Deposition Testimony of:

David McWhorter

Date: July 8, 2011

Created by:

www.indatacorp.com

Page 385:01 to 385:10

00385:01 THE VIDEOGRAPHER: All set?
02 This is Volume 2 in the 30(b)(6)
03 deposition of David McWhorter, in regarding
04 the oil spill by the DEEPWATER HORIZON in the
05 Gulf of Mexico on April 20th, 2010.
06 Today is July the 8th, 2011.
07 The time is 8:30 a.m., and we are on the
08 record, start Tape 9.
09 MR. BAAY: This is David Baay for
10 Transocean. Before we get going, I'm just

Page 401:05 to 403:17

00401:05 Q. Okay. And the way I understand
06 it is the EB 70 -- 702D can be relied upon by
07 Cameron's customers to make the shearing
08 calculations for the pipe they're running in
09 their hole. Is that true?
10 A. That's close.
11 Q. Okay.
12 A. I -- I would characterize it
13 slightly differently. It -- it does have a
14 calculation component, but it also has
15 admonitions, warnings, disclaimers, and --
16 and words to the effect that if it's close,
17 in other words, if you calc -- use this
18 method to calculate what we think is a
19 conservative shear pressure, but it turns out
20 to be close to your maximum allowable working
21 pressure of your system, then you need to
22 conduct some tests to be sure that you're --
23 you know, so it's not just do the calculation
24 and everything is fine.
25 Q. Let me ask you this question:
00402:01 Are the variances that are reported in
02 Exhibit 3168 accounted for by the
03 calculations in EB 702D?
04 A. I -- I -- I believe they are to
05 my satisfaction, yes.
06 Q. How, describe how?
07 A. That's -- that's a great
08 question. We -- we have a -- a history of
09 tests that go back many years, as you might
10 imagine. And in the process of compiling and
11 rewriting EB 702 to include the calculations
12 that -- that we're talking about, we charted
13 these values. And we -- we know that the
14 best way to predict the shear value, the most
15 accurate way, is -- is a calculation based on
16 the maximum shear stress principle of when
17 tubulars will shear.
18 But that is not the best way in
19 practice because it -- it will predict the

mean or average shear force required, and that means that half the time, it's going to be an error, and half the time it will be conservative.

And so we didn't want to do that. What we wanted to do is we wanted to -- to look at the plot of all of the -- the shear tests that we conducted for a specific grade of pipe, and then we wanted our calculation not to estimate the mean. We wanted it to be at the top so that all the datapoints were -- were at or below that line.

And if there was a datapoint, that happened to be above the line, that it was a -- that -- that there was some way that we could -- we could rationalize or explain it, some -- some abnormal -- abnormality to the test.

So the calculation that we developed -- if this answers your question, I'm not sure -- the calculation we developed was intentionally conservative

Page 405:24 to 406:24

Q. You also testified yesterday that Cameron experienced a spike in business or an increase in business in the Summer of 2010 for recertifying BOP components. Did I understand that correctly?

A. That's a fair statement, yes.

Q. And did that begin in -- in the early Summer, or when did you see the increase actually take place?

A. It -- it began shortly after the well was capped.

Q. Okay. Did you -- did you form an opinion as to what the cause in the increase was?

A. You know, it -- it -- it seemed clear to me that -- that you had a -- first off, you had a -- the entire Gulf of Mexico shut down, and so it was an optimum time to have equipment worked on.

And it was also a -- you know, felt worldwide, not just in the Gulf of Mexico, in that Drilling Contractors and operators all around the world had a return, to a degree, to OEM, and so we -- we have seen a -- an increase in business as a result of that.

Page 408:17 to 409:01

00408:17 Q. Mr. McWhorter, do you consider a
18 rig that's operating with a Mark II System to
19 be a safely operating rig?
20 A. I sure do. The Mark II is a
21 fine product.
22 Q. Okay. As you stated yesterday,
23 it was state-of-the-art -- it is
24 state-of-the-art and a highly redundant
25 system?
00409:01 A. It -- it is.

Page 409:08 to 409:15

00409:08 Q. Sure. If -- if a company
09 follows all of the recommendations for
10 maintaining a battery and follows the
11 recommendations to replace and -- and service
12 it according to whatever the OEM provides,
13 there's still an occasion in which that
14 battery could discharge below its sufficient
15 operating level?

Page 409:17 to 409:23

00409:17 A. Yeah, I -- I can't specifically
18 think of -- of how that would happen that you
19 could -- I suppose theoretically you could
20 have a defective battery, but I -- I'm not
21 familiar with any way that that -- you could
22 drain the battery if it -- if everything is
23 working properly.

Page 410:22 to 411:18

00410:22 Q. (By Mr. Baay) Well, let me just
23 ask -- ask you the question: Did you
24 experience some frustration in the -- in your
25 involvement in those efforts to cap the well
00411:01 in the months following the explosion?
02 A. There was not a -- a person
03 working for any company in that building that
04 was not experiencing frustrations. And that
05 goes for employees for Cameron, Transocean,
06 BP, and the dozens of other companies that
07 were in there doing their best to shut that
08 well in. It was a -- it was a horrible time.
09 Q. Did you specifically -- through
10 this process, were you act -- interacting
11 with a Cameron employee by the name of Mel
12 Whitby?
13 A. I worked very closely with Mel,
14 yes.
15 Q. And what is his title and role?

A. He is Director of Technology for the Drilling Systems Division.
Q. And what was his role

Page 415:04 to 415:13

Q. You understand that you are the 30(b)(6) representative from Cameron today, correct?
A. I do.
Q. And that there was an agreed upon set of topics that would be within the scope of your knowledge, and as to those topics, you are Cameron for the purposes of this deposition, correct?
A. I understand that.

Page 415:18 to 418:13

Q. (By Mr. Morriss) Now, in terms of the -- your educational background, I want to follow up just a little bit. I thought I read somewhere that you attended a Well Control School at some point in time in your career?
A. I did.
Q. And I think it had been some years ago. Do you remember approximately when that was?
A. It -- it would have been in the neighborhood of 1988, '89.
Q. Okay. Do you remember where that school was conducted and who was the sponsor of that program?
A. It -- it was conducted at a -- at a hotel in Houston by the airport. I could not tell you who -- who sponsored it.
Q. Do -- do you remember what level program it was, what the scope of the one-week Well School was --
A. Yes, sir.
Q. -- in 1990?
A. I do. I was a -- was a young -- young Engineer just out of school working for Cameron, and they sent me to -- to this introductory Well Control School.
Q. And --
A. And it was -- it was a -- I think a week long, four or five days.
Q. Did you get some kind of Certificate upon completion of the course?
A. I probably did. It's been a long time.
Q. Do you recall whether it had any

materials or topics that dealt with subsea drilling or subsea wells?
A. I don't recall if it was -- if it was specifically geared towards subsea.
Q. It may have been, may not have been, you just don't recall, as we sit here today?
A. That's right. That's right.
Q. Did it involve sort of the role that a BOP plays in drilling?
A. You know, to a -- to a limited extent -- to a limited extent, yes.
Q. Okay. After this one-week Well Control School which you attended in 1990, have you attended any other well control schools?
A. No.
Q. Any in-house programs that Cameron sponsored that you attended?
A. Regarding well control?
Q. Well control.
A. No, sir.
Q. All right. In your studies as an Engineer, did you have any studies involving geology formations, that sort of thing?
A. No, I did not.
Q. And I think you said that you have a -- an MBA in addition to your engineering degree, correct?
A. I do.
Q. Okay. And when did you obtain that?
A. 2003.
Q. And that was from Texas A&M?
A. It was.

Page 427:18 to 428:02

Q. Okay. Was Cameron considered an industry leader in the design, development, and production of subsea deepwater drilling equipment?
A. I -- I believe our customers would consider us to be industry leaders in that area, yes.
Q. And was Cameron familiar with the risk associated with deepwater drilling?
A. I believe --

Page 428:04 to 428:05

A. I believe Cameron and the entire industry.

Page 428:12 to 430:02

00428:12 Q. -- and some the second day,
13 today. But my question is really about
14 Cameron: Did Cameron understand the risk
15 associated with deepwater drilling?
16 MR. JONES: Object to form.
17 A. Well -- well, Cameron doesn't
18 design wells. We don't drill wells. We
19 manufacture equipment. We -- we understand
20 how our equipment is used, we understand how
21 to design it. We understand especially well
22 how to manufacture it.
23 Q. (By Mr. Morriss) Would you agree
24 with me that it would be necessary for
25 Cameron to be knowledgeable about the
00429:01 conditions faced in deepwater drilling to
02 adequately design and build its BOPs?
03 A. There's --
04 MR. JONES: Objection, form.
05 A. There's certainly an -- an
06 element of knowledge that would be necessary.
07 Q. (By Mr. Morriss) And I believe
08 you've testified previously that Cameron
09 understood that hydrocarbons above the riser
10 was a foreseeable risk for Cameron when it
11 designed and built the BOP on the DEEPWATER
12 HORIZON?
13 MR. JONES: Object to form.
14 Q. (By Mr. Morriss) Is that
15 correct?
16 A. I believe that's -- that's a
17 reflection of what I said yesterday.
18 Q. And you've also said that it's
19 your experience as -- at Cameron that kicks
20 occur every single day during the drilling
21 process?
22 A. No, I -- I -- if I -- if I -- my
23 statement was taken that way, then -- then I
24 would like to correct the record.
25 Q. Okay. Well, I don't think it
00430:01 was taken that way. I think that's what you
02 said, so I -- well, let me -- let me rephrase

Page 430:04 to 430:17

00430:04 Do you agree that kicks are a
05 common occurrence in drilling?
06 A. I -- I -- I agree that -- that
07 kicks occur, and there is -- there is likely
08 a kick that occurs somewhere in the world on
09 a drilling rig virtually every day.
10 Q. And Cameron had that information

when it was designing, developing, producing, and selling BOPs such as the one that was on the DEEPWATER HORIZON?
A. Cameron and all of our customers understand --
Q. Yeah.
A. -- that kicks do occur.

Page 431:02 to 431:08

Q. All right. And my -- my question is: Did Cameron understand that kicks occurred in the way you described it fairly commonly as part of the drilling process?
A. Again, kicks are a common -- common occurrence in the drilling industry.

Page 431:18 to 432:07

Q. (By Mr. Morriss) Right. Well, I -- I -- I described that because I thought that's what you said yesterday. Do you agree that at least part of Cameron's market is big bore, high-temperature, and deepwater?
A. That is part of our market.
Q. All right. And did you understand that the BOP models you were selling for subsea use would be utilized in that market with the risks that are associated with deepwater drilling?
A. Cam -- Cameron expects that our equipment will be used consistent with its ratings and with its -- with its design scope as des -- as defined by 16A.

Page 433:07 to 433:18

Q. If the drill crew operates the equipment correctly, do you expect your equipment to work?
A. If -- if it is put in a condition in a situation in -- in which it was des -- for which it was designed, then I would expect it to work.
Q. Okay. And would you agree with me that Cameron would not sell a BOP that it believed was unsafe or not suited for its intended purpose?
A. You and I can agree on that.

Page 437:07 to 437:21

00437:07 Q. But at the end of the day, you
08 manufacture the product, correct?
09 A. We manufacture the product.
10 Q. At the end of the day, it's a
11 Cameron BOP when it leaves your facility and
12 you deliver it to a customer?
13 A. Configured to customer
14 specifications, who are the experts of how it
15 will be used, where it will be used, and the
16 conditions in which it will be used.
17 Q. Okay.
18 A. We manufacture equipment to
19 specifications that the industry has decided
20 are what BOPs and BOP control systems should
21 be designed and manufactured to.

Page 438:02 to 438:07

00438:02 Q. Okay. Do you agree with me
03 that -- that you are the Industry Leader as
04 it comes to BOP and blind shear rams?
05 A. I -- I consider that we are the
06 Leader in designing and manufacturing BOPs
07 and BOP-related equipment.

Page 443:04 to 443:12

00443:04 Q. Okay. Tell me what the BOP on
05 the DEEPWATER HORIZON was designed to do?
06 A. Well, the BOP was designed --
07 the -- the individual components were
08 designed to the various API specifications to
09 which -- that -- that apply. The valves were
10 designed to 6A. BOPs were designed to 16A.
11 The control system was designed to 16D.
12 The --

Page 443:15 to 445:17

00443:15 Q. You -- you sold to Transocean a
16 BOP?
17 A. (Nodding.)
18 Q. Correct?
19 A. That's right.
20 Q. And it had various components,
21 and you've told me that its designed to
22 API 16, right?
23 A. The BOPs are.
24 Q. Right.
25 A. Yes.
00444:01 Q. Now my question to you is pretty
02 simple: What was the BOP designed to do?
03 What function was it designed to carry out?

A. The -- the BOP is -- is a tool -- or actually, a BOP is a tool. The BOP stack, to which I believe you refer, can be thought of as a toolbox. It's a toolbox that is used by the drilling crew in a variety of different ways in the course of drilling the well.
Q. And my question to you is: What do you expect the BOP and BOP stack that you sold to Transocean, what do you expect it to be capable of performing? What kinds of things can it do?
A. Well, it -- it can -- it can hold pressure. It -- the annular packers can strip pipe. It -- it can do all sorts of things. You have valves that can control the flow of hydrocarbons and -- and -- and move them up and down the choke and kill lines. It's a -- there's a variety of things that that BOP stack can do and is used to do every day.
Q. And if it's operated properly, maintained properly, all those things that you said earlier, is it designed to shut in a well if there is a kick?
A. It -- it is -- it has features, clearly, that are designed to do that.
Q. Okay. Is it designed to shut in a flowing well where there is hydrocarbon in the BOP and in the riser?
A. It is designed and tested to API 16A. It is used in applications like you've just described with flowing kick conditions every day.
Q. All right. And is it designed to have the capability of shutting in the well if there are hydrocarbons above the riser?
A. No.

Page 445:19 to 445:22

A. If -- if hydrocarbons are above the riser, you cannot stop the hydrocarbons. They're already past the BOP, if I'm understanding the question --

Page 446:17 to 446:20

Q. That's not my question. My question is: Is the BOP designed by Cameron to shut in a well if there are hydrocarbons in the BOP and the BOP stack?

Page 446:22 to 447:08

00446:22 A. It's -- it's -- it's going to
23 depend. Okay? If -- if as -- as in the Bly
24 Commission Report you're talking about a
25 situation with velocities of fluid -- fluid
00447:01 flow, they're an order of magnitude greater
02 than what would be necessary to cut steel,
03 that -- that is -- that is a situation where
04 you could clearly have a problem.
05 If it's in -- in a more typical
06 drilling situation where you have a kick and
07 the flow has just begun, it -- it does that
08 every day, if that answers your question.

Page 447:10 to 452:08

00447:10 you.
11 And what has Cameron done in
12 terms of testing to determine to what extent
13 flow prohibits the operation of a blind shear
14 ram in shearing pipe and shutting in the
15 well?
16 MR. BAAY: Objection to form.
17 A. We -- we test our BOPs to 16A.
18 Q. (By Mr. Morriss) Right.
19 A. 16A does not, as I'm sure you're
20 aware, does not have a flowing test
21 requirement.
22 Q. I'm going to ask the question
23 again.
24 A. Okay.
25 Q. Has Cameron performed any test
00448:01 under dynamic conditions that would give any
02 information to a customer about when the
03 blind shear ram would shear pipe and seal the
04 well under dynamic conditions?
05 A. Our customers know --
06 Q. I didn't ask you what your
07 customers know.
08 MR. JONES: You can finish your answer.
09 Q. (By Mr. Morriss) My question
10 is --
11 A. Our -- our customers know that
12 we design and test our BOPs to 16A. They're
13 well aware of what 16A is, and it does not
14 have a flowing requirement. And we -- and we
15 have not tested at flowing conditions.
16 Q. (By Mr. Morriss) Right. I
17 understand that. You've said it 15 times
18 over the last two days, and I'm not really
19 arguing with you about that. I just want to
20 make sure you answer my question, though.
21 And my question simply --

MR. JONES: Objection, sidebar.
Q. (By Mr. Morriss) -- is: Did Cameron perform any test under dynamic conditions? I'm not --
MR. BAAY: Objection to form.
Q. (By Mr. Morriss) I'm not asking for the excuse on why you didn't do it. I'm asking you whether you did it or not.
MR. JONES: Object to form --
MR. BAAY: Objection to form.
MR. JONES: -- and object to the sidebar.
Q. (By Mr. Morriss) So I'll ask it again: Did Cameron perform any tests under dynamic conditions for the blind shear ram that was on the DEEPWATER HORIZON?
A. We test --
MR. BAAY: Objection to form.
A. We test to 16A. It does not have a flowing requirement. We have not tested it in a dynamic situation.
Q. (By Mr. Morriss) And that would be true of both the BOP and specifically the blind shear ram?
A. The BOP and the blind shear ram are both tested to 16A, which is -- does not have a dynamic flowing component. We have not conducted a dynamic flowing test with those rams.
Q. And has Cameron performed any feasibility studies, looked at any protocols, evaluated the possibility of testing under dynamic conditions?
A. Can you -- that was a compound question --
Q. Sure.
A. -- I apologize. Can you answer -- can you specify?
Q. Do you have any written feasibility study where Cameron has evaluated doing dynamic testing?
A. Dynamic testing is not part of 16A. We have not looked at doing dynamic testing.
Q. That's -- that wasn't the question.
A. That was exactly your question.
Q. No, I didn't ask you anything about 16A. My question was simply: Do you have any feasibility studies that evaluate whether or not you can do dynamic testing?
A. We -- we design and test to 16A which doesn't have that component, the dynamic component. Therefore, we have not tested in a dynamic mode nor have we

evaluated a dynamic mode test.
Q. Is it -- is it your position -- is it Cameron's position that 16A does not require you to do testing if in sound engineering judgment it would be appropriate?
A. I don't -- rephrase the question, please.
Q. All right. You keep going to 16A, I understand that. And it's your position, Cameron's position that 16A does not require testing under dynamic conditions, right?
A. It -- it clearly does not.
Q. Okay. And my question to you is: If, in fact, good engineering judgment would require dynamic testing, would that override the specific requirements of API 16?
A. Cameron does exercise its good engineering judgment in a -- in a multitude of ways in designing our BOPs and control systems. So I'm not sure what your specific --
Q. Right.
A. -- question is.
Q. Well, I'm not really asking you yet sort of whether Cameron did or didn't.
A. (Nodding.)
Q. My question to you is: If, in fact, good engineering judgment would require testing beyond what is specified in API 16, do you believe that API 16 would require you to do it?

Page 452:12 to 453:08

Q. No, sir --
A. -- then based --
Q. -- that's not what I'm asking.
A. -- based on the -- the sentence that you're highlighting about "good engineering judgment," I think that would be a stretch to think that 16A would -- would expect dynamic testing to be -- be a requirement.
Q. And -- and there may be people who agree with that and disagree with that.
A. (Nodding.)
Q. So my question to you is more general: If, in fact, good engineering judgment would require a specific test that is not specified in API 16, would you agree that API 16 would require you to do it?
MR. JONES: Object to form.
A. I -- I think that if 16A would require us to do it they would -- it would be

07 written into the Procedure.
08 Q. (By Mr. Morriss) Well, do you

Page 454:09 to 455:10

00454:09 The first question is: Does API
10 16 require you to use good sound engineering
11 judgment?
12 A. I -- I think our position as
13 a -- as an equipment provider provides --
14 requires us to use sound engineering
15 judgment.
16 Q. And if good sound engineering
17 judgment required you to test beyond API 16,
18 would Cameron do it?
19 A. We would, and do.
20 Q. Are there any specific
21 statements that are made when you deliver the
22 product to the customer that there is no
23 dynamic testing that's done, other than the
24 reference that it has been tested to API 16?
25 A. Our customers specify API 16A
00455:01 equipment. Customers like Transocean and
02 like BP, they understand what API 16A is all
03 about. It's not necessary to describe to
04 those very knowledgeable customers what is
05 not in that specification.
06 Q. Right. My question to you is:
07 Does Cameron provide any written statement to
08 any of its customers that the BOPs and the
09 BOP stacks are not tested dynamically, other
10 than the reference to API 16?

Page 455:12 to 456:13

00455:12 A. Again, our customers
13 specifically order 16A equipment, number one.
14 Number two, they're well aware of what's in
15 16A, and it is not necessary to note
16 everything that's not in 16A; therefore, we
17 don't notify them about the nonexistence
18 of -- or the -- the exist -- the lack of a
19 flow test.
20 Q. Right. They're also aware that
21 16A requires Cameron to use good engineering
22 judgment, right?
23 A. They expect Cameron and all of
24 their vendors, I'm sure, to use good --
25 Q. Right.
00456:01 A. -- engineering judgment.
02 Q. And is it -- and we'll move on,
03 if you'll answer this: There is no written
04 statement given by Cameron to any of its
05 customers that its BOPs are not tested

dynamically?
A. I think I just answered that.
Q. Well, you give a speech and then you answer. So I'm trying to get an answer to my question.
MR. JONES: There's no question pending.
Q. (By Mr. Morriss) The question

Page 456:24 to 457:15

Q. (By Mr. Morriss) And have you at any point in time since you sold the BOP to TO that was on the DEEPWATER HORIZON issued any Safety Alert or Engineering Bulletin indicating that the BOP and the BOP stack were not tested dynamically?
A. Once again, our customers know what API 16A equipment is. They know that flow tests are not part of API 16A. There would be no reason to issue such an alert.
Q. Again, I -- I appreciate your statement about what others know. You're not here to talk about the others. I just want to know what Cameron did.
Did Cameron send out a Safety Alert any time after 2000 relating to dynamic testing?

Page 457:18 to 457:25

A. I -- I understand what your question was. Cameron would -- would not feel it would be necessary to issue a Safety Alert on a feature that is not required by API, nor required by our customer or our customer's customer.
Q. (By Mr. Morriss) So the answer is "No"?

Page 458:02 to 458:07

Q. (By Mr. Morriss) Is the answer "No"?
A. I've answered the question in -- in the way I would like to answer it.
Q. Well, but you haven't answered the question. Is -- is the answer "No"?

Page 458:09 to 461:05

A. The answer is that we -- we would not find it necessary to issue an alert

on a nonexisting requ -- nonexistent requirement.
Q. (By Mr. Morriss) And, therefore, you did not issue one?
A. I think I just said that.
Q. And, therefore, you did not issue one?
A. We have not issued a Safety Alert on flow testing.
Q. Now, I want to move, if we could, to some of the components.
First I want us to talk about the -- the blades, the shearing blades and rams on the DEEPWATER HORIZON blind shear rams. Can you describe what was on the
00459:01 DEEPWATER HORIZON BOP blind shear ram? What kind of blades?
A. It was an -- a -- an SBR ram.
Q. And that would be a flat piece and a single V, correct?
A. That is correct.
Q. Okay. And when was the DVS system developed?
A. I believe 1998.
Q. Okay. And was -- was that DVS system available to be included on the BOP blind shear ram that was on the DEEPWATER HORIZON? Was that an option or an availability at the time?
A. It was an option.
Q. Okay. Have you seen any documents about how the decision was made about what particular shearing devices would be on -- would be put on the blind shear ram?
A. Have I seen a document on how --
Q. Right. How the decision --
A. -- Transocean and BP made their decision?
Q. About how -- whoever made it, how that decision was made.
00460:01 A. Not specifically on -- on the shear ram, no.
Q. Did -- did Cameron provide any testing information to Transocean about the centering capability of either the DVS system or the single V system?
A. I'm not sure. Are you talking about during the -- during the period of sale?
Q. At any time before Transocean made the decision to purchase the BOP from Cameron, did Cameron provide any testing information to Transocean about the centering capabilities of either of the two options, the DVS or the single blade?

A. We -- we -- we test our BOPs to API. And as you're aware, API does not have a centering test for the shear rams, and so we would not have conducted a test with that specifically in mind.
Q. And, therefore --
A. The shear rams.
Q. And, therefore, no information about the centering capabilities of either of those two options, the single V or the double V, would have been provided to Transocean?
A. I -- I cannot say for certain if the double V blade was not mentioned in that context to having a greater tendency to center than the single blade.

Page 464:17 to 464:25

Q. The -- the sales information that you would have presented to Transocean, if you did, would not have had any testing information showing that the double V system had greater centering capabilities than the single V system, because Cameron didn't do any testing of that nature?
A. There would be no test data of that nature in a sales pre -- presentation.

Page 465:04 to 465:19

Q. (By Mr. Morriss) Has Cameron issued any Safety Alerts or Engineering Bulletins prior to April of 2010 indicating that the DVS system should be utilized to replace the single V system?
A. We -- we have an an Engineering Bulletin 702 which describes --
Q. And we'll cover the Engineering Bulletin.
A. Okay.
Q. My question is: Did Cameron issue a Safety Alert to its customers who were utilizing the single V system any time prior to April of 2010?
A. No, there -- there would have been no reason to issue a Safety Alert.

Page 470:18 to 474:02

A. It was.
Q. All right. And then if you look down to the fifth bullet point, it sort of gives the final conclusion that "The BSRs

were not able to move the entire pipe cross section into the shearing surfaces of the blades"?
A. According to DNV.
Q. According to DNV, which is what we talked about earlier, correct?
A. Yeah, and -- and it's what -- and what it indeed says in -- in the --
Q. In the Report?
A. -- in -- in -- in this Safety Alert --
Q. Right.
A. -- according to DNV.
Q. And did you give your customers any recommendations about what they should do?
A. Can -- can I read this before --
Q. Please.
A. -- I answer your question?
Q. (Nodding.)
A. (Reviewing document.) Okay. In -- in response to your question, did we -- did we give our customers any advice on what to do, in this Safety Alert, we asked them if they had any concerns to -- about the -- the -- their specific equipment configuration or the conclusions raised by DNV, please call your Cameron Sales Representative.
Q. Did you give any recommendations about specific things that operators or drillers should do with their equipment that was in operation, in this Safety Alert?
A. In -- in this Safety Alert, no. This Safety Alert was designed to alert our customers, who -- who typically were already clearly aware of the issuance of this Report, but to do our due diligence and let them know that the Report was out.
Q. And since the receipt of this Report, has Cameron done anything to change its testing protocols?
A. No. We still design and test to API 16A when it comes to shear rams.
Q. And still today, Cameron does not perform any testing of its blind shear rams, either dynamically or with off-centered pipe?
A. We -- we do -- we test to 16A, and we maintain that our -- our -- our customers have -- know and understand what 16A is, and they take measures, as -- as recorded in their own well control procedures, to manage the pipe appropriately.
Q. Right. So my question was: Even after the DEEPWATER HORIZON and after

the receipt of the DNV Report, Cameron has not changed its testing protocols?
A. We -- we -- nei -- and nor has the industry, and we -- we still test to those same specifications.
Q. And no plans to date, to alter, change, or modify the testing protocols as it relates to the blind shear ram under dynamic conditions or off-center pipe?
A. Okay. Cameron, along with their customer -- our customers, is al -- are always evaluating new and better ways to do things, so --
Q. And --
A. -- do -- I do not preclude the possibility in the future that we will modify something. We've -- we've done it throughout our history.
Q. But have not done it to date, as it relates --
A. We --
Q. -- to dynamic testing or off-centered pipe?
A. Ag -- ag -- again, we -- we do not dynamic test, and we are still testing to 16A.

Page 480:07 to 481:07

In terms of wa -- the battery system that was on the DEEPWATER HORIZON, there was no alarm system that would have alerted the rig crew if there was a problem with the charge level in the battery; is that correct?
A. That is true. The -- the battery could not be monitored from the surface. The charge of the battery could not be monitored.
Q. Nei -- neither the -- neither an alarm that would warn if it was insufficient or a monitoring system that would actually give you the level -- neither of those two things would have been on the DEEPWATER --
A. That --
Q. -- HORIZON?
A. That is correct.
Q. And the battery itself was not rechargeable?
A. That is right. It is not a rechargeable battery.
Q. Okay. And I think you indicated the -- the primary way to maintain this battery system would be through frequent replacement?

Page 481:09 to 481:16

00481:09 A. Yeah, wou --
10 Q. (By Mr. Morriss) Let me -- let
11 me rephrase it.
12 Would be through replacement of
13 the batteries?
14 A. Yeah. We -- we have an
15 Engineering Bulletin that gives guidance to
16 that effect.

Page 486:08 to 487:09

00486:08 Q. (By Mr. Morriss) So if you'll --
09 you'll now look at Exhibit 3605, is this the
10 Engineering Bulletin that you referenced
11 earlier on "AMF/Deadman Battery Replacement"?
12 A. It is.
13 Q. Okay. And I believe you
14 testified yesterday that this was the only
15 information that would have been provided to
16 customers in the form of an Engineering
17 Bulletin relating to battery replacement?
18 A. Yeah, this -- this is the only
19 Engineering Bulletin of which I'm aware for
20 battery replacement recommendations.
21 Q. And as far as you know, there's
22 not a Safety Alert or an Engineering Bulletin
23 that recommended upgrading from the Mark II
24 system where you had to replace batteries, to
25 the Mark III System that had alarms and
00487:01 monitoring systems and the like?
02 A. There would have been no -- no
03 need for such a Safety Alert, in my opinion.
04 Q. Because the Mark II, without the
05 alarms and monitors, in Cameron's view, was
06 perfectly acceptable and a safe Operating
07 System?
08 A. It -- it -- it's a fine product
09 in my opinion, yes.

Page 489:13 to 491:06

00489:13 Q. And then is it fair to say that
14 this Engineering Bulletin set out the
15 requirements for battery replacement?
16 A. That's fair to say.
17 Q. Okay. And if you turn to Page 2
18 of the exhibit, there's a series of bullet
19 points that set out when the battery should
20 be replaced, correct?
21 A. That's right.

Q. And under the first bullet point, it says: "One year of on-time operation."
What does "on-time operation" mean?
A. "On-time operation" is from -- from the time it's installed.
Q. Okay. So if you look at the third bullet point, that says: "Five years after date of purchase."
You might have a customer who purchases a battery, but does not actually put it in use?
A. That's right.
Q. And the second bullet point talks about: "...the number of actuations has...exceeded for that year (33)."
So tell me what that means. How do you actuate, and -- and what are -- what are we counting to get to the 33?
A. Sure. If during the -- the course of testing or actual, you know, use of a deadman during -- during Drilling Operations, the -- the total number of -- of deck tests or subsea tests or actual operations of the deadman exceed 33, then you got to change your battery.
Q. Do you know whether or not Transocean had a tracking system for actuations on the DEEPWATER HORIZON?
A. No, I do not, all -- although it would be when the con -- the condition's being met should be observable in the event logger, so you should be able to go back and -- and look.

Page 493:21 to 494:24

Q. Okay. Is there a nonbattery-powered system that would have been feasible in 2000 to operate the Deadman System?
A. There -- there is a -- what we call a hydraulic deadman, which -- which does basically the same thing.
Q. How -- how does it operate?
A. It -- it's a -- it's a pure mechanical device, mechanical hydraulic device, and it is -- it is hooked up to various valves and -- and solenoids in the Pods in such a way that it can detect when power goes away, because a -- a valve will no longer have pressure, and that valve will be spring-biased. And it's -- it's a very clever way to mechanically do what the

Deadman System here does hydraulically.
Your specific question was it available in 2000, and I'm -- I'm -- I'm trying to remember if I've seen any -- any evidence of the fact that such a -- such a design was available in 2000. I -- I -- I think it should have been. I just can't recall at this moment.
Q. But your best judgment at this point would be that it was available?
A. I -- I -- I think it was. I think it was.

Page 495:06 to 495:19

Q. (By Mr. Morriss) Is -- is that a frequently utilized design or setup on BOPs?
A. It -- it is used, yes. It's -- it's not uncommon.
Q. Could -- could it have been used on the DEEPWATER HORIZON BOP? Is that a possibility?
A. Assuming that my -- my memory is correct and it was available in 2000, it -- it could have, yes.
Q. How about the battery monitoring systems and battery alarms, were -- would those have been available in 2000?
A. No, they would not.

Page 496:05 to 496:23

Q. Do you know whether the technology existed in 2000 to develop that kind of product?
A. You know, in dis -- in preparing for this deposition and discussing this very issue with my Engineers, the -- the feedback that I received was that the technology at that time was not -- was not proven -- the -- the technology for batteries that -- that can be monitored with a -- you know, in that -- in the way that you described was -- was not -- was not robust enough or reliable enough or proven enough in these critical applications for -- for consideration in that pod, and the nature of the batteries that were used were not conducive to those monitoring techniques. If you want me to go into that, I definitely can, but -- because there's many uses for that --

Page 500:10 to 500:18

00500:10 Q. (By Mr. Morriss) Do you know
11 when the battery recharging system became
12 available?
13 A. The Mark III became available in
14 about 2006.
15 Q. Okay. Did Cameron have any
16 designs in place prior to 2005 for recharging
17 systems?
18 A. Not to my knowledge.

Page 503:20 to 503:20

00503:20 (Exhibit No. 3178 marked.)

Page 503:24 to 504:06

00503:24 Q. (By Mr. Morriss) This appears to
25 be a Cameron Field Service Order?
00504:01 A. It is.
02 Q. And it's dated March 12th, 2001?
03 A. Right.
04 Q. And then if you look down in the
05 text area where it says "WORK PERFORMED." Do
06 you see that section?

Page 504:13 to 505:02

00504:13 Q. And is this a Field Service
14 Order on the DEEPWATER HORIZON?
15 A. Okay. Let me see. It does say
16 DEEP -- DEEPWATER HORIZON, yes.
17 Q. And under the March 7th, if
18 you'll read me just the first sentence, what
19 that says.
20 A. It says, "RAN DEADMAN TESTS -
21 FAILED EVERY TIME."
22 Q. All right. And so is this a
23 Cameron Service Representative testing the
24 Deadman?
25 A. It appears to be.
00505:01 Q. And how would the Service Rep
02 test the Deadman System?

Page 505:14 to 505:18

00505:14 A. Sure, sure. The -- the only --
15 to answer your specific question, the only
16 way in which I'm aware to test a Deadman is
17 to literally disconnect the three signals
18 that we've previously discussed.

Page 510:24 to 511:15

00510:24 Q. Okay. Do you know whether or
25 not there were reliability problems with the
00511:01 solenoids utilized by Cameron?
02 A. I -- I know that from time to
03 time, there are -- are reports of -- of
04 issues with solenoids as there are for -- for
05 many components of a BOP stack. To the
06 extent that I would call it unreliable, I
07 don't think -- I don't think so.
08 Q. Here's the question: Are
09 you aware of the fact that there were
10 complaints about the reliability of the -63
11 solenoid?
12 A. We've -- we've had complaints
13 over the years, yes.
14 Q. About the reliability?
15 A. We've -- we've had complaints.

Page 513:12 to 515:01

00513:12 Do you know when the -63 was
13 discontinued in terms of manufacturing use in
14 your products?
15 A. For -- for new sale products?
16 Q. For new sale products?
17 A. Yeah, I do.
18 Q. When -- when did that take
19 place?
20 A. The -- in 2006, when we went to
21 the Mark III, the Mark III became the --
22 the -- the frontline product for Cameron. It
23 does not mean that after 2006 we did not sell
24 a handful of Mark IIs. We did. We have
25 customers that prefer them, that have -- have
00514:01 fleets full of Mark II Systems, and they
02 wanted to stick with the Mark II System.
03 But as I said yesterday, we have
04 end-of-life issues with some of the
05 electronics in the Mark IIs, and -- and, in
06 effect, that means that our ability to
07 manufacture Mark II Systems from scratch,
08 including the -- that would include the -6 --
09 63 solenoid is limited. And so it is -- for
10 all effects and purposes, there will be no
11 more Mark II Systems
12 manufactured --
13 Q. Right.
14 A. -- because of those end-of-life
15 issues.
16 Q. I'm more focused on the solenoid
17 as opposed to the system. The Mark III
18 System does not use the old solenoid
19 design --

A. That's true.
Q. -- correct?
A. That's true.
Q. And if I understood you correctly, although the design is different, you don't believe it's necessarily better?
A. That's right. That's right.

Page 515:16 to 519:23

Do you know whether or not Cameron performed any testing after the incident on any of the solenoids on the DEEPWATER HORIZON?
A. I -- I know that our Team that was on the Q4000, working with the -- the Federal Authorities and others on the Q4000, did -- did do some cursory testing on the solenoid valve.
Q. If you'll turn to Tab 4, which is Exhibit No. 3179.
(Exhibit No. 3179 marked.)
A. Okay. Yes.
Q. (By Mr. Morriss) Does this represent sort of Cameron's Report -- Daily Report Sheet of work that was done on the DEEPWATER HORIZON? I'm not going to ask you very many questions about it. I just want to make --
A. Okay.
Q. -- sure that's what it is.
A. It -- it -- it appears to be, yes, sir.
Q. Okay. And there are some indications, if you turn to the third page, on testing -- of deadman tests and Solenoid Valve 103. And so my question really is: Were you physically present when any of this testing was done?
A. No.
Q. Did you have as part of your job responsibility overseeing the testing that was being performed?
A. No.
Q. Was this testing reported back to you in your -- your job capacity at Cameron in any way?
A. All -- all of the VPs that were involved in the intervention did get copies of the -- the Daily Service Report.
Q. Was this in some way within what you would consider to be your scope of responsibility, the performing of the test or the analysis of the test results?
A. No.

Q. Okay. Who would be the best person to answer the questions -- to answer my questions, if I have any, about these tests that were done on Page 3 in that first block?
MR. JONES: Object to form.
Q. (By Mr. Morriss) Particularly the simulated deadman test on the solenoid and the test on Solenoid Valve 103?
A. I --
MR. JONES: Object to form.
A. The -- the -- the best guy, or guys, you've actually already talked to. William LeNormand --
Q. (By Mr. Morriss) Yeah.
A. -- and Carter Erwin, they're -- they're the two guys that actually conducted the test.
Q. Okay. Anybody in -- in your level that would have taken the results of this test and made any decisions in terms of design, testing of your products?
A. I -- I see where you're coming from now.
Q. (Nodding.)
A. Noth -- nothing like that was done. The results from this test are too -- too preliminary, too crude to draw any conclusions like that. And, in fact, we drew no conclusions from them.
Q. And -- and you did not draw any conclusions from the fact that there were at least reported failures noted from these tests?
A. We -- we -- we noted that with -- with great interest, as you -- as you might can imagine, given what was going on at the time.
Q. But had not drawn any conclusions about what it means, I guess that's my point?
A. That -- that's right.
Q. Okay. Do you have -- does Cameron have an opinion about what caused these failures?
MR. JONES: Object to form.
A. You're talking about the specific failure listed there on Page 3?
Q. (By Mr. Morriss) Yes, sir.
A. I -- I guess what I can tell you about that is that -- is that this particular test is -- with using the electromagnetic pin is -- is a very crude way to test a valve, and the correct way to test it is to bench test it. And so I would say that without

regards to whatever the results would have been on the Q4000 that are -- that are stipulated in that bullet point, Cameron's -- Cameron's position with that would be too -- too cursory and crude of an evaluation to draw a final conclusion. You need to bench test it; maybe even take it apart and look at it.

Page 522:05 to 522:12

Q. (By Mr. Morriss) Okay. And if you turn to the third page. Under the note section, there's an indication that: "Proper Wiring is an as shown above. Solenoid 103Y original and 3A had the black & white wires reversed on one coil."

Do you know what that means and what results that would cause?

Page 522:14 to 522:18

Q. (By Mr. Morriss) Or am I better off asking somebody else?

A. No. I -- I can just tell you what it -- what it means is it's not wired correctly.

Page 523:24 to 524:01

Is it fair to say that the Solenoid 103 must function in order for the blind shear ram to close?

Page 524:03 to 524:07

A. One of the two Solenoid 103s would have to function.

Q. (By Mr. Morriss) All right. And there would be one in each pod?

A. Correct.

Page 525:17 to 526:08

Q. Right. Is there a regulator setting?

A. There -- there is a regulator setting on the high-pressure shear circuit, not -- not in the deadman circuit itself.

Q. Okay. And is that regulator setting, is there a minimum pressure of hydraulic fluid that's needed to shear at a

25 given wellbore pressure?
00526:01 A. Yes, and it will vary from
02 situation to situation.
03 Q. And does the high pressure shear
04 regulator need to be set at or above that
05 pressure to reach the minimum to shear the
06 pipe?
07 A. I think that's just a law of
08 physics. Absolutely, it would have to be.

Page 527:08 to 527:16

00527:08 Q. If you decrease the pressure
09 setting, do you decrease the ability of the
10 blind shear ram to perform as intended?
11 A. Well.
12 Q. Let me ask it -- let me try to
13 rephrase it to make it easier: If you lower
14 the pressure setting, do you reduce the
15 capability of the blind shear ram to shear
16 pipe?

Page 527:18 to 528:13

00527:18 A. You would literally reduce the
19 force available for that blind shear ram and,
20 therefore, that would reduce its ability to
21 cut -- cut tubulars.
22 Q. Right. Is a nitrogen precharge
23 a necessary component of the system?
24 A. Yes, it is.
25 Q. And is the nitrogen precharge,
00528:01 must it be set at a certain level to ensure
02 that sufficient hydraulic fluid is available
03 from the accumulator to reach 4,000 psi
04 level?
05 A. It has to be set, yes.
06 Q. All right. And is the nitrogen
07 precharge also a function that is performed
08 by the customer like Transocean?
09 A. It would be, yes.
10 Q. And if the nitrogen precharge is
11 insufficient, can that lower the ability of
12 the blind shear ram to shear pipe?
13 A. It can.

Page 537:09 to 537:11

00537:09 Q. First of all, Cameron performed
10 the conversion on the lower VBR; is that
11 correct?

Page 537:13 to 538:17

00537:13 A. Yeah, I know that we had a
14 Service Hand on the rig that did -- did --
15 did do some work that was necessary to -- to
16 flip that ram up side down, yes.
17 Q. (By Mr. Morriss) And did Cameron
18 raise any safety concerns with this
19 modification?
20 A. Once again, we just sent a
21 Service Hand out there to -- to perform a
22 very common change to a stack, and there
23 would have been no need to raise any alerts.
24 Q. Right. And I'm -- I guess
25 that's my point. This was a common change
00538:01 and did not raise any safety issues in the
02 mind of anyone there, including Cameron?
03 A. The -- the configuration of the
04 stack, including the inclusion, if any, of
05 test rams, is -- is a decision made by the --
06 the -- the Drilling Contractor and the
07 operator, but it is a very common decision.
08 Q. And --
09 A. It's -- it's -- it's a common
10 practice.
11 Q. And did not raise any safety
12 concerns with Cameron?
13 A. It -- it wouldn't have, no.
14 Q. Okay. As part of the
15 conversion, is there any replumbing that is
16 required?
17 A. No.

Page 539:06 to 539:09

00539:06 Q. All right. Would it have been
07 customary to replumb the hot stab at the time
08 the conversion was made so that it would
09 operate another ram?

Page 539:12 to 540:24

00539:12 A. If you had a hot stab that was
13 operating that lower cavity prior to the test
14 ram conversion, when you converted to a test
15 ram, I -- I would expect and anticipate that
16 you would change that -- that's -- that's a
17 plumbing consideration for the operator of
18 the rig, the Drilling Contractor, and its --
19 its customers.
20 Q. (By Mr. Morriss) Do you know
21 whether or not Transocean had any
22 communications with Cameron about replumbing
23 so that that hot stab would not activate the
24 test ram?

A. I'm not aware of any such communications.
Q. In your review of documents in preparation for the deposition, did you see any indication that Transocean made a request to Cameron to replumb the hot stab so that it operated a different ram?
A. No, I have not.
Q. Does Cameron believe that it had any obligation to either replumb the hot stab or to raise the issue with Transocean at the time the work was done?
A. We -- Cameron's obligation was to -- was to carry out a very specific task, that was to modify the bonnet, so that we could invert a ram, and then to, actually, physically invert the ram. That -- that was the extent of our instructions, and that is indeed what we did.
Q. And do you have the documents that set out what the instructions were for Cameron?
A. In preparation for this deposition, I have reviewed a couple of documents to that effect.

Page 541:05 to 541:25

Q. I'm sure you don't have them with you, but can you identify those documents for me so that I can find them?
A. I would suggest that the best way to find them would be to specifically ask for documents surrounding the -- the Cameron Service Hand participation in the ram conversion. There -- there were -- there was sales -- there was a -- a purchase order from the customer, if memory serves me correctly, and -- and then perhaps even a series of E-mails.
Q. But at -- at the end of the day, Cameron's position is that: A, it did not have an obligation to replumb without Transocean making a specific request; and B, Transocean did not make a request to replumb the hot stab?
A. And that Cameron did not -- TO did not make a request, to the best of my knowledge.

Page 551:14 to 552:05

Q. All right. So for the BOP to do its job, which, in some cases, would be to

shear pipe and shut-in the well, the people who were working on the rig have to do their job; is that correct?
A. It's the people.
Q. Okay. And is it fair to say that a loss of well control can lead to a blowout?
A. It -- it -- it would be fair to say that a loss of well control could lead to a blowout.
Q. And could result in fire, explosion, or other things that would be unwanted?
A. I think you make a fair statement.

Page 552:15 to 552:17

Q. Is it fair to say that the sooner you detect a kick, the more effective your equipment will be in controlling it?

Page 552:19 to 553:06

A. I -- I -- I would say that that is a true statement. I'm not a Driller, but I -- I would say that -- that our customers in the industry recognizes the principle that you just articulated as being -- being a truism.
Q. (By Mr. Morriss) And the longer you allow hydrocarbon flow in the wellbore, before you activate the Cameron BOP blind shear ram or other rams that help control well control situations, is it fair to say the less likely the equipment is to be able to control the Well Control Incident?

Page 553:08 to 553:15

A. I -- I would say that would apply to all BOPs and all well control systems, not just Cameron's --
Q. (By Mr. Morriss) All right.
A. -- yes.
Q. And it would certainly have applied to the BOP on the DEEPWATER HORIZON that was being operated by Transocean?

Page 553:17 to 553:22

A. Soon -- sooner is better than later in all cases.

Q. (By Mr. Morriss) And the reason it's sooner is better than later is because the equipment has a better chance to work if you operate it sooner rather than later?

Page 553:24 to 554:02

Q. (By Mr. Morriss) Right?
A. It -- it -- it -- depending on the circumstances, it -- that you're in, that could definitely be the case.

Page 575:08 to 576:11

Q. And, in fact, it would be Cameron's position that the BOP, as manufactured for the DEEPWATER HORIZON, was, in fact, safe and capable of performing its intended purposes?
A. Once again, it requires an educated and informed user, an operator, to make that determination in every case. Cameron is -- is rarely, if ever, apprised of the specific well situations that these rigs would be working on. So at the time we sold it, it was to the customer's specifications, it was to Industry Standards, and it was a fine product and con -- continues to be a fine product, and that's Cameron's position.
Q. Perfect. Thank you.
Is it fair to say that Cameron knew that there would be times when the BOP would be operated under emergency conditions?
A. The -- the BOP does have certain emergency features that are built into the system.
Q. The autoshear, the deadman, the EDS would qualify for that, right?
A. They would.
Q. And in emergency situations, it would be fair to say that the rig crew might not be able to manage the pipe and the systems as it would in normal operations?

Page 576:14 to 576:24

A. Yeah, that -- that's -- that's not necessarily the case or the -- or the assumption that would have been made, in -- in most of those cases.
Q. (By Mr. Morriss) Yeah. No, I'm not asking you if that's the assumption that was made. I'm just saying it was certainly

something that could happen during the drilling process, and Cameron certainly would have known that?
A. It --

Page 577:01 to 577:12

A. It -- it -- it -- can you ask the specific question again?
Q. (By Mr. Morriss) Right. Just that Cameron knew at the time it manufactured not only the DEEPWATER HORIZON BOP but -- but all BOPs that are used in deepwater drilling -- understood that there could be an occasion where an emergency situation would develop in the drilling operation where the dri -- where the crew might not have normal control of the operations?
A. Yeah, ev --

Page 577:15 to 577:16

A. Everyone understands that that's a possibility.

Page 577:25 to 578:05

Q. (By Mr. Morriss) Is your equipment rated to any particular depth?
A. Yeah. Our -- our -- our -- a BOP stack like -- like the HORIZON's stack would be rated, I believe, to 10,000 foot water depth.

Page 588:10 to 589:03

Q. Now, to the best of your knowledge and to the best of the knowledge of Cameron, did anybody from Cameron ever have any communication with anybody from Anadarko concerning the DEEPWATER HORIZON or the Macondo Well at any time before the incident on April the 20th, 2010?
A. Not -- not to my knowledge.
Q. Okay. Have -- have you conducted a -- a search into the Cameron files and have you talked to individuals at Cameron in order to try to find out the answer to that question?
A. I -- I can tell you in preparation for this deposition, I have reviewed many and various E-mails related to the DEEPWATER HORIZON, documents of that

02 nature, and I cannot recall prior to -- to
03 the event Anadarko's name being mentioned.

Page 590:10 to 590:15

00590:10 Yesterday you said that you have
11 reviewed documents that suggest that BP
12 played an active role in specifying the specs
13 for the stack that was on the DEEPWATER
14 HORIZON. Do you recall giving that
15 testimony?

Page 590:20 to 591:17

00590:20 A. I believe I do, yes.
21 Q. Yes. Now, can you tell us what
22 the documents were that you reviewed that
23 indicated that to you?
24 A. There -- there were -- I -- I
25 reviewed in preparation for this deposition
00591:01 numerous E-mails and Meeting Minutes and
02 documents related to the -- the specification
03 and configuration of the DEEPWATER HORIZON
04 back when it was being designed and built.
05 In addition, hand -- handwritten notes and
06 things of that nature that -- that had Vastar
07 employees' names on them, a predecessor of
08 BP, and -- and so it's -- it's clear to me,
09 in reviewing those documents, that -- that BP
10 was involved in the configuration of that BOP
11 from the beginning.
12 Q. And was that involvement, as
13 indicated by the documents that you have
14 referred to, was that involvement generally
15 during the time period 1999 to 2001,
16 thereabouts?
17 A. That's right.

Page 592:07 to 592:23

00592:07 Q. Can you give us examples of the
08 nature of BP's involvement?
09 A. BP was -- was involved in -- and
10 this is not an unusual thing. This is --
11 this is -- this is how it works. An operator
12 and a Drilling Contractor are often -- or --
13 or do take the lead in configuring the BOP
14 stack. So this -- this is no -- nothing
15 shocking to me when I found this, but -- but
16 they were in meetings, they -- they were
17 in -- in reviews, and they were actively
18 involved.
19 Q. Okay.

A. As you would expect.
Q. Would -- based upon your review of those materials, did it appear to you that BP was, quote, in the lead?

Page 592:25 to 593:06

A. I'm -- I'm going to resist making that characterization. They were -- they were definitely involved. Ultimately our customer was -- was Transocean, and so from our perspective, Transocean took the lead. But Transocean's customer was BP, as you know.

Page 594:13 to 594:17

Q. Now, with regard to the original specs that you have indicated BP played an active role in specifying, do you recall any of the particular specs that you recall BP being involved with specifying?

Page 594:19 to 594:24

A. I -- I can recall one, as I sit here. They -- they -- I -- I saw a document in preparation for this deposition in which -- which a Vastar employee was -- was actively involved in the -- in considering the sequence to be programmed into the AMF.

Page 613:24 to 614:17

Q. Is Cameron going to issue a Report, like several other Parties have issued, in reference to what you believe occurred?
A. It -- it -- you -- you know, it -- it's been our position from the beginning to support the various Investigations, and because of our -- our position of -- of an equipment manufacturer who literally can't touch or feel or possess the equipment any longer, it puts us in a very difficult situation. So I'm not precluding the possibility that we'll come out with a Report or a Statement, but at this time, there is none in progress. We're -- we're evaluating the data as it comes out of the multiple Investigations, and -- and we are cooperating, to the best of our ability, on -- with all of those Investigations.

Page 622:14 to 623:11

00622:14 So September 8th of 1998; is
15 that correct?
16 A. That's what it looks like.
17 Q. And do you know who Hugh L.
18 Elkins is?
19 A. Yeah. Yeah, I do.
20 Q. Who is he?
21 A. Hugh Elkins -- and that's why
22 I -- this -- this document's puzzling me.
23 Hugh Elkins works for or worked for NOV.
24 Q. A competitor of yours at the
25 time?
00623:01 A. Yes.
02 Q. Okay.
03 A. And they still -- they still
04 are.
05 Q. All right. And it's got a
06 Reading & Bates fax line at the time. That
07 would be R&B Falcon's predecessor. Do you
08 know that to be true?
09 A. That's my understanding, yes.
10 Q. Go to Page 3, and Mr. Elkins is
11 talking about control systems.

Page 623:16 to 624:22

00623:16 Q. (By Mr. von Sternberg) And if
17 you look at the first paragraph down almost
18 to the bottom, it said: "Consideration
19 should be given to some type of emergency
20 back-up system..."
21 Do you see that?
22 A. No. Show it to me.
23 Q. Okay. It's --
24 A. Okay.
25 Q. -- about right here. It's four
00624:01 lines up from the bottom of --
02 A. Gotcha.
03 Q. -- that first paragraph.
04 A. Gotcha.
05 Q. And I'll go ahead and continue:
06 "...back-up system that can be used in case
07 of a failure in the BOP control system or
08 loss of control due to Riser loss or rig
09 problems."
10 Do you see that?
11 A. Yes.
12 Q. And then the third possible
13 thing that he lists is an acoustic backup
14 system. Do you see that?
15 A. I do.

Q. So can you agree that at least Mr. Elkins thought, for purposes of NOV at least, back in September of 1998 that you could use an acoustic system as a backup to the MUX cables?
A. It appears that's what he's saying.

Page 624:25 to 624:25

00624:25 (Exhibit No. 3183 marked.)

Page 625:08 to 626:05

00625:08 Q. (By Mr. von Sternberg) Are you familiar with this document, sir?
A. Yes.
Q. Were you able to look at this before your deposition today, recently?
A. I've -- I've looked at it many times over the years.
Q. I can imagine.
All right. Can you describe it for us, please?
A. This is a -- an Engineering Bulletin, No. 852D, that -- that describes our shear ram product line.
Q. Okay. And it was drafted by Mr. B.C. Williams. Is he still with the company?
A. No.
Q. Okay. Mr. Whitby approved it, though, right?
00626:01 A. Right.
Q. And October 30th of 1998 was when it was approved; is that correct?
A. That's what it looks like, yes.

Page 627:01 to 628:18

00627:01 This would be the one. And if we were going to change it, we would revise it.
Q. Okay.
A. So it's -- whether the A1 Revision --
Q. Right.
A. -- is the current revision or not, I couldn't tell you off the top of my head.
Q. Okay. But Page 1 of 17, which is Bates 3198 is the shearing blind ram; is that correct?

A. It is.
Q. And that's -- that's the ram that was either the shearing blind ram or blind shear ram, depending upon how you want to say it, that was on the DEEPWATER HORIZON at the time of the incident; is that correct?
A. Not -- not exactly.
Q. Okay.
A. It's --
Q. Is it the second one?
A. Yes, it's the second one.
Q. Okay. And what's the difference? This one can handle hydrogen sulfide?
A. The -- well, this one has -- has inserts on the front of the blades specifically --
Q. Okay.
A. -- that are immune to H2S attack.
Q. Great. I'm glad I asked that question.
All right. And if you look at "Shearing Action," it says: "Upon completion of shearing, the lower fish is folded over and flattened to allow the front surface of the lower blade to seal against the blade packer."
That's how you understand it works; is that correct?

Page 628:20 to 631:11

A. That is -- that is one -- one possibility.
Q. (By Mr. von Sternberg) Okay.
A. One possibility.
Q. But that's -- that's what it says right here on the Engineering Bulletin in reference to shearing action; is that right?
A. I understand that's what it says.
Q. Okay.
A. It -- it is possible and I have reviewed documents that -- that there are certain situations in which a foldover would not be formed.
Q. Okay. But I did read this correctly --
A. You did --
Q. -- that's what document says?
A. You did read it correctly, yes, sir.
Q. Now, if we move on to Bates

No. 3203 is the double V shear rams, correct?
A. Correct.
Q. And that's the one that has the two Vs?
A. It is.
Q. Okay. And then the shearing action statement is the same as it is on the H2S blind shear ram; is that right?
A. The statement is the same.
Q. Okay. Now, I understood that both the blind shear rams or the shearing blind rams, and H2S is the version that you mentioned was actually used and the double V shear rams were available for the TL BOP stacks; is that right?
A. They are.
Q. And they were back in 1999?
A. They were.
Q. Okay. Now, if you'll go to 3208, the "Shear Ram Comparison Table." Now, the S -- SBRs and the H2 SBRs are the first two on the list; is that right?
A. Right.
Q. Now, if you look at "Current BOP Availability," it doesn't have the TL there. Do you have any idea why?
A. Yeah. You know, the -- the T and the TL are often used interchangebly. The T is -- I think discussed earlier was a predecessor of the TL.
Q. All right.
A. The L is literal -- quite literally just a lightened up. That's what the L stood for as a matter of fact, a lightweight version of the T but the -- the rams are essentially the same.
Q. Okay. And you'll go down, though, on your document. It says the DVS is available on the TL and so are the SSRs. Do you see that?
A. Yes.
Q. Okay. So sitting here today, you don't know why the SBRs and the H2S SBRs don't say they're available for the TL?
A. No, but I --

Page 631:13 to 631:16

A. I -- I can confirm to you they are available for the TL.
Q. (By Mr. von Sternberg) And they were back in 1999?

Page 631:21 to 632:11

00631:21 (Exhibit No. 3184 marked.)
22 Q. (By Mr. von Sternberg) Have you
23 seen this document before, or any iteration
24 of it?
25 A. (Reviewing Exhibit 3184.) I -- I
00632:01 can't recall specifically looking at this
02 one, no.
03 Q. Okay. At the top of it says:
04 "Request" -- "Requested Revisions by
05 Cameron."
06 Do you see that?
07 A. Yes.
08 Q. Okay. Do you have any reason to
09 believe that these aren't revisions of the
10 Purchase Order for the BOP stack that went on
11 the DEEPWATER HORIZON?

Page 632:13 to 633:10

00632:13 A. Yeah, I -- I -- I don't know
14 what this is, exactly, or -- or what that
15 notation is referring to.
16 Q. (By Mr. von Sternberg) Okay.
17 Look at the last page of the document, and if
18 you can't confirm it, you can't, and we'll
19 just move on. Do you see the price at the
20 bottom?
21 A. I do.
22 Q. 5,562,988?
23 A. Correct.
24 Q. Okay. And that's without the --
25 the actual rams; is that correct? Do you see
00633:01 that, the first sentence?
02 A. The first sentence in the -- in
03 the whole --
04 Q. In the document.
05 A. -- document?
06 Q. It says -- yes -- "This PO will
07 define the Subsea BOP stack, lower marine
08 riser system, (less rams and annulars)." Is
09 that correct?
10 A. Yes, I see that.

Page 634:19 to 634:25

00634:19 Q. (By Mr. von Sternberg) All
20 right. Earlier, you testified about the fact
21 that once you have a well control situation,
22 the longer one waits to activate the BOP, the
23 less chance it has of shearing and sealing
24 the well; is that correct?
25 A. I remember --

Page 635:02 to 635:14

00635:02 A. I remember discussing that, yes.
03 Q. (By Mr. von Sternberg) Well,
04 is -- is my statement a correct statement of
05 what you've already testified to?
06 A. I -- I -- I think -- I think
07 everyone knows and understands that sooner is
08 better than later, and that's a -- a -- a
09 basic tenet of well control procedures.
10 Q. Does Cameron hold the position,
11 and does -- do they advise their clients that
12 the BOP is, in fact, the main barrier to
13 prevent a blowout?
14 A. The BOP is a tool --

Page 635:16 to 635:24

00635:16 A. -- to be used with a -- a
17 trained crew when properly operated in a well
18 control situation, and -- and as such, it
19 would be essential -- an essential ingredient
20 to controlling any type of a kick.
21 Q. (By Mr. von Sternberg) Once all
22 else has failed and there's a kick, the BOP
23 is the last resort to shutting down the well;
24 is that right?

Page 636:02 to 637:09

00636:02 A. Yeah, I -- I -- I -- I don't
03 know that I would characterize it as that.
04 Q. (By Mr. von Sternberg) Okay. If
05 I said that the BOP and the blowout preventer
06 is the main barrier protecting human life,
07 capital equipment, and the environment, you
08 would disagree with that?
09 A. No, it -- it is a -- it is an
10 insis -- an essential barrier, along with
11 other things.
12 Q. Okay. So what you're arguing
13 with, then, is the term "main barrier."
14 A. It -- it -- a BOP is a tool.
15 If -- if -- if the tool is not used, it's not
16 a barrier. If it's not used properly, it's
17 not a barrier. If it's used in a situation
18 in which it cannot -- it -- it cannot
19 operate, then it is not a barrier. So it has
20 to be -- there's a time and a place to use a
21 BOP, and a right way to maintain a BOP, and a
22 right way to use a BOP.
23 Q. I assume that you've written
24 quite a few publications on the subject of
25 BOPs; is that right?

00637:01 A. I wouldn't say that.
02 Q. All right. Have you written
03 any?
04 A. I probably have, yeah.
05 Q. Okay. How about Mr. Whitby, has
06 he written a few publications in reference to
07 the BOP?
08 A. Mr. Whitby has written a few
09 publications, yes.

Page 637:12 to 637:12

00637:12 MS. ADAMS: 3186.

Page 637:20 to 639:07

00637:20 (Exhibit No. 3186 marked.)
21 Q. (By Mr. von Sternberg) This
22 appears to be an article written by
23 Mr. Whitby in May/June of 2007; is that
24 correct?
25 A. It does.
00638:01 Q. Look at the second column, first
02 paragraph, and I'll quote it so that you
03 don't have to spend a lot of time reading it.
04 "Today, a subsea BOP can be required to
05 operate in water depths of greater than
06 10,000 feet, at pressures of up to 15,000 psi
07 and even 25,000 psi, with internal wellbore
08 fluid temperatures up to 400 degrees
09 Fahrenheit and external immersed temperatures
10 coming close to freezing (34 degrees
11 Fahrenheit.)"
12 Do you agree with that
13 statement?
14 A. That there are BOPs that -- that
15 are rated for those conditions.
16 Q. Okay. Now, the DEEPWATER
17 HORIZON BOP is not one of those; is that
18 right?
19 A. Some of them, but not all of
20 those.
21 Q. Okay. What pressure was it
22 rated to?
23 A. The ram BOPs were rated for 10.
24 One of the anuulars was rated -- I mean,
25 there were 15, excuse me. One of the
00639:01 annulars was rated for 10, and one -- one of
02 the annulars, the body was rated for 10, but
03 my understanding is the packer that was in it
04 on that day was rated for 5.
05 Q. Right. Because they made it a
06 stripper packer; is that right?
07 A. Yeah, that's right.

Page 639:20 to 640:25

00639:20 Q. Okay. Now go to the -- "THE
21 CHALLENGE," and then the second paragraph.
22 "Today's deepwater BOPs can be required to
23 remain subsea for extended periods of time
24 ranging from 45 to 90 days for a single
25 well..."
00640:01 You agree with that, don't you?
02 A. That is a possibility.
03 Q. "...to more than a year in" a
04 case "where drilling and completions on
05 multiple wells are required."
06 Do you agree with that, too?
07 A. That is -- is -- is -- that --
08 that is a possibility.
09 Q. Okay. And now Mr. Whitby says:
10 "In all cases, however, when the BOP is
11 called on to function in an emergency
12 situation, it is the main barrier protecting
13 human life, capital equipment and the
14 environment."
15 Do you see that?
16 A. I see that.
17 Q. Okay. And do you disagree with
18 Mr. Whitby on that point?
19 A. I -- I -- I -- I say that -- I
20 would say that when a BOP is called on --
21 called upon, using his own words, another
22 barrier would have had to have failed, but
23 at -- at -- at the time that that BOP is
24 activated, it's very possible that all the
25 other barriers have been defeated.

Page 641:05 to 641:06

00641:05 Q. (By Mr. von Sternberg) Even in
06 the words of Mr. Whitby?

Page 641:08 to 641:17

00641:08 A. Yeah, I don't know if I would
09 characterize it as that, but it -- it --
10 Q. And then he goes on, the last
11 thing I'll read for you: "Therefore, it must
12 function without fail."
13 Do you see that?
14 A. I see that.
15 Q. And you agree with that, don't
16 you?
17 A. It -- it -- it should function.

Page 643:22 to 644:05

00643:22 Q. All right. If you would, turn
23 to Tab 5 in that binder in front of you --
24 I'm sorry, Tab 6 in that binder in front of
25 you. This was a document marked today as
00644:01 Exhibit 3178. This is a Cameron Field
02 Service Order. Do you see that?
03 A. Yes.
04 Q. Yesterday, during the deposition
05 there was a very brief mention of

Page 647:12 to 649:05

00647:12 Q. The first thing I'm going to
13 start with is Exhibit 1199, I believe you
14 have in front of you, and you've seen that
15 before of course. Correct?
16 A. Yes.
17 Q. You're very familiar with what
18 it is, right?
19 A. I am.
20 Q. Was it actually put out -- just
21 if I can find where my copy of it is.
22 Were you actually instrumental
23 in that being issued?
24 A. I would say so, yes.
25 Q. Okay. So that was literally you
00648:01 were part of the authorship of this
02 particular document?
03 A. That's right.
04 Q. And it's dated approximately
05 January 21st, 2008?
06 A. That's right.
07 Q. Is this the latest iteration
08 before April 20th, 2010 as far as you know?
09 A. As -- as far as I know.
10 Q. Right. The -- okay. And this
11 is supposed to be telling people, "Gee, we
12 can calculate the shearing capability of a
13 Cameron shear ram," correct?
14 A. Yeah, a conservative estimation,
15 yes.
16 Q. Right. Because you actually
17 want your customers -- you have additional
18 recommendations, such as do actual shear
19 tests?
20 A. That's right.
21 Q. You know, take a piece of your
22 pipe and actually shear it and see if that's
23 right or not?
24 A. That's correct.
25 Q. Okay. That's just a good,
00649:01 prudent idea; is that right?
02 A. I -- I thought so, yes.

Q. And I bet you Cameron's willing to assist in that, aren't they?
A. We are.

Page 653:10 to 654:14

Q. All right. I'm going to ask you to do some calculations here under EB 702D.
A. Okay.
Q. But before I start that, can you do them?
A. Yes.
Q. Are you able to use this document to actually calculate the actual shearing capability?
A. I can.
Q. First of all, if you're at 5,000 feet below sea level, is that going to affect the pressure needed to accomplish a shear?
A. You -- you -- you need to be cognizant of the hydrostatic head, but ultimately, no, it's not.
Q. Okay. And does your formula say that you need to take into account wellbore pressure?
A. It does say you need to take into account wellbore pressure. That's correct.
Q. All right. And does wellbore pressure actually increase the shearing force if I use the formula in 702D?
A. Yes.
Q. Okay. So you -- does it matter or doesn't it matter? Does wellbore pressure matter?
A. Wellbore pressure matters.

Page 656:21 to 657:07

Q. Okay. Now, if you actually have pressure in the wellbore where you have flow coming from above, and there's pressure in front of the pistons that is not behind the pistons, then you have to take that pressure into account?
A. The -- the difference, correct.
Q. Okay. So if you have, for example, 8,404 psi in the wellbore, then it becomes important to calculate wellbore pressure if you're going to calculate shear force?

Page 657:09 to 657:21

00657:09 A. That's right.
10 Q. (By Mr. Williamson) Okay. And
11 do I understand correctly what you're saying
12 is if you had 8,404 psi in the wellbore --
13 and I didn't pick that number by accident,
14 hence you may or may not know -- do you know
15 where that number comes from?
16 A. Prob -- probably the -- the Bly
17 Commission Report, but I'm not sure.
18 Q. No, that number actually comes
19 out of an MMS application that BP filed where
20 they estimated MASP at mud line. That's
21 where 8,404 psi comes from.

Page 657:23 to 658:06

00657:23 A. Okay.
24 Q. (By Mr. Williamson) Okay?
25 The -- I'm not asking -- you can assume that
00658:01 for my purposes of my question. The document
02 either says it or it doesn't, and we can all
03 go look at the document. Okay.
04 But if you have 8,404 psi at mud
05 line, would you have to use that number in
06 order to calculate your shear force?

Page 658:08 to 658:19

00658:08 A. You -- you would use that number
09 less the hydrostatic head --
10 Q. (By Mr. Williamson) Okay.
11 A. -- of 2,200 psi approximately.
12 Q. All right. And then, of course,
13 you would have to apply whatever safety
14 factor you would think be appropriate?
15 A. The -- if -- if, as an operator,
16 you think the pressure is going to be greater
17 than 8,400, if there's any uncertainty in
18 that number, you would have to account for
19 that.

Page 659:04 to 661:15

00659:04 Q. But let's start with here. When
05 you do the calculations under 1199,
06 Exhibit 1199, you have to use C1, C2, and C3,
07 correct?
08 A. Correct.
09 Q. Okay. I would like you to tell
10 me what C1 and C2 and C3 are for this
11 particular blowout preventer, the DEEPWATER
12 HORIZON blowout preventer, given the fact
13 that you have five and a half inch drill

pipe, 21.9 pounds per foot, S135, with 135,000 yield pressure.
A. Okay. Which one do you want to do first?
Q. I don't care. You tell me what C1 is, C2, and C3.
A. All right.
Q. Just identify which number you're giving me.
A. Okay. Okay. C1 is going to be the BOP Operator Constant which would be obtained from Table 2 on Page 6. And so you would go down the table. This is a 18-15 TL BOP with ST lock with standard bonnets which is SB, and so C1 would be 238.
Q. Okay. And it's going to be 238 -- C1 will remain constant no matter what kind of pipe you're calculating, correct?
A. That's correct.
Q. Okay. Go ahead give me C2 or C3.
A. C -- C3 is the shear Ram Type, Pipe Grade Constant from Table 3 on Page 7. So I'll flip -- flip to Page 7, and I will go down to on C3, the C3 column, I will -- I will use the row for the SBR, and you said S135 pipe?
Q. Yes.
A. Is that correct?
Q. M-h'm.
A. Then -- then the C3 Constant would be .23.
Q. Okay. And now, C2 will vary depending on the type of pipe you're trying to cut, correct?
A. That's correct. Well, hang on one second. CT -- C2 is going to be the -- the BOP Operator Constant obtained from Table 2 on Page 6. It will not vary with the pipe.
Q. Okay. Which one varies with the pipe?
A. At -- at -- at this point, all the -- the C1, the C2, and the C3 parameters that -- that you put in, C3 would vary with the pipe, because it's dependent upon the yield strength, the -- the grade, if you will, of the pipe.
Q. Okay. So if you have 135,000 yield, which I believe is going to be the pipe strings I'm going to show you in a second, will C3 always be .23?

Page 661:17 to 662:04

00661:17 A. When using an SBR, yes.
18 Q. (By Mr. Williamson) Right. I'm
19 sorry. And we're use -- we're talk -- I'm
20 talking about the SBR.
21 A. Right.
22 Q. And the SBR is what was in the
23 DEEPWATER HORIZON at the time, correct?
24 A. That's -- that's right.
25 Q. Okay. All right. Go ahead.
00662:01 And then C1 and C2 will be constant?
02 A. That's correct.
03 Q. Okay. And what will C2 be?
04 A. C2 will be 36.

Page 663:25 to 664:07

00663:25 Q. Okay. Alr my question to you
00664:01 was to calculate what the shear force is
02 needed to calculate to shear five and a half
03 inch drill pipe, S135, 135,000 yield, 21.9
04 pounds per foot.
05 A. 21 what?
06 Q. Can you tell me that?
07 A. 21.9?

Page 664:10 to 664:10

00664:10 A. Can I borrow a calculator?

Page 665:01 to 665:13

00665:01 Q. (By Mr. Williamson) All right.
02 You've looked at a couple of calculations
03 that I've asked you to do in connection with
04 your Engineering Bulletin 702 Delta, D,
05 correct?
06 A. That's right.
07 Q. The first thing I asked you was
08 I asked you to take five and a half inch
09 drill pipe with a yield of 135,000, S135,
10 21.9 pounds per foot, and calculate what it
11 would take to shear that, according to your
12 Engineering Bulletin, at sea level, correct?
13 A. That's right.

Page 665:15 to 665:18

00665:15 Q. (By Mr. Williamson) Okay. And
16 you did that calculation, correct?
17 A. Yes.
18 Q. And what did you come up with?

Page 665:20 to 666:04

00665:20 A. 2857 psi.
21 Q. (By Mr. Williamson) Okay. 2,857
22 pounds per square inch, correct?
23 A. Yes.
24 Q. Okay. Now, if we then lower the
25 blowout preventer to 5,000 feet below sea
00666:01 level, you're saying that adds what you call
02 a hydrostatic head of approximately 2,200
03 psi?
04 A. That was my assumption.

Page 666:06 to 666:10

00666:06 Q. (By Mr. Williamson) Okay. I
07 asked you to assume that you have pressure of
08 8,904 psi inside the wellbore.
09 A. And I understood that to be
10 an --

Page 666:12 to 667:10

00666:12 A. -- absolute pressure.
13 Q. (By Mr. Williamson) Static,
14 right?
15 A. Static and absolute.
16 MR. MORRISS: Objection, form.
17 Q. (By Mr. Williamson) What do you
18 mean by "absolute"?
19 A. In other words, the -- the
20 hydrostatic head had not already been
21 deducted from it.
22 Q. Right. Okay. I understand.
23 We're on the same page. You're correct.
24 That was the assumption.
25 Therefore, to cal -- you had
00667:01 calculated -- you, to do -- use your formula
02 correctly, would have to calculate a
03 differential pressure, which means you'd take
04 8,904 and subtract 2200?
05 A. Yes, sir.
06 MR. MORRISS: Form.
07 Q. (By Mr. Williamson) Okay. If I
08 do the arithmetic, under your formula, I'm
09 going to end up with a numerator of 921,339,
10 correct?

Page 667:12 to 667:16

00667:12 A. I believe that was right, yes.
13 Q. (By Mr. Williamson) And you'll
14 end up with a denominator, pursuant to

15 Cameron's constant, of 238?
16 A. That's right.

Page 667:18 to 667:22

00667:18 Q. (By Mr. Williamson) Okay. When
19 you've done the -- and you did the math
20 yourself. You're not relying upon me,
21 correctly?
22 A. That's right.

Page 667:24 to 667:24

00667:24 Q. (By Mr. Williamson) Tell me --

Page 668:09 to 669:01

00668:09 Q. (By Mr. Williamson) And let me
10 just tell you something, Mr. McWhorter. When
11 you get home and read your deposition, if you
12 think the arithmetic is done incorrectly,
13 because we're kind of sitting here doing it
14 in five minutes --
15 A. M-h'm.
16 Q. -- feel free to correct the
17 numbers.
18 A. Okay.
19 Q. Is that fair?
20 A. Sure.
21 Q. Okay. Given your calculations,
22 though, if we have 8,904 psi in the wellbore,
23 at 5,000 feet water depth, what does Cameron
24 say the shear force will be needed in order
25 to shear five and a half inch S135 drill
00669:01 pipe?

Page 669:03 to 669:05

00669:03 Q. (By Mr. Williamson) 21.9 pounds
04 per foot.
05 A. Three thousand --

Page 669:07 to 669:16

00669:07 A. -- eight hundred and seventy-one
08 psi.
09 Q. (By Mr. Williamson) Okay.
10 THE COURT REPORTER: Say it again.
11 THE WITNESS: 3,871.
12 Q. (By Mr. Williamson) All right.
13 And you have not taken into consideration any
14 calculation based upon the -- the fact that

15 the pipe might be off-center and outside the
16 cutting blades, correct?

Page 669:18 to 669:24

00669:18 A. That's correct.
19 Q. (By Mr. Williamson) And you have
20 not taken into consideration the fact that
21 there may be a dynamic flow effect because
22 the well is actually flowing? You didn't
23 take that into consideration here, right?
24 A. That's not part of the --

Page 670:01 to 670:20

00670:01 A. -- the EB or the equation,
02 that's right.
03 Q. (By Mr. Williamson) Okay. Well,
04 that's my point. I've asked you if there's a
05 dynamic flow effect, and I thought your
06 answer was you did not know, because that
07 testing has never been done. Did I
08 misunderstand?
09 A. On -- on -- on calculating the
10 shear force requirement, I cannot imagine
11 that dynamic flow would matter, except to the
12 extent that dynamic flow would contribute to
13 pressure in the BOP.
14 Q. Okay.
15 A. Pre -- pressure is what drives
16 this equation, not flow.
17 Q. Okay. So what you're saying is
18 dynamic flow may change the pressure numbers?
19 A. And to -- to the extent that
20 it --

Page 670:22 to 671:04

00670:22 A. -- does, if it does, then --
23 then it would change this calculation.
24 Q. (By Mr. Williamson) Okay. But
25 in the meantime, you have not assumed -- for
00671:01 your purposes, the shear force is the same
02 whether it's 8,904 psi not flowing or 8,900
03 psi flowing?
04 A. Tha -- tha --

Page 671:06 to 671:09

00671:06 A. That's right.
07 Q. (By Mr. Williamson) Okay. And
08 if it's flowing, that might change the
09 pressure calculation?

Page 671:11 to 671:11

00671:11 A. It typ --

Page 671:13 to 673:01

00671:13 A. Typically, flow is going to
14 reduce pressure, but, yes, it will change
15 the -- it will change the calculation. If --
16 if the pressure changes, the calculation will
17 change.
18 Q. (By Mr. Williamson) Okay. And
19 do you know -- do you have any -- because I
20 thought you'd said earlier you didn't know
21 how much dynamic flow conditions would change
22 the shearability of the BOP rams. Did I
23 misunderstand that?
24 A. That was in conjunction with a
25 different conversation about a different
00672:01 thing. This is about --
02 Q. Sure.
03 A. -- shearing pipe and the amount
04 of force that can be brought to bear to cut
05 pipe. And -- and to my knowledge as an
06 Engineer, I -- I don't know that flow would
07 make a difference in this calculation. It
08 may make a difference in another aspect of
09 shearing -- for example, the potential to get
10 debris or to erode a seal, et cetera. But as
11 far as this calculation goes, I can't
12 really -- I can't really see how that would
13 make a difference.
14 Q. Okay. Have you ever seen
15 anything in the literature in the Field that
16 disagrees with that?
17 A. That disagrees with what I just
18 said?
19 Q. M-h'm.
20 A. I haven't, no.
21 Q. Okay. Okay. I'm -- let me get
22 this straight, then, because I want to
23 understand what you're thinking. Okay.
24 Are you thinking dynamic flow
25 makes a difference, or it doesn't make a
00673:01 difference, or you don't know?

Page 673:03 to 675:03

00673:03 A. What I do know is pressure makes
04 a difference. So to the extent that dynamic
05 flow could change the pressure, the -- the
06 MASP, for example, then it would make a

difference.
Q. (By Mr. Williamson) Okay. Can you tell me how much flow is going to change the MASP?
A. Not -- not as I sit here, no. I couldn't --
Q. And has --
A. -- tell you.
Q. -- Cameron ever done those calculations, where they say, "We would like to tell our customers dynamic flow conditions will reduce or increase or won't really matter"?
A. No. It -- it -- it -- it is the customer's responsibility to establish that MASP or whatever pressure they want to use for the mud line pressures in a subsea BOP, for the purposes of calculating shear forces in EB 702.
Q. Okay. What I'm asking is: Has Cameron ever given any information to its customers regarding how dynamic flow conditions might affect shearability?
A. When -- when talked about in connection with the shear force, no.
Q. Okay. And we've asked you if you've ever done any testing under dynamic conditions, correct?
A. That's right.
Q. And you've said, "No," repeatedly, correct?
A. That's correct.
Q. Okay. Have you ever done any computer modeling where you figure out what the effect of dynamic flow would be on shera -- shearability?
A. We -- we have -- we -- we don't design to a flow condition, and, so, as a result, we -- we have not -- or at least I'm not aware of any dynamic flow models that you -- as -- as you have described. I'm not aware of any.
Q. Well, I'm trying to ask about Cameron's dynamic flow models. Has Cameron ever done any computer model where they tried to figure out what the effect of dynamic flow would be, if any, on shearing?

Page 675:05 to 676:08

A. Ag -- ag -- again, that's not something we would test for, that's not something that we would design for. It's not part of our Specification, and, as such, we have not done computer modeling as you have

described it.
Q. (By Mr. Williamson) Okay. Therefore, the answer is, with your explanation, no, Cameron has not done such computer mod -- computer model?
A. Not to my knowledge.
Q. Okay. And, to be honest with you -- you're the Director of Engineering -- you would know about it if Cameron had done it?
A. It -- it -- it -- I'm not aware of any.
Q. Okay. Isn't there a very, very high likelihood that if Cameron had done that, you would know about it?
A. It -- it -- it is likely that I would know about it.
Q. All right. The -- okay. So let's go back to our hypothetical, 8,904 psi at mud line.
A. Okay.
Q. Cameron says it's going to take 3,871 pounds per square inch, psi, to sever that pipe?

Page 676:10 to 677:04

Q. (By Mr. Williamson) Correct?
A. I -- I -- I'm -- I'm going to correct you just slightly. It -- it -- it -- this is not what we say it will shear at. If you were going to ask us to predict the most accurate calculation that we could, the number would be lower.
Okay. This is a calculation that has conservatism built in, so this -- this is a number that I would expect the majority of -- of shear tests to fall below.
Q. Fair.
A. It's a -- it's an upper limit.
Q. But, on the other ha --
A. Near upper limit.
Q. But, on the other hand -- you've -- you've hi -- you've anticipated my very next question. Cameron doesn't guarantee this is the upper limit, do they?
A. That -- that -- that's a --

Page 677:06 to 677:11

A. -- that's a -- an excellent point.
Q. (By Mr. Williamson) Right. Cameron says, "This is what we think the

upper limit might be, but you should probably do shear tests to verify that for yourself."

Page 677:13 to 677:24

Q. (By Mr. Williamson) That's what Cameron says?
A. In -- in effect, that -- that -- that is in the spirit of what our -- our Recommendation in EB 702 says.
Q. Therefore, you think you will shear it with 3,871 psi --
A. Or less.
Q. -- but you -- or less. But Cameron says there's actually the possibility of a margin of error, so that you will need more than 3,871 psi to shear it?

Page 678:02 to 678:08

Q. (By Mr. Williamson) Do I understand Cameron's position correctly?
A. That is correct.
Q. Okay. And that's, again, without any compensation based upon the fact that the might -- pipe might be off-center, am I correct?

Page 678:11 to 678:17

A. It -- it is -- it is -- there is no consideration for pipe location in this calculation.
Q. (By Mr. Williamson) Right. And that does not give any consideration that the pipe may be held off-center by some force, such as an elastic force?

Page 678:22 to 679:03

A. That's correct.
Q. (By Mr. Williamson) And there is no compensation for the fact -- or there -- this formula was not derived based upon any dynamic flow considerations --
A. Okay.
Q. -- correct?

Page 679:05 to 679:11

A. As -- as we've already di -- discussed, no.

07 Q. (By Mr. Williamson) Okay. Oh,
08 by the way -- and, of course, you only have
09 4,000 psi available under every emergency
10 activation system available on the DEEPWATER
11 HORIZON, right?

Page 679:14 to 679:20

00679:14 A. That's the way it left -- left
15 our possession in 2001. That's my
16 understanding.
17 Q. (By Mr. Williamson) Okay. And,
18 by the way, that 4,000 psi might not be
19 available if there's leaks in the hydraulic
20 system, correct?

Page 679:23 to 680:10

00679:23 A. It -- it -- it is possible that
24 leaks could -- could compromise the hydraulic
25 system and -- and mean that you -- you don't
00680:01 have the hydraulic volume or pressure that
02 you think you do.
03 Q. (By Mr. Williamson) Right. A
04 leak might not diminish the 4,000 psi,
05 depending on the severity of the leak, to be
06 fair, correct?
07 A. To be fair, that's correct.
08 Q. But a leak might compromise
09 whether you have 4,000 psi, again, depending
10 on the severity of the leak?

Page 680:13 to 680:17

00680:13 A. That's right.
14 Q. (By Mr. Williamson) Okay. And,
15 of course, there's nothing in your
16 calculation that takes into the consideration
17 any leaks in the BOP system?

Page 680:21 to 680:21

00680:21 A. That's correct.

Page 680:24 to 681:07

00680:24 show you Exhibit No. 3187. Do you see that?
25 Have you ever seen that before?
00681:01 A. I don't think I have, no.
02 Q. Mr. Guide, a BP employee, their
03 Wells Team Leader who is responsible for the
04 DEEPWATER HORIZON, wrote this E-mail after

05 the April 20th, 2010 incident. Do you see
06 that, based upon the dates in there?
07 A. Yes.

Page 681:09 to 681:17

00681:09 Q. (By Mr. Williamson) Okay. And
10 the middle E-mail is from Mr. John Guide,
11 BP's Well Teams Leader. Okay?
12 A. Okay.
13 Q. And, apparently -- and what you
14 were saying while ago is what you really need
15 to do is calculate the pressures that your
16 BOP will be subject to before you need it,
17 right?

Page 681:19 to 681:25

00681:19 A. That would be prudent, yes.
20 Q. (By Mr. Williamson) That's just
21 common sense, in addition to Engineering
22 knowledge. You need to know -- you've
23 described the BOP as a tool. That's --
24 you've used that word several times. That's
25 your word you like to use.

Page 682:02 to 682:10

00682:02 Q. (By Mr. Williamson) The word
03 "tool" is the way you described the BOP,
04 right?
05 A. I -- I -- that's the way I
06 consider it, yes.
07 Q. Okay. Let's just use your word
08 for a second. If I have a tool, I need to
09 know the design limitations and operating
10 limitations of that tool, don't I?

Page 682:12 to 682:15

00682:12 A. You do.
13 Q. (By Mr. Williamson) Okay. And I
14 need to know it in advance of an emergency,
15 don't I?

Page 682:17 to 682:22

00682:17 A. You would.
18 Q. (By Mr. Williamson) Okay.
19 Mr. Guide, two weeks after this, is sending
20 out an E-mail asking what forces it will take
21 to shear drill pipe on the DEEPWATER HORIZON,

22 isn't he?

Page 682:24 to 683:04

00682:24 A. It -- it looks like he's looking
25 for Cameron shear data, yes.
00683:01 Q. (By Mr. Williamson) Okay. Let's
02 just be honest. He should know the shear
03 data on the DEEPWATER HORIZON before a
04 disaster occurs --

Page 683:06 to 683:11

00683:06 Q. (By Mr. Williamson) -- correct?
07 A. Someone should.
08 Q. Oh, that's a fair comment.
09 Somebody at BP has got to know it before the
10 disaster arises, and communicate it to the
11 appropriate personnel on the rig --

Page 683:13 to 683:14

00683:13 Q. (By Mr. Williamson) -- right?
14 A. Some -- someone should know.

Page 684:20 to 684:25

00684:20 Q. (By Mr. Williamson) Okay. I've
21 asked you to take Exhibit 3187, and I've
22 asked you to calculate the shear value at sea
23 level of what it would take to cut the
24 drillstrings that Mr. Guide said were on the
25 HORIZON. So first --

Page 685:02 to 685:07

00685:02 Q. (By Mr. Williamson) -- we'll
03 take five and a half inch, 38 pound per foot,
04 S135 at 135,000 yield. What would be
05 Cameron's estimate of the pressure needed to
06 shear that pipe?
07 A. Yeah, our --

Page 685:09 to 685:17

00685:09 A. -- our EB 702 calculation comes
10 out to 4957 psi.
11 Q. (By Mr. Williamson) Okay. So
12 Cameron would not predict that that
13 drillstring could be severed by the emergency
14 activation systems on the DEEPWATER HORIZON,
15 given the fact that those emergency

16 activation systems only deliver 4,000 psi?
17 A. Keep --

Page 685:19 to 686:05

00685:19 A. -- keeping in mind that these
20 are conservative calculations, and that a --
21 a followup test would definitely be
22 warranted. But, yes, our calculation would
23 predict that it would -- it would not cut at
24 4,000.
25 Q. (By Mr. Williamson) Right. Next
00686:01 we -- I asked you to six and five-eighths, 32
02 pounds per foot, S135, 135,000 yield. How
03 much force would be needed to shear it
04 according to calc -- Cameron's calculation?
05 A. A --

Page 686:07 to 686:10

00686:07 A. -- 4175 psi.
08 Q. (By Mr. Williamson) Same thing,
09 it requires more than 4,000 psi to sever
10 that, according to Cameron's calculations?

Page 686:12 to 686:19

00686:12 A. According to the calculation.
13 Q. (By Mr. Williamson) Right. And
14 then last is six and five-eighths, 40 pound
15 per foot, S135, 135,000 yield. What would be
16 the amount of psi, pressure per square inch,
17 that would be needed to shear that, according
18 to Cameron's calculations?
19 A. I think --

Page 686:21 to 686:25

00686:21 A. -- the calculation is 5218 psi.
22 Q. (By Mr. Williamson)
23 Substantially more than a 4,000 psi available
24 under the Emergency Activation Systems that
25 the DEEPWATER HORIZON had?

Page 687:02 to 687:06

00687:02 A. That's right.
03 Q. (By Mr. Williamson) And in all
04 of these calculations, we have not calculated
05 any additive effect for wellbore pressure,
06 correct?

Page 687:08 to 687:14

00687:08 A. Correct.
09 Q. (By Mr. Williamson) And, again,
10 we have not calculated any calculation based
11 upon the fact that the pipe may be buckled or
12 against the wall or held against the wall or
13 outside the cutting blades?
14 A. We did --

Page 687:16 to 687:21

00687:16 A. -- we did not consider anything
17 like that.
18 Q. (By Mr. Williamson) And we did
19 not consider -- your formula does not take
20 into any consideration any change based upon
21 dynamic flow conditions?

Page 687:23 to 687:24

00687:23 A. The formula has no such
24 variable.

Page 689:13 to 689:19

00689:13 Q. Okay. And it's well -- been
14 well known since well before 1979, certainly
15 since then, that if you're running a
16 nonshearable string across the BOP, you're
17 taking a certain risk, because you do not
18 have the BOP available to stop any potential
19 blowout?

Page 689:21 to 689:21

00689:21 A. That's my understanding.

Page 690:09 to 690:13

00690:09 Q. (By Mr. Williamson) Okay. So if
10 you were consistering -- consistently running
11 drill pipe strings that were not shearable
12 across the BOP, you would be taking a certain
13 amount of risk, wouldn't you?

Page 690:15 to 690:15

00690:15 A. I would agree with that.

Page 692:20 to 692:22

00692:20 Q. (By Mr. Williamson) One way
21 would be to use tandem boosters, just like BP
22 themself uses on the THUNDER HORSE --

Page 692:24 to 693:06

00692:24 Q. (By Mr. Williamson) -- correct?
25 A. Tan -- tandem boosters will
00693:01 virtually double your shear force
02 availability.
03 Q. And while I'm on that subject,
04 were tandem boosters available in '99, 2000,
05 2001?
06 A. Yes, they were.

Page 693:18 to 694:06

00693:18 Now, this particular BOP doesn't have tandem
19 boosters, right?
20 A. Right.
21 Q. Even though they were available
22 in 2001, right?
23 A. Right.
24 Q. This particular BOP does not
25 have DVS rams, even though they were
00694:01 available in 2001, right?
02 A. No, it doesn't.
03 Q. This particular BOP does not
04 have an acoustic trigger system, even though
05 it was available in 2001?
06 A. That's right.

Page 694:13 to 694:19

00694:13 Q. (By Mr. Williamson) Because
14 there's some things that this BOP could be
15 done -- I'll limit it to blind shear ram
16 capability. There are things that could have
17 been done to increase blind shear ram
18 capability, even in 2001; isn't that true?
19 A. I --

Page 694:22 to 694:25

00694:22 A. -- I will agree -- I will agree
23 with that statement: There were things that
24 were available to increase bine -- blind
25 shear ram shearing efficiency at that time.

Page 696:19 to 696:22

00696:19 Q. And BP accepted the DEEPWATER
20 HORIZON, knowing that those three emergency
21 activation systems operated the blind shear
22 rams?

Page 696:24 to 697:03

00696:24 A. Sure, they knew that.
25 Q. (By Mr. Williamson) Okay. And
00697:01 they still did not order the better set or
02 the more efficient set of DVS ram blocks,
03 correct?

Page 697:06 to 697:08

00697:06 A. They -- to my knowledge, they --
07 they never ordered them for the DEEPWATER
08 HORIZON.

Page 701:04 to 702:04

00701:04 Q. If I don't order it originally,
05 what's it going to cost to get it?
06 A. I don't know. You're -- you're
07 probably talking something less than a
08 million, hundreds of thousands, as opposed to
09 millions of dollars. It's south of a million
10 dollars.
11 Q. And that's a system so if the
12 rig inadvertently leaves location, that it
13 will automatically activate the autoshear?
14 A. Or it -- no, that -- that would
15 be -- when the -- when the rig reaches a
16 critical angle.
17 Q. M-h'm.
18 A. When the riser reaches a
19 critical angle, it would, in effect, initiate
20 a disconnect sequence that would -- that
21 would disconnect automatically before
22 something is damaged, and close blind shear
23 rams or whatever other functions the customer
24 would specify in that preprogrammed sequence.
25 Q. Okay. And that's an option that
00702:01 Cameron does offer?
02 A. We do.
03 Q. And BP and Transocean never
04 ordered it?

Page 702:06 to 702:06

00702:06 A. Not to my knowledge.

Page 709:14 to 710:20

00709:14 Q. Right. The -- okay. I had
15 requested counsel to provide me with the
16 width of the cutting blades. Do you now know
17 those?
18 MR. JONES: (Tendering.)
19 A. I do.
20 Q. (By Mr. Williamson) Okay. One
21 of them was the width of the actual SBR
22 blades that were on the DEEPWATER HORIZON.
23 What's that number, please?
24 A. The -- the lower blade is 17 and
25 seven-eighths inches wide.
00710:01 Q. Okay.
02 A. And the upper blade is 15 and a
03 quarter.
04 Q. Okay. And the 17 and -- is
05 there -- why -- I guess I'll ask: Why is
06 there a difference between those two numbers?
07 A. Well --
08 Q. I know the numbers are
09 different. I'm not asking -- I'm trying not
10 to ask a silly question.
11 Is there an engineering reason
12 that the cutting blade areas are different on
13 the upper and lower?
14 A. It -- it has to do with the way
15 the blades mesh together with -- with -- and
16 leave room for side packer seals.
17 Q. So repeat, which one's lower and
18 which one upper?
19 A. The lower is the 17 and
20 seven-eighths; upper is 15 and a quarter.

Page 711:07 to 711:14

00711:07 Q. Right. Okay. All right. And
08 y'all actually at some point started making a
09 cutting blade that's as wide as the wellbore?
10 A. We -- we do.
11 Q. That's called the CDV?
12 A. S. CDVS.
13 Q. CDVS?
14 A. (Nodding.)

Page 717:19 to 717:20

00717:19 Q. (By Mr. Williamson) So something
20 failed in this case?

Page 717:23 to 718:01

00717:23 A. There -- there were -- there are
24 a lot of reasons that can -- a lot of things
25 that contributed to this accident, and you
00718:01 and I can agree on that.

Page 720:10 to 720:25

00720:10 the event logger data, if we had it
11 available, would tell us when that annular
12 was activated, if at all?
13 A. It sure would.
14 Q. And that event logger, if we had
15 it available, would tell me when the variable
16 bore rams was activated, if at all?
17 A. It would.
18 Q. And if you still had power, and
19 the blind shear rams were activated before
20 the loss of power, the event logger would
21 tell us when the blind shear rams were
22 activated?
23 A. Even if you lost power, it would
24 tell you that because you -- you have a -- a
25 backup power supply, a UPS.

Page 733:09 to 733:12

00733:09 Q. Okay. And do you know why that
10 particular capping stack wasn't put on the
11 well in May 2010?
12 A. No, I don't.

Page 734:08 to 734:11

00734:08 given the fact it was attached on July 19th
09 successfully, you see no reason it wouldn't
10 have been successful if it had been attached
11 in early May?

Page 734:13 to 734:13

00734:13 A. That's right.