

# Deposition Testimony of:

## **Richard Coronado**

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Page 8:07 to 8:09

00008:07 RICHARD CORONADO,  
08 having been first duly sworn, testified as  
09 follows:

Page 8:16 to 8:18

00008:16 Could you please state your name  
17 for the record?  
18 A. Richard J. Coronado, Jr.

Page 9:20 to 10:07

00009:20 Q. You are currently employed by  
21 Cameron, correct?  
22 A. Yes, that is correct.  
23 Q. And your title is engineering  
24 manager, drilling systems controls; is that  
25 correct?  
00010:01 A. Yes. I'm actually engineering  
02 manager of a software group for drilling  
03 systems controls, yes.  
04 Q. And with respect to this case,  
05 you'll be testifying as a fact witness and an  
06 expert; is that correct?  
07 A. Yes, that is correct.

Page 10:14 to 12:04

00010:14 Q. So behind tab 94 is a document  
15 that's been marked as exhibit 8035.  
16 Exhibit 8035 is Cameron's Rule 26 disclosure,  
17 correct? Do you see the title on the top  
18 there? It says Cameron Rule 26?  
19 A. Can I have a moment to read it,  
20 please? Okay.  
21 Q. Have you seen this document  
22 before?  
23 A. No, I can't say that I recall.  
24 Q. Could you please turn to page 2  
25 of exhibit 8035? And go to item 3 under your  
00011:01 name. Do you see that?  
02 A. Yes.  
03 Q. Is it your understanding that  
04 you will be testifying today about all  
05 aspects of design, manufacture and operation  
06 of the electronic components and functions of  
07 blowout preventer control systems, including  
08 capabilities and limitations of the  
09 electronic components and functions of  
10 blowout preventer control systems, in  
11 general, and the configuration of the blowout

12 preventer control system on the Macondo well?  
13 A. I can speak to -- to the  
14 electrical and the software with regards to  
15 drilling control systems.  
16 Q. So please now refer to tab 1 in  
17 your binder.  
18 (Exhibit Number 8036 marked.)  
19 Q. And behind tab 1 is a document  
20 that has been marked as exhibit 8036. Is  
21 this the expert report that you submitted in  
22 this matter?  
23 A. Yes. This does appear to be the  
24 exhibit report that I submitted, yes.  
25 Q. And this expert report is  
00012:01 entitled expert report prepared by Richard  
02 Coronado, Cameron International Corporation,  
03 correct?  
04 A. That is correct.

Page 13:07 to 16:24

00013:07 Q. So you started working at  
08 Cameron in 1998; is that correct?  
09 A. That is correct, yes.  
10 Q. And beginning in 1998, you were  
11 the lead engineer for the DEEPWATER HORIZON  
12 project; is that correct?  
13 A. I was one of two lead engineers  
14 involved in that. I was responsible for the  
15 electrical side of the -- of the project and  
16 it was -- there was another person  
17 responsible for mechanical side.  
18 Q. Who was the other lead engineer  
19 for the DEEPWATER HORIZON project in 1998?  
20 A. I believe that was Bollie  
21 Williams, IV.  
22 Q. As the lead engineer for the  
23 DEEPWATER HORIZON project, what were your  
24 duties?  
25 A. Duties were primarily to create  
00014:01 the bills and material, create the  
02 schematics, create some test procedures for  
03 the -- for the project.  
04 Q. Other than creating schematics,  
05 creating test procedures, and I think you  
06 said bills and materials?  
07 A. That's correct, yes.  
08 Q. Did you have any other duties  
09 that you can recall?  
10 A. Well, during -- during the  
11 initial stages of the project, we -- I met  
12 with R&B Falcon and Vastar during the early  
13 ages of the project.  
14 Q. So did you work on any software  
15 design or software program with respect to

16 the DEEPWATER HORIZON project?  
17 A. I don't -- I don't recall. I  
18 may have assisted writing or helping the --  
19 some software at that particular time. My  
20 primary function at that particular time was  
21 electrical schematics.  
22 Q. So I want to ask you some  
23 particular questions about your experience  
24 with respect to the source code and software  
25 that's used -- that was used with the  
00015:01 DEEPWATER HORIZON project. So focusing on  
02 the AMF software that was used with the Mark  
03 II control system on the DEEPWATER HORIZON,  
04 did you contribute to that software in any  
05 way?  
06 A. Which software are you speaking  
07 of?  
08 Q. The AMF software for -- for the  
09 AMF card.  
10 A. 'Cause -- for the AMF card, no,  
11 I did not.  
12 Q. Are you familiar with the  
13 software for the AMF card?  
14 A. Yes, I am.  
15 Q. And how is it that you're  
16 familiar with that software?  
17 A. Well, we've had to install that  
18 firmware on -- on a chip whenever a customer  
19 orders that particular software -- or, excuse  
20 me, orders that particular card or has that  
21 installed on a particular system that has an  
22 AMF system.  
23 Q. Would it be fair to say that you  
24 understand the functionality of the AMF  
25 software?  
00016:01 A. I would be, yes.  
02 Q. Okay.  
03 A. Yeah.  
04 Q. Did you spend any time at all  
05 during your 13 years at Cameron working on --  
06 or actually developing the AMF software for  
07 the DEEPWATER HORIZON?  
08 A. The only thing that -- that I  
09 was -- participated in was in the actual  
10 sequence. I really didn't participate in the  
11 sequence. I -- when we were in conversations  
12 with Vastar and R&B Falcon with regards to  
13 the sequence, and that was really the only  
14 thing we would -- we would give them maybe  
15 a -- provide them a sample sequence and then  
16 they would mark it up and give us the actual  
17 sequence for the DEEPWATER HORIZON. But that  
18 was the extent.  
19 Q. And when you say sequence, what  
20 is it that you're referring to?

21           A.       The AMF sequence. The one  
22 that's actually -- I believe it actually is  
23 the one that closes the blind shear ram when  
24 all the conditions are met for an AMF.

Page 17:11 to 18:01

00017:11       Q.       And how is it that you're  
12 familiar with the AMF sequence for the  
13 DEEPWATER NAUTILUS?  
14       A.       That one is -- the sequence is  
15 basically identical to the DEEPWATER HORIZON.  
16       Q.       So when you say the sequence for  
17 the DEEPWATER NAUTILUS is basically identical  
18 to the sequence for the DEEPWATER HORIZON, do  
19 you mean that the AMF sequence is basically  
20 the same -- the functionality of the AMF  
21 sequence is basically the same?  
22       A.       Yes, yes, yes.  
23       Q.       So have you worked on a SEM  
24 software?  
25       A.       I am familiar with the -- with  
00018:01 the software in the SEM, yes.

Page 18:13 to 19:01

00018:13       Q.       So was it -- would it be fair to  
14 say that you understand the functionality of  
15 the SEM software that was used with the  
16 DEEPWATER HORIZON?  
17       A.       Yes, I understand the  
18 functionality.  
19       Q.       Do you understand the  
20 functionality of the SEM software that's used  
21 with the DEEPWATER NAUTILUS?  
22       A.       Yes. I understand the  
23 functionality of that -- that one as well.  
24       Q.       Now, you have a BS in electrical  
25 engineering; is that correct?  
00019:01       A.       That is correct, yes.

Page 19:05 to 20:24

00019:05       Q.       Other than your BS in electrical  
06 engineering, do you have any other training  
07 or education related to electrical  
08 engineering?  
09       A.       I've had some -- some PLC  
10 experience, some PLC classes that I've --  
11 that I've taken that have been given by our  
12 vendors and some other training classes with  
13 respect to PLCs. And, of course, my  
14 experience with this equipment, my years of

15 experience that I have worked there at  
16 Cameron.  
17 Q. Now, with respect to your work  
18 on the DEEPWATER HORIZON, you said that you  
19 worked on schematics; is that correct?  
20 A. That is correct, yes.  
21 Q. Now, when you say schematics, do  
22 you also mean that you worked on wiring  
23 diagrams for the SEMs?  
24 A. To my -- to me, wiring diagrams  
25 and schematics are, you know, basically the  
00020:01 same.  
02 Q. So with respect to the wiring  
03 diagrams for the SEMs that were used on  
04 DEEPWATER HORIZON, what was your contribution  
05 to those diagrams? What did you do?  
06 A. Well, we created them  
07 specifically for the DEEPWATER HORIZON.  
08 Q. So when you say we create  
09 them -- created them, do you mean that you  
10 created the wiring diagrams?  
11 A. Actually, it was -- there was a  
12 team. There was a designer that was  
13 responsible for creating those and then there  
14 was a person who checked them. And then  
15 there was -- I think I was -- if I remember  
16 correctly, I approved the drawings.  
17 Q. So you approved the SEM wiring  
18 diagrams for the DEEPWATER HORIZON; is that  
19 correct?  
20 A. Yes.  
21 Q. And as part of that approval,  
22 did you have to review the diagrams and  
23 provide feedback?  
24 A. Yes, that is correct.

Page 21:20 to 23:11

00021:20 Q. With respect to the actual AMF  
21 card or AMF board, were you involved in any  
22 testing or debugging of the AMF board?  
23 A. No, no. The only -- I mean, the  
24 only thing that I may have been involved with  
25 is the actual testing of the -- not -- not  
00022:01 directly, but generating FATs to test the --  
02 the actual AMF sequence like during a SEM FAT  
03 or during a pod FAT and/or commissioning.  
04 Q. Okay. Now, when you say FAT,  
05 are you referring --  
06 A. I'm sorry. FAT stands for  
07 factory acceptance test.  
08 Q. And are you -- did you testify  
09 that you were responsible for generating the  
10 factory acceptance test for the AMF sequence?  
11 Is that what you said?

12 A. Yeah, that's -- that's correct.  
13 Q. What experience do you have with  
14 respect to the SEM batteries that are used in  
15 a Mark II control system?  
16 A. I'm familiar with those -- with  
17 those types of batteries in -- in their use  
18 in the Mark II SEM.  
19 Q. And how is it that you are  
20 familiar with the SEM batteries and their use  
21 in the Mark II control system?  
22 A. I'm familiar with the -- with  
23 some of the documents that -- you know, that  
24 engineering bulletin that Cameron has with  
25 regard to those -- to those batteries. And,  
00023:01 of course, on the bills of material, those  
02 are -- those are also listed as part of the  
03 SEM, bills of material.  
04 Q. What experience do you have with  
05 solenoid valve 223290-63, and I think that's  
06 referred to solenoid valve-63?  
07 A. I am familiar with it from --  
08 from the electrical side of it. I know  
09 that -- you know, some general  
10 characteristics of the solenoid valve with  
11 regard to electrical.

Page 23:18 to 24:15

00023:18 Q. Do you have specific experience  
19 with respect to solenoid valve-103 that was  
20 used with the Mark II control system on the  
21 DEEPWATER HORIZON?  
22 A. I mean, just -- just what I've  
23 read in -- in preparing my report and, you  
24 know, the various, you know, reports.  
25 That's -- that's all my -- my -- or my  
00024:01 knowledge is of that valve.  
02 Q. So you -- so you said you -- you  
03 read various reports when preparing your  
04 report. Is that what you said?  
05 A. That is correct, yes.  
06 Q. What reports did you read?  
07 A. The various reports from the  
08 Department of Justice, by Mr. Davis, the DNV  
09 Phase I testing, Perkins report, the various  
10 expert reports, Zatarain, Stevick.  
11 Q. Did you read a report by  
12 Mr. Greg Childs that was submitted in this  
13 case on behalf of Transocean?  
14 A. I'm sorry. Yes, I've -- I've  
15 also read that report, too.

Page 24:25 to 26:08

00024:25 Q. Now, on the DEEPWATER HORIZON  
00025:01 there are two AMF cards on each SEM; is that  
02 correct?  
03 A. Per the -- per the electrical  
04 schematics, yes, there are two cards in  
05 each -- in each SEM.  
06 Q. So altogether there are four AMF  
07 cards, correct?  
08 A. With respect to?  
09 Q. The DEEPWATER HORIZON?  
10 A. Yes. If you look at it from a  
11 pod perspective or two SEMs, yes. There are  
12 two on each SEM. So two plus two would be  
13 four on a control system.  
14 Q. Now, during normal  
15 circumstances, circumstances other than the  
16 AMF deadman sequence, could an individual  
17 look at an indicator on the control panel and  
18 determine that all four of the AMF cards were  
19 armed?  
20 A. There is a way you could -- you  
21 could do that. You could -- after you sent  
22 the command to arm all four AMF cards, you  
23 could select the other SEMs and confirm that  
24 the other AMF cards have been armed. Another  
25 way to do that is you can look at the event  
00026:01 logger and confirm that the analog value has  
02 changed and that you have armed all four  
03 cards.  
04 Q. Let me just make sure I  
05 understand what you said. So for each AMF  
06 card, an individual would have to confirm  
07 that the particular AMF card -- each one has  
08 been armed?

Page 26:11 to 29:10

00026:11 THE WITNESS: Okay.  
12 A. You could -- yes, you can  
13 confirm that -- as a way of confirming to  
14 making sure that all four cards are armed,  
15 you can go through and select each SEM to  
16 make sure that that command has reached the  
17 SEM and that the AMF card is armed as well as  
18 the event logger, as I mentioned previously.  
19 Q. Now, does the term armed mean  
20 that the AMF card latch relay has been set to  
21 enable the AMF card to monitor the deadman  
22 conditions?  
23 A. Yes, yes.  
24 Q. Now, the three conditions  
25 necessary for the AMF card to perform the AMF  
00027:01 deadman sequence are: Loss of power, loss of  
02 hydraulic supply and loss of communication,  
03 right?



04           A.       It's actually loss of -- yeah,  
05 loss of power to the -- to the topside  
06 equipment, loss of hydraulic supply and loss  
07 of communication to the other pod.  
08           Q.       Okay. And in this deposition,  
09 when I use the term deadman condition, will  
10 you understand me to mean loss of power to  
11 topside, loss of hydraulic supply and loss of  
12 communication to the other pod?  
13           A.       Right.  
14           Q.       When the AMF card has detected  
15 the deadman conditions, would it be correct  
16 to say that the AMF card has been triggered?  
17           A.       Triggered or activated, yeah.  
18 So you -- you basically satisfy the  
19 conditions and now the sequence that's  
20 programmed in the SEM will actually run or  
21 start.  
22           Q.       Now, when the -- when the  
23 deadman is armed, how is it -- how are all  
24 four cards armed?  
25           A.       A command is initiated from the  
00028:01 driller's or toolpusher's panel and then that  
02 command goes through the -- through the  
03 communications network on the topside  
04 equipment. And it then gets routed through  
05 the -- through the modems and then that  
06 command goes through the MUX cables and then  
07 goes through the modem in the -- in the SEM  
08 and then goes through the processor in the --  
09 in the SEM. And then that processor takes  
10 that command and then sends a command to the  
11 card to arm it.  
12           Q.       And with respect to that one  
13 command, do all four AMF cards respond to  
14 that one command?  
15           A.       Yes. All four cards would  
16 respond to all -- that one command on the  
17 DEEPWATER HORIZON.  
18           Q.       And once all four cards respond  
19 to that one command on the DEEPWATER HORIZON,  
20 there's a way to verify that each card has  
21 been armed, right?  
22           A.       That is correct, yes.  
23           Q.       Now, when a command is set to  
24 arm the AMF cards, is there any scenario that  
25 you can think of where all four AMF cards  
00029:01 would not be armed?  
02           A.       I mean, I don't know, you know,  
03 right off the top of my head why, you know --  
04 unless the -- you know, there are -- there  
05 are various things that could -- you know,  
06 that could be wrong for that to happen. You  
07 know, the MUX cable could be -- could be  
08 damaged, the -- you know, there would have to

09 be some sort of hardware failure that would  
10 -- that would cause that to happen.

Page 30:06 to 30:14

00030:06 Q. If -- if the read back on a  
07 yellow pod shows that its SEMs are blue,  
08 would that read back -- read back affect  
09 whether the yellow pod's AMF cards are armed?  
10 A. No.  
11 Q. So it doesn't matter if the  
12 yellow pod has a SEM that thinks it's blue;  
13 is that correct?  
14 A. Correct. It does not matter.

Page 30:20 to 32:25

00030:20 Q. Yeah. During the normal  
21 operation, is the BOP routinely controlled by  
22 two control pods?  
23 A. My knowledge of -- that's --  
24 that would -- I mean, let me just say that  
25 it's -- we have an electro hydraulic system,  
00031:01 so we use electrical signals to -- to send to  
02 the SEM, and then those -- those signals are  
03 in turn, converted to hydraulic signals.  
04 So to answer your question, we  
05 send -- for most commands, we send commands  
06 to -- to both pods. Okay. But there are  
07 certain functions or certain commands that  
08 only are pod-specific and only go to a  
09 specific pod.  
10 To answer your question  
11 directly, based on my knowledge, is that only  
12 one pod usually has hydraulics on it at a  
13 time. Okay. Even though we send commands to  
14 both pods and both pods -- the solenoids are  
15 actually shifting hydraulically, but on the  
16 lower section of the pod, you only have  
17 hydraulics on one pod.  
18 Q. So you send command -- you send  
19 a command to both pods, but only one pod has  
20 the hydraulic supply; is that correct?  
21 A. Right. For most functions, that  
22 is the case. Okay. There are certain  
23 functions that are exceptions to that.  
24 Pod-specific functions, direct functions,  
25 are -- are -- could be exceptions to that  
00032:01 rule --  
02 Q. What type --  
03 A. -- statement.  
04 Q. What type of functions are  
05 pod-specific functions?  
06 A. Those would be, like, for

07 example, your -- your pod stingers, your  
 08 extending, your retract, your energize.  
 09 Those would be pod-specific functions.  
 10 Examples of direct functions --  
 11 and, again, I'm going from -- from memory  
 12 here. I think that would be the valve 103,  
 13 the high pressure blind. I believe that was  
 14 a direct function.  
 15 Q. Just with respect to  
 16 terminology, what is the difference between a  
 17 pod-specific function and a direct function?  
 18 A. Direct function is a -- is a  
 19 function that goes -- doesn't rely on -- on  
 20 hydraulic power on the lower section of the  
 21 pod. It -- it just uses solenoid supply.  
 22 Q. And a pod-specific function,  
 23 does that just mean referring to a blue pod  
 24 or a yellow pod --  
 25 A. Yellow pod. That's correct.

Page 33:08 to 34:09

00033:08 Q. When you send a command to a  
 09 pod, does only one SEM respond to the  
 10 command?  
 11 A. Pod-specific function, no. Both  
 12 SEMs will respond in that pod.  
 13 Q. So on the surface panel display,  
 14 is there information for each of the four sub  
 15 SEM -- subsea SEMs?  
 16 A. No. On the -- on the display,  
 17 you can only see one SEM -- your active SEM.  
 18 That's the only thing you can view on the --  
 19 on the panel.  
 20 Q. Now, what does it mean for a SEM  
 21 to be active?  
 22 A. That's the one SEM that you're  
 23 looking at, at that particular point in time,  
 24 that you want to display. You select that  
 25 from the panel.  
 00034:01 And, I'm sorry, I have to  
 02 correct my -- my last statement. There are  
 03 pod-specific functions on the panel that are  
 04 also displayed irregardless of -- of the  
 05 active SEM.  
 06 Q. You said there are pod-specific  
 07 functions that are also displayed on the  
 08 panel? Is that what you said?  
 09 A. Right. Yes.

Page 34:19 to 34:25

00034:19 Q. If the BOP is controlled by the  
 20 blue pod, does this mean that the blue pod is

21 actually receiving hydraulic power and  
 22 operating the ram?  
 23 A. Based on my knowledge, that  
 24 would be -- that would be one way of looking  
 25 at it.

Page 35:12 to 36:18

00035:12 Q. So if, for example, the BOP were  
 13 to be controlled by the blue pod, is the  
 14 yellow pod on standby?  
 15 A. Yellow pod may not necessarily  
 16 be on -- on standby. It may just not have  
 17 hydraulic power to the lower section.  
 18 Q. Is there a difference between a  
 19 pod not having hydraulic power to the lower  
 20 section and a pod being on standby?  
 21 A. I mean, to me, pod on standby  
 22 may be that it's -- it -- it doesn't  
 23 necessarily have its -- have its functions  
 24 energized. It may just be they're looking  
 25 until you -- until you decide to -- to  
 00036:01 transition to that pod and then it'll make  
 02 its functions active.  
 03 Q. So I'm just trying to understand  
 04 the terminology.  
 05 So in one sense, you can have a  
 06 pod that's not receiving the hydraulic  
 07 supply, right?  
 08 A. Right.  
 09 Q. And in another sense, you can  
 10 have a pod whose functions haven't been  
 11 activated.  
 12 Is that what you said?  
 13 A. Right. Right.  
 14 Q. And when you have a pod whose  
 15 functions haven't been activated, that pod is  
 16 on standby; is that correct?  
 17 A. That would be -- that would be  
 18 my definition of it, yes.

Page 36:21 to 37:22

00036:21 (Exhibit Number 8037 marked.)  
 22 Q. Now, tab 80 -- 83 -- I'm sorry.  
 23 Tab 83 has a document behind it that's been  
 24 marked as exhibit 8037, and the Bates number  
 25 on that document is TRN-HCEC 00007069.  
 00037:01 And it is a wiring diagram for  
 02 the multiplex BOP control system, correct?  
 03 A. Actually, in the lower  
 04 right-hand corner, it states that it's the  
 05 interconnection diagram, general arrangement  
 06 interconnection diagram for the MUX BOP

07 control system.  
08 Q. Using exhibit 8037, can you  
09 explain how the BOP selects which pod will be  
10 in control?  
11 A. This is -- this is just a -- an  
12 overview drawing that we -- that's prepared  
13 to -- to kind of show the customer, you know,  
14 what -- what's the deliverable items. It  
15 doesn't really give you information as far  
16 as, you know, what the BOP is going to be  
17 selected.  
18 Q. So if we look at the bottom left  
19 side of this document -- let's see here. And  
20 it says, electrical part, SEM ASSY,  
21 2020722-21.  
22 Do you see that?

Page 38:08 to 40:14

00038:08 A. That's okay.  
09 Okay. Yes, SEM assembly,  
10 2020722-21. Yes, I see that.  
11 Q. Does that represent the blue  
12 pod?  
13 A. That -- that is -- that is a  
14 portion of the -- of the pod. There's also  
15 a -- a -- the hydraulic lower section.  
16 That -- that assembly is in the MUX section,  
17 which is the -- the upper section of the pod.  
18 Q. So if we look a little bit to  
19 the right -- and I'm holding it up and  
20 looking here --  
21 A. Right.  
22 Q. -- is that -- is that a  
23 representation of the yellow pod?  
24 A. That would be a representation  
25 of the -- the -- the other pod, yes.  
00039:01 Q. So on this drawing, the pods are  
02 subsea, correct?  
03 A. Well, it's -- again, it's --  
04 this drawing is just a general arrangement  
05 drawing that's provided to customers to give  
06 them an idea of what the equipment -- what  
07 kind of -- what the deliverables are for  
08 their project.  
09 Q. Okay. Well, can you tell me,  
10 just explain in your own words, how, in  
11 general, the BOP selects which pod is going  
12 to be in control?  
13 A. Where would you like me to  
14 start?  
15 Q. Start from -- is -- is there a  
16 command on the panel -- on the -- on -- does  
17 someone have to select a command on the  
18 panel?

19           A.       Yes. There is -- there's  
20 usually a -- on the control panels, on either  
21 the driller's, toolpusher's, there's a  
22 command to -- to select the pod.  
23           Q.       And so once the -- that -- how  
24 is that command entered? Is it a button, or  
25 does someone have to enter in text, or --  
00040:01       A.       Typically, there's a button, and  
02 it's -- it's a two -- two-handed operation.  
03 You have to press the enable button as well  
04 as, you know, which -- which button -- which  
05 pod you want to select, either the blue or  
06 the yellow.  
07           Q.       What is the purpose of the  
08 enable button?  
09           A.       It's -- that enable button is --  
10 is basically to prevent inadvertent  
11 operation. You have to have a two --  
12 two-handed operation, so, you know, prevent  
13 from accidentally somebody pushing just one  
14 button.

Page 42:07 to 42:10

00042:07       Q.       Does each SEM have a unique  
08 address or a unique identifier?  
09           A.       Yes, that is correct, each SEM  
10 has a unique identifier.

Page 52:07 to 52:11

00052:07       Q.       Does each SEM, SEM A or SEM B --  
08 SEM B operate differently based on being  
09 designated as a 1, 2, 3 or 4?  
10           A.       With regards to DEEPWATER  
11 HORIZON, no.

Page 53:11 to 53:16

00053:11       Q.       Let me just go back to one of  
12 the things that we discussed this morning.  
13                    You said that a command is  
14 set -- sent and all four AMFs respond to one  
15 command for the DEEPWATER HORIZON, correct?  
16           A.       Correct.

Page 54:14 to 59:25

00054:14       Q.       On the DEEPWATER HORIZON when  
15 the BOP is in its normal operating mode, can  
16 the SEMs communicate with each other?  
17           A.       No. No. Well, I should -- now  
18 that I think about the question a little bit

19 more, let me -- when you say communicate with  
20 each other, what do you -- what do you --  
21 what do you mean by that?

22 Q. I mean, is there any electronic  
23 message interaction between the SEMs?

24 A. To my knowledge, the -- the --  
25 the only interaction, if you -- if you arm  
00055:01 the AMF, okay, then there is a -- there is a  
02 heartbeat that -- that then gets -- gets read  
03 by the AMF card. That would be the only --  
04 only interaction.

05 Q. When you say there's a heartbeat  
06 that's read by the AMF card, what do you  
07 mean?

08 A. It's -- the SEM, whenever it's  
09 powered up, it generates -- whenever you have  
10 an AMF system as an option on your SEM, you  
11 generate a heartbeat and that heartbeat gets  
12 read by all the other AMF cards.

13 Q. Is that heartbeat -- heartbeat  
14 transmitted directly between the AMF cards,  
15 or does that heartbeat go to the riser  
16 control box and then is sent to the -- to the  
17 cards? How does it work?

18 A. It's -- the way the heartbeat  
19 works is that everybody is -- is looking at  
20 the heartbeat. And one of the conditions is  
21 the communication between the pods based on  
22 the AMF, Cameron AMF system. So if -- as  
23 long as there's at least one heartbeat  
24 available, then the -- the conditions are not  
25 met for the AMF and so it will not activate.

00056:01 Q. When you say the SEM is looking  
02 for the heartbeat, where is it -- is it  
03 looking for it -- looking -- getting a --  
04 a -- detecting it from the riser control box,  
05 or is it looking -- are the SEMs  
06 communicating with each other? That's what  
07 I'm trying to figure out.

08 A. The way -- the way it usually  
09 works is that there's a cable that -- or  
10 cables. And so it usually goes -- the part  
11 usually goes through the riser control box.  
12 All those cables are connect -- are  
13 interconnected between the two pods.

14 Q. So the riser control box is  
15 connected to each of the SEMs and the SEMs  
16 actually sensor or detect the heartbeat from  
17 the riser control box; is that correct?

18 A. Well, based on those -- on those  
19 cables being interconnected. The riser  
20 control box is -- really doesn't retransmit  
21 the -- the heartbeat. It's just merely a --  
22 a conduit for that heartbeat.

23 Q. I want to go back to tab 83 and

24 we marked tab 83 as exhibit 8037. And I want  
25 to just make sure that I understand what  
00057:01 you're saying. So do you see the riser  
02 control box on exhibit 8037? It's at the  
03 bottom.  
04 A. Yes.  
05 Q. Do you see it?  
06 A. Yes.  
07 Q. Okay. So you've -- you're  
08 testifying that each of the SEMs -- their  
09 heartbeat signals goes through this riser  
10 control box?  
11 A. Yes.  
12 Q. Okay. And the riser control box  
13 does not retransmit the signal, the riser  
14 control box is just a conduit, correct?  
15 A. Right.  
16 Q. Yes.  
17 A. One thing I have to -- I have to  
18 comment about is -- is -- you know, during --  
19 during the course of the SEM investigation it  
20 was -- I was told that this -- this might not  
21 be -- this drawing here, I'm not sure if it's  
22 been reflective of how the actual  
23 configuration was onboard the -- the  
24 DEEPWATER HORIZON. 'Cause I -- I was told  
25 there were some -- there were some changes  
00058:01 done to it.  
02 Q. Okay. So with respect to the  
03 drawing on exhibit 8037, your understanding  
04 is that this drawing may not represent what  
05 was actually used in the DEEPWATER HORIZON;  
06 is that correct?  
07 A. Correct.  
08 Q. And so you said you were told  
09 that there were some changes made to the  
10 drawing in exhibit 8037. What changes were  
11 made?  
12 A. Specifically about the -- about  
13 the MUX cable, how it -- how it terminated --  
14 I believe it -- that was changed. It was --  
15 it was no longer going through a riser  
16 mounted junction box. And this -- again,  
17 this is based on what I was -- what I was  
18 told.  
19 Q. Who told you about the changes  
20 that were made to exhibit 8037?  
21 A. Like during -- during -- back  
22 during -- whenever they were bringing the  
23 stack back up to the -- or the pods back up  
24 to the surface. I believe it was William  
25 LeNorman who mentioned that to me.  
00059:01 Q. So did you observe the DNV  
02 testing?  
03 A. No, I wasn't -- I wasn't present



04 for DNV testing.  
05 Q. So other than the changes to  
06 exhibit 8037 with respect to the MUX cable,  
07 what other changes are you aware of?  
08 A. I'm not aware of any other --  
09 those -- that's specifically about the  
10 electrical side. There -- you know,  
11 during -- there were reports of other changes  
12 that were -- that were done to the -- to the  
13 stack and -- and -- but I -- I'm not aware of  
14 those -- I'm not aware of those details of  
15 those changes.  
16 Q. So as you sit here today, the  
17 only change that's related to the electrical  
18 side of the system is the change to the MUX  
19 cable; is that correct?  
20 A. That I'm aware of.  
21 Q. Other than the -- the heartbeat  
22 that's sent by the SEMs, is there any other  
23 electronic message interaction between the  
24 SEMs?  
25 A. No.

Page 60:06 to 61:24

00060:06 Q. There's no way -- since there's  
07 no electronic message interaction between the  
08 SEMs, there's no way for two SEMs to  
09 coordinate an activity; is that correct?  
10 A. Well, typically, coordination of  
11 activity between SEMs is not -- is not -- is  
12 not required.  
13 Q. Now, you say coordination  
14 between SEMs is not required. That's not my  
15 question. My question is, is there any way  
16 for two SEMs to coordinate an activity?  
17 A. Again, to my knowledge, I mean,  
18 there -- it's not required as part of our --  
19 part of our system so there would be no need  
20 to have that coordination.  
21 Q. So then your testimony is there  
22 is no way for two SEMs to coordinate any  
23 activity, correct?  
24 A. Again, there's -- there's no  
25 need for our system to have that  
00061:01 coordination.  
02 Q. So then the SEMs don't perform  
03 any coordination, correct?  
04 A. Again, there's -- there's no  
05 need for our system to have that  
06 coordination.  
07 Q. Well, I understand what you're  
08 saying that there's no need and it's not  
09 required. What I'm trying to understand is,  
10 is there any way for -- for the SEMs to

11 coordinate an activity.  
12 A. Well, I guess in -- in -- in my  
13 mind, if there's -- if there's no need for  
14 that coordination, then, you know, why would  
15 you -- why would you have that?  
16 Q. So then your testimony is that  
17 there's no way for two SEMs to coordinate any  
18 activity, right?  
19 A. As -- as I said before, there's  
20 no need to have that coordination.  
21 Q. So you testified earlier that  
22 you were involved in -- with respect to the  
23 AMF software, you were involved in the AMF  
24 sequence, correct?

Page 62:02 to 62:03

00062:02 A. Correct. I was involved in  
03 the -- in the sequence, yes.

Page 62:11 to 62:21

00062:11 Q. When the SEM first boots up and  
12 its AMF card has detected the deadman  
13 conditions, will the SEM process the AMF  
14 deadman sequence if its power source is a  
15 battery?  
16 A. The sequence will be -- if the  
17 conditions are met by the -- from the AMF  
18 card, the -- and -- and those conditions  
19 are -- are met and processed, then the  
20 sequence will -- will get executed in the  
21 PLC, yes.

Page 63:01 to 67:03

00063:01 Q. Okay. The first question I  
02 asked: When the SEM first boots up and its  
03 AMF card has detected that -- the deadman  
04 conditions, will the SEM process the AMF  
05 deadman sequence if its power source is a  
06 battery?  
07 A. When you -- when you say -- when  
08 you say power source, you're talking about  
09 if -- if the AMF system has a battery  
10 attached to the -- to the SEM?  
11 Q. Yes.  
12 A. Okay. As part of our AMF  
13 system, yes, it is designed to -- when the  
14 conditions are met, the AMF card -- when the  
15 conditions for the AMF card are met, then the  
16 sequence will use the -- the batteries to --  
17 to do the preprogramed sequence in the SEM.

18 Q. So when the SEM first boots up  
19 and its AMF card has detected the deadman  
20 conditions, will the SEM process the AMF  
21 deadman sequence if the power source is a  
22 PETU?

23 A. In -- in what conditions are  
24 you -- are you speaking of?

25 Q. I'm speaking of the deadman  
00064:01 conditions, the ones that -- the ones that we  
02 talked about earlier, the loss of hydraulic  
03 supply, loss of communication.

04 A. What -- in -- in what -- I guess  
05 I'm trying to understand, what circumstances  
06 would that -- would that be the case?

07 Q. Well, what I'm -- what I'm  
08 trying to understand is, is there any  
09 differences between when the SEM is powered  
10 by a battery versus when the SEM is powered  
11 by a PETU?

12 A. I mean, there -- there are  
13 differences, obviously. You know, the AMF  
14 control system is designed to -- to power up  
15 the -- the SEM via the batteries. So  
16 powering the system up via the PETU, I'm --  
17 I'm trying -- I mean, that's one of the  
18 things that you do is, you -- you arm the AMF  
19 card when you want to test your AMF from the  
20 PETU. You send the command to arm it. And  
21 then you remove the power from the PETU, and  
22 then you use the batteries to test it.

23 So I'm trying to understand how  
24 you -- where the PETU comes into -- into the  
25 equation here. I mean, you -- you basically  
00065:01 remove power from the PETU, which is  
02 essentially your -- your power from the  
03 surface as one of the conditions for the AMF.

04 Q. Can you test a SEM just using  
05 the PETU as a power source?

06 A. Well, you would test the --  
07 the -- I'm sorry. Repeat your question.

08 Q. Can you test the SEM using a  
09 PETU as a power source?

10 A. When you speak of testing the  
11 SEM, what are you -- what are you speaking of  
12 testing?

13 Q. Testing the AMF sequence.

14 A. No. You would -- you would need  
15 the batteries as well, to test the AMF  
16 sequence.

17 Q. During bench testing of the  
18 pods, are PETUs -- PETU used as a power  
19 source?

20 A. To -- to be able to send  
21 commands to arm and disarm the card, yes.

22 Q. Can you test the SEMs just using

23 a power supply?  
 24 A. What -- what type of power  
 25 supply?  
 00066:01 Q. Have you ever tested the SEMs  
 02 using a power supply?  
 03 MR. JONES: Object to form. Is all of  
 04 this in connection with deadman, or are you  
 05 just testing a SEM generally?  
 06 MS. MCKENZIE: Testing a SEM with  
 07 respect to the AMF deadman sequence.  
 08 MR. JONES: Okay. Thank you.  
 09 A. When -- when you -- I guess are  
 10 you asking with respect to sending commands  
 11 to arm the AMF system?  
 12 Q. I'm asking -- I'm asking with  
 13 respect to it running through the AMF deadman  
 14 process.  
 15 A. Well, there's -- I mean,  
 16 there's -- there's two things that you have  
 17 to -- obviously, you have to have batteries  
 18 for the AMF sequence to run. Okay? That's  
 19 part of our -- part of our system, power  
 20 system design. But you also -- also have  
 21 a -- have to have a PETU to be able to send  
 22 command to arm the system.  
 23 Now, once you arm it and then  
 24 all the conditions are satisfied, you remove  
 25 the power from the PETU. Then the AMF  
 00067:01 should -- if all the conditions are met, then  
 02 the AMF system should take over and do the  
 03 sequence.

Page 67:11 to 73:13

00067:11 Q. Yes. Referring to when the SEM  
 12 first boots up, is there a scenario where a  
 13 SEM with a good nine-volt battery and a  
 14 triggered AMF card will not run the AMF  
 15 deadman sequence?  
 16 A. When you -- when you say run the  
 17 AMF sequence, what -- what do you mean by  
 18 that?  
 19 Q. I mean, actually go through the  
 20 AMF deadman sequence.  
 21 A. And this is a -- what about --  
 22 what about the states of the other batteries?  
 23 Q. Well, is there a scenario where  
 24 you have a good nine-volt battery?  
 25 A. Uh-huh.  
 00068:01 Q. And a triggered AMF card, is  
 02 there a scenario where the AMF deadman  
 03 sequence would not be run?  
 04 A. And triggered, you mean, to  
 05 define as all the conditions have been  
 06 satisfied?

07 Q. Yes.  
08 A. I'm not aware of -- of -- no, if  
09 you have a good nine-volt battery and -- and  
10 all the conditions are met, then, you know,  
11 then the -- then the sequence will run in the  
12 processor.  
13 Q. What does it mean for the AMF  
14 card to be disarmed?  
15 A. That would mean, to me, that  
16 you've sent the command to disarm it. And so  
17 the AMF card is -- is no longer monitoring  
18 for the conditions for an AMF trigger, which  
19 will be loss of electrical from surface, loss  
20 of communications to the other pods, and loss  
21 of hydraulic supply.  
22 Q. So if we refer to when -- again,  
23 when the SEM first boots up, is there a  
24 scenario where a SEM with a good nine-volt  
25 battery and a triggered AMF card will not  
00069:01 disarm the AMF card?  
02 A. I mean, that -- that's a little  
03 different scenario, because in order -- with  
04 everything else being -- being okay, the --  
05 the -- you know, if other batteries and --  
06 no, I can't -- I can't see any reason why it  
07 would -- it would not disarm it.  
08 Q. When you were testifying, you  
09 talked about the condition of other  
10 batteries.  
11 How would the condition of other  
12 batteries affect the disarming of the AMF  
13 card?  
14 A. Well, one of the things that --  
15 you have to have a 27-volt to be able to --  
16 to send a signal to -- to disarm.  
17 Q. Why do you have to have a  
18 27-volt battery to be able to send a signal  
19 to disarm?  
20 A. Well, that's -- that particular  
21 signal goes through the -- the output boards  
22 on the -- on the SEM, so in order to -- that  
23 power is -- is typically received from the  
24 24-volt when the SEM is in normal operation.  
25 During an AMF system, obviously, that power  
00070:01 is no longer there. So that power comes from  
02 the 27-volt.  
03 Q. So is it correct, then -- then,  
04 that if you had a bad 27-volt battery, that  
05 would affect the ability to disarm the AMF  
06 card?  
07 A. It's -- it's possible, yes.  
08 Q. And why is it possible?  
09 A. Well, because you're -- the  
10 source -- power source is you rely on that  
11 27-volt battery for that power source to

12 disarm, to send the signal to disarm the  
13 card.

14 Q. So is it correct, then, that in  
15 the scenario where the SEM first boots up,  
16 you could have a SEM with a good nine-volt  
17 battery and a bad 27-volt battery, but you  
18 wouldn't be able to disarm the AMF card,  
19 correct?

20 A. It's -- it's possible, yes.

21 Q. Again, why do you say it's  
22 possible?

23 A. Again, you know, based on the  
24 fact that you need that -- you need that  
25 signal to -- to disarm the AMF card, you need  
00071:01 that 27 volts to disarm it.

02 Q. So it's more than possible,  
03 then, it's likely that if you have a good  
04 nine-volt battery and a bad 27-volt battery,  
05 you wouldn't be able to disarm that AMF card;  
06 isn't that correct?

07 A. It's -- I've -- you know, I've  
08 never actually, you know, tested it. But  
09 it -- it certainly is possible.

10 Q. Well, I'm asking you whether  
11 it's likely.

12 A. Again, I -- it's possible. You  
13 know, I haven't really looked -- looked at  
14 that, looked at the -- you know, the various  
15 requirements for that.

16 Q. Well, you discussed that you  
17 needed a 27-volt battery to disarm the AMF  
18 card, right?

19 A. Right.

20 Q. So if you don't have a 27-volt  
21 battery to disarm the AMF card, how can you  
22 disarm it?

23 A. Again, it's -- as I stated  
24 before, it's -- it's possible.

25 Q. Well, what I'm asking you is,  
00072:01 based on your 13 years of experience in your  
02 work with these SEMs and the AMF card, based  
03 on your experience and your knowledge, if you  
04 have a bad 27-volt battery, there's no way to  
05 disarm the AMF card; isn't that correct?

06 A. Again, it's possible.

07 Q. And when you say it's possible,  
08 give me, like, a probability.

09 Do you mean if you have a bad  
10 27-volt battery, it's more than a 50/50  
11 chance that you wouldn't be able to disarm  
12 the AMF card?

13 A. I don't -- I don't have a  
14 number. I don't have a number I can give  
15 you.

16 Q. You have no idea whatsoever? As

17 you sit here, you don't know?  
18 A. Right. I don't -- I don't have  
19 a number. I don't know either way.  
20 Q. Can you think of a scenario  
21 where a bad 27-volt battery would allow you  
22 to disarm the AMF card? Give me one.  
23 A. I can't think of anything at the  
24 moment.  
25 Q. But you can't think of scenarios  
00073:01 where a bad 27-volt battery would not allow  
02 you to disarm the AMF card, right?  
03 A. It could -- it could be a -- as  
04 I stated before, it could be a possibility.  
05 Q. Okay. In the scenario that  
06 we've been discussing, the scenario when the  
07 SEM first boots up and the SEM has a good  
08 nine-volt battery and a triggered AMF card,  
09 does the AMF board need to sense hydrostatic  
10 pressure?  
11 A. As one of the conditions for the  
12 AMF, yes, the AMF board needs to sense loss  
13 of hydraulic supply.

Page 74:13 to 75:15

00074:13 Q. Have you ever seen where -- for  
14 example, in the scenario that we're talking  
15 about when the SEM first boots up and you  
16 have a good nine-volt battery, a triggered  
17 AMF card, have you ever seen a scenario where  
18 the conduit pressure has zero value?  
19 A. I mean, that -- that would be  
20 a -- conduit pressure having a zero value,  
21 that would be -- that would be possible to  
22 have a zero value.  
23 Q. And how does the AMF board react  
24 when the conduit pressure has a zero value?  
25 Does that impact the operation of the AMF  
00075:01 board?  
02 A. Well, that's -- that's one the  
03 conditions that, you know, is required, that  
04 the -- you know, that the -- that the loss of  
05 supply pressure. So if -- if that condition  
06 is met for the AMF board, then that -- one of  
07 those conditions would be satisfied to -- to  
08 trigger the AMF.  
09 Q. So we turn to tab 35 of your  
10 binder. And tab 35 has been marked as  
11 exhibit 3620, and it's titled, factory  
12 acceptance test procedure for subsea  
13 electronic module.  
14 Do you see that?  
15 A. Yes.

Page 75:20 to 76:04

00075:20 Q. Is this one of the procedures  
21 that you wrote?  
22 A. For the initial design of the --  
23 of the HORIZON project, no, this is not one  
24 of the original ones that I wrote. This  
25 is -- this is the one that was written after  
00076:01 the incident.  
02 Q. Did you approve the test  
03 procedure in exhibit 3620?  
04 A. Yes.

Page 80:05 to 81:05

00080:05 Q. So I want to make sure I  
06 understand what you're saying. If you're  
07 testing the full AMF sequence, this procedure  
08 requires that you simulate pressure; is that  
09 correct?  
10 A. Well, just -- just -- you  
11 mentioned you wanted to test the sequence,  
12 and that's kind of what I -- what I focused  
13 on.  
14 Q. Yes.  
15 A. If you just wanted to test, you  
16 know, the sequence and the sequence is  
17 usually a preprogramed series of -- of  
18 commands that go out to the solenoids, if you  
19 just want to test that, you may not  
20 necessarily want to simulate these pressures.  
21 But if you want to test the full AMF control  
22 system, then, yes, you would have to simulate  
23 these pressures.  
24 Q. What do you mean when you say  
25 test the full AMF control system?  
00081:01 A. Well, there are obviously three  
02 conditions. So you want to -- you want to --  
03 if you wanted to test that, then you would  
04 want to simulate all three of those  
05 conditions.

Page 82:22 to 84:16

00082:22 Q. If you don't apply pressure, the  
23 only thing you can test is that the AMF  
24 actually runs through the sequence, right?  
25 A. Correct. Correct.  
00083:01 Q. So on this same exhibit,  
02 exhibit 3620, can we go to the page ending in  
03 1947? And under 1947, there's a header that  
04 says test 1 and there's an item 2.  
05 Do you see that?  
06 A. Page 1, item 2. It starts with



07 confirm?  
 08 Q. Yes, confirm that AMF battery  
 09 supply is now pulsing the simulator --  
 10 simulator for TP9 conduit supply. Display  
 11 should be flashing on and off.  
 12 Do you see that?  
 13 A. Yes.  
 14 Q. When this says display should be  
 15 flashing on and off, what display is it  
 16 referring to?  
 17 A. If you're using a 4 to 20  
 18 simulator, then that display would be --  
 19 would typically would be pulsing.  
 20 Q. But -- so where is this display?  
 21 Is it located on the 4 to 20 simulator?  
 22 A. Yes.  
 23 Q. Okay.  
 24 A. Yes.  
 25 Q. Now, does this flashing display  
 00084:01 indicate that the card is measuring the 24 --  
 02 24 volts coming out -- what does it mean?  
 03 A. Typically, our -- our -- the 4  
 04 to 20 simulators that we use to simulate  
 05 this -- this conduit supply, it has a digital  
 06 readout. And so that digital readout,  
 07 whenever it's -- it's -- whenever you're  
 08 displaying it, it means that the circuit is  
 09 being completed and you're simulating a 4 to  
 10 20. Whenever -- whenever that display goes  
 11 away, it means you no longer are receiving or  
 12 simulating a 4 to 20 signal.  
 13 Q. So this display is all about  
 14 detecting whether or not you're simulating a  
 15 4 to 20 signal?  
 16 A. Right. Right.

Page 90:12 to 90:16

00090:12 Q. So it's your understanding that  
 13 version 1.2 is actually the version that was  
 14 used on -- on the AMF card that was used on  
 15 the DEEPWATER HORIZON --  
 16 A. Yes.

Page 90:19 to 91:11

00090:19 Q. Now, just referring to the AMF  
 20 software, does the AMF software continuously  
 21 cycle when the AMF card is triggered in  
 22 trying to run through the AMF deadman  
 23 sequence?  
 24 A. With regard to -- to this  
 25 specific card right here?  
 00091:01 Q. Yeah.

02           A.       Okay. I'm -- I'm not -- I'm  
03 not -- I've never actually tested it or -- or  
04 actually looked at -- to see if that  
05 particular scenario would happen. I do -- I  
06 do not have a -- an opinion either way on it.  
07       Q.       So you said -- you testified  
08 earlier, though, that you were -- you  
09 understood the functionality of the AMF  
10 software, right?  
11       A.       Yes.

Page 92:16 to 92:19

00092:16       Q.       So you've never observed the AMF  
17 software continuously cycling when the AMF  
18 card is triggered, right?  
19       A.       That is correct.

Page 93:03 to 96:09

00093:03       Q.       I'm -- I'm trying to understand,  
04 once the conditions are detected --  
05       A.       Satisfied?  
06       Q.       Satisfied.  
07       A.       Okay.  
08       Q.       Is there any point in time where  
09 the card goes back and -- and rechecks?  
10       A.       No. Once -- once all the  
11 conditions, the three conditions are met,  
12 which is the loss of surface power, loss of  
13 hydraulic supply and loss of communication to  
14 the pod, it does not recheck those.  
15       Q.       Now, with respect to the AMF  
16 card, does it have any low voltage dropout  
17 circuitry?  
18       A.       I'm -- I'm not -- I'm not aware  
19 of -- aware of that.  
20       Q.       So you're not aware of the AMF  
21 card having a low voltage dropout value of  
22 five volts, right?  
23       A.       No. No.  
24       Q.       And -- and -- and -- and -- and  
25 how long have you worked with these cards and  
00094:01 with the AMF software?  
02       A.       Approximately, you know, on and  
03 off for about 13 years.  
04       Q.       Can you please turn to tab 69.  
05 Tab 69 is a set of schematics that were  
06 previously marked as exhibit 5157.  
07       Now, you testified earlier that  
08 you created wiring diagrams for the SEMs that  
09 were used in the DEEPWATER HORIZON, correct?  
10       A.       Yes. Or schematics. And/or  
11 schematics.

12 Q. And/or schematics.  
13 If you -- if you look at the  
14 first schematic here on the first page -- and  
15 it's on the page ending 4715 of  
16 exhibit 5157 -- are these the type of wiring  
17 diagrams that you created for the DEEPWATER  
18 HORIZON?  
19 A. Yes, this -- yes, this looks  
20 like the schematics for the DEEPWATER  
21 HORIZON. And I base that on the fact that --  
22 that there's an SK number and then it says  
23 DEEPWATER HORIZON in the -- in the lower  
24 portion of the drawing.  
25 Q. Can you turn to the page ending  
00095:01 in 716 of exhibit 5157?  
02 A. Ending page?  
03 Q. It ends in --  
04 A. 47 --  
05 Q. 4716, the last four numbers.  
06 A. Oh, I'm sorry.  
07 Q. You got it?  
08 Now, on page 4716, there's a  
09 rectangle on the left side -- upper left side  
10 that says fuse board. Can you read that?  
11 A. Yes.  
12 Q. Okay. Now, looking at the fuse  
13 board, on the left side of the fuse board  
14 there are four lines going into the fuse  
15 board, going into pins 8, 15, 7 and 14.  
16 You see that?  
17 A. 8, 15, 7 -- yes, I see that.  
18 Uh-huh.  
19 Q. Would you agree that these lines  
20 represent 24 volts that were derived from an  
21 AC supplier?  
22 A. Just looking at this drawing and  
23 tracing the physical lines, it appears they  
24 go through -- through a diode and then go  
25 back to a power supply board, which would --  
00096:01 in fact, looks to be a 24-volt supply.  
02 Q. Okay.  
03 A. And there's also two other  
04 boards down on the right-hand side of that  
05 board. So their diode are together.  
06 Q. Two other -- are you referring  
07 to the two other power supply boards?  
08 A. Yes. Yes. Yes. Those are AC  
09 to DC power supplies.

Page 98:25 to 99:19

00098:25 Q. Now, the wiring diagram in  
00099:01 exhibit 5157, is it an accurate  
02 representation of the fuse board for the SEM  
03 that was used on the DEEPWATER HORIZON?

04           A.       On that page that we were just  
05 looking at?  
06           Q.       Yeah. The page is 4716.  
07           A.       Yes.  
08           Q.       That's an accurate  
09 representation of the fuse board?  
10           A.       Yes.  
11           Q.       Okay. Now, continuing to look  
12 at the schematic on the page ending 4716 on  
13 exhibit 5157, are there any changes to the --  
14 the power supply system that are not  
15 reflected in these schematics?  
16           A.       I'm not aware of any changes  
17 that were done with regards to the SEM.  
18 There -- it's possible it could have been  
19 done, but I'm -- I'm not aware of them.

Page 105:01 to 108:02

00105:01           Q.       Okay. So we're staying with  
02 this same exhibit, exhibit 5157, and I want  
03 to go back to the page ending in 4716.  
04                    So we're on page 4716 of  
05 exhibit 5157. And I want you to look down  
06 near the bottom of the page. And there's a  
07 connector that's labeled X11.  
08                    Do you see that?  
09           A.       Yes.  
10           Q.       Now, this X11 connector provides  
11 an external connection to the SEM, right?  
12           A.       Yes, that is correct. But at  
13 least looking at this drawing right here, it  
14 looks like it's got a -- it's been blanked  
15 off. This has, install a 20K psi rated cap.  
16 It's no longer making a connection to the  
17 outside world.  
18           Q.       So then for the DEEPWATER  
19 HORIZON, would it be correct to say that this  
20 X11 connector was not making -- making a --  
21 an external connection?  
22           A.       Well, at least according to  
23 this -- this right here. But, again, I'm --  
24 you know, that may have -- that may have  
25 changed. That's just what I -- what I note,  
00106:01 what I see right there.  
02           Q.       Well, if it were -- if this X11  
03 connection would have been providing an  
04 external connection, what type of equipment  
05 would be connected to it?  
06           A.       Well, it -- it looks like --  
07 looks from the writing here, it says AMF  
08 trigger in and out. So this had -- would --  
09 would have been the -- the heartbeat signal  
10 that's going to the other pod.  
11           Q.       So AMF trigger in and out refers

12 to the heartbeat signal?  
 13 A. Yes.  
 14 Q. But would there be some kind of  
 15 equipment connected to this X11?  
 16 A. Typically, there -- there would  
 17 be, yes.  
 18 Q. And what type of equipment?  
 19 A. Well, that would be the PBOF  
 20 cables.  
 21 Q. The what?  
 22 A. PBOF cables.  
 23 Q. Uh-huh.  
 24 A. It stands for pressure-balanced  
 25 oil field.

00107:01 Q. And what is the purpose of the  
 02 PBOF cables?  
 03 A. That would be to get signals,  
 04 electrical signals, from this particular SEM,  
 05 wherever you may -- you may desire them. In  
 06 this particular case, I think they were  
 07 probably going to the riser control box and  
 08 then from the riser control box, to the other  
 09 pod.  
 10 Q. Other than the PBOF cables that  
 11 could be connected to this X11 connector, is  
 12 there other types of equipment that can be  
 13 connected to the X11 connector?  
 14 A. No, not to -- not to my  
 15 knowledge.  
 16 Q. So -- so we talked about the  
 17 SEMs being able to sense the heartbeat from  
 18 another SEM, right?  
 19 A. (Moves head up and down.)  
 20 Q. And if this X11 connector was  
 21 blanked out, how would the SEM sense the  
 22 heartbeat?  
 23 A. It -- it -- it would not.  
 24 Q. So is it correct that, according  
 25 to this wiring diagram, the SEM was unable  
 00108:01 to -- to sense the heartbeat because its X11  
 02 connector was blanked out?

Page 108:04 to 109:12

00108:04 A. I mean, it -- it is required. I  
 05 mean, it is needed to -- in order to  
 06 communicate to the other pod, you need to  
 07 have this connector installed, or this  
 08 connector connected to the other pod.  
 09 Q. So if you don't have this X11  
 10 connector, if it doesn't have the ability to  
 11 sense the heartbeat for the DEEPWATER  
 12 HORIZON, how was the heartbeat sensed?  
 13 A. It would -- it would not be  
 14 sensed. I mean, you would have the heartbeat

15 in this particular SEM from the other --  
 16 from -- you'd have two SEMs or two heartbeats  
 17 in a SEM. So the other one it would detect,  
 18 but you would not be able to detect the  
 19 other -- other two from the other SEM.  
 20 Q. Okay. Let me break this up. I  
 21 want to understand what you're saying.  
 22 A. Okay.  
 23 Q. So if you're in one pod, you can  
 24 detect the heartbeat --  
 25 A. You would have two available.  
 00109:01 Q. -- between the two SEMs?  
 02 A. Right.  
 03 Q. But because this X11 connector  
 04 is external --  
 05 A. Right.  
 06 Q. -- and it's blacked out --  
 07 A. If it was blanked off.  
 08 Q. -- you wouldn't be able to sense  
 09 the heartbeat from the SEMs in the other pod?  
 10 A. Correct.  
 11 Q. Is that what you're saying?  
 12 A. That's correct.

Page 112:14 to 113:09

00112:14 Q. And I think you're answering a  
 15 different question than I'm asking.  
 16 And what I asked was, if this  
 17 wiring diagram was used with the DEEPWATER  
 18 HORIZON, the SEMs would not have been able to  
 19 detect the heartbeat pulses from other SEMs,  
 20 right?  
 21 MR. JONES: Object to form.  
 22 A. Well, if -- if the -- this  
 23 particular X11 connection, yes, it needs to  
 24 be used to -- for the PBOF cables for the  
 25 communication between the other pod. I do  
 00113:01 not know if -- if it was -- as it states on  
 02 the drawing, if it was capped or not. It  
 03 just says, install 20K psi ready cap. I --  
 04 obviously, if they changed something, they  
 05 would have to remove that cap.  
 06 Q. But if that cap wasn't in  
 07 existence on the DEEPWATER HORIZON, the SEMs  
 08 would not have been able to communicate with  
 09 each other, correct?

Page 113:11 to 113:20

00113:11 A. Again, I would expect that if --  
 12 you know, that -- that was an issue with the  
 13 communications between the two pods, then it  
 14 wouldn't have -- would not have worked. It

15 needs the communications between the two  
16 pods, as our three conditions require.  
17 Q. And if -- if it would not have  
18 worked such that the SEMs couldn't detect the  
19 loss of communication, then the AMF card  
20 couldn't have triggered; is that correct?

Page 114:06 to 114:18

00114:06 A. Actually, this is one of the  
07 conditions that's required for the AMF to  
08 trigger. So if -- if this condition wasn't  
09 there, one of the conditions would have  
10 already been satisfied to trigger it. So  
11 it would have -- it would have triggered.  
12 Q. So your testimony is that if  
13 this X11 connector had been capped, the SEM  
14 would have already sensed the loss of  
15 communication? Is that what you're saying?  
16 A. Correct. Correct. Correct.  
17 Q. So could that have caused a  
18 false trigger?

Page 114:20 to 115:14

00114:20 A. False trigger being that one of  
21 the conditions was -- was satisfied.  
22 Q. Was not satisfied because --  
23 because if you don't have this X11  
24 connection, you don't know whether the other  
25 two SEMs are -- are sending --  
00115:01 A. Having a heartbeat or not.  
02 Q. -- or not, right?  
03 A. Okay. So if you do not have  
04 this -- if you do not have this connected,  
05 then one of the conditions for AMF would have  
06 been satisfied.  
07 Q. Well, the SEM would have thought  
08 one of the conditions were satisfied?  
09 A. Yes.  
10 Q. But -- but it might not, in  
11 fact, have been satisfied because the other  
12 SEM could have been sending pulses, right?  
13 A. Correct. Would have -- not have  
14 seen the other SEM, that is correct.

Page 116:02 to 117:07

00116:02 Q. How do -- how do you know that  
03 the photo on exhibit 8039 is the card that's  
04 represented in the schematic?  
05 A. Well, we typically used this  
06 same deadman card for a number of years. And

07 up at the top, it's -- it's etched right  
 08 there. It says deadman version 1.6. That is  
 09 the -- that is the hardware identifier that  
 10 I've seen before.

11 Q. As you sit here today, are you  
 12 aware of any differences between the  
 13 schematics shown on page 51 -- I'm sorry, the  
 14 schematics shown on page 4737 of exhibit 51  
 15 and the photo shown behind tab 88,  
 16 exhibit 8039?

17 A. Am I -- I'm sorry, am I aware?

18 Q. Are you aware of any differences  
 19 between the photo and the schematic?

20 A. To my -- to my knowledge, no.

21 Q. So if we refer, again, to  
 22 exhibit 5157, the page ending in 4737, is  
 23 this the most recent version of this  
 24 schematic that was used for the DEEPWATER  
 25 HORIZON?

00117:01 A. To my -- to my knowledge,  
 02 it's -- to my knowledge, it's the -- it's the  
 03 latest. But I'm -- again, I'm not -- I'd  
 04 have to compare it to what we have on our --  
 05 on our database as far as electronic --  
 06 electrical schematics are concerned, to see  
 07 if it's the latest.

Page 117:22 to 118:10

00117:22 Q. Okay. And so on tab 71, it's --  
 23 it's been marked as 5159.

24 And -- and tab 71 is the -- the  
 25 AMF schematic, right? A more detailed --

00118:01 A. Right. Yeah.

02 Q. -- version of the schematic?

03 A. Yeah, that -- that appears to be  
 04 the -- yeah, the -- the electrical schematic  
 05 of the AMF board, yes.

06 Q. And that's the electrical  
 07 schematic of the AMF board that was used on  
 08 the DEEPWATER HORIZON, correct?

09 A. To the best of my knowledge,  
 10 yes.

Page 120:04 to 120:09

00120:04 Q. Okay. And the PIC computer is  
 05 capable of measuring battery voltages,  
 06 correct?

07 A. I'm not -- I'm not aware that  
 08 it's -- that it's able -- I'm not aware if  
 09 that's able to do that or not.



Page 122:14 to 123:14

00122:14 Q. So -- but we -- we do show this  
15 connector, we have the 27-volt battery, the  
16 nine-volt battery and then we're going to the  
17 PIC computer, right?  
18 A. Right.  
19 Q. So it could measure voltages,  
20 right? Whether it was designed to do that or  
21 not, what I'm asking was it could do that?  
22 A. Oh, sure. I mean, it could.  
23 Q. So -- so the AMF card for the  
24 Mark II control system could measure  
25 voltages, correct, based on this schematic?  
00123:01 A. Well, again, I mean, based on  
02 what you see here on this schematic. But I  
03 would have to do additional research as far  
04 as the PIC is concerned, whether the -- the  
05 firmware on the PIC was able to measure those  
06 voltages or not.  
07 I mean, we see -- it may appear  
08 that it may be able to measure those  
09 voltages, but until you look at the hardware  
10 in detail, the PIC in -- in particular, the  
11 PIC schematic or the PIC documents or the  
12 specifications. And you may have to do some  
13 research to -- to really determine if it can  
14 measure voltages or not.

Page 129:12 to 130:21

00129:12 Q. Okay. When the PLC is running  
13 the AMF deadman sequence, the PLC uses power  
14 from the 27-volt battery to energize the  
15 solenoids, correct?  
16 A. Yes, that is correct.  
17 Q. And at the end of a AMF deadman  
18 sequence, the PLC uses 27-volt battery power  
19 to disarm the AMF card, correct?  
20 A. It uses the 27-volt and the  
21 nine-volt battery to disarm it.  
22 Q. How does it use both the  
23 nine-volt and 27-volt to disarm it?  
24 A. Well, it uses the 27-volt to  
25 actually send a command to the AMF board to  
00130:01 disarm it and the nine-volt is actually  
02 powering up the -- the logic circuits on the  
03 PLC.  
04 Q. So assuming that we have a  
05 nine-volt battery that has enough capacity to  
06 power up the -- the logic circuits, is it  
07 possible that the PLC can run through the AMF  
08 deadman sequence with the -- a 27-volt  
09 battery that only has 12-volt capacity and  
10 the 27-volt battery would be incapable of

11 energizing the solenoid, but still capable of  
12 disarming the 12-volt relay on the AMF card?  
13 A. I mean, I've never actually --  
14 never actually witnessed that or -- or -- or  
15 looked into that. So I couldn't -- I  
16 couldn't -- couldn't really comment on that.  
17 Q. Well, let me just ask you -- ask  
18 you this, then. If you have a -- a weak  
19 27-volt battery, a 27-volt battery that's  
20 incapable of energizing the solenoid, would  
21 the PLC know that?

Page 131:09 to 132:04

00131:09 A. No. To my knowledge, the PLC  
10 would not know that.  
11 Q. So -- so the PLC would not have  
12 any information about whether the 27-volt  
13 battery can energize the solenoid; is that  
14 what you're saying?  
15 A. Give me a moment, if you don't  
16 mind. I want to refer to the SEMS schematics  
17 for the HORIZON. Do you know what -- what  
18 page they were on?  
19 Q. I think that's tab 69.  
20 A. Tab 69.  
21 Q. Tab 69 is exhibit 5157.  
22 A. Yeah. There's no -- yeah,  
23 there's no detection for the 27-volt --  
24 Q. Okay.  
25 A. -- on the PLC.  
00132:01 Q. What -- what page number were  
02 you referring to?  
03 A. I was looking at page number --  
04 that's 00304737.

Page 134:20 to 136:05

00134:20 Q. Now, we talked about -- you  
21 testified about the conditions that would  
22 trigger the AMF card, and one of the  
23 conditions was loss of hydraulic pressure,  
24 correct?  
25 A. Yes.  
00135:01 Q. So in order for the AMF card to  
02 detect loss of hydraulic pressure, in order  
03 for that condition to be satisfied, does the  
04 AMF card need to sense some positive  
05 hydrostatic pressure?  
06 A. I -- I do recall something  
07 that -- if -- if the transducers are --  
08 are -- are, you know, totally disconnected,  
09 then the AMF will -- will run the -- that  
10 will be one of the condition -- that

11 condition will be satisfied and it will -- if  
12 the other two conditions are -- are  
13 satisfied, the loss of power to the -- to the  
14 surface as well as loss of communication to  
15 the pod, then the AMF will execute or  
16 activate.

17 Q. Now, when you said if the  
18 transducers are totally disconnected that  
19 condition will be satisfied, did you mean  
20 that if the transducers are totally  
21 disconnected --

22 A. In other words, if you're not  
23 generating -- yes, if you're not actually  
24 generating the 4-20 milliamp signals.

25 Q. So if the -- if the 4-20 amp --  
00136:01 20-milliamp signals are not being generated,  
02 then this loss of hydraulic pressure  
03 condition can be satisfied; is that what  
04 you're saying?

05 A. Yes. Yes.

Page 141:21 to 142:02

00141:21 exhibit 5153 and similar to, I think, to a  
22 document we looked at earlier, but it's  
23 entitled test procedure for deadman battery  
24 pack longevity test. Have you seen this  
25 document before?

00142:01 A. Yes. I have seen it before,  
02 yes.

Page 143:13 to 146:12

00143:13 Q. Okay. So we're looking at  
14 exhibit 5153. Please turn to the page ending  
15 in 0630. Are you there?

16 A. Yes.

17 Q. Okay. Do you see where it says  
18 2.0 drain on the battery pack? Do you see  
19 that? It's about in the middle of the page.  
20 It's bolded.

21 A. Oh, I see it. It's -- right.  
22 It's -- yes, 2.0 drain on battery pack.

23 Q. And I know you said you weren't  
24 involved in evaluating the current drain on  
25 the nine-volt battery, but do you know why  
00144:01 Cameron evaluated the current drain on the  
02 nine-volt battery?

03 A. The nine-volt battery is the --  
04 is the limiting factor versus the 27-volt  
05 battery in the -- in the -- in the SEM.  
06 You'll -- you'll consume the capacity in a  
07 nine-volt battery pack before you will  
08 consume the capacity in a 27-volt battery

09 pack.  
10 Q. And I just want to make sure I  
11 understood what you said. You said the  
12 nine-volt battery is the limiting factor  
13 in the -- in the SEM. What do you mean when  
14 you say limiting factor?  
15 A. It's the one that's going to --  
16 that's going to -- it's the one that's going  
17 to put forth -- put forth the most -- or --  
18 or -- or be consumed. The capacity is going  
19 to be consumed in it sooner than the 27-volt.  
20 Q. So -- so what you're saying is  
21 the -- the capacity of the nine-volt battery  
22 is also -- always going to be consumed faster  
23 than the capacity on the 27-volt battery.  
24 Is that what you mean?  
25 A. Yes.  
00145:01 Q. So if we look at -- we're still  
02 under this 2.0 drain the battery pack on  
03 page -- the page ending 6030 of exhibit 5153.  
04 And I want to look at the paragraph starting  
05 with a long-term. Do you see that?  
06 A. Yes.  
07 Q. Okay. So according to this  
08 pack -- this paragraph, during the monitoring  
09 mode, the current drain on the nine-volt  
10 battery is 1.7 milliamps, correct?  
11 A. Yeah. The -- this document  
12 states 1.75 milliamps. Low -- low term, low  
13 current drain while the deadman controller is  
14 in the monitoring mode. This is the main  
15 cause of discharge of the battery pack.  
16 After one year operation in the monitoring  
17 mode, roughly 60 percent of the battery  
18 capacity is drained out.  
19 Q. Do you have any information  
20 about the current drain on the 27-volt  
21 battery during the monitoring mode?  
22 A. I can't seem to recall any tests  
23 that were done or any -- for -- for the  
24 27-volt as far as it being in monitoring  
25 mode.  
00146:01 Q. You know Ed Guade, correct?  
02 A. Yes, I know of -- yes. Ed  
03 Guade, yes.  
04 Q. When you were preparing for your  
05 report and preparing for this deposition,  
06 did -- did you read his transcript?  
07 A. I may have been -- I did not  
08 read his transcript, no.  
09 Q. Would it surprise you if I told  
10 you that he testified that you would know the  
11 current drain on the 27-volt battery during  
12 the monitoring mode?

Page 146:14 to 146:24

00146:14 A. No. Ed -- no, I would not be --  
15 not be surprised if he said my name, no.  
16 Q. Well, isn't -- well, the 27-volt  
17 battery, the purpose of it is to energize the  
18 solenoids, correct?  
19 A. That's one of its purposes. The  
20 other purpose is to generate power for the  
21 transducers to monitor the pressure.  
22 Q. So isn't it important --  
23 wouldn't it be important to understand the  
24 drains on the 27-volt battery?

Page 147:02 to 149:02

00147:02 A. Again, you know, the 27 --  
03 nine-volt battery pack is the one that's  
04 going to have the most -- it's going to use  
05 up the capacity faster when compared to the  
06 27-volt battery pack.  
07 Q. So the reason -- in your  
08 opinion, the reason to focus on the nine-volt  
09 battery is because it's going to use up the  
10 capacity faster?  
11 A. Right. That's right.  
12 Q. And if the --  
13 A. It's going to use the capacity  
14 faster and that's going to be your limiting  
15 factor.  
16 Q. Okay. Well, based on your  
17 experience and based on your work with the  
18 Mark II control system, would you expect the  
19 27-volt battery to have a higher current  
20 drain than -- than the nine-volt battery  
21 during the monitoring mode?  
22 A. Again, I -- I haven't  
23 specifically looked at that, so I -- I do not  
24 know. I do know that based on our -- our --  
25 this procedure right here, the nine-volt  
00148:01 battery pack is the one that's going to  
02 get -- the capacity is going to be -- that  
03 nine-volt is going to be the limiting factor.  
04 Q. Okay.  
05 A. Versus the 27-volt.  
06 Q. Okay. During the monitoring  
07 mode, the AMF card senses the -- the deadman  
08 conditions that you testified about earlier,  
09 right?  
10 A. Yes.  
11 Q. So if the AMF card senses only  
12 the loss of power, would the drain on the  
13 nine-volt battery change from one milliamp?  
14 A. If only -- if only one of the  
15 conditions were satisfied, loss of -- loss of

16 power to the -- to the topside equipment and  
17 the other two conditions had not been met,  
18 would the -- I'm -- you're asking the  
19 question, would the nine-volt drain be any  
20 different?  
21 Q. Yes.  
22 A. I'm -- I'm -- I'm not sure. I'm  
23 not sure. I -- I'm not sure if it would be  
24 any different or not.  
25 Q. So it's likely to -- to remain  
00149:01 at that 1.7 milliamps, right?  
02 A. It's -- it's -- it's possible.

Page 149:06 to 151:07

00149:06 Q. And tab 69 is exhibit 5157. And  
07 I want to turn to the page ending in 4716.  
08 And we -- we -- we -- you testified earlier  
09 about this bold line at the top of the  
10 schematic and you said that was a 24-volt  
11 bus, correct?  
12 A. Right.  
13 Q. So when we talk about sensing  
14 the -- the loss of power, is it sensing the  
15 loss of this power that's represented by the  
16 bold line on page 4716?  
17 A. Actually, it would be losing --  
18 it would be -- it would -- I'm sorry. Give  
19 me -- give me a minute.  
20 With that in conjunction with  
21 the heartbeat loss from the -- from that  
22 particular SEM that was -- that was lost.  
23 Q. So -- so just to make sure I  
24 understand what you're saying, so sensing the  
25 loss of power, sensing the loss of this  
00150:01 24-volt bus that's shown on page 4716 of  
02 exhibit 5157, right?  
03 A. Uh-huh. Right.  
04 Q. And then also when we are  
05 accepting loss of power, according to you,  
06 we're sensing the loss of that heartbeat  
07 signal between the two pulses, right?  
08 A. Well, that's -- that's your  
09 heartbeat signal that's on a -- that's on a  
10 common -- common bus between all the SEMs.  
11 Q. So once the card senses the loss  
12 of power, if it senses the loss of power  
13 only, what would be the load on a 27-volt  
14 battery?  
15 A. Well, if it -- if it lost the  
16 power, then -- then one of the things that it  
17 would check for is the -- is the heartbeat.  
18 If the heartbeat was still available, then --  
19 then there would be -- I don't -- I don't  
20 believe there would be any additional load on

21 the 27-volt battery until all the conditions  
22 are satisfied.

23 Q. Well, if a SEM loses power, does  
24 the 27-volt battery have to provide the  
25 required power to the transducers?

00151:01 A. It will only do that when --  
02 when the heartbeats from the other -- from  
03 the other SEMs are -- are not -- are not  
04 available. In other words, all the  
05 heartbeats have to be gone before it'll move  
06 into the checking that the transducers are --  
07 are okay or not.

Page 151:11 to 151:15

00151:11 Q. If this 24-volt power is lost,  
12 is it your testimony that the 27-volt battery  
13 will not provide power to the transducers?

14 A. Until all the other heartbeats  
15 are -- have been -- are gone.

Page 151:18 to 153:03

00151:18 Q. If the 24-volt power was gone  
19 and the heartbeats are not being detected,  
20 that's when the 27-volt battery would provide  
21 power to the transducers, correct?

22 A. Right. It would -- it would  
23 periodically check them to make sure or to  
24 confirm that if the -- where the pressure  
25 was. Obviously, if the loss of supply was  
00152:01 such that it did not fall below a certain  
02 value, then -- then it would not activate the  
03 AMF.

04 Q. Now, when the 27-volt battery is  
05 providing power to the transducers, it would  
06 have a four-milliamp drain, right?

07 A. It would -- it would depend on  
08 what the transducers is -- is reading to  
09 pressure.

10 Q. Now, I guess I just want to make  
11 sure I understand.

12 So the 27-volt battery provides  
13 power to two 20-milliamp transducers; is that  
14 correct?

15 A. I think they're -- they're 4-20  
16 milliamp, if memory serves me correct.

17 Q. But the -- the max is 20 --  
18 20 milliamp, right?

19 A. It could -- depending on -- that  
20 would be dependent on what your pressure is.  
21 It -- it -- the transducer is -- is, you  
22 know -- it's measuring range is zero to  
23 12,325 psi.

24 Q. How is it that you remember that  
25 exact value, 12,325 psi?  
00153:01 A. I deal with it on a -- on a  
02 regular basis. It roughly equates to  
03 850 bar, so --

Page 153:07 to 153:23

00153:07 Q. And we're at exhibit 5153. And  
08 we want to turn back to that page ending in  
09 630.  
10 And, again, we're looking at the  
11 text under the -- the volt 2.0 drain on the  
12 battery pack. And I'm looking at the  
13 paragraph that says, a short-term.  
14 Do you see that?  
15 A. Yes, a short-term high current  
16 up to 5.5 amps drain during emergency  
17 shutdown sequences.  
18 Q. So does this mean that when the  
19 AMF board boots the SEM and runs through the  
20 AMF deadman sequence, the current drain on  
21 the nine-volt battery is 5.5 amps?  
22 A. Yes, that would be -- that would  
23 be roughly what it is.

Page 154:03 to 155:01

00154:03 Q. The document behind tab 91 has  
04 been marked as 8043. It's titled deadman  
05 system. It has Bates number CAM\_CIV 0277329  
06 to 0277332, correct?  
07 A. It goes to 333.  
08 Q. Okay. Thanks. 333. So if we  
09 turn to the page ending in 332 and near the  
10 top half of the page, there's a paragraph.  
11 The second full paragraph says, having  
12 satisfied.  
13 Do you see that?  
14 A. Having satisfied this condition,  
15 SEM initiates its -- excuse me --  
16 preprogrammed shutdown sequence.  
17 Q. What is the -- what is meant by  
18 that, the phrase preprogrammed shutdown  
19 sequence?  
20 A. What that means is that a --  
21 that shutdown sequence is -- is stored  
22 into -- in the SEM. And that shutdown  
23 sequence has a series of -- of commands or  
24 solenoids that it energizes based on some --  
25 it also has some time -- time intervals or  
00155:01 timing that it -- that they're energized by.



Page 156:08 to 157:03

00156:08 Q. So if we just look at -- look at  
09 the preprogrammed shutdown sequence, the  
10 SEM's already been booted up, right, at this  
11 point?  
12 A. I mean, it -- it's -- I mean,  
13 it -- yes, it would be going through its --  
14 through it -- all its initialization of, you  
15 know, getting into the operating system of  
16 the -- of the PLC. And then the -- yeah, the  
17 next thing it would do would be to actually  
18 run the sequence.  
19 Q. But -- but what I'm saying, by  
20 the time it gets to running the sequence, the  
21 SEM is already booted up.  
22 So it's booted up?  
23 A. Right.  
24 Q. The first thing, it boots up and  
25 the second thing, it runs this preprogrammed  
00157:01 shutdown sequence, correct?  
02 A. I would say that would be a --  
03 yes, accurate way of describing it.

Page 157:15 to 158:15

00157:15 Q. -- 69. And we're going -- 69 is  
16 exhibit 5157.  
17 A. Okay.  
18 Q. And we're going to the schematic  
19 that ends in 4716.  
20 A. All right.  
21 Q. So we were talking about that --  
22 that booting phase of the SEM and then that  
23 shutdown sequence, right?  
24 A. Right.  
25 Q. Now, during that booting phase,  
00158:01 is the 27-volt battery providing power to the  
02 24-volt bus on the SEM if we look here at the  
03 schematic?  
04 A. I would say that when you --  
05 when -- when the AMF card, when the  
06 conditions are met and it provides power to  
07 the -- to the PLC five-volt power or  
08 nine-volt power, that 27-volt power will also  
09 be put on the -- put on that -- put on that  
10 same bus.  
11 Q. So is it correct that during the  
12 booting -- booting phase of the SEM, the  
13 27-volt battery is providing power to the  
14 24-volt bus in the SEM; is that correct?  
15 A. Yes, that's correct.

Page 160:02 to 162:21

00160:02 Q. Okay. We -- we talked about  
03 that there's kind of, like, two phases.  
04 There's the booting up of the SEM.  
05 A. Right.  
06 Q. And then once the SEM is booted  
07 up, the PLC actually runs -- processes the  
08 shutdown sequence.  
09 A. Uh-huh.  
10 Q. Right? So what I'm asking is,  
11 during that booting up phase of the SEM, my  
12 first question is, does a 27-volt battery  
13 provide power to this 24-volt bus that's --  
14 A. It's connected.  
15 Q. -- on the schematic that's shown  
16 on page 4716?  
17 A. And I would -- I would have to  
18 say it's connected right there. I think we  
19 talked about it earlier. So, yes, it would  
20 provide power to that 24-volt bus.  
21 Q. Now, then we also talked about  
22 the 27-volt battery providing power to  
23 transducers?  
24 A. To other -- to transducers, yes.  
25 Q. So then my question is --  
00161:01 A. Would it provide anything else  
02 besides that?  
03 Q. Yes.  
04 A. Okay. I would have to say that  
05 if anything else is connected to that 24-volt  
06 bus and if the AMF system batteries are  
07 providing power to that 24 bus, then, yes, it  
08 will be -- it will be -- it will power -- be  
09 powering up those -- those devices on there.  
10 Q. What other types of things would  
11 be connected to that 24-volt bus? And I'm  
12 only asking you that because you said if  
13 anything else is connected.  
14 A. Sure. No, no. I mean, I think  
15 we saw earlier that --  
16 Q. Those converters?  
17 A. Those converters -- I'd have  
18 to -- I'd have to look through the -- through  
19 the schematics to find out what else is  
20 powered up from the 27 -- 24-volt bus. But I  
21 do know in -- in the course of our  
22 discussions, that I do know those other  
23 components would be powered up.  
24 Q. Okay. So -- so at least we know  
25 that during the boot-up phase, the 27-volt  
00162:01 would be powering this 24-volt bus, the two  
02 transducers, those converters that we looked  
03 at, the A64, A65. But it would not be  
04 powering the solenoid valve?  
05 A. Until it was -- until it was  
06 commanded from the -- from the sequence.

07 Q. So during the sequence, the --  
 08 the 27-volt battery sees a command to power  
 09 up the solenoid valve, correct?  
 10 A. Yes, during the -- during the  
 11 sequence, yes. If -- if the solenoid valve  
 12 is -- or solenoid valves are part of that  
 13 sequence, then they will -- and -- and if the  
 14 sequence tells them to -- to energize, then  
 15 they will get energized.  
 16 Q. What is the current drain of a  
 17 27-volt battery when the PLC processes the  
 18 shutdown file?  
 19 A. I'd -- I'd -- I'm not -- I'm not  
 20 sure. I really -- really haven't measured  
 21 that.

Page 162:25 to 164:13

00162:25 Q. You testified that the nine-volt  
 00163:01 battery is -- is the limiting factor, right?  
 02 A. In -- when compared to the  
 03 27-volt battery, yes.  
 04 Q. Right. So -- so whenever the  
 05 PLC processes the shutdown, the current drain  
 06 on the nine-volt battery is always heavier  
 07 than the drain on the 27-volt battery, right?  
 08 A. Yes. I would say it's larger  
 09 compared to the 27-volt battery when it --  
 10 when it's performing the AMF sequence.  
 11 Q. And is it -- in your opinion,  
 12 since you've described the nine-volt battery  
 13 as this limiting factor, would you say that  
 14 the current drain on the nine-volt battery  
 15 during the shutdown sequence is significantly  
 16 larger than the current drain on the 27-volt  
 17 battery?  
 18 A. Significant is a -- is a -- I  
 19 mean, a relative term. I would say it's --  
 20 it is larger. As to how much larger than it  
 21 is compared to the 27-volt battery, I do not  
 22 recall. I do not remember what that value  
 23 is.  
 24 Q. Well, the only reason I use the  
 25 significant term -- and I understand it is  
 00164:01 relative -- is because you have been saying  
 02 the nine-volt battery was a limiting factor.  
 03 A. Sure.  
 04 Q. So given that it's a limiting  
 05 factor and it's what Cameron has been focused  
 06 on, wouldn't it -- wouldn't it then be the  
 07 case that the nine -- the current drain on  
 08 the nine-volt battery is significantly larger  
 09 than the current drain on the 27-volt  
 10 battery?  
 11 A. Yeah. Again, I mean, it's --

12 significant is, you know, a relative term, as  
13 you stated.

Page 164:18 to 165:16

00164:18 Q. Did you read his expert report,  
19 Greg Child's expert report?  
20 A. Yes, I did.  
21 Q. Have you -- when you read Greg  
22 Child's -- his report that was submitted on  
23 behalf of -- of Transocean, do you recall  
24 that he claimed that the 27-volt blue control  
25 pod battery discharged after the incident  
00165:01 because of a low nine-volt battery that went  
02 into a cycle, continuing to try to activate  
03 the AMF deadman sequence? Do you recall  
04 he -- he said that?  
05 A. I don't -- I don't specifically  
06 recall all the details. But I do remember  
07 generally that, yeah, he -- he stated that  
08 because of a low nine-volt battery, that  
09 that's what caused the -- the 27-volt to  
10 drain.  
11 Q. Well, if this alleged cycling  
12 theory were true, and given your testimony  
13 that the nine-volt battery drains much faster  
14 than a 27-volt battery, wouldn't you have  
15 expected that at the end of the cycling, you  
16 would find a depleted nine-volt battery?

Page 165:19 to 168:11

00165:19 A. Would -- would I expect to -- to  
20 have a low nine-volt battery?  
21 Q. Yes.  
22 A. Okay. If my nine-volt battery  
23 was low before, right? Is -- is that what  
24 you stated? I'm sorry.  
25 Q. No. Let's -- let's try again.  
00166:01 A. Okay. I'm -- I'm sorry.  
02 Q. That -- that's okay.  
03 You testified earlier that the  
04 nine-volt battery was the limiting factor  
05 because it had the heavier load.  
06 A. Right. Yes.  
07 Q. And that the -- the nine-volt  
08 battery would drain much faster than the  
09 27-volt battery --  
10 A. Right.  
11 Q. -- right?  
12 A. Yes.  
13 Q. So I'm asking if this alleged  
14 cycling had occurred with respect to the  
15 SEM B nine-volt battery, wouldn't you have

16 expected that battery to -- to be discharged  
17 much faster than a 27-volt battery?  
18 MR. JONES: Let me object to form.  
19 A. I would -- I would expect that,  
20 yes.  
21 Q. And if that occurred, if the --  
22 if the nine-volt battery was discharged much  
23 faster than the 27-volt battery, wouldn't you  
24 have expected the nine-volt battery to be  
25 depleted at the end of the cycling?  
00167:01 MR. JONES: Same objection.  
02 A. Well, it -- I'm sorry. Could  
03 you ask the question again?  
04 MS. MCKENZIE: Could you re-ask my  
05 question?  
06 (Reporter read requested testimony.)  
07 A. Well, I mean, it's -- it's  
08 difficult to -- you know, to -- to say that.  
09 I mean, I -- I mean, I would have to look at  
10 the -- you know, the -- you know, the various  
11 data on both -- both the batteries and -- and  
12 to take a look at.  
13 I mean, the -- you know, the  
14 deadman batteries, you know, they have a --  
15 after the load is removed from them, they  
16 tend to -- to rebound. So some additional  
17 testing may have to be done to confirm if  
18 that's actually the case or not.  
19 Q. When you use the term rebound,  
20 what -- what do you mean?  
21 A. Well, batteries -- this  
22 particular battery, it can rebound and it can  
23 get back to the nominal voltage it was before  
24 a load was placed on it. But -- and -- and  
25 once a load is removed. So once a load is  
00168:01 removed and you measure the open circuit  
02 voltage on this battery, then -- then it  
03 would appear that it -- it would -- it would  
04 give you a nominal load and it would appear  
05 that it was okay.  
06 But in actuality, when you put  
07 an actual load on it, that load would  
08 probably, you know -- the reading -- the  
09 voltage reading may dip down to a point that  
10 it may not be able to -- to supply enough  
11 power.

Page 169:01 to 169:03

00169:01 Q. Have you performed any testing  
02 of the SEM batteries that were used on the  
03 DEEPWATER HORIZON?

Page 169:08 to 169:13

00169:08 A. Yeah, I can't -- I can't answer  
09 that based on that.  
10 Q. Have you performed any tests on  
11 any batteries for the purpose of determining  
12 what happened to the blue pod SEM batteries  
13 on the night of the Macondo incident?

Page 169:15 to 169:24

00169:15 A. Again, I can't answer that based  
16 on that.  
17 Q. Do you have any information  
18 about anyone at Cameron performing any tests  
19 on batteries for the purposes of determining  
20 what happened to the blue pod SEM batteries  
21 on the night of the Macondo incident?  
22 MR. JONES: Same admonition.  
23 A. Same -- same response as the  
24 previous one. Can't answer that.

Page 170:12 to 170:18

00170:12 Q. Let me just re-ask the question  
13 because I think it may have gotten blurred.  
14 In all your time at Cameron,  
15 your 13 years of experience, have you ever  
16 observed the alleged cycling that was  
17 discussed in the expert report by Mr. Greg  
18 Childs?

Page 170:21 to 171:20

00170:21 A. Yeah, I can't answer that based  
22 on --  
23 Q. What is the normal operating  
24 temperature within the SEM container when  
25 it's on the seafloor?  
00171:01 A. I don't have any -- any  
02 specific -- I don't remember any specific  
03 numbers. I do remember a range being, just  
04 from my, you know, discussions with some of  
05 our service personnel, it could, you know, be  
06 anywhere from, you know, 60 degrees  
07 Fahrenheit to 70 degrees Fahrenheit. That's  
08 just a rough estimate.  
09 Q. So as a rough estimate, the  
10 operating temperature within the SEM, when  
11 it's operating on the SEM [sic] floor, is  
12 between 60 degrees Fahrenheit --  
13 A. It could be -- it could be plus  
14 or minus 10 on that.  
15 Q. So the normal operating  
16 temperature within the SEM container when

17 it's on the seafloor is around 60 degrees  
18 Fahrenheit and that can vary plus or minus  
19 10, right?  
20 A. Yeah. Yeah.

Page 172:20 to 173:02

00172:20 Q. And so with respect to the  
21 shutdown sequence, when the AF -- AMF board  
22 boots the SEM, the load on a 27-volt battery  
23 is -- is pretty low because it's not  
24 energizing the solenoids during that boot-up  
25 phase, right?  
00173:01 A. That -- that's -- that's  
02 correct.

Page 173:18 to 178:01

00173:18 Q. And the voltage -- I'm sorry,  
19 and the current drain on the 27-volt battery  
20 is low in comparison to the current drain on  
21 the nine-volt battery as well, right?  
22 A. Right.  
23 Q. Okay. So we're at tab 3 and the  
24 document behind tab 3 is exhibit 8038.  
25 Could you turn to page 18015?  
00174:01 MR. WILLIAMSON: Which tab?  
02 MS. MCKENZIE: 18015 of exhibit 8038.  
03 Q. You there?  
04 A. Yes.  
05 Q. So the file name on page 18015  
06 is solve.c, correct?  
07 A. Yes, that's what it appears to  
08 be on this particular document, yeah,  
09 solve.c.  
10 Q. Now, is solve.c, is that the key  
11 module that controls the pulse with  
12 modulation to solenoid valve 103?  
13 A. Based on my experience, yes, I  
14 would -- I would agree that solve.c -- or  
15 excuse me, solve routine is -- is -- is the  
16 one that -- is the one that controls the  
17 pulse with modulation on a Cameron Mark II  
18 SEM.  
19 Q. So would it be correct to say  
20 that every function in the SEM that is  
21 related to operating solenoid valve 103 uses  
22 this solve module?  
23 A. I -- I -- I would say generally  
24 speaking, yes. But I -- I haven't actually  
25 looked through here to see if all the -- or  
00175:01 all the -- you know, solenoids would actually  
02 use it. I would say, generally speaking,  
03 yes.

04 Q. So if the SEM was powered up by  
05 a PETU, the SEM would use this solve -- I'm  
06 sorry -- solve module to control the pulse  
07 with modulation to the solenoid, correct?  
08 A. That is correct, yes.  
09 Q. And if the SEM was powered by  
10 batteries, it would use this same solve  
11 module to control the pulse with modulation  
12 to the solenoid, right?  
13 A. That -- that is correct, yes.  
14 Q. So then is it correct to say  
15 that the SEM always uses this solve module to  
16 control the pulse with modulation to the  
17 solenoid regardless of whether it's booted  
18 using a PETU or a battery?  
19 A. Generally -- generally speaking.  
20 Or whether -- yeah, whether it's -- it's  
21 powered via the -- you send the command via  
22 the PETU or whether you send the command via  
23 the AMF sequence, yes, that is -- that is  
24 correct, you use the same solve routine.  
25 Q. So this solve routine does not  
00176:01 distinguish between whether the SEM is  
02 powered by a PETU or a battery, correct?  
03 A. I -- I would agree with that  
04 statement, yes.  
05 Q. So some of the documents that  
06 I've read -- and I'm just wondering if you  
07 can help me out -- it discusses the process  
08 of using a PETU to turn on a solenoid valve  
09 manually. Do you understand what that means,  
10 to manually turn on a solenoid valve?  
11 A. From the PETU?  
12 Q. Uh-huh.  
13 A. Yes.  
14 Q. What -- how -- how does that  
15 work? Is there a command that you type in,  
16 or --  
17 A. Typically what -- what happens  
18 is that you -- you have a laptop or a  
19 computer and you have some software that's on  
20 the laptop or computer and then you -- you  
21 use that software in conjunction with the  
22 PETU box, the hardware, which on this  
23 particular system had a modem in it.  
24 So then you would -- you would  
25 use that PETU and you would connect it, you  
00177:01 know, via some interconnect cables, power  
02 cables and communication cables.  
03 And then you would obviously  
04 apply power to the SEM and depending on which  
05 SEM you wanted to communicate to, you'd make  
06 the selection. There's a -- a rotary knob on  
07 the -- on the PETU to -- to determine which  
08 SEM you want to -- you want to talk to or



09 communicate with. And then you would select  
10 the appropriate command that you wanted to --  
11 you wanted to activate. If you wanted to  
12 activate, you know, open choke and kill  
13 valve, then you would click on that and send  
14 the command to open the choke and kill valve  
15 through the PETU.

16 Does that generally --

17 Q. Yeah. I was just trying to  
18 understand what -- thank you -- what -- what  
19 it meant to turn on the solenoid valve  
20 manually, so that was very helpful.

21 Can you turn to tab 39? Tab 39  
22 has been marked exhibit 5165 and it is a  
23 Cameron document.

24 Have you ever seen exhibit 5165  
25 before?

00178:01 A. Yes. Yes.

Page 178:03 to 178:03

00178:03 have you seen exhibit 5165?

Page 178:06 to 178:19

00178:06 Q. So the first full paragraph that  
07 says, please review, refers to solenoid part  
08 number 223290-63, correct?

09 A. Oh, up at the --

10 Q. Up at the top. Yes.

11 A. Yes.

12 Q. Now, solenoid part number dash  
13 63, that's the solenoid valve -- that's the  
14 type of solenoid valve that was installed on  
15 the DEEPWATER HORIZON, correct?

16 A. I would have to confirm that via  
17 the bill -- bill of materials, but the  
18 last -- we typically referred to it as a dash  
19 63, so that looks to be like the part number.

Page 179:09 to 184:05

00179:09 Q. Okay. So we're on number 4 on  
10 page 341. It says, performed hydraulic  
11 function test with both coils activated.  
12 Result, pressure dropped to zero psi after  
13 two seconds of holding pressure. Solenoid  
14 was in a locked position with zero psi.

15 What -- what does that mean?

16 A. I mean, it -- it -- it looks to  
17 me -- I mean, based on that statement there  
18 -- and, again, I don't -- I don't have all  
19 the -- the details of this -- of this FPR,

20 and I wasn't -- I wasn't there doing the  
21 test. But it -- it looks like that based on  
22 this, the pressure went back to zero when  
23 both coils were -- were activated.

24 Q. And if we look at the paragraph  
25 below item 4 on exhibit 5165, at page 341, it  
00180:01 says, the above test proves reverse polarity  
02 between coil A and coil B results in two  
03 different magnetic fields which -- which  
04 cancels each other out, correct?

05 A. That's as it states in this  
06 document, yes.

07 Q. So you would agree with me that  
08 for solenoid valve 103, if the wires attached  
09 to one of the coils is reversed, the solenoid  
10 valve will not function when both coils are  
11 energized at the same time, right?

12 A. It appears that from this --  
13 this -- this document here, that that's what  
14 that -- that's what that states when the  
15 pressure goes to zero.

16 Q. And you would also agree that  
17 when the deadman -- the AMF deadman sequence  
18 is -- is activated, the coils connected to  
19 solenoid valve 103 are energized  
20 simultaneously, correct?

21 A. I mean, from -- are you --

22 Q. Well, I'm just asking you based  
23 on your experience and --

24 A. Okay. Well, with respect to  
25 the -- to the HORIZON, the sequence was --  
00181:01 for all four SEMs, was identical. So if --  
02 you know, generally speaking, I would -- I  
03 would expect both coils to be energized if  
04 the sequence was the same.

05 Q. Now, you -- you say generally  
06 speaking.

07 Is it your testimony that on the  
08 DEEPWATER HORIZON, that when the deadman is  
09 activated, both coils are energized  
10 simultaneously?

11 A. Right. Generally speaking,  
12 that's -- as I stated. I -- I don't -- you  
13 know, I'm not sure if, you know, there's  
14 other -- but generally speaking, yes, that  
15 would -- I would expect that to be the case.

16 Q. Okay. If you go under the  
17 conclusion section on page 4341 of  
18 exhibit 5165, in the second to the last  
19 sentence in that paragraph, it says, in  
20 addition, the power-saving software installed  
21 on the SEM plays a vital role in producing  
22 the pulsation in a solenoid with reverse --  
23 reverse polarity.

24 Do you see that?

25 A. Yes.  
00182:01 Q. Now, is that power-saving  
02 software, is that referring to that solve  
03 file that we were looking at?  
04 A. I -- I believe it is, yes. But  
05 I'm -- I'm not -- yeah, the power-saving  
06 software, yes, that is correct.  
07 Q. And you testified that the  
08 solve -- that solve software always provides  
09 the pulsation to -- the pulsing power to the  
10 solenoid, right?  
11 A. Well, it's -- some people call  
12 it pulse with modulation, some people refer  
13 to it as power-saving software. It's --  
14 it's -- it's that -- it's the function or  
15 it's the result of the solve software.  
16 Q. Okay. So let me make sure I  
17 understand.  
18 So the -- so power-saving  
19 software is -- is the same thing as, like,  
20 the pulse with modulation that's provided to  
21 the solenoid?  
22 A. Right.  
23 Q. Right. And that same pulse with  
24 modulation is provided to the solenoid --  
25 solenoid regardless of whether the SEM is  
00183:01 booted with a PETU or a battery, right?  
02 A. Correct. That's correct.  
03 Q. Now, referring to that last  
04 sentence under the heading conclusion, it  
05 says, it is possible this did not show up in  
06 our valve test at first -- at first pass  
07 because those solenoids are fed a constant  
08 24-volt.  
09 Now, what is that talking about?  
10 Is that talking about a prior test?  
11 A. It's -- it's -- I think it's --  
12 it's referring to the pulsation, perhaps,  
13 that they did not -- that the pulsation did  
14 not show up.  
15 Q. Okay. So -- so this -- this  
16 sentence means that when you feed the  
17 solenoid with a constant 24 volts, the  
18 pulsation wouldn't show up? Is that --  
19 A. Well, I mean, that's just what  
20 it -- what it states here. I'm -- I'm -- I  
21 wasn't there. I wasn't there when this test  
22 was conducted, so I'm not -- I'm not sure.  
23 But to me, reading that last sentence, it's  
24 possible this did not show up. I think that  
25 refers to the -- to the pulsation.  
00184:01 Q. Okay. So after -- after this  
02 memo, after September 14th, 2010, do you have  
03 any information about whether Cameron took  
04 any action to -- to inform its customers

05 about this reverse wiring issue?

Page 184:07 to 184:24

00184:07 A. Reverse wiring issue?  
08 Q. Reverse -- reverse wiring issue  
09 that's discussed in exhibit 5165.  
10 A. Well, Cameron's test procedures,  
11 I think, it's referenced in this -- that --  
12 that test procedure actually tests for a  
13 reverse-wired solenoid.  
14 Q. Okay. So Cameron's test  
15 procedures actually -- if someone followed  
16 Cameron's test procedures, this reverse-wired  
17 solenoid issue would -- would come up?  
18 A. Right. Right.  
19 Q. Do you have any information  
20 about whether the investigating teams, such  
21 as DNV, were they notified about this  
22 reverse-wiring issue with the solenoid valve?  
23 A. I'm -- I'm not aware of that.  
24 I'm not aware of that.

Page 186:11 to 186:11

00186:11 (Exhibit Number 8044 marked.)

Page 186:15 to 186:16

00186:15 0017573, and it's entitled, assembly and test  
16 procedure for Cameron solenoid valves,

Page 188:07 to 188:16

00188:07 Q. Okay. I want to turn to tab 1  
08 of the binder.  
09 And tab 1 is your report,  
10 correct?  
11 A. Correct. It appears to be my  
12 report.  
13 Q. And this is a report that you  
14 submitted on behalf of Cameron on  
15 November 7th, 2011, correct?  
16 A. Correct.

Page 193:03 to 193:09

00193:03 Q. Now, you said you read  
04 Mr. Zatarain's report, correct?  
05 A. That is correct.  
06 Q. In your report, you don't  
07 disagree with Mr. Zatarain's opinions that

08 the improper battery maintenance caused the  
09 blue pod to fail, right?

Page 193:11 to 193:14

00193:11 A. Again, that's -- that's Mr., you  
12 know, Zatarain's, you know, response to that.  
13 I have -- I have no -- I have no opinion on  
14 that.

Page 193:22 to 194:01

00193:22 Q. So within pages 2 through 19 of  
23 your report, you don't disagree with  
24 Mr. Zatarain's opinions that improper battery  
25 maintenance caused the blue pod to fail,  
00194:01 correct?

Page 194:03 to 197:10

00194:03 A. I have -- I have no -- no  
04 opinion one way or the other.  
05 Q. And what I'm asking is, anything  
06 in this report about your disagreement with  
07 Mr. Zatarain's opinion that improper battery  
08 maintenance caused the blue pod to fail?  
09 A. I do not have an opinion on  
10 that.  
11 Q. And since you don't -- you don't  
12 have an opinion, it's not included in this  
13 report, correct?  
14 A. It's not included in the report,  
15 yes.  
16 Q. Now, in your report in pages 2  
17 through 19, you don't disagree with  
18 Mr. Zatarain's opinion that improper  
19 maintenance of solenoid valve 103 caused the  
20 yellow pod to fail, correct?  
21 MR. BAAY: Object to form.  
22 A. Correct.  
23 Q. Have you been involved as an  
24 expert in cases other than the current case?  
25 A. No.  
00195:01 Q. Are you the named inventor on  
02 any patents?  
03 A. No.  
04 Q. Have you published any articles?  
05 A. No.  
06 Q. In your report, you use the  
07 phrase imperative mood.  
08 What did you mean by imperative  
09 mood?  
10 A. Imperative mood?

11 Q. Yes. You use that phrase in  
 12 your report.  
 13 A. Which -- which page are you  
 14 referring to?  
 15 Q. Well, you used that phrase. I'm  
 16 just asking what -- what -- what you meant by  
 17 it.  
 18 A. I'm -- I'm sorry. It's been --  
 19 you know, it's been a while since I've -- let  
 20 me look through here and see where  
 21 specifically you're -- you're referring to  
 22 that.  
 23 I found it.  
 24 Q. What -- what did you mean by  
 25 that phrase, imperative mood?  
 00196:01 A. Well, the word -- the word shall  
 02 as far as a -- the description of the deadman  
 03 system does not appear in -- in API 16D.  
 04 Q. And -- and that's what you meant  
 05 by imperative mood?  
 06 A. Right.  
 07 Q. And in Cameron's literature and  
 08 documents, isn't it Cameron's practice to  
 09 refer to the Mark II control system by using  
 10 a Roman numeral two to represent the  
 11 number two?  
 12 A. I mean, it can be used --  
 13 I've -- I've probably seen it used with  
 14 the number -- Roman numeral two, maybe the --  
 15 the number two. I mean, it's -- it's -- it  
 16 can be referred to as either -- either way.  
 17 I've seen it both ways.  
 18 Q. So if you turn to -- just for an  
 19 example, if you turn to tab 32 in your  
 20 binder, tab 32, that's been marked  
 21 exhibit 5169.  
 22 Do you see that?  
 23 A. Yes.  
 24 Q. And you see where at the top the  
 25 title states, deck test procedure for Mark II  
 00197:01 control pod, and here Cameron is following  
 02 its practice of using the Roman numeral two,  
 03 correct?  
 04 A. Correct.  
 05 MR. JONES: Objection, form.  
 06 Q. So now if we turn back to tab 1  
 07 and we -- we -- we look at your report.  
 08 A. Which page?  
 09 Q. Any -- any page where you refer  
 10 to Mark II.

Page 197:20 to 198:13

00197:20 Q. What is API 16D?  
 21 A. API 16D is the -- is the API

22 standard for -- for designing and building a  
 23 drilling control system.  
 24 Q. And it's your opinion that based  
 25 on API 16D, the deadman function is optional,  
 00198:01 correct?  
 02 A. As stated in the -- in the 16D,  
 03 yes. It is an optional safety system.  
 04 Q. And it's also Mr. Zatarain's  
 05 opinion that based on API 16D, the deadman  
 06 function is optional, correct?  
 07 A. I don't recall specifically what  
 08 Mr. Zatarain stated with regards to -- but  
 09 Mr. Zatarain, as in my -- discussed in my  
 10 report, he -- he -- you know, he thinks that  
 11 the optional safety system should be a  
 12 requirement or a -- or a definition rather  
 13 than an optional safety system.

Page 201:23 to 202:14

00201:23 Q. And he agrees with you on  
 24 page 35. He says -- let me just quote you  
 25 here. On page 35 in the second paragraph it  
 00202:01 says, the deadman is defined in section 5.9.3  
 02 of API 16D as, and I quote, an optional  
 03 safety system, correct? So he agrees with  
 04 you, right?  
 05 A. It's listed as an optional  
 06 safety -- that particular page is listed  
 07 right there. However, as I stated in my  
 08 report, he goes -- the imperative mood is  
 09 that, you know, he -- he feels or he  
 10 thinks -- the way it's read is that he -- he  
 11 uses the word -- the words, you know, systems  
 12 directly sense surface communications  
 13 capability and the word directly does not  
 14 appear in the API 16D test.

Page 227:17 to 231:06

00227:17 Q. Right. So signal transmission  
 18 is referred to in the first paragraph under  
 19 5.8.2, and it says, acoustic signal  
 20 transmission may be used as an emergency  
 21 backup means for controlling critical BOP  
 22 stack functions.  
 23 Do you see that?  
 24 A. Acoustic signal transmission may  
 25 be used as an emergency backup means for  
 00228:01 controlling critical -- I see that first  
 02 sentence, yes.  
 03 Q. Okay. And then under 5.8.2.1,  
 04 again, I'm referring to acoustic subsea  
 05 systems. If you look at item A, second

06 paragraph, it says, this arrangement enables  
07 the acoustic system to be functional in the  
08 event that the primary system has lost signal  
09 transmission.  
10 Do you see that?  
11 A. Yes.  
12 Q. Now --  
13 A. I'm sorry, that's -- that's the  
14 last -- the last sentence, right, in  
15 number A?  
16 Q. Yes.  
17 A. Okay.  
18 Q. So in a discussion about  
19 acoustic system, that necessarily involves  
20 communication between the surface and the  
21 seafloor, correct?  
22 A. With -- with regards to acoustic  
23 what, again? I'm sorry.  
24 Q. Yeah. With -- with regards to  
25 an acoustic control system, a reference to  
00229:01 signal transmission necessarily includes a  
02 communication between the surface and the  
03 seafloor, correct?  
04 A. Well, in this particular  
05 paragraph associated with API 16D, it says,  
06 acoustic signal transmission, yes, may be  
07 used as an emergency backup means for  
08 controlling critical BOP stack functions.  
09 Q. So -- so -- so there on -- on --  
10 on page 38, the use of the term signal  
11 transmission is in a reference to  
12 communication between the surface and the  
13 seafloor, correct?  
14 A. Yeah, based on this description  
15 or write-up, it -- it refers to acoustic  
16 signal -- acoustic control systems  
17 specifically and their -- and their signal  
18 transmission to -- to emergency backup, to  
19 another emergency backup system.  
20 Q. And the signal transmission  
21 refers to the communication between the  
22 surface and the seafloor, correct?  
23 A. Yes, it refers to an acoustic  
24 control system, which -- which it appears  
25 from this to communicate to -- to another  
00230:01 emergency backup system for controlling  
02 critical BOP stack functions.  
03 Q. Okay. Let's turn to page 36,  
04 page 36 under 5.6.5. The first paragraph  
05 under 5.6.5, the second system uses the  
06 phrase signal transmission, and I'm going to  
07 read it to you.  
08 Typical ancillary functions  
09 integrated into the signal transmission and  
10 electrical power supply array of an



11 electro-hydraulic multiplexed BOP control  
 12 system may include the following, and it  
 13 provides a list of features that may be  
 14 included.

15 Now, this is talking about  
 16 the -- this section is talking about the --  
 17 the MUX system, right?

18 A. I see the word electro-hydraulic  
 19 or multiplex MUX system mentioned in the --  
 20 in the text.

21 Q. So the -- the MUX cable system  
 22 relates to communication between the surface  
 23 and the seafloor, correct?

24 A. The MUX cable, generally  
 25 speaking, has power and communication down  
 00231:01 the MUX cable, yes.

02 Q. So then the use of the phrase  
 03 signal transmission on page 36 under  
 04 section 5.6.5, refers to communications  
 05 between the surface and the seafloor,  
 06 correct?

Page 231:14 to 235:08

00231:14 A. It -- it looks like it's --  
 15 generally speaking, it appears that it's  
 16 speaking about the -- about the  
 17 communications from the -- from the subsea  
 18 pods to the -- to the topside equipment  
 19 through the MUX cable.

20 Q. Let's turn to page 5 of API 16D.  
 21 So on page 5 of API 16D under 3.7, the phrase  
 22 signal transmission -- transmission is used  
 23 and I'll read it to you.

24 Pressure biased control system,  
 25 a discrete hydraulic control system utilizing  
 00232:01 a means to maintain an elevated pressure  
 02 level less than control valve actuation  
 03 pressure on pilot lines such that the  
 04 hydraulic signal transmission time is  
 05 reduced.

06 Do you know, what is a pressure  
 07 biased control system?

08 A. I'm -- it's -- it's -- it looks  
 09 like this is referring to a discrete  
 10 hydraulic control system, which is -- which  
 11 is different than a -- than a MUX system.

12 Q. How is a discrete hydraulic  
 13 system different than a MUX system?

14 A. Well, based on my understanding,  
 15 a discrete hydraulic control system does  
 16 not -- does not use MUX cables or umbilicals  
 17 to communicate down to the -- to the subsea  
 18 control system or pods.

19 Q. What does discrete hydraulic

20 system use to communicate down to the subsea  
 21 system or the pods?  
 22 A. I'm -- I'm not sure. I just --  
 23 I just know those two systems are -- are  
 24 different.  
 25 Q. So the phrase signal  
 00233:01 transmission on page 5 at 3.7 relates to the  
 02 communication from the surface to the pods,  
 03 right?  
 04 A. On -- on -- sorry, 3.7?  
 05 Q. Yes, 3.7.  
 06 A. That actually refers to  
 07 hydraulics, not -- not electrical signals.  
 08 Q. So it refers to the hydraulic  
 09 signal transmission from the surface to  
 10 the -- the seafloor, right?  
 11 A. I'm -- I'm not sure. I mean,  
 12 the discrete hydraulic system is -- is just  
 13 that, hydraulics. It's more hydraulics  
 14 than -- than electrical.  
 15 Q. So now we turn to page 1 and  
 16 refer to 1.1 B on page 1. Do you see that?  
 17 A. Yes.  
 18 Q. Okay. So I'm going to read it  
 19 to you.  
 20 Remote control of a seafloor BOP  
 21 stack requires specialized equipment. Some  
 22 of the control system elements are common to  
 23 virtually all subsea control systems,  
 24 regardless of the means used for function  
 25 signal transmission.  
 00234:01 So, again, the phrase signal  
 02 transmission is used here, correct?  
 03 A. I see that used in that  
 04 statement you just -- you just read.  
 05 Q. And -- and 1.1 B is speaking  
 06 about remote control of a seafloor BOP,  
 07 correct?  
 08 A. As it states, it says, control  
 09 systems for subsea BOP stacks.  
 10 Q. So then the phrase on this page,  
 11 on page 1, 1.1 B, the phrase signal  
 12 transmission refers to signal transmission  
 13 from the surface to the seafloor, correct?  
 14 A. I'm not -- I'm not sure. I  
 15 mean, reading -- reading the last -- the last  
 16 sentence, regardless of the means user  
 17 function signal transmission, I'm -- you  
 18 know, I'm not sure if that actually means  
 19 with regards to communicating to -- to the  
 20 seafloor.  
 21 Q. Can you point to any place, any  
 22 section of API 16D that discusses signal  
 23 transmission with respect to signal  
 24 transition between pods?

25           A.       In the description of the -- of  
00235:01 the deadman, subsea transmission capacity in  
02 both subsea control pods.  
03           Q.       And where -- and where are you  
04 talking about?  
05           A.       I'm sorry.  
06           Q.       So are you talking on page 41?  
07           A.       Yes. Five -- page 41, 5.9.3,  
08 deadman systems.

Page 235:14 to 236:24

00235:14       Q.       According to you, this section  
15 relates to the signal transition between  
16 pods? Is that what you're saying?  
17           A.       Yes. Signal transmission  
18 capacity in both subsea control pods.  
19           Q.       Under 5.93, do you see the word  
20 between?  
21           A.       No. It's in both subsea control  
22 pods.  
23           Q.       So that signal transition  
24 capacity in both subsea control pods could be  
25 signal transmission from the surface to the  
00236:01 seafloor, couldn't it?  
02           A.       Well, as I stated in -- in my  
03 report that -- that the -- the pods or the --  
04 or the SEMs are not passive. They're more  
05 active. They receive commands. So if -- if  
06 you've lost one of those -- one of those SEMs  
07 or -- or one of those pods, then -- then  
08 you've lost not only power communication --  
09 you lost power and communication.  
10           Q.       I don't think you're answering  
11 my question. I'm -- I'm not sure what  
12 question you're answering.  
13                    What I asked was, when we look  
14 at this paragraph under 5.9.3 and the words  
15 signal transmission capacity in both subsea  
16 control pods, those words could be  
17 interpreted to mean transmission from the  
18 surface -- between the surface and the  
19 seafloor, correct?  
20           A.       The way -- the way Cameron --  
21 the Cameron control system interprets those  
22 words to be is that we have communication  
23 between the pods, okay? That's one of the  
24 definitions for the deadman.

Page 252:03 to 253:09

00252:03       Q.       Okay. So the only place in API  
04 16D that you indicated that signal  
05 transmission -- in your opinion, signal

06 transmission refers to communication between  
07 pods is on page 41; is that correct?

08 A. Signal transmission capacity in  
09 both subsea control pods, that's page 41,  
10 5.9.3, deadman system.

11 Q. Now, in this paragraph there's  
12 no explicit reference to the word between  
13 pods; is that correct?

14 A. The definition doesn't --  
15 doesn't have the word between -- I'm sorry.  
16 Not the definition, the description doesn't  
17 have the word between.

18 Q. And the language on page 41  
19 under 5.93 also is lacking the language --  
20 any language about between or within,  
21 correct?

22 A. Yes. But -- yeah, I don't -- I  
23 don't see between. As it states, it says  
24 signal transmission capacity in both subsea  
25 control pods.

00253:01 Q. So did you identify anywhere in  
02 this document where the phrase signal  
03 transmission is described to mean  
04 transmission between pods? And the document  
05 I'm referring to is API 16D that we marked as  
06 8045.

07 A. It merely states signal  
08 transmission capacity in both subsea control  
09 pods.

Page 254:02 to 254:11

00254:02 Q. Prior to page 41, did you find  
03 any reference of signal transmission that  
04 referred to the transmission between pods?

05 A. No, I don't -- I don't recall  
06 seeing anything written about -- between  
07 pods.

08 Q. So since there's nothing,  
09 according to you, in AP -- API 16D about  
10 signal transmission between pods, where are  
11 you getting this definition from?

Page 254:13 to 256:16

00254:13 A. Which definition are you  
14 referring to?

15 Q. Let's go back to your report.  
16 Tab 1. So we're at tab 1, page 7. At the  
17 top of page 7, the first sentence in the  
18 first paragraph. And -- and I'll read it to  
19 you.

20 It says, for these reasons, a  
21 reading of API 16D's reference to signal

22 transmission capacity that is more consistent  
23 with the actual function of deadman systems  
24 in subsea BOPs envisions a deadman system  
25 which monitors for the loss of signals  
00255:01 generated within and exchanged between the  
02 subsea pods.  
03 And my question is, based on API  
04 16D, where -- where do you get that from?  
05 A. Well, API 16D doesn't --  
06 doesn't -- you know, API 16D says -- you  
07 know, subsea communications between -- not  
08 between, but in both capacity for both subsea  
09 control pods.  
10 Q. So couldn't that mean that both  
11 subsea control pods have the capacity to  
12 communicate with the surface?  
13 A. That's not what it -- what it  
14 states.  
15 Q. Well, it also doesn't state that  
16 it's a signal transmission between pods,  
17 right? Isn't that correct?  
18 A. But we -- again, it states  
19 the -- the, you know, communication  
20 capacity -- loss of communication capacity  
21 between both subsea control pods.  
22 Q. Okay. Let's go back. Let's go  
23 back to tab 95, page 41. Okay? And I'm just  
24 trying to understand how is it that you're  
25 interpreting signal transmission capacity in  
00256:01 both subsea control pods to mean the loss of  
02 signal generated within and exchange between  
03 the subsea pods. Where are you getting that  
04 from?  
05 A. Oh, that's how our system  
06 operates. I mean, API doesn't  
07 specifically -- you know, our system relies  
08 on -- on three things. Loss of power to the  
09 surface, loss of hydraulic supply and loss of  
10 communication to the other pod. Okay?  
11 API, you know -- you know,  
12 doesn't state direct -- direct as -- as in  
13 Zatarain's report. It -- it states the  
14 direct indications of -- of surface  
15 communications capability. That's what  
16 Mr. Zatarain states.

Page 256:23 to 257:10

00256:23 Q. Okay. Now, what you said is --  
24 you referred to loss of signals generated  
25 within and exchange between the subsea pods?  
00257:01 A. That's -- that's Cameron's --  
02 that's Cameron's requirements for AMF system.  
03 Q. So this -- so what you're  
04 talking about are Cameron's requirements,

05 correct?  
06 A. That's what's required for a  
07 Cameron AMF system to trigger.  
08 Q. You're not talking about what  
09 signal transmission means in API 16D,  
10 correct?

Page 257:12 to 257:22

00257:12 A. Signal transmission capacity  
13 in -- in -- in both subsea control pods, you  
14 know, that -- you know, that -- that's --  
15 that's affected obviously when the MUX cable  
16 is -- is cut. So we would lose the ability  
17 to -- to communicate back to the -- we would  
18 lose power to the surface.  
19 And so we would also -- if both  
20 MUX cables were -- were cut, then we would  
21 also lose the communication to -- to both --  
22 to both pods.

Page 258:03 to 258:07

00258:03 Q. So your statements here on  
04 page 7, at the top of page 7, as I understand  
05 you, all you're talking about is how  
06 Cameron's AMF deadman system performs,  
07 correct?

Page 258:09 to 258:16

00258:09 A. Yes. We -- Cameron envisions --  
10 you know, we envision our system with -- with  
11 three criteria. You know, loss of power to  
12 the -- to the surface, loss of communication  
13 to the pod and loss of hydraulic supply.  
14 Q. Okay.  
15 A. That's what Cameron's -- those  
16 are Cameron's requirements for an AMF system.

Page 265:01 to 266:02

00265:01 Q. Well, isn't he right? It  
02 doesn't directly sense -- isn't he correct?  
03 Wouldn't you agree -- let me see. Wouldn't  
04 you agree that Cameron's AMF system doesn't  
05 directly sense communication from the  
06 surface?  
07 A. But, again, it's not a  
08 requirement in API 16D.  
09 Q. But wouldn't you agree that  
10 Cameron's AMF system doesn't directly sense  
11 communications from the surface?

12           A.       Again, you know, Cameron has --  
 13 there are three requirements. Loss of power,  
 14 loss of communications to the other pod and  
 15 loss of hydraulic supply.  
 16           Q.       Does Cameron's AMF deadman  
 17 directly sense communication from the  
 18 surface?  
 19           A.       Again, loss of power, loss of  
 20 hydraulic supply and loss of communication to  
 21 the other pod.  
 22           Q.       And none of that includes  
 23 directly sensing communication from the  
 24 surface, correct?  
 25           A.       Again, loss -- loss of power and  
 00266:01 loss of communication to the other pod and  
 02 loss of hydraulic supply.

Page 267:21 to 268:12

00267:21           Q.       Why -- why do you say that -- on  
 22 page 7, tell me all the reasons that you say  
 23 a reading of API 16D's reference to signal  
 24 transmission capacity that is more consistent  
 25 with the actual function of the deadman  
 00268:01 system in -- in subsea BOPs envisions a  
 02 deadman system which monitors for the loss of  
 03 signals generated within an exchange between  
 04 the subsea pods.  
 05                   Why -- why do you make that  
 06 statement?  
 07           A.       Again, that's -- that's -- that  
 08 statement was based on -- on the Cameron --  
 09 Cameron system and how it -- how it arrives  
 10 at the three conditions. And that is one of  
 11 the conditions, loss of communication to the  
 12 other pod.

Page 268:22 to 268:25

00268:22           Q.       You are not saying that API  
 23 16D's use of signal transmission capacity  
 24 means the loss of signals generated within an  
 25 exchange between the subsea pod?

Page 269:02 to 269:12

00269:02           A.       I mean, I am referring to the  
 03 fact that this is how the AMF system works  
 04 for -- on -- on the Cameron Mark II control  
 05 system, that it -- one of the conditions is  
 06 it has to lose communications between the  
 07 other pod.  
 08           Q.       But this -- this sentence in the

09 first paragraph on page 7 is not referring to  
10 what signal transmission capacity means with  
11 respect to API 16D, right? You're just  
12 talking about Cameron's requirements?

Page 269:14 to 270:15

00269:14 A. Again, my interpretation of  
15 signal transmission capacity is that, you  
16 know, you monitor the -- the signals between  
17 both pods.  
18 Q. And so is your interpretation  
19 based on API 16D?  
20 A. Yes.  
21 Q. So other than page 41 in API  
22 16D, can you tell me what in API 16D leads  
23 you to believe that signal transmission means  
24 transmission between two pods?  
25 A. Well, it says that -- again, you  
00270:01 know, it states -- as it states in API 16D,  
02 it's the capacity and -- signal transmission  
03 capacity in both subsea control pods.  
04 Q. Well, other -- I'm asking you,  
05 other than --  
06 A. But that's the --  
07 Q. -- page 41, there -- there's no  
08 other basis for your understanding of the  
09 meaning of signal transmission? That's the  
10 only -- the only thing that you're pointing  
11 to is page 41 for your -- for your definition  
12 of signal transmission?  
13 A. And that is the -- and -- I'm  
14 sorry. That is the description of the  
15 deadman system in API 16D.

Page 270:20 to 271:07

00270:20 Q. Wouldn't it be reasonable for  
21 someone to interpret the phrase signal  
22 transmission capacity as the ability of both  
23 pods to communicate with the surface?  
24 Wouldn't that be one way to interpret it?  
25 A. Well, that's not the way that  
00271:01 the Cameron system -- or that's not the way  
02 that I have interpreted that to -- to mean.  
03 I mean, that's -- our -- again, the -- the  
04 three -- you know, the three requirements  
05 are -- are power to the surface,  
06 communication to both pods and loss of  
07 hydraulic supply.

Page 272:25 to 274:09



00272:25 Q. Do -- do you -- are you aware of  
00273:01 any Cameron documents that talk about loss of  
02 communication to the surface as being one of  
03 the conditions for triggering the AMF card?

04 A. No, I'm not -- I'm not aware of  
05 it.

06 Q. Okay. So you've never seen any  
07 Cameron documents that talk about loss of  
08 communication from the surface being one of  
09 the conditions that trigger the AMF card?

10 A. Well, there may have been, you  
11 know, loss of power and communications.

12 Q. So when you say loss of power  
13 and communications, what does that mean?

14 A. Well, that means losing -- if  
15 you -- if you lose -- if you lose power from  
16 the surface, you -- you've essentially  
17 lost -- lost communications as well. So  
18 some -- that could have been -- that could  
19 have been written that way. But in a sense,  
20 it -- it means one and the same. You've lost  
21 power, you've lost communications as well.

22 Q. Okay. So if there were some  
23 Cameron documents that talk about losing  
24 power and communication from the surface,  
25 your understanding is that --

00274:01 A. You lose power, you lose  
02 communications.

03 Q. So in that sense, the loss of  
04 communication is kind of embedded in the loss  
05 of power. Is that what you mean?

06 A. Since you need power to -- to  
07 establish communications with the topside,  
08 if -- if you lose power, you lose  
09 communications.

Page 275:12 to 275:15

00275:12 Q. So if the MUX cables fail, you  
13 also -- your understanding is you also lose  
14 power?

15 A. Yes.