not asking about DNV's opinion.

04:16 11 MR. WILLIAMSON: Exactly.

04:16 12 THE COURT: So I'll overrule the objection.

04:16 13 BY MR. WILLIAMSON:

04:16 14 Q. Why does this support or defeat your opinion, Mr. Davis?

04:16 15 A. Well, this is basically a depiction of measurements taken.  
04:16 16 So I don't really think this is analysis, by the way. And this  
04:16 17 shows very clearly how the piece of drill pipe that remained  
04:16 18 below the blind shear rams fits in an area -- way off to the  
04:17 19 side in the blind shear rams, where it was trapped for a long  
04:17 20 period of time.

04:17 21 Q. And your --

04:17 22 A. And I could see this on the actual pieces as well.

04:17 23 Q. Okay. I want to turn -- and you believed that was -- that  
04:17 24 played a part in shearing and sealing how?

04:17 25 A. Because of the fact that the pipe was too far to the side,

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04:17 1 it was not possible to completely shear it; and the pipe itself  
04:17 2 blocked the rams from completely closing because of -- it was  
04:17 3 way over to the side, where there are other pieces of blocks  
04:17 4 that don't have blades.

04:17 5 Q. All right. I want to turn to the last subject that we'll  
04:17 6 cover, I believe, and that is capacity.

04:17 7 The wellbore, when it is flowing, will generate a  
04:17 8 certain amount of pressure inside the wellbore; correct?

04:18 9 A. Say that again.

04:18 10 Q. If you have a blowout and you have hydrocarbons that have  
04:18 11 overcome the pore pressure and the barrier and they're flowing  
04:18 12 to the surface, will you have some sort of pressure inside the  
04:18 13 wellbore and the drill pipe?

04:18 14 A. Yes. And that pressure varies depending on where you are  
04:18 15 vertically in the well.

04:18 16 Q. Right.

04:18 17 And will that wellbore pressure -- one way to express  
04:18 18 it is in terms of pounds per square inch, psi?

04:18 19 A. Yes.

04:18 20 Q. Will that wellbore pressure affect the ability of the  
04:18 21 blind shear rams to shear a piece of pipe and seal it?

04:18 22 A. Yes. The wellbore pressure has a certain ability to fight  
04:18 23 the action of the pressure on the piston that actuates the ram.  
04:18 24 We know what that ratio is. That's part of the calculations  
04:19 25 that are done.

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04:19 1 Q. And there's actually two different methodologies that you  
04:19 2 looked at that can calculate that; correct? Maybe more, but at  
04:19 3 least two?

04:19 4 A. Yes.

04:19 5 Q. Which one did you use?

04:19 6 A. I think you're referring to the West Engineering's  
04:19 7 formulas --

04:19 8 Q. Correct.

04:19 9 A. -- that I used in my initial calculations. You can also  
04:19 10 use Cameron's recommended formulas in what they call 702-D  
04:19 11 document.

04:19 12 Q. I know. You've anticipated correctly my question.

04:19 13 MR. WILLIAMSON: Please pull up Exhibit 1199,  
04:19 14 Fly-out 1.

04:19 15 BY MR. WILLIAMSON:

04:19 16 Q. This is an engineering bulletin put out by Cameron in  
04:19 17 January 2008 called "Shearing Ability [verbatim] of Cameron  
04:19 18 Shear Rams"; correct?

04:19 19 A. Yes, shearing capabilities.

04:20 20 MR. WILLIAMSON: Pull out Fly-out 6.

04:20 21 BY MR. WILLIAMSON:

04:20 22 Q. And this is actually -- I'm not going to take you through  
04:20 23 the math because the math is contained within your report and  
04:20 24 within the other expert reports on this subject. Right?

04:20 25 A. Yes. I'm not the only one that's looked at these

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04:20 1 formulas. Others have actually reported numbers they got out  
04:20 2 of these formulas.

04:20 3 Q. Tell the Court what this formula is. What is this formula  
04:20 4 designed to do?

04:20 5 A. The quantity "P shear" on the left is the pressure in the  
04:20 6 ram in question required to shear a certain size of pipe. And  
04:20 7 then the terms inside represent the strength of the pipe, which  
04:20 8 is the first term, "C3 ppf," sigma yield. And the second term  
04:20 9 represents the effect of the wellbore pressure and how much it  
04:21 10 can influence the required pressure to shear that.

04:21 11 Q. Okay. Did you use this formula when you were calculating  
04:21 12 the capacity for this particular BOP?

04:21 13 A. I have used these formulas and looked at the numbers, yes,  
04:21 14 I have.

04:21 15 Q. Okay. I'm about to turn to your report. Can you remember  
04:21 16 what your report says in terms of the pressure you thought it  
04:21 17 would take to shear the pipe? We'll take the pipe that was  
04:21 18 actually in the string at the time, 5 1/2-inch, 21.9 -- or  
04:21 19 24.7 pounds per foot, S135.

04:21 20 A. I don't know if I can remember the exact number.

04:21 21 Q. Sure.

04:21 22 MR. WILLIAMSON: Please turn to Exhibit 7660,  
04:21 23 page 37, second paragraph.

04:21 24 Actually, before we do that, turn to page 36,  
04:21 25 the bottom of the paragraph on page 36.

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04:21 1 BY MR. WILLIAMSON:

04:21 2 Q. I will represent to you, this is out of your report.

04:21 3 MR. WILLIAMSON: Can you blow up the second-to-last  
04:21 4 paragraph or the next-to-last paragraph.

04:22 5 BY MR. WILLIAMSON:

04:22 6 Q. "Note this value is based on West Engineering's work based  
04:22 7 on actual testing, not Cameron's shearing formula. BP quotes  
04:22 8 that Cameron's formula results in 2840 psi cutting pressure at  
04:22 9 surface or 2410 psi at sea bed, which both would be  
04:22 10 substantially worse than the West prediction."

04:22 11 Right?

04:22 12 A. Yes.

04:22 13 Q. Do you agree with that, that if you use the West number,  
04:22 14 you'll get one number; if you use the Cameron number, you'll  
04:22 15 get an even higher number?

04:22 16 A. Yes.

04:22 17 Q. You used the West number?

04:22 18 A. Yes.

04:22 19 MR. WILLIAMSON: Go to page 37, second paragraph,  
04:22 20 TREX-7660.

04:22 21 BY MR. WILLIAMSON:

04:22 22 Q. "We then add the 2183 psi design requirement to the  
04:22 23 1493 psi worst case wellbore pressure" --

04:22 24 THE COURT: Slow down. Slow down.

04:22 25 MR. WILLIAMSON: I apologize.



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04:23 1 BY MR. WILLIAMSON:

04:23 2 Q. -- "for a required pipe cut to the pressure of 3676 psi."

04:23 3 Is that what you calculated as the shear pressure?

04:23 4 A. Yes. This is out of my report.

04:23 5 Q. And out of your report, what type of ram configuration did  
04:23 6 you use for this?

04:23 7 A. Well, it turns out that the West Engineering data was  
04:23 8 representative of double-V rams, not single-V rams. So I was  
04:23 9 being charitable somewhat in the pressure requirements because  
04:23 10 a single-V ram is worse.

04:23 11 Q. Right.

04:23 12 A. Would have higher pressures.

04:23 13 Q. Okay. You have a wellbore pressure -- what wellbore  
04:23 14 pressure were you assuming?

04:23 15 A. That 1493 psi wellbore pressure effect was for 10,000 psi  
04:23 16 in the wellbore relative to seawater.

04:23 17 Q. Which is what you thought was worst case?

04:23 18 A. Which I thought was worst case, yes.

04:23 19 Q. All right. Now, wellbore pressure is only one factor in  
04:23 20 calculating the shear force needed?

04:24 21 A. That's correct. The other main one is the strength of the  
04:24 22 pipe.

04:24 23 Q. And it's also -- okay.

04:24 24 When we use wellbore pressure, strength of pipe, type  
04:24 25 of ram blocks, type of BOP and apply a formula, we come up with

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04:24 1 another number, which is the number of force that will be  
04:24 2 needed to apply to the pistons. Is that a fair way to say it,  
04:24 3 or is that an unfair way?

04:24 4 A. The force or the pressure that you apply to the pistons,  
04:24 5 yes.

04:24 6 Q. Okay. If you use Cameron's formula -- the people who  
04:24 7 manufactured this and put out the engineering bulletin in  
04:24 8 2008 -- are you going to come up with a number -- if you're  
04:24 9 correct, for DVS rams to SBR rams, are you going to come up  
04:24 10 with a number higher than 3676?

04:24 11 A. Yes, it will be substantially higher. The last time I did  
04:24 12 the calculation, I got about 4200 psi.

04:24 13 Q. Okay. Now, tell the Court, in the AMF system that was  
04:24 14 deployed on this rig on April 20th -- what does that mean,  
04:25 15 4200 psi?

04:25 16 A. Well, unfortunately, you only have 4,000 available in the  
04:25 17 high-pressure regulated system. So if the formula comes out at  
04:25 18 4200 -- and those formulas, by the way, are based on what you  
04:25 19 would expect for a maximum -- there are some times when it's  
04:25 20 not going to be able to cut the pipe.

04:25 21 Q. Okay.

04:25 22 A. Even with a higher-pressure system.

04:25 23 Q. So you have 4,000 psi available for the piston. And  
04:25 24 that's it; right?

04:25 25 A. Yes, it's regulated --

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04:25 1 MR. DOYEN: Objection, leading.

04:25 2 MR. WILLIAMSON: I was trying to work through it,  
04:25 3 Judge.

04:25 4 THE COURT: It was leading. I'll sustain the  
04:25 5 objection.

04:25 6 We had, apparently, an e-mail message from  
04:25 7 somebody that was listening somewhere that when people are  
04:25 8 objecting, they're not able to hear. So if you-all could make  
04:25 9 sure you try speaking into one of microphones when you do  
04:25 10 object. Okay?

04:25 11 MR. DOYEN: Thank you, Your Honor.

04:25 12 BY MR. WILLIAMSON:

04:25 13 Q. Mr. Davis, how many pounds per square inch pressure can  
04:26 14 this system deliver to that piston in an emergency when the AMF  
04:26 15 is needed?

04:26 16 A. It can deliver 4,000 psi, which is regulated from the  
04:26 17 accumulator stack.

04:26 18 Q. And even with 5 1/2-inch pipe, how many pounds per square  
04:26 19 inch does Cameron tell BP and TO, Transocean, that they're  
04:26 20 going to need to shear the pipe?

04:26 21 A. Well, they don't really tell them; they provide the  
04:26 22 formulas so that they can figure it out. And it's up around  
04:26 23 4200 psi, above the 4,000 number.

04:26 24 Q. So if you get that type of wellbore pressure, you simply  
04:26 25 do not have a big enough blowout preventer?

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04:26 1           **MR. DOYEN:** Objection, Your Honor.

04:26 2 **BY MR. WILLIAMSON:**

04:26 3 **Q.** What is your opinion on that?

04:26 4           **MR. DOYEN:** My fault, Your Honor. I withdraw that  
04:26 5 objection.

04:26 6           **THE COURT:** Okay.

04:26 7           **THE WITNESS:** You would not be able to reliably cut  
04:26 8 the pipe every time. There is scatter in the ability or the  
04:27 9 pressure required to cut pipe, so only a certain percentage of  
04:27 10 the time would you be able to cut the pipe. Other times you  
04:27 11 could not finish cutting the pipe.

04:27 12 **BY MR. WILLIAMSON:**

04:27 13 **Q.** And what type -- if we're going to do that -- we have  
04:27 14 4,000 available and we're going to need 4200 shear 5 1/2-inch,  
04:27 15 if we let the Court look at all the numbers for 6 5/8-inch  
04:27 16 pipe, is this analysis going to get worse or better?

04:27 17 **A.** It will get substantially worse.

04:27 18 **Q.** And what did BP and Transocean drill this well with,  
04:27 19 6 5/8-inch pipe every day from February 6th to April 9th? Or  
04:27 20 did they drill it with 5 1/2? Or do you know?

04:27 21           **MS. KARIS:** Your Honor, I have an objection to  
04:27 22 relevance of this because this witness, in his report,  
04:27 23 specifically stated that in this instance, on April 20th, this  
04:27 24 was not a limitation that played any role in the outcome of  
04:27 25 what happened.

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04:27 1 THE COURT: Is that correct?

04:28 2 THE WITNESS: In this particular accident, this  
04:28 3 inadequacy did not have an effect.

04:28 4 THE COURT: Okay. I sustain the objection.

04:28 5 MS. KARIS: Thank you, Your Honor.

04:28 6 MR. WILLIAMSON: I think I'm done, Your Honor. I'm  
04:28 7 trying to make sure I haven't thought of another question.

04:28 8 BY MR. WILLIAMSON:

04:28 9 Q. One last question to follow.

04:28 10 Would you recommend that you design a safety-critical  
04:28 11 system that goes to the blind shear rams?

04:28 12 Under this system, what was the safety margin? What  
04:28 13 is the safety margin that was on this system for shearing pipe?

04:29 14 A. Well, if you use the 4200 number, like I was talking  
04:29 15 about, you would only be able to cut the pipe maybe 90 percent  
04:29 16 of the time instead of 100 percent of the time, which is not  
04:29 17 good for a safety-critical system.

04:29 18 Q. Okay. Which means -- and that leaves you with, what,  
04:29 19 basically a zero safety margin if you need 4200 and you've got  
04:29 20 4,000?

04:29 21 A. Well, it's clearly not sufficient. You're going to be  
04:29 22 unable to shear the pipe and seal the well a substantial  
04:29 23 portion of the time. In contrast, when engineers design  
04:29 24 things, they try to design them to succeed 99.9 percent of the  
04:29 25 time, not 90 percent of the time. So 10 percent is a big, big

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04:29 1 problem.

04:29 2 Q. Had they put DVS rams, the plug-and-play you referred to,  
04:29 3 on this, would that have increased the efficiency of the  
04:29 4 cutting blades?

04:30 5 A. Yes. The double-V blade rams like DVS require about 600  
04:30 6 to 800 psi less pressure to cut the same pipe. So that would  
04:30 7 be a substantially safer system, and you would be able to cut  
04:30 8 the pipe almost 100 percent of the time.

04:30 9 Q. And would DVS rams, the double-Vs, have provided a greater  
04:30 10 chance of centering the pipe and bringing it within the ram  
04:30 11 blades?

04:30 12 A. The double-V rams have a much, much greater capacity to  
04:30 13 push the drill pipe back to the center before it cuts. It's a  
04:30 14 major advantage of using the double-V blades.

04:30 15 Q. And I'm not going to do it because I already went longer  
04:30 16 than I should have; but is there actually an analysis in your  
04:30 17 rebuttal report, TREX-07661, page 17, that deals with the fact  
04:30 18 that the DVS rams are -- their centering ability compared to  
04:31 19 the SBR rams? Is there such a chart?

04:31 20 A. Yes. I went through a straightforward engineering  
04:31 21 analysis, and I presented a chart showing a drastically  
04:31 22 increased ability to center the pipe.

04:31 23 MR. WILLIAMSON: Okay. Thank you, Your Honor.

04:31 24 THE COURT: All right. Alabama, do you have any  
04:31 25 questions?

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04:31 1 MR. MAZE: No questions, Your Honor.

04:31 2 THE COURT: Louisiana?

04:31 3 MR. KRAUS: No questions, Your Honor.

04:31 4 THE COURT: All right. Transocean is up next.

04:31 5 CROSS-EXAMINATION

04:31 6 BY MR. DOYEN:

04:33 7 Q. Mike Doyen for Transocean. Dr. Davis, good afternoon.

04:33 8 MR. DOYEN: Your Honor, I have quite a bit to cover.  
04:33 9 I'm going to start with some quick topics to finish off the  
04:33 10 afternoon.

04:33 11 THE COURT: That's fine. We'll go for about another  
04:33 12 30 minutes.

04:33 13 MR. DOYEN: Thank you, Your Honor. I might need a  
04:33 14 biology break before that. The fortitude of this room stuns  
04:33 15 me.

04:33 16 THE COURT: It all has to do with planning.

04:33 17 MR. DOYEN: Not my strong suit maybe.

04:33 18 BY MR. DOYEN:

04:33 19 Q. Dr. Davis, you performed a finite element analysis --

04:33 20 MR. DOYEN: Is this too close? I feel like I'm  
04:33 21 booming and echoing a little bit.

04:33 22 BY MR. DOYEN:

04:33 23 Q. You performed a finite element analysis of a pipe cutting  
04:33 24 and crushing in the blind shear rams; correct?

04:33 25 A. Cutting and crushing in a blind shear ram? I did analysis

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04:33 1 but using other people's models. I didn't do my own FEA.

04:34 2 Q. You were looking at somebody else's nonlinear finite  
04:34 3 element analysis of pipe crushing and cutting?

04:34 4 A. Yes.

04:34 5 Q. Would you agree that shows --

04:34 6 MR. JONES: Your Honor, I need to object. This is  
04:34 7 discussing the DNV finite element analysis, which is not  
04:34 8 underlying facts in the data. It is their expert analysis.

04:34 9 THE COURT: Is that what you --

04:34 10 THE WITNESS: That is not what I was talking about.  
04:34 11 I was talking about models that came from other experts, not  
04:34 12 DNV.

04:34 13 THE COURT: Okay. Go ahead.

04:34 14 BY MR. DOYEN:

04:34 15 Q. And that analysis showed you that the blind shear rams had  
04:34 16 sufficient pressure to cut the pipe had the pipe been centered;  
04:34 17 correct?

04:34 18 A. They did, but I had independent verification of that.

04:34 19 Q. In fact, from your forensic examination, you concluded  
04:34 20 that the pressure available to the blind shear rams was clearly  
04:34 21 sufficient to cut the pipe had it been centered, didn't you?

04:34 22 A. Yes, I did. I saw the crush marks on the pipe.

04:35 23 Q. In fact, it was your opinion that had the pipe been  
04:35 24 centered, the pressure available to the BSR -- I'm sorry, I'm  
04:35 25 looking at the same one again.



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04:35 1 Had the pipe been centered, it was your conclusion  
04:35 2 that the BSR almost certainly would have cut the pipe and  
04:35 3 sealed the well; correct?

04:35 4 A. You need to refer to which time we're talking about. In  
04:35 5 the case of autoshear, because we were using the single-V blade  
04:35 6 blind shear ram, it could not center the pipe. But it had  
04:35 7 enough pressure to do so, but it failed for another reason.

04:35 8 Q. That wasn't my question.

04:35 9 A. I'm sorry.

04:35 10 Q. That's all right. I may have made it unclear.

04:35 11 If the pipe was centered --

04:35 12 A. I'm sorry.

04:35 13 Q. -- it is your opinion that the BSR almost certainly would  
04:35 14 have cut the pipe and sealed the well; correct?

04:35 15 A. Yes, absolutely.

04:36 16 Q. Now, I have just a quick question on your qualification.

04:36 17 It's true, is it not, that of the other members of  
04:36 18 your team, when we look over their CVs, we likewise see no  
04:36 19 experience listed with blowout preventers; correct?

04:36 20 A. I believe that's the case, yes.

04:36 21 Q. You yourself have written a number of articles, haven't  
04:36 22 you?

04:36 23 A. Yes.

04:36 24 Q. I think you list 19 or 20 in your CV?

04:36 25 A. Yes.

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04:36 1 Q. About half of them deal with bicycles?

04:36 2 A. I don't remember the number.

04:36 3 Q. And some deal with rockets?

04:36 4 A. A few with rockets.

04:36 5 Q. And some with turbomachinery?

04:36 6 A. Yes.

04:36 7 Q. None deal with BOPs; correct?

04:36 8 A. No.

04:36 9 Q. I'm sorry. That is correct?

04:36 10 A. That is correct.

04:36 11 Q. Thank you.

04:37 12 Now, you said you thought that your outside -- your  
04:37 13 view outside of the industry was of some benefit to us here in  
04:37 14 this case; is that correct?

04:37 15 A. Yes, I believe so.

04:37 16 Q. If gives you a fresh perspective?

04:37 17 A. Yes.

04:37 18 Q. But you're not coming in here with any preexisting  
04:37 19 knowledge of the way things are typically done in the industry.  
04:37 20 Is that fair?

04:37 21 A. Yes.

04:37 22 Q. And before preparing your report, you didn't go to any of  
04:37 23 the BOP manufacturers to look at the different type of blowout  
04:37 24 preventers that are available, did you?

04:37 25 A. Not physically, but I reviewed documents.

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04:37 1 Q. You haven't done that at any point in your career prior to  
04:37 2 being retained in this case; correct?

04:37 3 A. Looking at actual hardware at the manufacturer, no.

04:37 4 Q. In fact, you indicated that when you got the call to work  
04:37 5 on this case after Macondo, you went online, on the Internet,  
04:37 6 to look at the BOP pictures; correct?

04:38 7 A. Yes, and I saw some of that there.

04:38 8 Q. And you indicated that was the first time you had seen  
04:38 9 those pictures; correct?

04:38 10 A. I don't recall, but that would have been true, yes.

04:38 11 Q. Okay. Now, I think you stated that the Mark III control  
04:38 12 system, had it been offered by Cameron, was available since  
04:38 13 when? Do you know that?

04:38 14 A. I think it was 2006, but I don't recall for sure.

04:38 15 Q. Okay. And you indicated you thought that would have  
04:38 16 eliminated malfunction associated with solenoids in batteries;  
04:38 17 correct?

04:38 18 A. I believe it would have, yes.

04:38 19 Q. And you do understand, don't you, that a requirement for  
04:38 20 something to be the best available and safest technology is  
04:38 21 that it be practical to use? Correct?

04:38 22 A. Well, you know, if you read the words, it says "best and  
04:38 23 safest when practical." So that's not what best and safest is.  
04:38 24 "Practical" is added to that.

04:38 25 Q. But the regulation does use the word "when practical";

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04:38 1 correct?

04:38 2 A. When practical, yes.

04:39 3 Q. And you understood that to have -- considering the  
04:39 4 practical implications of things, it's just sensible from an  
04:39 5 engineering perspective anyways, isn't it?

04:39 6 A. Yes.

04:39 7 Q. And you agree, don't you, that you're not qualified to  
04:39 8 assess all the practical ramifications of implementing the  
04:39 9 Mark III control system on the *Deepwater Horizon*; correct?

04:39 10 A. Not all of them, but because this system was in use and  
04:39 11 for commercial sale, I considered it practical.

04:39 12 Q. And you didn't, in fact, evaluate the practical  
04:39 13 ramifications of implementing the Mark III system in forming  
04:39 14 your opinion here; isn't that true?

04:39 15 A. No.

04:39 16 Q. No, did you not do it? I'm sorry.

04:39 17 A. I'm sorry. I did not do any further analysis of its  
04:39 18 practicality. I saw that it was available, in commercial use,  
04:39 19 and so I considered it practical.

04:39 20 Q. You agree you don't have the expertise to evaluate whether  
04:39 21 replacing the Mark II system with the Mark III system would be  
04:40 22 safer; correct?

04:40 23 A. Would be what?

04:40 24 Q. Safer.

04:40 25 A. Safer. I do have some expertise that would come to bear

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04:40 1 on that. I may not have all of it that would be required to  
04:40 2 make the replacement. But certainly, I believe, for example,  
04:40 3 the rechargeable battery system is safer.

04:40 4 **MR. DOYEN:** Let's look at Deposition 375, lines 13  
04:40 5 through 19.

04:40 6 **BY MR. DOYEN:**

04:40 7 **Q.** You were asked:

04:40 8 "QUESTION: You would not have the full expertise to  
04:40 9 evaluate whether relacing the Mark II control system with  
04:40 10 the Mark III control system was a safer step?

04:40 11 "ANSWER: I would not be able to evaluate all aspects  
04:40 12 of it, no. I think it would require other expertise, as well."

04:40 13 Were you asked that question, and did you give that  
04:40 14 answer?

04:40 15 **A.** Yes, and that's exactly consistent with what I just said.

04:40 16 **Q.** You didn't do any analysis to see why the replacement of  
04:40 17 the Mark II system with the Mark III system would be a safer  
04:41 18 step, did you?

04:41 19 **A.** I did do analysis by default, I guess you'd call it, that  
04:41 20 monitoring of batteries is safer, and that's part of the  
04:41 21 Mark III system; therefore, the Mark III system is safer.

04:41 22 **MR. DOYEN:** Let's look at deposition page 375,  
04:41 23 lines 20 through 22.

04:41 24 **BY MR. DOYEN:**

04:41 25 **Q.** Immediately following this question and answer where you

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04:41 1 said it would require other expertise:

04:41 2 "QUESTION: And you've got not done that analysis; is  
04:41 3 that correct?

04:41 4 "ANSWER: I have not done that analysis."

04:41 5 Were you asked that question, did you give that  
04:41 6 answer?

04:41 7 A. I think that's out of context. You should show more up  
04:41 8 above that.

04:41 9 Q. I'm happy to show that. Let's go back up to line 13  
10 through 22.

04:41 11 "QUESTION: You would not have the full expertise to  
12 evaluate whether replacing the Mark II control system with the  
13 Mark III control system was a safer step?

04:42 14 "ANSWER: I would not be able to evaluate all aspects  
15 of it, no. I think it would require other expertise as  
16 well."

04:42 17 "QUESTION: And you've not done that analysis; is  
18 that correct?

04:42 19 "ANSWER: I have not done that analysis."

04:42 20 Were you asked those questions, did you give those  
21 answers?

04:42 22 A. Yes. And, again, it's talking about full expertise, other  
23 expertise; and those are the analyses that I didn't do because  
24 there are other people that would come into play, and they  
25 would do their analyses.

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04:42 1 Q. In fact, Cameron issued a safety alert in February of 2009  
04:42 2 about the Mark III system; isn't that correct?

04:42 3 A. Yes.

04:42 4 MR. DOYEN: Let's put up TREN-3626.18, please.

04:42 5 BY MR. DOYEN:

04:42 6 Q. Safety Alert from Cameron, dated 12 February 2009,  
04:42 7 regarding the Mark III modular drilling control pod. Do you  
04:43 8 see that?

04:43 9 A. Yes.

04:43 10 MR. DOYEN: Can we put up the following two pages,  
04:43 11 please. I believe it's TREN-3626.38, please.

04:43 12 BY MR. DOYEN:

04:43 13 Q. And the warning from Cameron notes that the issues that  
04:43 14 are being discussed with this system in February of 2009 could  
04:43 15 result in failure of the BOP to perform its intended function.

04:43 16 Do you see that?

04:43 17 A. I'd like to read the whole thing so that's in context.  
04:43 18 Give me a moment.

04:43 19 (Witness reviews document.)

04:43 20 Okay. Yes, I've read it.

04:43 21 Q. You did not discuss this safety alert in your report, did  
04:43 22 you, sir?

04:44 23 A. No, I didn't.

04:44 24 Q. You had some discussions earlier this afternoon about  
04:44 25 double-V shear rams. Do you recall that generally?

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04:44 1 A. Yes.

04:44 2 Q. And your reports, your initial report indicated that there  
04:44 3 should have been CDVS rams. Do you recall that?

04:44 4 A. Yes.

04:44 5 Q. That stands for cable double shearing -- it stands for  
04:44 6 "cable double-V shear rams"; correct?

04:44 7 A. I believe that's true, yes.

04:44 8 Q. And you agree, don't you, that those rams were originally  
04:44 9 developed to cut cable, wire rope, and welding? Don't you?

04:44 10 A. Yes.

04:44 11 Q. They're for use in wireline operations, not drilling  
04:44 12 operations; correct?

04:44 13 A. No, that's not correct.

04:44 14 Q. Let's look at deposition pages 102, 23, to line 103-3.

04:44 15 "QUESTION: Is it your understanding that the Cameron  
04:45 16 CDVS blind shear ram was designed to be used in wireline  
04:45 17 operations, not drilling operation?

04:45 18 "ANSWER: I understand it was originally designed to  
04:45 19 cut wire rope, yes."

04:45 20 Were you asked that question, did you give that  
04:45 21 answer?

04:45 22 A. Yes. But --

04:45 23 Q. Did you --

04:45 24 A. -- the question you just asked me wasn't "designed to"; it  
04:45 25 was "used for."



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04:45 1 Q. I think the question I asked you was exactly what's  
04:45 2 written on the page, but the record will reflect what the  
04:45 3 record reflects on that point. Cameron had said --

04:45 4 **BY MR. DOYEN:**

04:45 5 Q. You were aware at the time you prepared your report that  
04:45 6 there was a safety alert for the CDVS ram as well, weren't you?

04:45 7 A. Yes.

04:45 8 **MR. DOYEN:** Let's pull up 7661-A, TREX-7661-A.

04:46 9 And then we have 1-B as well, same document.

04:46 10 **BY MR. DOYEN:**

04:46 11 Q. Cameron is reporting here that these rams fail to hold the  
04:46 12 rated pressure after 42 open/close cycles, including six  
04:46 13 pressure cycles.

04:46 14 Do you see that?

04:46 15 A. Yes.

04:46 16 Q. Cameron recommended, in fact, as a result of that, that  
04:46 17 the pressure rating of these rams be limited to 10,000 psi;  
04:46 18 correct?

04:46 19 A. Something to that effect.

04:46 20 Q. Okay. And, in fact, you didn't discuss this safety  
04:46 21 warning in your report either, did you?

04:46 22 A. No. Because it doesn't prevent use of CDVS rams.

04:46 23 Q. There is, in fact, no analysis in your report of the  
04:46 24 impact of this safety alert and the impact it might have on the  
04:46 25 rig's ability to use these type rams in the operation in which

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04:46 1 it was engaged; isn't that true?

04:46 2 A. That's true, because it's not a major impact.

04:47 3 Q. You also talked about double-V design -- hang on one  
04:47 4 second. I'm going to see if I can do something about this wire  
04:47 5 that's creating so much trouble for the court reporter.

04:47 6 Let's see how that worked.

04:47 7 You suggested having double-V rams up at the center  
04:47 8 of pipe; correct?

04:47 9 A. Correct.

04:47 10 Q. You agreed that the blades of the DVS rams do not,  
04:47 11 however, go all the way across the wellbore; right?

04:47 12 A. In the case of the DVS ram, they do not.

04:47 13 Q. And you don't state anywhere in your report that use of  
04:47 14 DVS rams was industry practice at the time of the incident, do  
04:47 15 you?

04:47 16 A. I don't recall. I believe I mentioned CDVS rams only in  
04:48 17 my first report.

04:48 18 Q. And in your rebuttal report, there's no discussion  
04:48 19 suggesting that the use of DVS rams was standard in the  
04:48 20 industry, is there?

04:48 21 A. I don't believe so, no.

04:48 22 Q. You are aware, aren't you, that the Cameron shearing blind  
04:48 23 ram, the type of ram that was in use in this case, the blind  
04:48 24 shearing ram -- are you with me so far? Cameron calls that a  
04:48 25 shearing blind ram.

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04:48 1 A. Yes, I know. They call it an SBR, yes.

04:48 2 Q. Right. That's the ram we're talking about. SBR/DSR,  
04:48 3 we're talking about the same ram. Are you with me so far?

04:48 4 A. Yes.

04:48 5 Q. Okay. You're aware that the Cameron SBR model has been  
04:48 6 used on subsea BOP stacks for many rigs that operate in the  
04:48 7 Gulf of Mexico, aren't you?

04:48 8 A. Yes, I am aware.

04:48 9 Q. And it's your understanding that the Cameron SBR, the  
04:48 10 blind shear ram model that we have on the *Deepwater Horizon* and  
04:48 11 pieces of the models in your report, is still being used by  
04:48 12 rigs that operate in the Gulf of Mexico; correct?

04:49 13 A. Yes, unfortunately, that is still true.

04:49 14 Q. Your report does not discuss the extent to which these  
04:49 15 rams are industry standard or common in the Gulf of Mexico,  
04:49 16 does it?

04:49 17 A. No, and that's not really my concern. I'm evaluating it  
04:49 18 from a technical point of view, separately.

04:49 19 MR. DOYEN: Your Honor, both in terms of the subject  
04:49 20 I'm about to get into and for biological reasons, could we go  
04:49 21 ahead and adjourn here today?

04:49 22 THE COURT: All right. It's about 10 minutes to  
04:49 23 5:00. We'll go ahead and recess.

04:49 24 MR. DOYEN: Thank you, Your Honor.

04:49 25 THE COURT: Before we do that, let me just make a

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04:49 1 couple quick announcements.

04:49 2 First of all, next week the only two overflow  
04:49 3 rooms will be B-407 in the Boggs building, which is  
04:50 4 Judge Moore's former magistrate's courtroom; and C-311, which  
04:50 5 is on the third floor, down the hall, in this courthouse.

04:50 6 Judge Shushan may or may not make her courtroom  
04:50 7 available at various times. That's strictly up to her. We  
04:50 8 will no longer have the fourth courtroom because crowds have  
04:50 9 been rapidly diminishing. We don't need all those courtrooms.

04:50 10 Judge Shushan will be over here in a few  
04:50 11 minutes. So those of you who need to admit exhibits, please  
04:50 12 stick around.

04:50 13 Everyone have a good weekend. We'll see  
04:50 14 everyone 8:00 Monday morning.

04:50 15 **THE DEPUTY CLERK:** All rise.

05:01 16 \* \* \* \* \*

05:01 17 (The following proceedings were held before The  
05:01 18 Honorable Sally Shushan.)

05:01 19 **THE COURT:** Okay, guys. Mr. Miller. Mr. Miller.

05:01 20 I call us to order.

05:01 21 **MR. MILLER:** I'll get out of your way.

05:01 22 **THE COURT:** All right, guys. Let's get started. I  
05:01 23 think today is going to be very easy. The question is whether  
05:01 24 it's going to be fast and whether it's going to be expeditious.  
05:01 25 I think it's going to be both.

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05:01 1 Mr. Nomellini, Mr. Irpino, why don't you-all  
05:01 2 come up to the podium. Let me thank both of you for  
05:01 3 spearheading this week's marshaling of the exhibits. You did a  
05:02 4 fantabulous job, that's F-A-N-T-A-B-U-L-O-U-S, in pulling  
05:02 5 together last week's list.

05:02 6 So we've got two lists here. One is 2/28/12.  
05:02 7 Has that been presented to Stephanie?

05:02 8 **MR. IRPINO:** No, that list has not been presented to  
05:02 9 Stephanie. We have it with us.

05:02 10 **THE COURT:** Terrific. That is a six-page exhibit  
05:02 11 list of all exhibits and demonstratives that were gathered for  
05:02 12 last week's marshaling conference on February 28th, 2013.

05:02 13 As I understand it, the list has been agreed to  
05:02 14 by all parties. Are there any objections whatsoever?

05:02 15 Good. Then that list will be admitted, and  
05:02 16 whatever is reflected on that list is the official record for  
05:02 17 that week.

05:02 18 Moving on from there, we have a list of  
05:03 19 agreed-upon exhibits and demonstratives for the March 7th, 2013  
05:03 20 marshaling conference. It is a seven-page listing with the  
05:03 21 date, the witness, the exhibit or demonstrative number, the  
05:03 22 type, the party offering, and the ruling with any notes.

05:03 23 As I understand it, that list also has been  
05:03 24 agreed to by all parties. Does anybody have any objection to  
05:03 25 that list?

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05:03 1           **MR. NOMELLINI:** I think, Your Honor, Carter Williams  
05:03 2 had a brief comment.

05:03 3           **THE COURT:** All right. Mr. Williams. And notice I'm  
05:03 4 calling you "Mr. Williams."

05:03 5           **MR. CARTER WILLIAMS:** Good afternoon, Your Honor.  
05:03 6 Just a note we wanted to make regarding two summary exhibits.  
05:04 7 The first exhibit number listed is 50132-37. That appeared as  
05:04 8 part of Summary Exhibit 52658 on page 5 of 7.

05:04 9           **THE COURT:** All right.

05:04 10           **MR. CARTER WILLIAMS:** I just want to be clear for the  
05:04 11 record that this is not page 37 of 50132; this is actually a  
05:04 12 range of exhibits that for the sake of saving a little ink, we  
05:04 13 put that in as a range. There are a couple others. That's the  
05:04 14 only one from 5268 [verbatim]. So that would be Exhibits 50132  
05:04 15 consecutive to 50137.

05:04 16           Then on the summary chart -- exhibits admitted  
05:04 17 as underlying documents of the summary chart, 52661, there are  
05:04 18 the following ranges, which are all ranges consecutively  
05:05 19 numbered trial exhibits: Trial Exhibit 41040 to -42, 41053 to  
05:05 20 -54, 43009 to -17, 43029 to -31, 50969 to -70, 51277 to -78,  
05:05 21 and 51336 to -337.

05:05 22           **THE COURT:** Okay. Thank you.

05:05 23           **MR. CARTER WILLIAMS:** Your Honor, I believe, if I may  
05:05 24 turn it over to either Brad Brian or Kerry. They had a comment  
05:05 25 to make on the Bly exhibits.

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05:05 1           **THE COURT:** Before you leave, Carter, let's really  
05:05 2 quickly talk about how we want to designate from here on the  
05:05 3 difference between a range of pages and a page designation.  
05:05 4 Why don't you all work on that this week and just agree to  
05:05 5 that. It doesn't matter to me -- whatever's easier for you.  
05:05 6 But I appreciate the clarification on the page ranges rather  
05:06 7 than page number.

05:06 8           And relative to the underlying exhibits that you  
05:06 9 just read, are we going to amend this list to show that? Or  
05:06 10 what is the group's thought with regard to that?

05:06 11           **MR. CARTER WILLIAMS:** Your Honor, I think the  
05:06 12 clearest thing to do would be to break them out into individual  
05:06 13 numbers. So we're going to add a few lines to the chart. That  
05:06 14 would just give us a 100 percent-no-questions-asked clear  
05:06 15 record.

05:06 16           **THE COURT:** That's fine. I have no problem with  
05:06 17 that. We will go ahead and agree that those revisions will be  
05:06 18 made and submitted as part of the record on Monday.

05:06 19           **MR. CARTER WILLIAMS:** Thank you, Your Honor.

05:06 20           **THE COURT:** Okay, Carter. Thank you.

05:06 21           Okay. Brad, you've got something you want to  
05:06 22 add?

05:06 23           **MR. BRIAN:** Brad Brian for Transocean, Your Honor.  
05:06 24 Actually, there's a couple things I want to subtract.

05:06 25           We had submitted a revised set of exhibits for

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05:07 1 Mark Bly, consistent with the discussion with Judge Barbier the  
05:07 2 other day when he expressed a preference for, if possible, to  
05:07 3 give him individual pages and call-outs. So we did that.

05:07 4 BP had asked for a chance to look at that, and  
05:07 5 we sent them an e-mail indicating what the particular changes  
05:07 6 were. I think they've had a chance to look at that, and I  
05:07 7 think it's fine.

05:07 8 But there actually were a couple on there that  
05:07 9 we didn't use. So I would ask to remove from page 2 -- it's  
05:07 10 001-56, 001-67. Those were not used. So they would be  
05:07 11 removed. In fact, I'm not even sure we had a call-out for  
05:07 12 those.

05:07 13 Then on page 3 --

05:07 14 **MR. IRPINO:** Brad, I think it's 56 --

05:07 15 **MR. BRIAN:** It's TRES-1-56 or -67.

05:07 16 **MR. IRPINO:** Both of those are out.

05:08 17 **MR. BRIAN:** They're out.

05:08 18 Then on page 3 of this list, it would be  
05:08 19 295-21-A, which is a duplicate of another.

05:08 20 **THE COURT:** Okay.

05:08 21 **MR. BRIAN:** Then TRES-620-1, which is a duplicate.

05:08 22 **THE COURT:** Okay. So is that it, Brad?

05:08 23 **MR. BRIAN:** Is there one more?

05:08 24 That's it, Your Honor. Thank you.

05:08 25 **THE COURT:** Thank you. So subject to those



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05:08 1 changes -- which, Carter, you'll take at lead on, please --

05:08 2 **MR. WILLIAMS:** Sure.

05:08 3 **THE COURT:** -- the list dated March 7th, 2013, will  
05:08 4 be adopted with those modifications, and they can be filed on  
05:08 5 Monday to memorialize today's marshaling conference.

05:08 6 Is there anything else that you guys want to  
05:09 7 cover?

05:09 8 I was going to talk to you all again tomorrow  
05:09 9 morning at the work group conference about some of the issues  
05:09 10 that have come up with regard to exhibits and demonstratives.  
05:09 11 Nothing big and new, but just to make sure we're on good  
05:09 12 footing. We'll modify it as we go.

05:09 13 But anything you all want to talk about this  
05:09 14 evening?

05:09 15 **MR. KRAUS:** Doug Kraus for Louisiana. Are we going  
05:09 16 as to go over witnesses that will be called for next week?

05:09 17 **THE COURT:** If you want to, we certainly can.

05:09 18 **MR. KRAUS:** Because I don't know that the plaintiffs  
05:09 19 are going to make it throughout the entire week.

05:09 20 **THE COURT:** They're not going to make it?

05:09 21 **MR. KRAUS:** I don't know. I looked --

05:09 22 **MR. HERMAN:** I think Transocean gave us --

05:09 23 **MR. KRAUS:** Oh, if they did, I haven't seen that.

05:09 24 **THE COURT:** Yeah. I thought we had seen Transocean.

05:09 25 Is that correct, Brad? Have you all sent out

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05:09 1 your prospective list for next week?

05:09 2 **MR. BRIAN:** Your Honor, we were trying to figure out  
05:10 3 exactly when the PSC is going to rest. We've given them our  
05:10 4 first two witnesses for next week. We don't think we'll  
05:10 5 possibly get there.

05:10 6 We're going to try to actually give an informal  
05:10 7 list of the whole thing sometime tomorrow. It may fluctuate  
05:10 8 depending on the schedules, particularly of the CEO, whose  
05:10 9 schedule, as you probably expected, is pretty tight. We're  
05:10 10 trying to jockey around.

05:10 11 **THE COURT:** I would expect.

05:10 12 The first two witnesses that you disclosed are  
05:10 13 who so will Doug know?

05:10 14 **MR. BRIAN:** They are our two experts, Mr. Barnhill  
05:10 15 and Mr. Childs.

05:10 16 **MR. KRAUS:** Thank you.

05:10 17 **THE COURT:** Okay. Anything else that anybody wants  
05:10 18 to cover?

05:10 19 I hope our marshaling conferences will be this  
05:10 20 brief from now.

05:10 21 All right. Thank you very much. See you  
05:10 22 tomorrow.

23 (WHEREUPON, the proceedings were concluded.)

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CERTIFICATE

I, Jodi Simcox, RMR, FCRR, Official Court Reporter for the United States District Court, Eastern District of Louisiana, do hereby certify that the foregoing is a true and correct transcript, to the best of my ability and 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

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<p><b>5</b></p> <p>52658 [1] 2727/8  52661 [1] 2727/17  5268 [1] 2727/14  5395 [1] 2596/13  54 [1] 2727/20  546 [1] 2598/23  556 [1] 2594/20  56 [3] 2729/10 2729/14 2729/15  56 feet [1] 2620/16  589-7780 [1] 2599/20  599 [1] 2696/15  5:00 [2] 2603/18 2724/23  5th [2] 2683/25 2696/18</p>	<p><b>9</b></p> <p>9-inch [1] 2629/5  9-volt [5] 2651/6 2651/9 2651/11 2688/8  2693/20  90 percent [2] 2710/15 2710/25  90071 [1] 2598/14  93 [2] 2635/21 2699/7  94005 [1] 2597/13  94102 [1] 2596/14  97 [1] 2679/1  99.9 percent [1] 2710/24  9:49 p.m [1] 2679/21  9th [2] 2595/13 2709/19</p>	<p>2686/7 2702/23  activate [2] 2650/24 2655/5  activated [8] 2626/9 2649/20 2649/25  2652/8 2658/15 2686/17 2697/13  2700/23  activates [1] 2688/4  activating [2] 2654/18 2654/25  activation [1] 2649/21  activations [1] 2691/22  active [2] 2609/8 2609/12  activities [10] 2637/23 2637/24 2638/9  2638/11 2638/24 2639/6 2639/9  2650/14 2668/5 2670/25  actual [6] 2613/18 2653/10 2698/4  2701/22 2705/7 2716/3  actually [47] 2601/11 2629/15 2632/2  2633/12 2634/6 2634/13 2634/24  2635/4 2641/18 2645/13 2647/5  2647/13 2647/21 2651/4 2657/23  2659/24 2660/6 2660/8 2663/6 2663/23  2664/13 2664/25 2665/24 2666/21  2670/22 2673/3 2676/12 2678/20  2679/12 2682/12 2682/19 2685/22  2696/21 2697/22 2698/3 2700/10  2700/18 2703/1 2703/22 2704/1  2704/18 2704/24 2711/16 2727/11  2728/24 2729/8 2731/6  actuate [2] 2650/9 2664/22  actuated [1] 2664/23  actuates [1] 2702/23  add [6] 2617/19 2619/4 2632/5 2705/22  2728/13 2728/22  added [6] 2623/13 2623/16 2630/1  2630/13 2631/10 2716/24  adding [1] 2654/13  addition [2] 2631/9 2661/18  additional [3] 2624/24 2632/9 2683/8  additive [3] 2617/20 2630/2 2630/4  additives [15] 2615/21 2617/22 2617/24  2618/3 2618/13 2623/13 2623/16  2630/1 2630/5 2630/6 2630/7 2630/8  2630/9 2630/13 2631/9  address [1] 2619/12  addressed [1] 2670/1  addresses [1] 2608/1  adequacy [1] 2664/3  adequate [2] 2666/13 2671/10  adjourn [1] 2724/21  admit [3] 2605/25 2612/10 2725/11  admits [1] 2643/7  admitted [7] 2601/18 2604/13 2604/20  2611/24 2612/8 2726/15 2727/16  adopt [1] 2624/17  adopted [1] 2730/4  adoption [1] 2609/19  advantage [1] 2711/14  Advice [1] 2690/16  affect [1] 2702/20  after [31] 2606/14 2610/24 2621/1  2621/2 2626/14 2628/23 2633/1 2638/2  2639/12 2649/12 2653/25 2670/6  2674/6 2674/6 2674/7 2676/20 2677/22  2680/5 2680/6 2680/20 2682/21 2683/8  2686/2 2686/4 2686/5 2686/10 2686/24  2687/4 2693/21 2716/5 2722/12  afternoon [13] 2594/14 2601/1 2601/9  2603/18 2625/5 2625/6 2628/4 2637/4  2637/16 2712/7 2712/10 2720/24  2727/5  afterwards [1] 2683/2  again [19] 2602/16 2609/12 2612/8  2617/3 2623/10 2648/14 2655/23  2659/4 2659/6 2659/9 2669/7 2669/12</p>
<p><b>6</b></p> <p>6 5/8 [3] 2665/14 2665/18 2665/23  6 5/8-inch [4] 2665/12 2665/21 2709/15  2709/19  600 [5] 2595/10 2595/13 2598/17  2663/17 2711/5  601 [1] 2595/6  60654 [1] 2597/24  6166 [1] 2668/15  618 [1] 2596/3  67 [2] 2729/10 2729/15  6th [2] 2683/14 2709/19</p>	<p><b>A</b></p> <p>a.m [1] 2679/24  abandonment [1] 2612/14  ability [15] 2621/24 2633/7 2644/9  2647/14 2662/23 2665/6 2695/11  2702/20 2702/22 2703/17 2709/8  2711/18 2711/22 2722/25 2732/5  able [24] 2617/17 2621/7 2623/2  2638/13 2640/5 2647/7 2649/3 2651/13  2654/20 2657/16 2665/10 2665/18  2688/22 2689/13 2696/10 2700/17  2707/20 2708/8 2709/7 2709/10  2710/15 2711/7 2718/11 2719/14  about [93] 2601/21 2602/13 2604/17  2606/20 2606/23 2607/1 2607/9  2607/16 2607/17 2607/18 2608/9  2608/21 2609/2 2609/5 2613/24 2615/2  2620/25 2624/9 2624/18 2625/8  2625/16 2626/21 2627/24 2629/7  2630/1 2630/4 2630/9 2630/15 2630/16  2630/19 2631/20 2633/9 2633/17  2633/18 2633/20 2633/23 2636/23  2638/9 2641/6 2644/3 2644/22 2644/24  2646/7 2646/19 2652/19 2653/2  2653/19 2653/22 2655/24 2657/14  2657/18 2662/6 2662/8 2662/18 2664/5  2666/1 2667/17 2672/21 2675/7  2680/11 2680/14 2682/10 2682/24  2683/1 2685/2 2685/5 2685/13 2685/24  2687/22 2691/25 2692/7 2701/10  2704/15 2707/12 2710/15 2711/5  2712/11 2713/10 2713/11 2714/4  2715/1 2719/22 2720/2 2720/24 2723/3  2723/4 2724/2 2724/3 2724/20 2724/22  2728/2 2730/9 2730/13  above [9] 2665/7 2676/16 2678/23  2679/17 2680/20 2681/8 2708/23  2719/8 2732/7  above-entitled [1] 2732/7  Abramson [1] 2595/5  absolutely [4] 2651/10 2674/14 2690/3  2714/15  accepted [2] 2610/3 2611/15  access [1] 2632/25  accident [7] 2638/4 2639/11 2654/1  2664/9 2666/3 2682/10 2710/2  accomplished [1] 2673/2  accordance [1] 2670/22  According [1] 2620/19  account [1] 2632/2  accumulator [1] 2708/17  accurate [3] 2624/19 2639/6 2671/25  accurately [1] 2671/16  achieve [2] 2613/20 2613/25  achieved [1] 2612/17  across [4] 2614/14 2665/18 2665/24  2723/11  action [5] 2618/20 2622/19 2654/12</p>	<p>2686/7 2702/23  activate [2] 2650/24 2655/5  activated [8] 2626/9 2649/20 2649/25  2652/8 2658/15 2686/17 2697/13  2700/23  activates [1] 2688/4  activating [2] 2654/18 2654/25  activation [1] 2649/21  activations [1] 2691/22  active [2] 2609/8 2609/12  activities [10] 2637/23 2637/24 2638/9  2638/11 2638/24 2639/6 2639/9  2650/14 2668/5 2670/25  actual [6] 2613/18 2653/10 2698/4  2701/22 2705/7 2716/3  actually [47] 2601/11 2629/15 2632/2  2633/12 2634/6 2634/13 2634/24  2635/4 2641/18 2645/13 2647/5  2647/13 2647/21 2651/4 2657/23  2659/24 2660/6 2660/8 2663/6 2663/23  2664/13 2664/25 2665/24 2666/21  2670/22 2673/3 2676/12 2678/20  2679/12 2682/12 2682/19 2685/22  2696/21 2697/22 2698/3 2700/10  2700/18 2703/1 2703/22 2704/1  2704/18 2704/24 2711/16 2727/11  2728/24 2729/8 2731/6  actuate [2] 2650/9 2664/22  actuated [1] 2664/23  actuates [1] 2702/23  add [6] 2617/19 2619/4 2632/5 2705/22  2728/13 2728/22  added [6] 2623/13 2623/16 2630/1  2630/13 2631/10 2716/24  adding [1] 2654/13  addition [2] 2631/9 2661/18  additional [3] 2624/24 2632/9 2683/8  additive [3] 2617/20 2630/2 2630/4  additives [15] 2615/21 2617/22 2617/24  2618/3 2618/13 2623/13 2623/16  2630/1 2630/5 2630/6 2630/7 2630/8  2630/9 2630/13 2631/9  address [1] 2619/12  addressed [1] 2670/1  addresses [1] 2608/1  adequacy [1] 2664/3  adequate [2] 2666/13 2671/10  adjourn [1] 2724/21  admit [3] 2605/25 2612/10 2725/11  admits [1] 2643/7  admitted [7] 2601/18 2604/13 2604/20  2611/24 2612/8 2726/15 2727/16  adopt [1] 2624/17  adopted [1] 2730/4  adoption [1] 2609/19  advantage [1] 2711/14  Advice [1] 2690/16  affect [1] 2702/20  after [31] 2606/14 2610/24 2621/1  2621/2 2626/14 2628/23 2633/1 2638/2  2639/12 2649/12 2653/25 2670/6  2674/6 2674/6 2674/7 2676/20 2677/22  2680/5 2680/6 2680/20 2682/21 2683/8  2686/2 2686/4 2686/5 2686/10 2686/24  2687/4 2693/21 2716/5 2722/12  afternoon [13] 2594/14 2601/1 2601/9  2603/18 2625/5 2625/6 2628/4 2637/4  2637/16 2712/7 2712/10 2720/24  2727/5  afterwards [1] 2683/2  again [19] 2602/16 2609/12 2612/8  2617/3 2623/10 2648/14 2655/23  2659/4 2659/6 2659/9 2669/7 2669/12</p>
<p><b>7</b></p> <p>7-5395 [1] 2596/13  7-inch [1] 2629/5  70 [2] 2683/3 2727/20  701 [2] 2597/16 2597/19  70113 [1] 2594/24  70130 [6] 2595/7 2595/13 2596/10  2597/17 2598/24 2599/19  70139 [1] 2597/20  70163 [1] 2598/7  702-D [1] 2703/10  70360 [1] 2595/20  70458 [1] 2595/23  70501 [1] 2598/18  70502 [1] 2594/21  70801 [1] 2596/4  70804 [1] 2597/13  7308 [1] 2635/22  75 days [1] 2683/4  75270 [1] 2599/10  7611 [1] 2596/19  7660 [4] 2697/25 2700/1 2704/22  2705/20  7661-A [1] 2722/8  77002 [2] 2598/10 2599/17  77006 [1] 2596/7  77010 [2] 2599/5 2599/13  77098 [1] 2598/21  7780 [1] 2599/20  78 [1] 2727/20  78257 [1] 2595/17  7:40 [1] 2679/24  7th [2] 2726/19 2730/3</p>	<p><b>8</b></p> <p>80 [2] 2679/1 2679/3  800 [1] 2663/17  800 psi [1] 2711/6  8015 [2] 2633/13 2633/16  8048 [2] 2694/4 2695/3  820 [1] 2594/23  891 [1] 2692/12  8:00 Monday [1] 2725/14  8th [1] 2693/13</p>	<p>2686/7 2702/23  activate [2] 2650/24 2655/5  activated [8] 2626/9 2649/20 2649/25  2652/8 2658/15 2686/17 2697/13  2700/23  activates [1] 2688/4  activating [2] 2654/18 2654/25  activation [1] 2649/21  activations [1] 2691/22  active [2] 2609/8 2609/12  activities [10] 2637/23 2637/24 2638/9  2638/11 2638/24 2639/6 2639/9  2650/14 2668/5 2670/25  actual [6] 2613/18 2653/10 2698/4  2701/22 2705/7 2716/3  actually [47] 2601/11 2629/15 2632/2  2633/12 2634/6 2634/13 2634/24  2635/4 2641/18 2645/13 2647/5  2647/13 2647/21 2651/4 2657/23  2659/24 2660/6 2660/8 2663/6 2663/23  2664/13 2664/25 2665/24 2666/21  2670/22 2673/3 2676/12 2678/20  2679/12 2682/12 2682/19 2685/22  2696/21 2697/22 2698/3 2700/10  2700/18 2703/1 2703/22 2704/1  2704/18 2704/24 2711/16 2727/11  2728/24 2729/8 2731/6  actuate [2] 2650/9 2664/22  actuated [1] 2664/23  actuates [1] 2702/23  add [6] 2617/19 2619/4 2632/5 2705/22  2728/13 2728/22  added [6] 2623/13 2623/16 2630/1  2630/13 2631/10 2716/24  adding [1] 2654/13  addition [2] 2631/9 2661/18  additional [3] 2624/24 2632/9 2683/8  additive [3] 2617/20 2630/2 2630/4  additives [15] 2615/21 2617/22 2617/24  2618/3 2618/13 2623/13 2623/16  2630/1 2630/5 2630/6 2630/7 2630/8  2630/9 2630/13 2631/9  address [1] 2619/12  addressed [1] 2670/1  addresses [1] 2608/1  adequacy [1] 2664/3  adequate [2] 2666/13 2671/10  adjourn [1] 2724/21  admit [3] 2605/25 2612/10 2725/11  admits [1] 2643/7  admitted [7] 2601/18 2604/13 2604/20  2611/24 2612/8 2726/15 2727/16  adopt [1] 2624/17  adopted [1] 2730/4  adoption [1] 2609/19  advantage [1] 2711/14  Advice [1] 2690/16  affect [1] 2702/20  after [31] 2606/14 2610/24 2621/1  2621/2 2626/14 2628/23 2633/1 2638/2  2639/12 2649/12 2653/25 2670/6  2674/6 2674/6 2674/7 2676/20 2677/22  2680/5 2680/6 2680/20 2682/21 2683/8  2686/2 2686/4 2686/5 2686/10 2686/24  2687/4 2693/21 2716/5 2722/12  afternoon [13] 2594/14 2601/1 2601/9  2603/18 2625/5 2625/6 2628/4 2637/4  2637/16 2712/7 2712/10 2720/24  2727/5  afterwards [1] 2683/2  again [19] 2602/16 2609/12 2612/8  2617/3 2623/10 2648/14 2655/23  2659/4 2659/6 2659/9 2669/7 2669/12</p>

<p><b>A</b></p> <p>again... [7] 2670/1 2670/14 2671/11 2702/9 2713/25 2719/22 2730/8</p> <p>against [2] 2658/12 2697/3</p> <p>ago [2] 2670/4 2687/9</p> <p>agree [17] 2608/2 2628/7 2635/3 2650/23 2650/25 2655/4 2659/4 2671/11 2674/23 2692/21 2705/13 2713/5 2717/7 2717/20 2721/8 2728/4 2728/17</p> <p>agreed [6] 2602/25 2643/8 2723/10 2726/13 2726/19 2726/24</p> <p>agreed-upon [1] 2726/19</p> <p>agrees [1] 2671/22</p> <p>ahead [10] 2613/10 2628/20 2628/21 2632/6 2646/1 2652/9 2713/13 2724/21 2724/23 2728/17</p> <p>aid [1] 2630/14</p> <p>aided [1] 2599/24</p> <p>al [2] 2594/8 2594/11</p> <p>Alabama [6] 2595/4 2597/7 2597/8 2597/10 2627/12 2711/24</p> <p>alert [5] 2720/1 2720/6 2720/21 2722/6 2722/24</p> <p>ALEX [1] 2599/4</p> <p>all [107] 2601/4 2601/5 2601/6 2601/9 2601/14 2602/13 2602/17 2603/17 2604/24 2605/14 2605/23 2606/21 2607/16 2608/18 2611/23 2612/8 2613/10 2613/22 2613/24 2614/16 2623/18 2623/20 2627/9 2627/16 2630/13 2631/23 2633/9 2635/20 2636/20 2636/24 2637/1 2638/8 2638/22 2639/4 2639/6 2639/13 2640/4 2640/6 2640/8 2644/10 2644/17 2644/25 2645/15 2647/8 2648/16 2649/1 2649/1 2651/6 2658/7 2660/10 2664/20 2666/23 2667/12 2668/23 2669/1 2669/4 2669/6 2670/18 2671/3 2671/20 2672/10 2673/6 2675/24 2678/6 2679/20 2680/18 2681/21 2682/22 2683/13 2687/6 2687/13 2688/2 2690/24 2697/22 2698/14 2700/1 2702/5 2706/19 2708/8 2709/15 2711/24 2712/4 2712/16 2714/10 2717/8 2717/10 2718/1 2718/11 2719/14 2723/11 2724/22 2725/2 2725/9 2725/15 2725/22 2726/1 2726/11 2726/14 2726/24 2727/3 2727/9 2727/18 2728/4 2730/8 2730/13 2730/25 2731/21</p> <p>ALLAN [1] 2597/15</p> <p>allow [8] 2615/14 2615/18 2615/25 2634/17 2634/21 2681/7 2681/13 2701/2</p> <p>allowed [9] 2615/10 2616/4 2624/3 2624/16 2650/22 2660/5 2700/15 2700/16 2700/18</p> <p>allows [2] 2616/16 2634/13</p> <p>almost [3] 2711/8 2714/2 2714/13</p> <p>along [2] 2641/8 2664/20</p> <p>already [8] 2604/13 2625/7 2626/20 2661/14 2681/15 2689/7 2699/16 2711/15</p> <p>also [44] 2610/10 2610/17 2622/11 2626/17 2637/6 2637/20 2638/2 2638/10 2639/2 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