UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF LOUISIANA

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

* * * * * * * * * * * * * * * * * * *

DAY 15, AFTERNOON SESSION
TRANSCRIPT OF NONJURY TRIAL
BEFORE THE HONORABLE CARL J. BARBIER
UNITED STATES DISTRICT JUDGE

Appearances:

For the Plaintiffs: Domengeaux Wright Roy & Edwards, LLC
BY: JAMES P. ROY, ESQ.
556 Jefferson Street, Suite 500
Post Office Box 3668
Lafayette, Louisiana 70502

For the Plaintiffs: Herman Herman & Katz, LLC
BY: STEPHEN J. HERMAN, ESQ.
820 O'Keefe Avenue
New Orleans, Louisiana 70113

Appearances:

For the Plaintiffs:	Cunningham Bounds, LLC BY: ROBERT T. CUNNINGHAM, ESQ. 1601 Dauphin Street Mobile, Alabama 36604
For the Plaintiffs:	Lewis Kullman Sterbcow & Abramson BY: PAUL M. STERBCOW, ESQ. 601 Poydras Street, Suite 2615 New Orleans, Louisiana 70130
For the Plaintiffs:	Breit Drescher Imprevento & Walker, PC BY: JEFFREY A. BREIT, ESQ. 600 22nd Street, Suite 402 Virginia Beach, Virginia 23451
For the Plaintiffs:	Leger & Shaw BY: WALTER J. LEGER JR., ESQ. 600 Carondelet Street, 9th Floor New Orleans, Louisiana 70130
For the Plaintiffs:	Williams Law Group, LLC BY: CONRAD "DUKE" WILLIAMS, ESQ. 435 Corporate Drive, Suite 101 Houma, Louisiana 70360
For the Plaintiffs:	Thornhill Law Firm BY: TOM THORNHILL, ESQ. 1308 Ninth Street Slidell, Louisiana 70458
For the Plaintiffs:	deGravelles Palmintier Holthaus & Frugé, LLP BY: JOHN W. DEGRAVELLES, ESQ. 618 Main Street Baton Rouge, Louisiana 70801

Appearances:

For the Plaintiffs:	Williamson & Rusnak BY: JIMMY WILLIAMSON, ESQ. 4310 Yoakum Boulevard Houston, Texas 77006
For the Plaintiffs:	Irpino Law Firm BY: ANTHONY IRPINO, ESQ. 2216 Magazine Street New Orleans, Louisiana 70130
For the United States of America:	U.S. Department of Justice Torts Branch, Civil Division BY: R. MICHAEL UNDERHILL, ESQ. 450 Golden Gate Avenue 7-5395 Federal Bldg., Box 36028 San Francisco, California 94102
For the United States of America:	U.S. Department of Justice Environment & Natural Resources Environmental Enforcement Section BY: STEVEN O'ROURKE, ESQ. SCOTT CERNICH, ESQ. DEANNA CHANG, ESQ. RACHEL HANKEY, ESQ. A. NATHANIEL CHAKERES, ESQ. Post Office Box 7611 Washington, D.C. 20044
For the United States of America:	U.S. Department of Justice Torts Branch, Civil Division BY: JESSICA McCLELLAN, ESQ. MICHELLE DELEMARRE, ESQ. JESSICA SULLIVAN, ESQ. SHARON SHUTLER, ESQ. MALINDA LAWRENCE, ESQ. Post Office Box 14271 Washington, D.C. 20004

Appearances:

For the United States of America:	U.S. Department of Justice Fraud Section Commercial Litigation Branch BY: DANIEL SPIRO, ESQ. KELLEY HAUSER, ESQ. ELIZABETH YOUNG, ESQ. Ben Franklin Station Washington, D.C. 20044
For the State of Alabama:	Attorney General of Alabama BY: LUTHER STRANGE, ESQ. COREY L. MAZE, ESQ. WINFIELD J. SINCLAIR, ESQ. 500 Dexter Avenue Montgomery, Alabama 36130
For the State of Louisiana:	Attorney General of Louisiana BY: JAMES D. CALDWELL, ESQ. 1885 North Third Street Post Office Box 94005 Baton Rouge, Louisiana 70804
For the State of Louisiana:	Kanner & Whiteley, LLC BY: ALLAN KANNER, ESQ. DOUGLAS R. KRAUS, ESQ. 701 Camp Street New Orleans, Louisiana 70130
For BP Exploration & Production Inc., BP America Production Company, BP PLC:	Liskow & Lewis, APLC BY: DON K. HAYCRAFT, ESQ. 701 Poydras Street, Suite 5000 New Orleans, Louisiana 70139
For BP Exploration & Production Inc., BP America Production Company, BP PLC:	Kirkland & Ellis, LLP BY: J. ANDREW LANGAN, ESQ. HARIKLIA "CARRIE" KARIS, ESQ. MATTHEW T. REGAN, ESQ. 300 N. Lasalle Chicago, Illinois 60654

Appearances:

For BP Exploration & Production Inc., BP America Production Company, BP PLC:	Covington & Burling, LLP BY: ROBERT C. "MIKE" BROCK, ESQ. 1201 Pennsylvania Avenue, NW Washington, D.C. 20004
For Transocean Holdings LLC, Transocean Offshore Deepwater Drilling Inc., Transocean Deepwater Inc.:	Frilot, LLC BY: KERRY J. MILLER, ESQ. 1100 Poydras Street, Suite 3700 New Orleans, Louisiana 70163
For Transocean Holdings LLC, Transocean Offshore Deepwater Drilling Inc., Transocean Deepwater Inc.:	Sutherland Asbill & Brennan, LLP BY: STEVEN L. ROBERTS, ESQ. RACHEL G. CLINGMAN, ESQ. 1001 Fannin Street, Suite 3700 Houston, Texas 77002
For Transocean Holdings LLC, Transocean Offshore Deepwater Drilling Inc., Transocean Deepwater Inc.:	Munger Tolles & Olson, LLP BY: MICHAEL R. DOYEN, ESQ. BRAD D. BRIAN, ESQ. LUIS LI, ESQ. 355 S. Grand Avenue, 35th Floor Los Angeles, California 90071
For Transocean Holdings LLC, Transocean Offshore Deepwater Drilling Inc., Transocean Deepwater Inc.:	Mahtook & Lafleur BY: RICHARD J. HYMEL, ESQ. 600 Jefferson Street, Suite 1000 Post Office Box 3089 Lafayette, Louisiana 70501
For Transocean Holdings LLC, Transocean Offshore Deepwater Drilling Inc., Transocean Deepwater Inc.:	Hughes Arrell Kinchen, LLP BY: JOHN KINCHEN, ESQ. 2211 Norfolk, Suite 1110 Houston, Texas 77098
For Cameron International Corporation:	Stone Pigman Walther Wittmann, LLC BY: PHILLIP A. WITTMANN, ESQ. 546 Carondelet Street New Orleans, Louisiana 70130

Appearances:

For Cameron International Corporation:	Beck Redden & Secrest, LLP BY: DAVID J. BECK, ESQ. DAVID W. JONES, ESQ. GEOFFREY GANNAWAY, ESQ. ALEX B. ROBERTS, ESQ. 1221 McKinney Street, Suite 4500 Houston, Texas 77010
For Halliburton Energy Services, Inc.:	Godwin Lewis, PC BY: DONALD E. GODWIN, ESQ. BRUCE W. BOWMAN JR., ESQ. FLOYD R. HARTLEY JR., ESQ. GAVIN HILL, ESQ. 1201 Elm Street, Suite 1700 Dallas, Texas 75270
For Halliburton Energy: Services, Inc.:	Godwin Lewis, PC BY: JERRY C. VON STERNBERG, ESQ. 1331 Lamar, Suite 1665 Houston, Texas 77010
For M-I, LLC:	Morgan Lewis & Bockius BY: HUGH E. TANNER, ESQ. DENISE SCOFIELD, ESQ. JOHN C. FUNDERBURK, ESQ. 1000 Louisiana Street, Suite 4000 Houston, Texas 77002
Official Court Reporter:	Jodi Simcox, RMR, FCRR 500 Poydras Street, Room HB-406 New Orleans, Louisiana 70130 (504) 589-7780 Jodi_Simcox@laed.uscourts.gov

Proceedings recorded by mechanical stenography using computer-aided transcription software.

I N D E X

AFTERNOON SESSION

(March 20, 2013)

* * * * *

THE DEPUTY CLERK: All rise.

THE COURT: All right. Please be seated, everyone. Good afternoon.

MR. BRIAN: Your Honor, Brad Brian on behalf of Transocean.

I've given your clerk a revised list of exhibits for Mr. Newman. We added one in response to what the PSC was offering and subtracted one because I had not used it. So we would offer those.

We have no objection to the list we received from the PSC, subject to the motion in limine we had filed earlier, which Your Honor had granted in part and denied in part. We're preserving that objection and offered some evidence in response to that.

But subject to that --

THE COURT: Wait, wait, wait. Remind me. Motion in limine pertaining to --

MR. BRIAN: To the prior well control logs, Your Honor.

THE COURT: Oh, that one. Okay. I understand.

MR. BRIAN: So there are some exhibits that were offered, and we introduced some contrary exhibits that we would

not have offered. But subject to that, we would have no further objections.

THE COURT: I thought you were talking about a *Daubert* motion instead of --

MR. BRIAN: No. No, Your Honor.

THE COURT: All right. Thank you.

Any objection to Transocean's exhibits?

Without objection, those are admitted, pertaining to Mr. Newman.

MR. ROY: Jim Roy for the PSC, Your Honor.

Subject to our offering of the Quirk exhibits, exhibits associated with his cross-exam, the plaintiffs do rest.

THE COURT: Okay.

MR. TANNER: Your Honor, Hugh Tanner for M-I.

Now that the plaintiffs have rest, we are here to reurge our Rule 52(c) motion. You had asked plaintiffs their position in opposition. I think Mr. Roy said he wanted to confer with his group, and I believe he's done that at this point.

MR. ROY: Your Honor, the PSC, while not agreeing to the motion of M-I to dismiss the punitive damage claims against it and the underlying regular negligence claims, nevertheless believes the matter can be taken up orally. We trust the sound discretion of the Court to rule on their motion.

13:18 **THE COURT:** All right. Does anybody else have any response to M-I's motion?

13:18 **MR. KANNER:** Your Honor, Allan Kanner for the State of Louisiana.

13:18 The only point I would make is one that Your Honor made yesterday. Strictly speaking, I don't think it's appropriate until Transocean rests its case. But subject to that, we agree with Mr. Roy.

13:18 **MR. TANNER:** Your Honor, I do believe under 52(c) that it's a -- once an issue has been thoroughly heard, that it's -- and we're only moving against the party that has now rested.

13:19 **THE COURT:** You're only moving as to the plaintiff?

13:19 **MR. TANNER:** Well, the plaintiffs State of Alabama, State of Louisiana plaintiffs, yes.

13:19 **THE COURT:** That would include the United States?

13:19 **MR. TANNER:** The United States did not bring an action against us, Your Honor.

13:19 **THE COURT:** Did not bring it. That's right. Okay.

13:19 **MR. UNDERHILL:** We did not sue M-I, Your Honor.

13:19 **THE COURT:** So it would be the private plaintiffs, private claimants, Alabama and Louisiana?

13:19 **MR. TANNER:** That's correct, Your Honor.

13:19 **THE COURT:** Okay.

13:19 **MR. ROBERTS:** Your Honor, Steve Roberts for

Transocean.

Transocean has also brought a claim against M-I under Rule 14. Transocean does not object to M-I's motion.

THE COURT: Okay.

MR. GODWIN: Your Honor, Don Godwin for Halliburton.

Halliburton does not object to M-I's motion either.

THE COURT: All right. Very well.

Anybody else have anything to say?

MR. BROCK: Your Honor, sorry about that. BP has --

THE COURT: You might want to get near a microphone so we can hear you.

MR. BROCK: I'm sorry.

We have a single M-I witness on our will-call list, Leo Lindner. And if the Court were inclined to dismiss them from the case, we'd still like to have the option to call him in our case.

THE COURT: All right. But you don't -- you'd like to use him in your case, but that doesn't necessarily -- you're not necessarily objecting to their motion?

MR. BROCK: No, sir. I'm just making this point.

THE COURT: I see.

MR. BROCK: To be very honest, we haven't made that decision yet. We would like to reserve.

MR. LANGAN: Your Honor, we actually dismissed our

13:20 claims against M-I, and they dismissed their claims against us
13:20 some time ago.
13:20 **THE COURT:** All right. Very well. Thank you for
13:20 reminding me of that.
13:20 All right. Rule 52(c) of the Federal Rules of
13:20 Civil Procedure provide as follows. It's called "Judgment on
13:21 Partial Findings."
13:21 This particularly applies in a bench trial. It
13:21 says: "If a party has been fully heard on an issue during a
13:21 nonjury trial and the Court finds against the party on that
13:21 issue, the Court may enter judgment against the party on the
13:21 claim or defense that, under the controlling law, can be
13:21 maintained or defeated only with a favorable finding on that
13:21 issue.
13:21 "The Court may, however, decline to render any
13:21 judgment until the close of the evidence. A judgment of
13:21 partial findings must be supported by findings of fact and
13:21 conclusions of law as required by Rule 52(a)."
13:21 The difference in this and a so-called directed
13:22 verdict in a -- for example, in a jury trial is that once the
13:22 Court has heard all the evidence as to a particular claim --
13:22 claim or defense, a claim in this case -- the Court -- it's not
13:22 simply a question of whether there's any evidence; it's a
13:22 question if the Court can make even a factual finding and can
13:22 make credibility calls and so forth, although I don't think

there's really any to be made in this particular instance.

M-I has moved for a judgment on partial findings under Rule 52(c), and they have -- it's Record Document 8919. They have supported their motion with a memorandum or brief, and also with proposed findings of fact and conclusions of law which, as I appreciate it, largely rely on stipulated facts.

Is that right, Mr. Tanner?

MR. TANNER: That's right, Your Honor.

THE COURT: And those essential facts are as follows: That M-I and BP had entered into a contract related to the Macondo well that governed the scope of M-I's work on the Macondo well.

I'm not going to cite these stipulations that support this. They're set forth in the documents submitted by M-I.

M-I had -- M-I recommended a drilling fluids program for the Macondo well to BP. And BP reviewed, revised, and approved the drilling fluids program for the Macondo well.

Again, I'm just giving the bare essentials, I think, here.

The deepwater -- there was a displacement procedure that was based upon information provided by BP and the M-I drilling fluid specialists for the *Deepwater Horizon*, and that procedure was approved by BP.

The original procedure -- displacement

13:24 procedure -- a first draft, that is, did not include a step in
13:24 the middle of the displacement providing for the conduct of a
13:25 negative pressure test.
13:25 The step requiring the displacement to stop for
13:25 BP to conduct this negative pressure test was added to the
13:25 procedure based on instructions provided by BP.
13:25 M-I had no responsibility for determining
13:25 whether BP would conduct a negative pressure test during the --
13:25 during displacement.
13:25 M-I had no responsibility for determining the
13:25 depth to which the well would be displaced to seawater.
13:25 BP and M-I had discussed using two lost
13:25 circulation material pills available on the rig in the spacer
13:25 used during the displacement of the well to seawater.
13:25 BP approved the using of the two lost
13:25 circulation material pills in the spacer.
13:25 No M-I personnel were involved in developing the
13:25 basis of the design of the well.
13:26 No M-I personnel were responsible for monitoring
13:26 the well or well -- for well control purposes.
13:26 No M-I personnel were responsible for decisions
13:26 as to when or how to set the surface cement plug for the
13:26 temporary abandonment procedure.
13:26 No M-I personnel were responsible for the
13:26 cementing.

No M-I personnel were responsible for conducting or interpreting the negative pressure test on April 20th.

And the reason for the zero pressure reading on the kill line during the negative pressure test has not been definitively established.

So based on those findings of fact, the Court can reach legal conclusions that there is no basis on which to find that any act or omission of M-I caused or contributed to the explosion or blowout which occurred on April 20th, 2010.

I guess I should add -- before I finish this, I should ask one question.

Is there any argument or allegation that M-I was somehow involved in the -- or had any role in the -- that will be tried in Phase Two?

MR. TANNER: I'm not aware of any, Your Honor.

THE COURT: Okay. All right.

So based on those essential findings of fact and conclusions of law, I am going to grant M-I -- it's M-I, LLC; is that right?

MR. TANNER: That's the legal name, yes, sir.

THE COURT: -- M-I, LLC's motion for judgment -- judgment of partial findings.

MR. TANNER: Thank you very much, Your Honor. I appreciate that.

THE COURT: All right.

13:28 **MR. TANNER:** Thank you.
13:28 **THE COURT:** What are you going to do with the rest of your time now, Mr. Tanner?
13:28 **MR. TANNER:** Well, I've got to stay here and listen to Mr. -- to the next two parties, I guess, because you have causes of action against us.
13:28 **MR. ROBERTS:** Your Honor, unless that was unclear, I indicated that on behalf of Transocean, we dismiss any claims that we have pending against M-I, subject to M-I giving us one of the chairs in the top row.
13:28 **MR. LANGAN:** Your Honor, I thought that was my department.
13:28 **MR. TANNER:** Andy said he had the map.
13:28 **THE COURT:** Yeah. Mr. Langan's been our negotiator on space.
13:28 **MR. TANNER:** And then Halliburton as well. Right? Yeah. Yeah.
13:28 **MR. GODWIN:** I thought I said, Judge --
13:29 **THE COURT:** You've already said that. I want to make it clear.
13:29 There are no remaining claims -- I've dismissed the claims by the plaintiffs. And what was said before, as I appreciate it, all -- to the extent there were or are any remaining third-party cross-claims, anything of that nature, counterclaims against -- well, it wouldn't be a counterclaim, I

guess, against M-I; those are dismissed.

Correct? Everybody agree with that?

MR. TANNER: Thank you very much, Your Honor.

THE COURT: You're home free, Mr. Tanner.

MR. TANNER: Thank you, sir. I'll be out in the hallway about these chairs.

THE COURT: It was your persuasive examination that carried the day.

MR. TANNER: Well -- and I knew it would be. Thank you, Your Honor.

THE COURT: All right. Go ahead. I'm listening. I'm looking for something, but I'm listening.

MR. BECK: On behalf of Cameron, we move, pursuant to Rule 52(c), for a motion for judgment based on partial findings related to the claims for punitive damages against Cameron.

Our position is, Your Honor, that based on all the evidence that's been introduced after the plaintiffs have been fully heard, that there's no evidence of sufficient blameworthy conduct as required by the Fifth Circuit, which would be willful and wanton conduct. And, therefore, our position is that based upon Rule 52(c), after the plaintiffs have had an opportunity to be fully heard, that we -- that Cameron, respectfully, should be entitled to a motion for judgment on the punitive damages claim.

And Mr. Roy has agreed that this can be taken up

orally subject to Your Honor's permission.

THE COURT: All right.

Mr. Roy?

MR. ROY: Yes, sir, Your Honor. On behalf of the PSC, just to be absolutely clear -- and I think Mr. Beck has been clear. But just to belt and suspenders it, the PSC would object and does oppose granting any motion to dismiss of the underlying negligence and marine strict liability claims.

As to the punitive damage claim, which is the subject of his motion, and the limited subject of it, we do agree it can be taken up orally.

While we do not agree to the motion, we do believe that it is within the sound discretion of the Court to view the evidence and make a ruling at this time.

THE COURT: Anybody else want to be heard on this? No one else? Okay.

So you're moving only to dismiss the punitive damage claims -- let me refresh my recollection -- of the -- you're not sued by the United States, first of all?

MR. BECK: That is correct.

THE COURT: So no Clean Water Act claims or anything like that?

MR. BECK: Correct.

THE COURT: Okay. I'm -- I am -- obviously, I've sat through this trial, I've listened to all of the evidence

relating to Cameron, and I'm not prepared to issue any kind of findings or conclusions of law right now except to say that I have not heard or seen evidence that would support -- in any way support a finding of gross negligence or willful misconduct on the part of Cameron.

So I'm going to grant your motion, with the understanding I may have to issue something. If you want to submit some proposed findings and conclusions, I would invite that. Okay?

MR. BECK: Thank you, Your Honor.

One additional point. Mr. Roy is absolutely right that we're not moving at this time with respect to anything other than the punitive damages claim.

THE COURT: Right.

MR. BECK: We do intend, however, to file a similar motion, but not to take up the Court's time, because that's going to be opposed. We'll just file something in writing, with the Court's permission.

THE COURT: That will be good.

MR. BECK: Thank you, sir.

MR. ROBERTS: Your Honor, Steve Roberts on behalf of Transocean.

I've got the honor of having been preceded by two former law partners of mine, Mr. Tanner and Mr. Beck.

Our status as a limitation petitioner makes the

timing of this a bit questionable, I admit that. But just out of an abundance of caution, we again move for a directed verdict under 52(c) on factual insufficiency on all claims against us.

Again, we would reurge so that dare not waive the three partial -- motions for partial summary judgment that the Court has under advisement. That would be Docket Entry Nos. 8105, 8106, and 8120.

Thank you, Your Honor.

THE COURT: Thank you.

And I'll just state for the record with respect to Transocean, obviously Transocean is the petitioner in limitation. I think it's clear, in fact, as I appreciate it, that it's been admitted by Transocean that there was at least negligence on the part of certain people employed by Transocean with respect to what occurred on the rig that night.

So the issue then becomes, as I view it, we now switch to Transocean not only defending itself against the plaintiffs' claims, but being a petitioner in limitation, Transocean has the burden of going forward to prove lack of privity or knowledge. So I don't think I could act on your motion until we've heard all of that.

And then, of course, the other side gets a chance to defend against your lack of privity or knowledge claims.

13:34 So I'm going to deny your motion at this time without prejudice. Okay. It can be reurged.

MR. ROBERTS: Thank you, Judge.

THE COURT: Thank you.

MR. GODWIN: Hello, Judge. Don Godwin for Halliburton, Judge.

On behalf of Halliburton, Your Honor, we would file -- we would make this oral motion for 52(c) on partial findings regarding the PSC, state's and local government's claims for gross negligence, willful misconduct, and punitive damages. We do not believe there's any facts to support a gross negligence finding against Halliburton based on either of those causes of action.

But, Your Honor, we will be filing today, as we said yesterday, our written motion. But we wanted to bring this oral motion at this time, as you allowed us to do so.

THE COURT: Okay.

MR. GODWIN: For which we're most appreciative.

Anyway, that Rule 52 motion is granted -- not granted but is being made, Judge.

THE COURT: You can't grant your own motion.

MR. GODWIN: I know. I wish I could, Judge. I liked it when you were granting those motions when we got up there, so maybe you'll stay in that pattern.

THE COURT: Well, the pattern kind of changed,

though. You were in the wrong place in line, Mr. Godwin.

MR. GODWIN: I understand, Judge.

THE COURT: I want you to go ahead and file it in writing, but I'm going to -- again, I've heard enough evidence so that I'm not going to -- I'm not going to grant your motion. I'm going to deny your motion.

MR. GODWIN: Okay, sir.

THE COURT: Okay.

MR. GODWIN: Thank you.

Judge, is this an appropriate time now to ask to admit the documents from Calvin Barnhill's testimony?

THE COURT: If you'd like to.

MR. GODWIN: We have circulated those documents, I believe it was, last evening, Your Honor, that we used in our examination. To my knowledge, there are no objections. We'd offer them at this time.

THE COURT: Okay. Without objection, those are admitted.

MR. GODWIN: Thank you, Judge.

MR. LANGAN: Your Honor, Andy Langan for BP.

On Monday we raised 52(c) orally. The plaintiffs have now rested. So we just want to make sure for the record we do that again. You've already said you were going to defer on that, but just for the record, we want to --

THE COURT: I'll just -- I don't know if I was clear

whether I was deferring or denying or whatever. As a practical matter, particularly in a bench trial, I don't think it makes much difference, but I'm just going to say I'll deny your motion, but obviously you can reurge it at the conclusion of all the evidence. Okay?

MR. LANGAN: Thank you, Your Honor.

THE COURT: Thank you.

MR. IRPINO: Your Honor, Anthony Irpino for the PSC. We have our list of exhibits from Mr. Barnhill's testimony that have been sent around and approved by the parties. We'd like to offer, file, and introduce that.

THE COURT: Any objection to the private plaintiffs' exhibits relating to Mr. Barnhill?

MR. BRIAN: Your Honor, Brad Brian for Transocean. Mr. Hymel went back to the office. So we're going to submit our exhibits for Mr. Barnhill maybe tomorrow. And I guess I would ask the -- Mr. Hymel to look at this list before we -- we may not have any objections, but I don't know.

THE COURT: Okay. We can take that up tomorrow.

By the way, tomorrow you'll all be pleased to know, I get to play Judge Shushan tomorrow to do the exhibit marshaling.

MR. IRPINO: How does that work?

THE COURT: We'll see. She left me detailed instructions as to what I'm supposed to do, you know. So I

13:37 hope I don't screw it up.
13:37 **MR. IRPINO:** Judge, one other --
13:37 **THE COURT:** Anyway, I was just going to mention that
13:38 we'll have the regular marshaling conference even though she's
13:38 not here. I guess we'll do it around -- when did we break last
13:38 time, 5:30 or so?
13:38 **MR. UNDERHILL:** 3:00.
13:38 **THE COURT:** 3:00? I don't think so. No, 5:30.
13:38 **MR. IRPINO:** One final thing, Brad alluded to it
13:38 earlier. We've sent around or list for exhibits and
13:38 demonstratives used and offered in connection with Steve
13:38 Newman's testimony. We've received no objection. Transocean
13:38 specifically looked at it and said they didn't have any
13:38 objection.
13:38 **THE COURT:** Any remaining objection to the
13:38 plaintiff's motion -- I mean, exhibit list related to
13:38 Mr. Newman?
13:38 Hearing none, those are admitted.
13:38 **MR. STERBCOW:** Your Honor, good afternoon. Paul
13:38 Sterbcow for the PSC. It's a new matter, but the PSC feel like
13:38 we need to raise it with Your Honor now.
13:38 We've been notified by Transocean and
13:38 Halliburton that it is their intent between the two of them to
13:38 play up to 27 video clips in their cases, their defense cases.
13:39 We think it's an abuse and a violation of the rule.

Our understanding was video clips would be played in court for witness testimony context, for credibility purposes, but it was to be on a very limited basis, which we did.

We played two. The only reason we played a third, it was Mike Williams who we were going to bring live and we lost control of him.

I think at least two of the witnesses, Murry Sepulvado and John Gisclair, have been listed as will-call witnesses by the parties, one of whom at least was subpoenaed. We see it, Your Honor, as -- the PSC sees this as an attempt to play video clips and avoid putting witnesses live on the stand and subjecting them to cross-examination; and we would object.

I don't have a magic number as to how many video clips are appropriate; but 11 by Halliburton and up to 16 by Transocean, we feel, is wholly inappropriate.

THE COURT: All right. Let me hear from them.

MR. BRIAN: Your Honor, Brad Brian for Transocean.

I guess my first response is I'd like to take a look at this and maybe confer with Mr. Sterbcow and take this up at a different time.

With respect to the two that we wanted to play today, and actually now, one is Leo Lindner, who was on the plaintiff's list. And we were prepared to cross-examine him and was notified that he was not going to be called. So we

would like to play --

THE COURT: How long of one is that?

MR. BRIAN: About 15 minutes, I believe.

THE COURT: The other one is Murry Sepulvado?

MR. BRIAN: The other one is Murry Sepulvado, who was on our will-call list. We looked at it and thought, frankly, it would be just easier and shorter to do with -- it's about a 15-minute video clip.

THE COURT: I'm sure that would be shorter.

MR. BRIAN: It will be shorter. If -- we're not -- if Your Honor would prefer we bring him live, we'll do that, but we actually thought --

THE COURT: No. I don't see any problem with those two.

I tend to agree, if we're talking about 20 something total, that sounds maybe a little excessive.

MR. BRIAN: The only other ones we have that are more significant are Mr. Woelfel, our expert who unfortunately died. I think that's --

THE COURT: That's different, yeah.

MR. BRIAN: -- understandable. And then Paul Johnson is a more significant one.

The other ones are very, very short clips, most -- many of which go to this question that Mr. Webster testified to about the audits and things --

13:41 **THE COURT:** Why don't we do this: Why don't I ask you and Mr. Godwin, who's standing right behind you, to confer sometime today or this evening with the PSC and plaintiffs and see if we can work this out to reduce that number.

13:41 **MR. BRIAN:** We'll do that.

13:41 **THE COURT:** Okay.

13:41 **MR. BRIAN:** Then I would propose that -- before we do that, I would propose just to play Mr. Lindner's first and we'll talk about Mr. Sepulvado, unless they withdraw their objection to Mr. Sepulvado.

13:41 **MR. STERBCOW:** No, that's fine.

13:41 **THE COURT:** I said those two are okay. We can go ahead with those two.

13:41 **MR. BRIAN:** Okay. And one other --

13:41 **THE COURT:** I was talking about the remainder of them going forward.

13:41 **MR. BRIAN:** Will do, Your Honor.

13:41 The other thing I would mention, it was brought to my attention that the deponents in their depositions, when they're asked to introduce themselves, they gave their addresses. My mistake, we did not splice that from the videotape. I will take it out of the transcript when I give it to the -- it's in there right now, but I will blacken that out, if that's acceptable. Because I understand it's the Court's desire not to have that in the record.

13:42 **THE COURT:** Okay.

13:42 **MR. WILLIAMSON:** One last thing, Judge, we had told you we would redact the Perkin report, and we have two exhibits. I talked to BP. We're in the process of reaching -- trying to reach an agreement. We have reached partial agreement. I've talked to TO. I think I'll reach agreement.

I just wanted to make sure the Court knew that. I think it's appropriate to bring it up tomorrow at 5:30, assuming that's acceptable to the judge.

13:42 **THE COURT:** That's fine. That makes sense.

All right. So we're going to play Mr. Lindner's depo clips?

13:42 **MR. BRIAN:** Yes, Your Honor. I have copies of the -- of the actual transcript delivered to your clerk and the court reporter. I actually have copies for the parties if they want them.

We're going to play Mr. Lindner, Your Honor.

13:44 **THE COURT:** Okay.

09:20 (WHEREUPON, the videotaped deposition of **Leo Thomas Lindner** was played.)

13:59 **MR. BRIAN:** That completes Mr. Lindner, Your Honor.

13:59 **THE COURT:** All right.

13:59 **MR. BRIAN:** I've had further discussions with the PSC. I propose to go ahead with Mr. Childs at this time.

13:59 **THE COURT:** Okay. Very well.

Stephanie, turn the lights back on.

THE DEPUTY CLERK: Okay.

(WHEREUPON, **GREG CHILDS**, having been duly sworn, testified as follows.)

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

THE WITNESS: Eric Gregory Childs, E-R-I-C, G-R-E-G-O-R-Y --

THE COURT: You need to pull that microphone up.

No, it's -- oh, you have --

THE WITNESS: Is that better?

THE COURT: No. It must not be on.

THE WITNESS: Green light.

THE COURT: Can't hear you. Is that yours or ours? Did you bring your own?

THE WITNESS: It's the Court's. Is that any better?

MR. BAAY: It's the Court's.

THE WITNESS: I have to hold it up to my mouth for it to work.

THE COURT: Give that back to her. Why don't you just use the microphone that's there. When you have to get up, we'll give you one of these hand-held mics, and you can take it with you.

Make sure the battery's good, Stephanie.

Does it work?

14:01 **THE DEPUTY CLERK:** Give it a try.
14:01 **THE WITNESS:** Is this working?
14:02 **THE DEPUTY CLERK:** I think only one mic can --
14:02 **THE COURT:** I have no idea.
14:02 **THE DEPUTY CLERK:** And the battery's full.
14:02 **THE COURT:** Use that microphone there.
14:02 Why don't you call Steve and figure out what's going on.
14:02 **THE WITNESS:** This one works.
14:02 **MS. KARIS:** Your Honor, before we get started, with the Court's permission, if I could just move forward if he's going to be going to the board.
14:02 **THE COURT:** That's fine.
14:02 **MS. KARIS:** Thank you.
14:02 **THE COURT:** Swing the microphone toward you.
14:02 **THE WITNESS:** Is this working?
14:02 **THE COURT:** That's better. Yeah.
14:02 She may be able to adjust the volume when she gets back.
14:02 **MR. BAAY:** It will be a while before we go to the board.
14:02 Good afternoon, Your Honor. David Baay, Transocean. I have Greg Childs on direct examination.

DIRECT EXAMINATION

BY MR. BAAY:

Q. Tell the Court where you're currently working.

A. WEST Engineering Services.

Q. How long have you worked for WEST?

A. About 17 years.

Q. Is WEST located in Houston?

A. Houston area, yes, sir.

Q. Tell us about your training and education.

A. Bachelor of science, mechanical engineering, University of Houston, 1971; then Advanced Management Institute at Rice University in 1992.

MR. BAAY: Dennis, could we bring up D-6682, please.

BY MR. BAAY:

Q. Mr. Childs, when did you first become involved with blowout preventers?

A. After my joining of Cameron Iron Works. I started there as a design engineer II, graduated up through III, and then senior.

Q. Tell us what your responsibilities were as a design engineer for Cameron.

A. Design of all drill-through related equipment that Cameron sold: the BOPs, rams, connectors, riser -- drilling riser, ball joints/flex joints, anything involved with drill-through equipment.

14:03 **Q.** As you've marked on D-6682, you made a series of promotions through design engineer?
14:03 **A.** Those series, yes, sir.
14:03 **Q.** And that was II, III, and then senior?
14:03 **A.** Yes.
14:03 **Q.** And in that role of design engineer, did you have the opportunity to design any BOP or blowout preventer components for Cameron?
14:04 **A.** Complete BOPs and components around BOPs.
14:04 **Q.** After your time as design engineer, what was your next promotion within Cameron?
14:04 **A.** I became engineering manager for that same group.
14:04 **Q.** What were your responsibilities as engineering manager?
14:04 **A.** Manage design engineers designing the same equipment we just discussed.
14:04 **Q.** Through your time at Cameron, did you develop or become the primary author for patents related to components designed while at Cameron?
14:04 **A.** Yes, I'm the named inventor on five patents for Cameron.
14:04 **MR. BAAY:** Let's go to the second page of this exhibit, please, this demonstrative.
14:04 **BY MR. BAAY:**
14:04 **Q.** Tell us briefly what those patents involve, what components those patents involve.
14:04 **A.** The first one was on the super shear or casing shear ram.

Two or three others were on flex packers, which are a form of variable bore ram. The other over on ram BO- -- rams for ram BOPs.

THE COURT: Excuse me, one second.

Steve, is it possible to use two microphones at the same time?

MR. MUNSTER: Yes.

THE COURT: Because the witness was trying to use it and it didn't work.

THE WITNESS: I had to put it right at my mouth.

THE COURT: And also the hand-held mic wasn't working either.

MR. MUNSTER: When you use the lavaliers, the hand-held ones are disabled.

THE WITNESS: How's that?

THE COURT: That's better.

THE WITNESS: Is that working?

(OFF THE RECORD)

THE WITNESS: Is everybody hearing me?

MR. BAAY: Push the other one back. We're getting a little bit of an echo.

MR. MUNSTER: Hit mute on the witness mic.

THE WITNESS: I did not turn up the mic.

MR. BAAY: Try that.

THE WITNESS: How's that. Is everybody hearing me?

14:07 **THE COURT:** I can hear you, but I don't know if anybody else can.

Is that better or worse for everybody?

THE WITNESS: Is this acceptable in the back?

THE COURT: Can you hear in the back?

Yes. They can hear in the back.

MR. BAAY: Let's give it a go, and we'll readjust if need be.

THE COURT: Turn up the volume a little bit.

MR. BAAY: Try that, Greg.

THE WITNESS: Is that better? Are we there yet?

MR. BAAY: There you go.

THE COURT: Okay.

MR. BAAY: May I proceed, Your Honor?

THE COURT: Go ahead.

BY MR. BAAY:

Q. In sum total, how long were you with Cameron?

You said you started in 1974. When did you leave Cameron?

A. In 1996, 21 1/2 years.

Q. As you left, you were in the role of manager for design engineers?

A. My actual last role was responsibility for worldwide repair for all ram BOPs that Cameron produced.

Q. When you left Cameron, did you join WEST Engineering?

14:08 **A.** Yes, I went directly there.
14:08 **Q.** And in what capacity did you join WEST?
14:08 **A.** Vice president of drill-through equipment.
14:08 **Q.** At the time you joined WEST, were you one of two main principals of WEST Engineering?
14:08 **A.** Yes. The owner and myself were the principals.
14:08 **Q.** Now, describe for us what kind of work WEST Engineering does.
14:08 **A.** It started as a training company, moved into consulting, and branched out into assessments of rig equipment, drill-through equipment, mainly at the first on drilling rigs worldwide.
14:08 **Q.** When you say "drill-through equipment," you're talking about blowout prevention equipment?
14:08 **A.** That is the more generic term, blowout prevention equipment. So everything that you would drill --
14:08 **Q.** Would you consider WEST to be one of the leading experts in the industry when to comes consulting on blowout prevention equipment?
14:08 **A.** Yes, I would.
14:08 **Q.** Tell us about your role with WEST. What were your responsibilities when you joined WEST?
14:08 **A.** I've done training. I was the principal trainer or leader for both the basic and the advanced seminars.
14:09 I run the crew at the end that work across the world

14:09 doing rig assessments. Currently I have close to 90 surveyors or assessors that go around the world assessing equipment on drilling rigs around the world. We do troubleshooting. We do risk assessments.

Again, we're still basically a consulting company. So as our customers have issues, they request us for assistance.

Q. In your role with WEST -- you teach seminars, I believe you mentioned?

A. Yes, the basic and the advanced.

Q. And we're talking about the basic and advanced in blowout prevention equipment?

A. Yes, drill-through equipment. In fact, it's called DTE, drill-through equipment, and advanced offshore deepwater drilling-type advancements.

Q. Does WEST's work with blowout prevention equipment also involve maintenance work with blowout prevention equipment?

A. Yes. When we have our guys go on the rig, the idea is to assist them with their equipment, learning how to lower downtime. That would include, of course, better maintenance, possibly better procedures, and make recommendations where the operator or a contractor can lower downtime and have a more efficient operation, safer operation, and drill a cheaper and better well.

Q. Now, do operators like BP come and hire WEST for WEST to

consult on their blowout prevention equipment on their rigs?
A. Yes. We're currently working for all the major operators, including BP.
Q. Tell us briefly what type of work you do for companies like BP and other operators.
A. For BP, Chevron and a few others, we have a man on board full-time. We rotate men 28 and 28 days. They're there to assist with all aspects of drill-through equipment on the rig, full-time.
Q. Does WEST's work with operators involve consulting these companies on how to make sure their blowout prevention equipment complies with industry standards?
A. Yes. Part of assessments these gentlemen make are for regulatory requirements and API requirements; the OEM, or original equipment manufacturer, requirements; and good oil field practice and lessons learned in the oil field.
Q. And does WEST's work with these operators also involve making sure their blowout prevention equipment complies with applicable regulations?
A. Of course. Yes, sir.
Q. Now, were you and WEST hired to be a part of Transocean's internal investigation team following the Macondo incident?
A. Yes. I joined the team in May of '10.
Q. Describe for Judge Barbier what your role was on that team.

14:11 **A.** I was the leader of the WEST contingent of personnel assisting with blowout prevention equipment and controls or drill-through equipment.

14:11 **Q.** Did your role on that team also involve examining the forensic evidence and examination that occurred with DNV's review of the blowout preventer and the related equipment?

14:12 **A.** Yes. From the beginning each bit of information that was received was analyzed and reviewed by the drill-through equipment team.

14:12 **Q.** Did you have others from WEST with you on Transocean's internal team?

14:12 **A.** Yes. Initially, I brought over two of my other experts in drill-through equipment, hydraulics and mechanical types; and as we learned that there were more electrical questions or software questions, I brought in an electrical software specialist.

14:12 **Q.** Was the focus of your team, as you were housed on the Transocean internal team, to help understand why the blowout preventer did not seal the well on April 20th, 2010?

14:12 **A.** Of course. Again, as we gathered any data that would come from the field, we reviewed that and tried to understand exactly what happened.

14:12 **Q.** How long were you a member of Transocean's internal team?

14:13 **A.** About a year, through the time they issued their report.

14:13 **Q.** Now, I want to talk for a minute about experience with

14:13 control systems. Mr. Childs, do you have experience with
14:13 blowout prevention control systems?
14:13 **A.** Yes, sir.
14:13 **Q.** And let's start with your time at Cameron. What work did
14:13 you do with control systems while at Cameron?
14:13 **A.** While at Cameron, any new BOP equipment design, mocking
14:13 system design, connector had to have a proper circuit to
14:13 control it. So we worked directly with the control systems
14:13 group to devise the proper circuitry and controls that would
14:13 handle proper operation of a piece of equipment.
14:13 **Q.** And in your time at WEST, did WEST have experience and do
14:13 you have experience in performing risk assessments and
14:13 troubleshooting control systems?
14:13 **A.** Yes. Troubleshooting is basically a weekly occurrence,
14:13 maybe even more often. And we gather as a group and do --
14:13 assist our operators, our customers on troubleshooting of that
14:13 piece of equipment.
14:14 **Q.** All right. Mr. Childs, it's been reported that the folks
14:14 upstairs who are listening can't hear you. So try to lift your
14:14 voice. If that doesn't work --
14:14 **A.** I think this is a high as I can get.
14:14 **THE COURT:** I think, with all due respect, you're
14:14 very, very soft-spoken and that's part of the problem. These
14:14 guys know how to talk loudly.
14:14 **THE WITNESS:** Well, I'll have to learn how to talk

louder.

How's that, everybody?

THE COURT: That's better.

BY MR. BAAY:

Q. Keep it up.

A. Yes.

Q. I won't be shy to remind you.

MR. BAAY: We can pull down D-6682. Thank you.

THE WITNESS: Mr. Baay, we haven't got into the risk assessment part that we were going into. I was interrupted there.

Q. Okay. My fault.

MR. BAAY: Pull it back up, D-6682.

BY MR. BAAY:

Q. We were talking about control systems and your time at WEST and you were describing for us what these risk assessments involved when you were looking at control systems?

A. Right. I was involved in at least ten risk assessments, two of which I led myself. These risk assessments assess the control system from the point where the fluid enters the BOP or connector or valve all the way through the pod.

I assessed each line, hose, connection, valve, and the entire circuit to see if there were any issues, rank those issues, and then if they were high ranking, they had to have mitigations to know how to correct those issues.

14:15 **Q.** Now, is it fair to say your time looking at control systems involved time spent with solenoids and batteries in those control systems?
14:15 **A.** Yes, including the batteries and including the solenoids, of course, from the -15s that gave some problems in the field years ago until they were all replaced with the -63s we're talking about here. Yes, sir.
14:15 **Q.** Is it fair to say that your -- the majority of your risk assessments and troubleshooting activities involved Cameron control systems?
14:16 **A.** Yes, the majority were Cameron. And they have the majority of the equipment in the field.
14:16 **Q.** Did you spend time with Mark II control systems, the same system that we know was on the *Deepwater Horizon* BOP?
14:16 **A.** Yes, sir.
14:16 **Q.** Now, Mr. Childs, given the fact that this case involves examination of a Cameron BOP, do you feel qualified to serve as an expert in this litigation?
14:16 **A.** I do.
14:16 **Q.** And have you served as an expert consultant in other litigation matters involving the review of blowout prevention equipment?
14:16 **A.** I have.
14:16 **Q.** And have you given expert depositions in those matters where you were hired related to your review of blowout

prevention equipment?

A. I have.

MR. BAAY: Your Honor, at this time, we'd like to tender Mr. Childs as a qualified expert in blowout preventers.

MS. KARIS: Hariklia Karis on behalf of BP. We have filed a *Daubert* motion with respect to certain aspects of Mr. Childs' opinions. I'm happy to raise that now with the Court.

THE COURT: As I recall -- I read the motions; and as I recall, your motion is directed towards his opinion regarding the battery and the solenoids; correct?

MS. KARIS: That's correct. And included in that is Mr. Childs' reliance on some work done by Mr. Tolleson and some handwritten notes that apparently have never been produced and we've never had an opportunity to see the text of which Mr. Childs relies on.

THE COURT: All right. Well, I'm going to let him testify; and, you know, you can object to either certain questions or use that in cross-examination. And I will have to decide how much weight to give to his testimony, okay?

MS. KARIS: Thank you, Your Honor.

MS. HANKEY: Rachel Hankey for the United States. Just for the record, the United States also filed a motion on the same subject.

THE COURT: All right. Okay. Thank you.

14:17 **MR. BAAY:** May I proceed, Your Honor?
14:18 **THE COURT:** Yes.
14:18 **MR. BAAY:** Thank you very much.
14:18 Yes. Let's pull up D-6686.
14:18 **BY MR. BAAY:**
14:18 **Q.** Mr. Childs, let's turn to your opinions in connection with the Macondo incident, okay?
14:18 **A.** Yes, sir.
14:18 **Q.** Do you have an opinion, sir, as to whether the BOP did function on April 20th?
14:18 **A.** I do.
14:18 **Q.** What is your opinion?
14:18 **A.** That the BOP did function on April 20th.
14:18 **Q.** Now, explain to us what you mean by the fact that it did function.
14:18 **A.** The annular BOP was operated and functioned; the variable bore rams were operated and functioned; and the shear ram operated and functioned.
14:18 **Q.** According to your second opinion, if the BOP did operate on April 20th, do you have an opinion as to why it did not shut in the well on April 20th?
14:18 **A.** Yes.
14:18 **Q.** What is your opinion?
14:18 **A.** The extreme flow from the well created a lift on the drill pipe, which helically buckled drill pipe, forcing it to the

side of the bore and the shear rams operated a -- contacted drill pipe on the side of bore outside the shearing area and -- disabling the ability for the ram to fully close, seal, and seal the well.

Q. As you've read the reports of other experts who have been hired to review the BOP in this matter, as you've sat and heard the testimony in this case, is there any dispute that the pipe was off-center at the time that the blind shear ram activated?

A. No, sir.

Q. In your opinion and based on your review of the forensic evidence, was it possible for the pipe to have been off-center on April 22nd, at the time of the autoshear activation?

A. Not in my opinion.

Q. We'll explore that in detail in a minute.

Turning to your third opinion, do you have an opinion as to whether maintenance played a role in the blind shear rams' ability to shut in the well?

A. I do.

Q. What is that opinion?

A. There's no maintenance issue that played any role in the ability for the shear rams to close and seal on that off-center pipe.

Q. Now, we've heard quite a bit of testimony in the case that a dead 27-volt battery in the blue pod and faulty solenoid in the yellow pod could have prevented the blind shear ram from

functioning on April 20th; and we'll get into more detail on that in a minute.

For right now, let me ask you: Do you have an opinion as to whether any maintenance issues with the blue pod's 27-volt battery or the yellow pod's solenoid 103 affected those pods' ability to operate the blind shear ram?

A. They did not.

Q. And does the forensic evidence support your opinion that the blue pod 27-volt and the yellow pod solenoid functioned the blind shear ram on April 20th, 2010?

A. Yes, it does.

Q. In your fourth opinion and final opinion, do you have an opinion as to whether the configuration of the BOP stack on the *Deepwater Horizon* at the time of the incident complied with industry practice?

A. Yes, I do.

Q. Please tell the Court that opinion.

A. The configuration of the BOP stack did comply with industry standard.

Q. Okay. So that we understand your opinions as we get into them, let's first talk about how the BOP operates.

MR. BAAY: If you'll pull up D-6667.

BY MR. BAAY:

Q. This is a schematic I think the Court has seen quite a bit, but just orient us to the key components of the *Deepwater*

Horizon blowout preventer.

A. We'll be talking about the upper annular and the LMRP, the blind shear ram, the very top of the main BOP stack, and the variable bore rams below the casing shear rams.

Q. Remind us, what is the purpose of the blowout preventer?

A. The BOP, blowout preventer, is there when there is any abnormal pressure incurred, sometimes called a kick, to be able to close these, hold in that pressure, give you time to decide what to do next, and take care of that kick.

Q. Okay. Let's first talk about the upper annular.

MR. BAAY: Gary, if you'll pull up D-6668.

BY MR. BAAY:

Q. Mr. Childs, as we look at this animation, describe for us how the upper annular operates.

A. The green portion we see is actually an annular piston. The pressure below the annular piston pushes up through this T-shape called the annular blue piece, which is called a pusher plate.

This part is a solid rubber doughnut. As the pusher plate pushes it up, since this rubber is incompressible, it then forces this, which is the packer, inward until it contacts the pipe and seals against it.

The packer is rubber and steel inserts. The darker gray we see here, top and bottom, are parts of a segment that run completely through the height of the packer and strengthen

14:22 the packer so that it can hold the pressure. The rubber itself
14:22 is not sufficient for holding 10,000 psi, and it requires the
14:22 help of these metal inserts.
14:22 **Q.** If the upper annular operates correctly in a well control
14:22 event, what is the effect?
14:22 **A.** You get a seal between the wellbore, which is the
14:22 18 3/4 wellbore we're seeing here, and the pipe that's within
14:23 the packer.
14:23 **Q.** You mentioned this dark gray material that we see in
14:23 D-6668.
14:23 **MR. BAAY:** Gary, if you'll pull up D-6751.
14:23 **BY MR. BAAY:**
14:23 **Q.** Is this a picture of one of those inserts you were
14:23 describing?
14:23 **A.** Yes. The top view is a top view of one of the several
14:23 inserts within the annular packer. This portion right here is
14:23 basically T-shaped. You'll see another photograph, and you'll
14:23 notice it.
14:23 The bottom piece, this would be this -- the top end
14:23 that we're seeing here, the top end flange and there's another
14:23 bottom end flange here and then there's a web of steel
14:23 connecting these two.
14:23 Now, in this case, rubber is still -- it's still
14:23 encased by some rubber from the packer and then the packing
14:23 element -- it is fully encased in rubber on the right, as we'll

see here in just a minute.
Q. So in operation, these are standing right side up through the upper length of the upper annular?
A. Yes. This would be up, this end. So it would be up this way.
Q. Let's go to D-6669, which would be the bird's-eye view of the upper annular.
A. You can see the triangular-shaped metal inserts we're seeing here. As the annular closes, you see the inserts move much like the iris of a camera. We'll watch them again as they close around the pipe.

The rubber contacts the pipe, seals against the pipe, and this steel array of inserts contains that rubber. Again, the rubber cannot contain the pressure by itself. That is used to help contain the 10,000-psi rating of the upper annular.
Q. And these steal irises you were talking about, that's what we just viewed in D-6751?
A. Right. These are the top flanges of that segment, which are solid steel.
Q. All right. Let's turn now to the variable bore rams. How many variable bore rams did the *Deepwater Horizon* stack have?
A. There were three sets of variable bore rams.

MR. BAAY: Let's pull up D-6670.

BY MR. BAAY:
Q. Mr. Childs, I'll have you describe for us how these

components work.

A. We're seeing the right-hand and left-hand VBR ram and packer. They're identical units. They're just rotated to the opposite sides.

The operators are outside of this. The yellow portion is the operators. We've already seen it be actuated to the fully-closed position.

Within these rams is a packer that's much like your annular packer we just saw that contains these inserts, the iris like the camera lens. We have the side of the packer that seals against the side of the bore, the top seal, sealing around the floor wellbore.

Within here, as soon as we contact the pipe, it packs off around the pipe. The inserts help to form this metal ring that in this case hold 15,000 psi.

MR. BAAY: Let's look at D-6671.

BY MR. BAAY

Q. Does the variable bore ram seal the wellbore around the drill pipe just as the annular does?

A. The same basic way, except it's in two halves with the two rams. You'll see it's closed around the pipe. These metal inserts, we see the tips of the fingers here that form this nice metal ring around the pipe and help the ram have the ability to hold a full 15,000 psi.

Q. Let's talk now about the blind shear rams.

14:26 **MR. BAAY:** We can pull up D-6672.
BY MR. BAAY
Q. Describe for us how the blind shear rams function.
A. Very similar. We have the operators left and right. We have a lower shear ram on our right and an upper shear ram on our left.
The lower, of course, has the lower blade; and the upper has the upper blade. And contained within the upper ram block is a seal we cannot see running side to side that will allow sealing of this blade against it to form a complete seal when it's closed.
Q. Now, the upper BSR has the V-blade?
A. Yes. The upper blade is "V" shaped, as we can see here. The lower blade is straight or flat.
Q. And you've been involved in the design of blind shear rams throughout your career?
A. I have.
Q. In fact, did you give the name to Cameron's shearing blind ram?
A. My boss and I were in the office one day contemplating its name and we both came up with "shearing blind ram," as it's named.
Q. Now, is this the only component that severs the pipe and shuts in the well?
A. This is the only one that will, as you say, sever and seal

14:27 the well. That's the blind portion of the name. The blind portion of the name of the ram is the ability to seal the bore.

MR. BAAY: Let's look quickly at D-6673.

BY MR. BAAY

Q. This is, again, a bird's-eye view. Tell us what we see here.

A. As the rams close, we see the straight blade on the lower and the "V" shaped on the upper. It first collapses the pipe. Then it shears through the pipe. The upper piece is housed in this cavity as we see right here.

Below this, the lower piece has a cavity. It is also housed within. And that lower blade, the straight one, has gone across to that packer that's housed inside the upper ram block and seals across there, again, achieving a complete wellbore seal of up to 15,000 psi.

Q. Okay. I now want to talk about a component that I don't believe the Court has heard discussion of yet. So we go to our cutaway of a stack at D-6667.

Describe for the Court, or point out, where the ST locks are on the *Deepwater Horizon* -- excuse me -- BOP.

A. The upper shear ram and all three sets of variable bore rams, the ST lock on each end of the operators.

Q. So each of the variable bore rams and the blind shear rams have an ST lock?

A. Two locks per cavity. And there's one, two, three -- four

cavities with locks.

Q. If we look at D-6674, describe for us how these locks operate.

A. We're going to have -- the rams go to the closed position. The locks are used to lock them in the closed position. They are a hydraulically actuated lock that mechanically holds the rams in the locked or closed position.

We have colored the tail rod, in this case, yellow and black to see it better. It is part of the operating piston that's connected to the ram way to the left. Once it's in the fully closed position, you see there's an angle on the end of the tail rod.

This blue portion, this wedge, in the lock is forced hydraulically across until it contacts that same angle; and this mechanism we see up here is used to lock that wedge in that final position.

So now even if hydraulic pressure is lost from the lock or lost from the operator, it will stay in the closed and locked position.

Q. Now, why would you want to function your ST locks?

A. When you have the need to pull the LMRP, let's say, for a repair of a pod -- a pod's gone bad, you pull the LMRP to repair that, you have the BOP stack left on the ocean floor. You want to keep your well, of course, very safe.

So you would close the rams, to seal; and you would

14:30 lock the locks behind those rams. Just in the very slight case we lose hydraulic pressure from any type of leak, if there's any leak occurring and you lose the hydraulic pressure and you didn't have a lock, the rams could come back open.

So we mechanically lock them closed through -- what's involved in here requires another hydraulic action to unlock this to allow this to move back. So it is locked in the position much like the deadbolt lock on your door.

MR. BAAY: All right. Gary, play that back to the open position, please.

BY MR. BAAY:

Q. If your ram comes open and this tail rod slides back, will your ST locks close?

A. No. You have to have the ram in a fully-closed position; otherwise, it will interfere with this hold that's running through this blue wedge piece. It will not be able to lock.

Q. So if your ram comes open, what's to prevent the ST lock from fully shutting it?

A. The mechanical interference of this tail rod with the wedge itself.

Q. Thank you, Mr. Childs. We can pull that down.

I want to talk now a minute about the blowout preventer's backup systems for *the Deepwater Horizon*.

To your knowledge, what systems were in place to control the BOP in the event of an emergency?

14:31 **A.** The AMF -- sometimes called the deadman system -- and the autoshear system.
14:31 **Q.** Did the *Deepwater Horizon* also have an EDS system that we've heard about, emergency disconnect system?
14:31 **A.** Yes. EDS system can be emergency only, but it can also be manually activated. That's why I meant it as a separate entity.
14:31 **Q.** If the rig loses power, is the EDS able to operate the BOP?
14:31 **A.** If you've lost communication down the MUX cable to the stack, the EDS will not operate.
14:32 **Q.** Mr. Childs, you were here last week when Mr. Perkin and Dr. Davis testified?
14:32 **A.** I was.
14:32 **Q.** Mr. Perkin testified that the rig crew should have chosen a different sequence for the EDS functioning in this case.
14:32 Do you recall that testimony?
14:32 **A.** I do.
14:32 **Q.** Now, what is the difference between the two possible sequences related to your EDS?
14:32 **A.** Most of the time we've been calling them EDS-1 and EDS-2. But if you look at the panel, they're called normal and casing.
14:32 I think we saw a view of that on screen. I think we saw that on screen. Normal would be EDS-1. Casing would be EDS-2. EDS-1 closes only the sealing shear rams, the blind

14:32 shear rams.
14:32 EDS-2 would close the casing shear rams first and
14:32 then close the sealing shear rams.
14:32 **Q.** Are there tradeoffs between the two sequences?
14:32 **A.** Yes. There's a great difference in timing here.
14:33 The shearing blind shear rams have about -- can close
14:33 in 30 seconds in an emergency. They can close in less than
14:33 that, in as little as 16 seconds. Whereas, the super shear
14:33 rams have double the volume at least and they require double
14:33 the time to close. They have to complete closure, and then the
14:33 shear ram has to, then, have its own 16 to 30 seconds to close.
14:33 **Q.** So if there were an EDS-2 and the casing shear rams were
14:33 designed to operate first, that sequence takes longer?
14:33 **A.** The entire EDS-2 sequence does take longer. The quickest
14:33 close-in would be EDS-1.
14:33 **Q.** Is there anything that the crew could have done in the
14:33 case of the *Deepwater Horizon* -- anything they could have done
14:33 differently with respect to the EDS system that would have
14:33 impacted the blowout preventer's ability to shut in the well on
14:33 April the 20th?
14:33 **A.** Since we had no connection anymore through the MUX cable,
14:33 it wouldn't matter which EDS, 1 or 2, it was in.
14:34 **Q.** Now, describe for us how the automatic mode function
14:34 works.
14:34 **A.** Automatic mode function originally came up with -- was

originally come up with if we had complete loss of the drilling riser. So if the drilling riser fails, we've lost hydraulics. We've lost communication. We've lost power with the surface.

So it would automatically close the shear rams and protect the well. That's why it's called a deadman system, all systems are gone, and it would achieve a safe condition.

Q. So once the AMF perceives those conditions, it activates the blind shear ram?

A. That's correct.

Q. Mr. Perkin also testified that the -- let me first ask you: Does the AMF system trigger the ST locks that you just described for us?

A. After it triggers the shearing blind shear rams, it also activates all ST locks on the stack.

Q. Now, Mr. Perkin also testified that the AMF on the *Horizon* could have/should have been able to activate the casing shear rams first, followed by the blind shear rams.

Do you recall him saying that?

A. I recall that.

Q. Do you agree with that testimony?

A. No.

Q. Why not?

A. First off, the crew had no chance to change that. This is something programmed in from the original concept of the rig and the stack. They could have made no change to it.

14:35 **Q.** And like the EDS, would that second sequence of a different sequence that functions the casing shear ram first, would that take longer to shut in the well?
14:35 **A.** Same scenario as we listed before. The additional time for closing the shearing -- the casing shear rams and then closing the shearing blind rams.
14:35 **Q.** Mr. Childs, was it consistent with industry practice, at the time of the incident, to use an AMF system that was programmed to immediately activate the blind shear rams and shut in the well?
14:35 **A.** The majority I've seen close the sealing shear ram.
14:36 **Q.** And the autoshear is another system we've heard about in that case. Just tell us very briefly how that works.
14:36 **A.** A slightly different system in that it is built around the possibility that inadvertent disconnect of that LMRP from a BOP stack if, for some reason, it becomes disconnected. Again, you want to protect your well, you want to close in the shear rams.

If that lifts up, there's a mechanical device that says, "Okay. This is not here anymore. Close the shear rams."

MR. BAAY: D-6573.

14:42 **BY MR. BAAY:**
14:42 **Q.** So if your LMRP separates from your lower marine riser pack, will that trigger the autoshear?
14:36 **A.** That will directly trigger the autoshear.
14:36 **Q.** And it's a plunger-activated system?

14:36 **A.** The plunger is mechanically operated. As soon as that lift-up occurs it senses that, sets off the system, and would close your sealing shear rams.
14:36 **Q.** Same sequence as the AMF. It functions or activates your blind shear rams?
14:36 **A.** Correct.
14:36 **Q.** Let's turn to your opinions, Mr. Childs.
14:37 **MR. BAAY:** If we can put back up D-6686 and talk about your first -- beginning with the BOP function on April 20th.
14:37 And we can pull up TREX-43093.41.1.TO.
14:42 **BY MR. BAAY:**
14:42 **Q.** Do you recognize this table, Mr. Childs?
14:37 **A.** Yes. It's out of the DNV report.
14:37 **Q.** Is this a table summarizing the observations of the BOP components as received -- as the BOP was received at Michoud?
14:37 **A.** Yes, it does.
14:37 **Q.** What did DNV do to determine the position of these components when they recovered the blowout preventer?
14:37 **A.** These were -- in the original examinations they were able to look first at the annular, look down in it and see that it was closed.
14:37 **Q.** Were there also x-rays taken in the month following the Macondo incident confirming the position of the *Deepwater Horizon* BOP components?

14:37 **A.** Yes, sir. Prior it this, BP had x-rays taken showing that the rams were in the closed position.
14:37 **Q.** All right. So looking at 43093, what did DNV state -- what data did they collect about the position of the upper annular?
14:38 **A.** The upper annular was in the closed position.
14:38 **Q.** What do they state about the position of the upper variable bore rams?
14:38 **A.** They were in the closed position.
14:38 **Q.** Now, did the x-rays taken in May of 2010 agree with the data we see here from DNV's table?
14:38 **A.** Yes, the data did.
14:38 **Q.** Now, the table indicates that the blind shear ram was -- has starboard closed, port open.

Explain to us why that was the data collected.

14:38 **A.** In any ram BOP operation or hydraulic system, one's going to reach fully closed first; the other's going to come up to meet it.

As we know here, since the pipe is off-center, one could not complete a closure. So actually, I believe that "open" should say "partially open."

It definitely was not fully closed. It could not have fully closed. The pipe was in the way, so it was partially open. But that's listed as open in this chart.

14:39 **Q.** So it's your opinion, as you've stated, that the blind

14:39 shear ram didn't fully close because of the off-center pipe?
A. Precisely.
Q. And that's supported by the evidence that we see here as collected by DNV.
A. Yes. There's no dispute that the pipe was on the side of the bore, keeping the rams from fully closing.
MR. BAAY: Dennis, let's look at D-6703.
14:42 **BY MR. BAAY:**
Q. Mr. Childs, if we highlight those top three categories, does this chart accurately reflect the agreement by the experts in this case that the upper annular, the variable bore rams, and the blind shear rams all functioned?
A. Yes, it does.
Q. Have you read any dispute from those positions?
A. I have not.
MR. BAAY: You can pull that down.
Let's put up D-6661. I believe this is a demonstrative that Mr. Doyen showed to Mr. Perkin.
14:42 **BY MR. BAAY:**
Q. Were you in the courtroom for that, and do you recall this demonstrative?
A. I do.
Q. Now, is there a dispute among the experts in this case as to when the blind shear ram functioned?
A. There is.

14:40 **Q.** And is there a dispute among the experts in this case as to why the pipe was off-center when the blind shear rams functioned?
14:40 **A.** There is.
14:40 **Q.** Do you believe that the why and how of how the pipe was forced off-center helps us to answer this question as to when the blind shear ram might have activated?
14:40 **A.** Yes, it does.
14:40 **Q.** And does that help us to understand when it might have closed on this off-center pipe?
14:40 **A.** Yes, that as well.
14:40 **Q.** I'm going to ask you now --
14:40 **MR. BAAY:** You can pull that down. Thank you, Dennis.
14:42 **BY MR. BAAY:**
14:42 **Q.** If your microphone's working, we'll step to D-6635. And going to your second opinion that the blind shear ram failed to shut in the well, please just describe for the Court, using the sponge pipe as our drill pipe, why you believe the pipe came off-center and why the blind shear rams were unable to seal it.
14:41 **A.** Yes. As Mr. Doyen also did, I'm using this so I don't hurt myself with real pipe. This is foam pipe.
14:41 The pipe was in the bore, stream flow from the well is creating a lift on the pipe, forcing the pipe into a helically-bowed position.

Q. Where did that helical buckling take place?
A. It occurred between the bottom of the well, pushing up, and the pipe tool joint against the upper annular.
And we have both the weight of the drill pipe above, which is in excess of 100,000 pounds, and we have also --
THE COURT: I don't know if you can hold it in your hand. Whenever you turn your head, you're away from the microphone.
THE WITNESS: I thought I heard it going. So...
Well, I need three hands right now.
THE COURT: Well, maybe somebody can loan you one.
BY MR. BAAY:
Q. Use the microphone.
What force bent the pipe at the level of the blind shear ram?
A. The helical buckling from the extreme flow from the bottom buckled the pipe, put it in a bowed position. The tool joint went up against the annular. Once it's in the bowed position, it's at the side of the wellbore.
Q. Thank you. You can take your seat.
Now, when do you believe the lifting and the buckling of the drill pipe occurred?
A. There was sufficient lift to buckle the drill pipe right prior to annular closure.
Q. You have to speak up.

14:43 Based on your review of the forensic evidence, do you believe that this is the only plausible explanation for how the pipe was moved off-center when the blind shear rams activated?

A. When I look at the entirety of the evidence, everything learned forensically, yes, this is the only time.

Q. Did you find any plausible explanation for how the pipe could have been still off-center on April 22nd, at the time of the bottom shear activation?

A. No. Nothing, again, that matched all the evidence.

Q. Now, let's go through the series of events that occur as relates to the blowout preventer from the *Deepwater Horizon* and have you explain those events to us.

A. Yes.

MR. BAAY: If we could pull up D-6679.

14:42 **BY MR. BAAY:**

Q. Describe for the Court what was happening in the BOP as the well was flowing and the crew closed the upper annular.

A. We're showing here the extreme flow in the well, again, creating the lift on the pipe. As it's creating lift on the pipe, of course, the tool joint is moving up. It was placed below the annular. The action of the extreme flow pushed the tool joint partially into the upper annular BOP, which we've already seen we closed.

The effect of that, of course, is that since the tool joint's partially in the packer, it kept it from achieving a

14:44 complete seal, because the lower segments were not able to
14:44 close all the way as compared to the top segments.
14:44 **Q.** Okay. If we go back to the start of the sequence, when
14:44 did you believe that the crew operated the upper annular?
14:44 **A.** It was closed by 9:47, right in that range.
14:44 **Q.** The upper annular?
14:44 **A.** The upper annular, yeah. I'm sorry. I'm a few minutes
14:44 off. Excuse me. 9:43.
14:44 **Q.** So your opinion is the upper annular was activated by the
14:44 crew at 9:43?
14:44 **A.** Actually, it was slightly earlier, and fully closed by
14:44 9:43.
14:44 **Q.** I believe you testified that the tool joint, which we see
14:45 here, was below the upper annular at the time the crew closed
14:45 in the upper annular?
14:45 **A.** Right. It started below, and the force from the lift,
14:45 from the extreme flow of the well, lifted the tool joint up
14:45 into the annular, as we've depicted here, again, interfering
14:45 with the ability of the packer to close completely.
14:45 As Mr. Barnhill mentioned earlier this packer could
14:45 close on a tool joint if the tool joint was in -- in its
14:45 entirety was in the packer. But the fact it's partially on a
14:45 tool joint here and partially on plain pipe did not allow it to
14:45 have full closure, and we know it did not get a complete seal.
14:45 **Q.** Now, as you've described and others have described, the

14:45 tool joint is a slightly wider diameter than the rest of the drill pipe.
A. Yes. It's approximately 6 1/4, 6 3/8-inch in diameter, where the pipe is 5 1/2.
14:46 **Q.** What's the basis for your opinion that the tool joint was below the level of the upper annular before the crew activated the upper annular at 9:43?
A. We have both the fact that -- as we've heard earlier today -- that you place the tool joints out of the sealing elements, out of the BOP, so that when you close the BOPs, they can close on slick or plain pipe.
We have also the forensic evidence of the Sperry-Sun data showing continued lift on the drill pipe.
Q. Now, did you consider hook load data in forming your opinion that the well -- excuse me -- the flow from the well lifted the tool joint into the upper annular as it was closing?
A. Yes. The Sperry-Sun data I mentioned was -- and the hook load data are the same.
MR. BAAY: Let's look at D-6683.
14:42 **BY MR. BAAY:**
Q. Describe for the Court what hook load data is.
A. Hook load is, of course, in the derrick. The drill pipe's connected to the hook, and you have an indication of weight. So you know how much weight, the string, is exerted on this hook at the top in the derrick.

14:47 In this graph, the orange line is our hook load.
14:47 **Q.** Now, does the hook load serve as a type of scale to measure the weight of your drill string?
14:47 **A.** It measures continually the weight of the drill string.
14:47 **Q.** As we look at this ascending measurement here of hook load, which you pointed out was the orange line, why at 2140 do we have ascending hook load weight?
14:47 **A.** At this point in time, the riser is being filled more and more with gas. As we fill it with the gas, the bouyant force on the drill pipe is going down. So, in effect, the hook load is seeing a heavier load because the pipe is getting heavier because of lack of buoyancy.
14:48 **Q.** So as the well fills up with gas, the pipe feels heavier to the hook, the weight goes up, as measured by the hook load?
14:48 **A.** That is correct.
14:48 **Q.** Now, under normal operating conditions, with the drill pipe in the hole, what would you expect to see if you were monitoring the hook load?
14:48 **A.** A relatively constant number. Not exactly constant, but more constant than this.
14:48 **Q.** You don't expect to see these ups and downs in normal conditions?
14:48 **A.** No. You would not be having a change in buoyancy. Your only change would be maybe weight on bit and your penetration into the hole as you're drilling.

14:48 **Q.** What happens to the hook load when the crew closes the annular at 9:43?
14:48 **A.** Two things are happening here. Eventually, the loss of buoyancy gets overrun by the lift being caused by this extreme flow. Because as we're losing this gas and it's expanding out of the well, we're getting more and more flow at the surface, getting more and more flow at the bottom of the well, as well, lifting on this pipe.
14:49 So that overruns the loss of buoyancy, and you start getting a continued lifting of the drill pipe, which is lessening the load on the hook.
14:49 **Q.** And you believe that's caused by the flow of hydrocarbons entering the wellbore?
14:49 **A.** Yes.
14:49 **Q.** So what does this lightening of the hook load tell you, as it relates to your opinion that the tool joint rose to the level of the upper annular?
14:49 **A.** That it started rising, as we showed in our animation earlier, and that it continued rising up into the packer.
14:49 **Q.** Now, are there other experts in this case who agree with your opinion that the flow of the well lifted the tool joint?
14:49 **A.** Yes.
14:49 **Q.** Who do you recall agrees with you on that opinion?
14:49 **A.** Dr. Neil Thompson and Mr. Stevick.
14:49 **Q.** So if we look at this line here and highlight that.

So plaintiffs' Mr. Perkin, and Mr. Stevick from Halliburton?

A. I'm sorry. I left out Mr. Perkin. That's correct.

Q. All right.

MR. BAAY: We can pull that down.

BY MR. BAAY:

Q. You've mentioned this already, but tell me again.

Was the upper annular able to seal around the drill pipe, and if not, why not?

A. No. From the data we have, forensic data we have, we see that it does not complete a complete seal. That's due to the tool joint partially being within the packer.

Q. Okay.

MR. BAAY: Gary, will you pull up D-6681 and just freeze it on the initial frame, please.

BY MR. BAAY:

Q. I'm going to approach, Mr. Childs, and show you a model that's already been marked as D-6659. I believe you'll remember this one.

A. Yes, I remember that one.

Q. And as you heard described last week, this was created from the laser scan data from DNV.

A. Yes. 3D laser scan, and then printed from that laser scan information.

Q. And you've been out to Michoud, and you've inspected the

14:51 real tool joint, and you've seen the erosion patterns.
14:51 Does it accurately represent the tool joint as
14:51 recovered from the *Deepwater Horizon* BOP?
14:51 **A.** Yes, it does.
14:51 **Q.** All right. Now, I want you to tell us what these erosion
14:51 patterns at the top of the tool joint, and higher up on the
14:51 pipe, what do they tell us about the position of the tool
14:51 joint?
14:51 **A.** You can see, of course, massive erosion at this level.
14:51 And 18 inches higher, we have more massive erosion at this
14:51 location. As we're seeing in the graphic here, this is where
14:51 the tool joint started within the packer.
14:51 What's opposed to this are those metal inserts we
14:51 were looking at. The metal inserts here created a much, much
14:51 higher velocity through that neck-down area which, again,
14:51 increased the erosion. You'll see I'm sticking my finger in
14:51 the erosion here that's over an inch deep.
14:52 The same basic thing was happening up here. This
14:52 erosion was occurring at the top of the packer. The packer is
14:52 15 inches -- or 18 inches tall, thus, the dimension between
14:52 these massive erosion areas. So the upper inserts form the
14:52 basic same thing. We have them close. The velocity had to
14:52 increase.
14:52 The amount of fluid that's trying to come out of this
14:52 well in an 18 3/4 bore is now going through a very -- a much

smaller area. As the velocity increases, the erosion increases, and erosion creations here as well.

Q. So our most pronounced areas of erosion are at the bottom of the upper annular and at the top of the upper annular?

A. Yes.

Q. And just one more time. Tell me why those become our pinch points.

A. Because that's the area with the most velocity due to the restriction caused by the inserts here and the inserts here, the metal inserts.

Q. So does the forensic evidence, as collected by DNV, support your opinion that the tool joint was at the level -- or at the bottom of the upper annular at the time the well came in?

A. Yes.

Q. Mr. Childs, if the -- just play this through, this D-6681, and describe for us what you were describing as we looked at the tool joint model just a minute ago.

A. We're showing how this -- all this flow is coming out of this larger bore, as being necked down through this annular.

The velocity increases considerably, to be able to get that same amount of fluid through. We get that erosion.

This is the 3D scan printed here on the 2D. We see the massive erosion here, which matches the piece we just looked at.

This is the bottom of the packer. Here are those inserts. You see the inserts are right opposing that massive erosion.

Q. If the flow was pushing the drill pipe and the tool joint up into the upper annular with great force, why did this tool joint not go all the way through the level of the upper annular?

A. Not only do we have the restriction of the annular, we have the 100,000 pounds or more weight of all the drill pipe above that's pushing down on this. So it reached this point -- it was restricted at this point and pinned at this point.

MR. BAAY: Let's pull up D-6679.

BY MR. BAAY:

Q. Mr. Childs. I'm going to ask you to describe for us what happens to the remainder of the drill pipe once the tool joint is trapped in the upper annular.

A. Of course, we're pushing up from the bottom of this massive erosion and it helically buckles that drill pipe, as we're depicting here, which is a standard phenomenon. The natural deflection of this drill pipe, it wouldn't just deflect to the side, it actually takes a helical shape within its constraints, which in this case is the 18 3/4 wellbore.

Q. Does the upper annular serve as a pinpoint once the pipe buckles in the level of the BOP?

A. Yes. As we just discussed, it stopped here, pinned at the

packer, and we also have the assistance of the weight of all the pipe above.

Q. Does the fact that it's pinned by the upper annular assist with the buckle or contribute to the buckle?

A. It absolutely helps, yes.

MR. BAAY: Let's pull up D-6678, please.

BY MR. BAAY:

Q. Once the crew closed the upper annular, what was the next action they took as it relates to the blowout preventer?

A. Of course, we -- excuse me -- we did not get a good seal. So at 9:46, and probably full closure by 9:47, the VBRs were closed.

MR. BAAY: And we'll play D-6684.

BY MR. BAAY:

Q. Describe for Judge Barbier what happens to the drill pipe inside the BOP when the VBRs are closed -- or variable bore rams are closed.

A. We're depicting closing of the VBRs on this flowing well. And once we start achieving a seal, we turn the drill pipe red on purpose because we now have achieved a seal on the pipe and around the wellbore, meaning that the pressure that's in the wellbore below is now contained with -- within the drill pipe.

So the drill pipe pressure started going up rapidly.

MR. BAAY: If we play D-6685.

14:56 **BY MR. BAAY:**
14:56 **Q.** What does the closing of the variable bore rams do to the buckling of the pipe?
14:56 **A.** It slightly centers it at the bottom but also traps this buckle in between. Now that we have the pressure below, we have the assistance of the pressure end load below the VBRs pushing up on the pipe to hold it in the buckled position. We have it pinned at the top.
14:56 And with the pinning here and a pinning here, just the increase in pressure in this pipe will also buckle it. If you have fixed ends on a pipe and you increase its pressure, it will buckle just from that increased pressure.
14:57 **Q.** So like the pinning of the upper annular, did the pinning at the level of the variable bore ram contribute to the buckle at the level of the blind shear rams?
14:57 **A.** It contributed to it and helped hold it in position.
14:57 **Q.** Now, there's been others in this case -- I believe a Mr. Shanks. Are you familiar with Mr. Shanks?
14:57 **MR. BAAY:** Can we put that back up.
14:57 **THE WITNESS:** Yes, I'm familiar with Mr. Shanks.
14:57 **MR. BAAY:** Can we put up D-6685.
14:57 **BY MR. BAAY:**
14:57 **Q.** Mr. Shanks has testified that the closing of these variable bore rams short-circuited the flow up and would have reduced the buckle. Do you agree with that opinion?

14:57 **A.** Well, at this point in time, the flow -- the buckle is not really there -- continuing to be there because of the flow. We've already trapped the buckle in place. We have the pressure end load pushing up on the end of the pipe and the other phenomenon I just mentioned where trapped pipe on either end, when you increase the pressure, also buckles.

14:58 **Q.** You talked about pressure end load. What do you mean?

14:58 **A.** Below the rams -- we have a differential pressure between the top of the rams and the bottom. There's more pressure below. So this pressure is trying to push that pipe up through the VBRs as well.

14:58 **Q.** So the difference in pressure below the variable rams versus above contributes to the buckle?

14:58 **A.** It's all three were involved. It was helically buckled prior to VBR closure, slightly centered. But we have the trapped buckle that increases from the pressure end load, and just the fact that the pressure in the pipe is increasing.

14:58 **Q.** Mr. Childs, were you the first expert in this case to offer an explanation as to how the drill pipe between the upper annular and the variable bore rams was forced off-center?

14:58 **A.** No, I was not.

14:58 **Q.** Other than your work, did any other experts in this case conclude that the flow from the well pushed the drill pipe off-center on April 20th?

14:58 **A.** Yes, they did.

14:58 **Q.** And who was that?
14:58 **A.** We had Dr. Neil Thompson again and he --
14:59 **MS. HANKEY:** Objection, Your Honor. He's referencing an analysis by DNV, which has been excluded by the Court.
14:59 **MS. KARIS:** I join that.
14:59 **THE COURT:** We can't talk about DNV's --
14:59 **MS. KARIS:** We would move to strike any prior opinions that relied on Mr. Thompson's work in connection with DNV which he's previously referenced.
14:59 **THE COURT:** I'll sustain that.
14:59 **BY MR. BAAY:**
14:59 **Q.** Mr. Childs, I'll ask you to focus on the experts who have been identified by the parties in this litigation.
14:59 **A.** I will. I'm sorry.
14:59 **Q.** Who other than you has come to the conclusion that the flow from the well pushed the drill pipe off-center on April 20th?
14:59 **A.** Mr. Stevick, which is working for Halliburton.
14:59 **MR. BAAY:** If we can go to D-6687 -- excuse me -- 6678.
14:59 **BY MR. BAAY:**
14:59 **Q.** All right. So the crew has closed the upper annular at 9:43. They closed the variable bore rams at 9:47.
15:00 What happens next on the rig during the sequence of the events?

15:00 **A.** Explosion's at 9:47.
15:00 **Q.** And once the explosion occurred, did the rig lose power?
15:00 **A.** It lost all power. The rig is now adrift, no longer held in location. It is drifting out around due to wind, currents, and other effects.
15:00 **MR. BAAY:** Let's pull up, please, D-6687.
15:00 **BY MR. BAAY:**
15:00 **Q.** Going back to the level of the upper annular or the top section of the upper annular, what was the condition of the drill pipe at that point? And I'm talking about the level just here above these metal inserts you've been talking about.
15:00 **A.** Right. Again, severe erosion that continued still. Getting very thin walls in this area.
15:00 **Q.** Okay. And if you'll -- let's try one more time to step over towards the board.
15:00 I'd like for you to demonstrate for the Court what
15:01 happens to the drill pipe as the rig drifts off location and
15:01 loses power and drifts off location.
15:01 Keep your mouth to your microphone, or try to.
15:01 **A.** I'll look down.
15:01 We have the tool joint trapped here. This is
15:01 depicting the tool joint right here. We have a tool joint
15:01 here. And as erosion, of course, continued, we have erosion
15:01 here and here. And as the rig drifts off location, of course,
15:01 added tension is being added to the drill pipe.

15:01 As the rig is going further away, naturally, it's pulling on the drill pipe. As it pulls on the drill pipe, it reached the tensile capacity of this pipe and breaks the pipe at Location E, right above the upper annular.

Q. So if we're looking at D-6636, where do you believe the separation occurred?

A. Top of 1-B-1, right here at the top of the annular, which is the bottom of 39 E.

THE COURT: Between the purple and green sections?

THE WITNESS: Between these two sections, yes. The very top of the annular, which we're seeing up here. We're going to depict it in the video in just a minute. It eventually separated at this location.

BY MR. BAAY:

Q. Just for everyone's reference, who recorded these pipe conditions in the BOP?

A. These are all as found at Michoud. The locations, the numbers, the separation points were all named at Michoud.

Q. And so DNV identified the pipe -- conditions of the pipe -- locations of the pipe, excuse me, and assigned each section of pipe a number and a color?

A. Right. They determined which joint connects to which joint both by appearance and forensically.

If we go on to C, this is where all the pipes were found at the end, where the pipe is found in the riser kink.

15:03 So we know they ended up here.
15:03 So right prior to the kink, they had to be in this
15:03 position, as we showed, at Position B. Not everybody can see
15:03 the bottom of the board.
15:03 **Q.** We'll get to that.
15:03 **A.** This is A, B, and C.
15:03 **Q.** We'll get to that in one minute. Let's go look at the
15:03 animation of the rupture you just described at D-6687.
15:03 We can play this forward.
15:03 Why do we see a rupture at this point in the drill
15:03 pipe?
15:03 **A.** As its pressure is increasing -- we've already talked
15:03 about this massive erosion. The pipe wall has gotten very
15:03 thin. Pressure increases. We blow out -- what we call a
15:03 rupture, blow out a hole in the side of the riser.
15:03 **MR. BAAY:** Let's go to D-6668.
15:03 **BY MR. BAAY:**
15:03 **Q.** Describe for us what happens after the rupture, as you
15:04 just demonstrated with the pipe at the board, at D-6636.
15:04 **A.** This is our animation. As the rig is drifting off
15:04 location, it continually pulls on the drill pipe until it
15:04 exceeds the tensile capacity of the drill pipe, and we
15:04 separate, as we've just shown here.
15:04 **Q.** All right. Mr. Childs, when do you believe the separation
15:04 occurs between 1-B-1 E and 39 E?

15:04 **A.** Within about 10 minutes of the explosions.
15:04 **Q.** 10 minutes following explosion on April 20th, 2010?
15:04 **A.** On April 20th, yes, sir.
15:04 **Q.** And does the -- did the pipe tensilely fail at the point of 1-B-1 E?
15:04 **A.** Yes, it did.
15:04 **Q.** What do you mean by "tensile failure"?
15:04 **A.** It's where you're going to keep pulling on a part until we reach its ultimate strength and it fails in tension, just like I showed with our foam piece, where it suddenly pops apart.
15:04 **MR. BAAY:** Let's put up on the screen D-6704, please.
15:05 **BY MR. BAAY:**
15:05 **Q.** Are these accurate photos of the sections of pipe we've just been discussing, both 1-B-1 E and 39 E?
15:05 **A.** Yes. These are the two pieces. I'm talking, of course, 1-B-1 E and 39 E in these two pieces we're seeing up on the screen.
15:05 **Q.** Now, like we did for the tool joint, we've created a 3D model from DNV's laser scan data of 1-B-1 E.
15:05 My question for you is: Do the erosion patterns and the break at 1-B-1 E support your opinion that the pipe tensilely failed?
15:05 **A.** Yes.
15:05 It shows us several other things. It shows the massive erosion that occurred on this piece. You can see --

I'll hand this to you, if you wish. This is almost a knife edge in this area where the blowout occurred, the rupture occurred. Very, very thin wall here, very thin wall here, loss of lots of material here.

We had some good wall thickness left here, but it's only about a third of what we originally had as far as its strength.

As the tension increased, we had a tensile failure across this section here. And this is a classic tensile failure. I agreed that it was. I had another metallurgical gentleman look at it and agree this was a classic tensile failure.

Q. And the patterns we see both in your model and from D-6704, do they support your opinion that it failed when the pipe was pulled in tension?

A. Yes. On the view up there, the actual photograph on the upper right is this view, and the actual photograph on the lower left is this view.

Q. Hand that over to Judge Barbier, if he'd like to look at that one.

Do other experts in this case, putting aside anyone from DNV who looked at this, do they agree with you that the pipe separated due to the tensile failure?

A. Yes, there's agreement.

Q. Do they agree that the pipe separated at the level of

15:07 1-B-1 E and the 39 E because of the erosion that occurred at that spot?
A. Right. There's no dispute about that.
MR. BAAY: Let's look at D-6703 quickly.
BY MR. BAAY:
Q. So every expert who's been retained by the parties in this case to look at the blowout preventer has agreed that the pipe, in fact, does separate at that location?
A. Yes, sir.
Q. Have you read the Bly report that was prepared by BP in this case, Mr. Childs?
A. I have.
MR. BAAY: Let's put up TREX-1.148.1.TO.
BY MR. BAAY:
Q. Did BP agree with your conclusion that the flow of the hydrocarbons was sufficient to cause the pipe to erode and break within minutes of the explosion?
A. Yes, they agreed.
Q. In fact, what do they say here in the highlighting we have pulled up in Exhibit 1.148?
A. According to OLGA, which is a modeling program for well control -- according to OLGA well flow modeling, the fluid velocity through a leaking annular preventer could have reached levels that were orders of magnitude greater than drill pipe steel erosion velocity.

15:08 **Q.** What is meant by "orders of magnitude"?
15:08 **A.** At least ten times more than necessary.
15:08 **Q.** And you agree with that opinion as stated in the Bly report?
15:08 **A.** Yes. There was massive flow.
15:08 **Q.** How soon do you believe the erosion occurred at the level of the upper annular in the section of pipe we've been discussing?
15:08 **A.** It did not take very long. The erosion was occurring within minutes.
15:08 **Q.** Now, Mr. Childs, what did the separation of the pipe at the level of the upper annular at Section E, as we've identified on D-6636 -- what did that mean as far as any effect it could have on the drill pipe below that breaking point?
15:09 **MR. BAAY:** If we put D-6636 on the big board.
15:09 **THE WITNESS:** I'll wait for it to come up.
15:09 Well, we've had separation at this point, Judge, right above the annular, full separation. So this pipe above is no longer connected to the pipe below. There's no connection here.
15:09 We've lost 100,000 pounds of load pushing down. Again, that's approximate load. I didn't get it exact, but approximate load pushing down.
15:09 We have continued erosion at the level of the annular packer. So without this load pushing down and with the

15:09 erosion here, this elastic buckling that we have was allowed to
15:10 relax. Elastic buckling, of course, is like the ruler you saw
15:10 the other day where you push down on it -- the elastic ruler we
15:10 still have. You push down and you let go; it comes back.
15:10 The same thing here. As soon as the
15:10 100,000 pounds of load was gone and more erosion occurs here
15:10 and the pinning is released a little bit, this pipe went back
15:10 straight just like our ruler.
15:10 **BY MR. BAAY:**
15:10 **Q.** We'll get into that in a minute.
15:10 My question went more to the fact of what effect
15:10 could this section of pipe running from the BOP up to the
15:10 rig -- what could that pipe -- how could that pipe impart any
15:10 force upon this section of pipe in the BOP after the time of
15:10 separation?
15:10 **A.** Well, there's no longer any connection. The pipe above,
15:10 at the E section, anything that happens with this piece above
15:10 can have no effect on this piece below.
15:10 **Q.** And you believe the pipe separated on April 20th; is that
15:10 right?
15:11 **A.** April 20th, fairly soon after the explosions.
15:11 **Q.** So if our rig drifts off and pulls this section of pipe on
15:11 April 21st or 22nd, what is your opinion as to whether that
15:11 would bow or bend the pipe at the level of the blind shear ram?
15:11 **A.** It's no longer connected to it. It would have no effect

15:11 on the pipe below the annular.
15:11 **Q.** I want to now talk about the activation of the blind shear rams.
15:11 **MR. BAAY:** If we could pull up D-6689.
15:11 **THE WITNESS:** I want to make sure I got what you said -- there was a cough there. Could you repeat, please.
15:11 **BY MR. BAAY:**
15:11 **Q.** We're going to look at the blind shear ram.
15:11 **A.** Fine.
15:11 **Q.** I want to first start by having you describe for us why the blind shear ram can't close on off-center pipe.
15:11 **A.** Here we're looking at the upper shear ram below. The lower shear ram would be above us. Here's our drill pipe forced to the side of the bore rams.
15:11 If we close the shear rams -- and stop right there --
15:11 **MR. BAAY:** Pause it right there.
15:11 **THE WITNESS:** Very good.
15:11 -- you can see the upper shear ram blade does not extend the full width of the bore, and the pipe is partially outside of that shear surface.
15:12 So as you complete as much of a closure as you can get, this pipe that's outside gets trapped between the two ram blocks. This holds the two ram blocks apart, 2.2 to 2.8 inches, depending on where you take the measurement, but considerably apart, enough that considerable flow continues

15:12 through the shear ram.
15:12 **BY MR. BAAY:**
15:12 **Q.** Now, I'm going to use another model that we've taken from
15:12 DNV's laser scan data. This one is marked D-6700, and the
15:12 sections of pipe are D-6701.
15:12 I'd like for you just to demonstrate for the Court
15:12 why the conditions of the blind shear ram and of these sections
15:12 of pipe support your opinion that the blind shear ram closed on
15:12 off-center pipe.
15:13 **A.** This is a quarter scale of the actual ram after all the
15:13 erosion. We lost side packers on both sides, lost considerable
15:13 metal.
15:13 The markings we've depicted are the same markings
15:13 that were applied by DNV at Michoud. This section, marked with
15:13 94, matches perfectly with this L-shaped section. This is
15:13 called a foldover shoulder of the shear ram, upper shear ram
15:13 block, and these match up perfectly, showing, just like we have
15:13 in our animation, where the pipe is inside the bore, part of
15:13 the pipe is well outside of the shear area, which is -- it's
15:13 here. And the ram could not close completely.
15:13 **Q.** And how about Section 83, which is above the level of the
15:13 blind shear --
15:13 **A.** This is the upper section, as Mr. Baay is saying.
15:13 Now, we have this .8 -- or area 83, the L-shaped edge
15:13 of the upper blade. We have the corresponding marks on this

15:13 pipe. We can also match them exactly to show that the pipe was
15:14 at this location on the side of the bore, which happens to be
15:14 the kill side, which is one -- you have a choke side and a kill
15:14 side of the BOP. This is the kill side.
15:14 **Q.** What do you mean by "kill side"?
15:14 **A.** Just a designation for the sides of the bore. There's
15:14 valving on each side of the bore. One side can be used for a
15:14 killing operation, and one side can be used for choke
15:14 operations. For us right now, this matters. It's one side or
15:14 the other. This is kill side. We always know how to match
15:14 this up, which is with its corresponding ram bore, and there's
15:14 also the same level of erosion in the ram bore.
15:14 **Q.** So do the erosion patterns on the kill side support your
15:14 opinion that the pipe was trapped off-center on the kill side
15:14 of the blind shear ram?
15:14 **A.** Yes. You can see the massive erosion here on the side of
15:14 ram block, Judge, and it was definitely placed on this side,
15:14 plus the forensic examination shows that these match.
15:14 **Q.** Now, did you review these sections -- if you want to offer
15:14 those to Judge Barbier to examine.
15:15 **A.** These two are probably the most compelling, if you want to
15:15 look at them.
15:15 **Q.** Did you also review these sections of pipe when you went
15:15 to Michoud?
15:15 **A.** Yes, I did.

15:15 **MR. BAAY:** Let's pull up D-6234.
BY MR. BAAY:
Q. Describe for us what we're seeing here.
A. This is that same upper shear ram. Part of the marking for 83 has rubbed away over the months from the people looking at these and using these.
THE WITNESS: This is our lower fish that you have on your desk there now, Judge. This is that fish. This is placed in position, just like I did the two scan models; and it fits perfectly in this Section 94.
BY MR. BAAY:
Q. When you say "fish," you're talking about drill pipe; is that right?
A. That is the field terminology when you shear a piece of pipe. That's the lower fish, and the upper piece of pipe would be the upper fish.
Q. And the pipe you -- that's actually your hand there holding that section of pipe?
A. Yes, I'm holding this in position as the professional photographer takes the shot.
Q. And you're holding Section 94?
A. 94 against the foldover shoulder of the upper shear ram block.
MR. BAAY: Let's look at D-6241.

15:16 **BY MR. BAAY:**
15:16 **Q.** Did you also examine a piece of pipe marked 83?
15:16 **A.** Yes. This is the actual 83, again, being positioned on the upper shear blade portion of the upper shear ram.
15:16 **Q.** Again, do we see erosion patterns on here that confirm the pipe was off-centered to the kill side of the blind shear ram?
15:16 **A.** Yes. You can see the patterns caused by the one pipe being here and the flow now coming from this pipe through this area, causing this massive erosion on the side of the ram block.
15:16 **MR. BAAY:** All right. Let's pull up D-6690.
15:16 **BY MR. BAAY:**
15:16 **Q.** And just go through the entire sequence of events as you just described with the blind shear ram cutting off-center pipe.
15:16 **A.** We'll start in the open position. The pipe's pinned to the side of the bore. It closes. Part of the pipe is on the -- outside the shearing surface gets trapped between the blocks, and you do not get full closure.
15:17 We're looking now at the side view. We see where some of that piece of pipe is trapped between the two blocks. There's a few pieces of these pipe that did fall away. They're down in the well. We'll never retrieve them. We only have the pieces you see there and the same pieces we see here on the screen.

15:17 We transition now to the actual photographs of these models that you're seeing. You see the 83 matched L-shaped sections and the matched 94 L-shaped sections.

Q. So again, what do the contours on the face of 94 and Section 83 tell us about the location of the drill pipe?

A. They give us a precise position of that pipe at the side of the wellbore partially outside of the shearing surface of the ram and interfering with closure, plus interfering with the seals. They're called side packers, the side packers that are installed on the side of each of the rams.

Q. So the forensic evidence supports your opinion that the pipe was off-center when the blind shear ram closed. And has there been any dispute in this case by any of the experts who reviewed this forensic evidence as to the location of pipe and the blind shear ram?

A. No.

Q. Now, all of the blind shear rams did not fully shear through the pipe.

Did the pipe eventually separate at the level of the blind shear ram?

A. Yes, it did.

Q. And had the pipe, as you've described, also broken or separated at the level above the upper annular at 1-B-1 E and 39 E?

A. Yes. All this time we've been looking at is right above

15:18 this tool joint, Section E, that is right at the top of the upper annular BOP.

Q. Now, which portions of pipe -- Mr. Childs, I'm going to ask you again to walk to D-6636, the board. And if you will, there's some sections of drill pipe there. You can take those with you.

If we look to the middle section -- and be aware, Mr. Childs, speak into your microphone. I know it's tough to do both.

If you look at the middle section of D-6636, what sections of pipe ended above the upper annular? It's that middle B section that I'm looking at in particular.

MS. HANKEY: Objection, Your Honor. I'm sorry. This is -- in fact, the two pieces on the right of this are analysis by DNV. This does not represent the way the pipe was recovered.

MR. BAAY: Your Honor, this is simply a schematic that is recorded by DNV. This is the data of the pipe locations as they've included in their report.

THE COURT: Is it an analysis or a factual finding or is this an opinion by DNV?

MS. HANKEY: It's an opinion, Your Honor, because these are not the way the pipe pieces were found. This is DNV's opinion as to the -- as you see at the bottom, the sequence of the drill pipe, that's their description.

15:19 **THE COURT:** Are we talking about this -- the middle depiction or the one on the right?

15:20 **MS. HANKEY:** Both the middle and the right.

15:20 **THE COURT:** Let me ask the witness.

15:20 Is that --

15:20 **MS. HANKEY:** Yeah, the one on the left is --

15:20 **THE COURT:** Wait, wait, wait. Let me ask the witness.

15:20 **THE WITNESS:** Well, I've often seen the drill pipe, and it was matched up. As we take these pieces, we see visually that, yes, these match and these match. And I know there was further metallurgical examinations performed that did some more assurance that these were the -- they were found.

15:20 Much of this you can match up the shapes; and you can see that, yes, these two came from each other. I've seen the pieces in person.

15:20 **THE COURT:** Okay. But is the issue whether you saw them -- whether they were in the position as depicted? That's, I think, the question.

15:20 **THE WITNESS:** Well, we can read -- we can see the pieces that came apart here.

15:20 We can see by the visual appearance of each of these sections that they came from each other. So you can reconstruct this. They weren't exactly in these positions. Because as we know, several pieces ended up in the riser.

15:21 **THE COURT:** So that's what I was trying to understand. Where were -- these pieces of pipe that you're talking about, where were they found when the BOP was retrieved? I guess this occurred at Michoud, right?

THE WITNESS: At Michoud when they were taking them apart.

THE COURT: Where were they found at that point?

THE WITNESS: I was there when we were cutting into this riser joint and found these pieces.

THE COURT: As you're depicting on the right-hand side of this chart?

THE WITNESS: Yes. We'll show you a photograph later of looking -- excuse me -- looking into this piece of riser is showing these two joints in that riser.

THE COURT: So what you're saying is that depiction on the right isn't just somebody's opinion, that's what you actually observed?

THE WITNESS: They were found there, exactly.

BY MR. BAAY:

Q. Then that --

THE WITNESS: Now, this would be -- if we found them here, they had to have been here prior to the kink.

15:22 **THE COURT:** And that's your opinion or is that somebody else's opinion?

THE WITNESS: It's physically impossible to have

been --

THE COURT: So you're making this connection?

THE WITNESS: Exactly.

THE COURT: Okay. All right. I'm going to let the witness testify.

Go ahead.

MR. BAAY: Thank you, Your Honor.

BY MR. BAAY:

Q. My question was, Mr. Childs, which portions of the pipe moved up above the upper annular?

A. We have this piece again. We know it's this piece because of the erosion on the tool joint.

Q. Let me interrupt you. Try to refer to them by numbers so that if someone's not watching us, they can later come back and see what you're talking about.

A. All right. The piece I'm holding up with the tool joint has 1-B-1. We left this joint in our model together with 1-B-2, 84 and 83. So I have one full piece that goes from the shear ram up through the upper annular. It includes the tool joint, which has been proven to have been in this location.

Again, the evidence shows it there. We measured the distance. We know it was here. This piece, we already have above here Section 39 and 1-A-1, which we know were there because they ended up here. So we have their location set.

Then we had -- excuse me -- this section eventually

15:23 be released from its pinning at the annular BOP. We've lost the load from the upper piece because we had the separating here. So the 100,000 pounds is not holding down on this piece anymore. More erosion occurs here. We still have all this massive flow.

This eventually erodes enough around the annular that the tool joint can go through. Now we have this very small area still with massive flow and this jetted -- this piece up and onto the top of the annular, which then put the original piece that was already there being 39 and 1-A-1 --

Q. Let me interrupt you.

Okay. So my question was: Which sections of pipe and -- above the upper annular?

And I believe your opinion is it was 83 and 1-B-1?

A. Yes. I was just placing them there. 83, 84, 1-B-2 and 1-B-1 end up above the upper annular.

Q. And those are sections of drill pipe that were previously located below the upper annular?

A. Yes. They started with the top of that whole section, the top of 1-B-1 at the upper annular; and eventually, when they were allowed to go through, we lost all this load from the upper pipe. The flow continues, it shoots this up and puts it above the upper annular next to the pipe that was already there.

Q. Now, you've testified earlier that the tool joint is

pinned at the level of the upper annular. How then is it possible for these sections of pipe to release from that and end up above the upper annular?

A. Two things did occur. Remember when I was talking about the massive flow pushing up, buckling the pipe, we had the force down from its own weight, which is the weight of the drill pipe above, plus we had the tool joint being trapped in the annular.

We lost all this weight pushing down, which is in excess of 100,000 pounds. We've had continued erosion through the packer, and it eventually eroded enough of that that this tool joint can go through the packer. We still have a very small area for this fluid to go through, so the velocity is very high.

So that's why I say it took this, shoots it through there and above and then lands it back on top of the annular packer. A nice, flat surface on the annular packer, and the bottom of that joint does show the kind of deformation caused by landing on top of a flat, metal surface.

Q. Now I'm going to ask you to stay right where you are.

MR. BAAY: I ask that D-6678 be pulled up.

BY MR. BAAY:

Q. In your opinion, Mr. Childs, when does the *Deepwater Horizon* sink, what date and time?

A. On the 22nd, a little after 10:00.

15:26 **Q.** In your opinion, as you marked it on the far right of D-6636, where do the pieces of pipe go once the rig sinks?
15:26 **A.** Well, they were found within this kink, as we've shown here in this diagram. They were inside this kink, as we've shown here as well. The pipe was in this location. When the riser kinked, of course, it trapped that pipe in this location, as we see here.
15:27 **Q.** Okay. And we'll play D-6692.

Describe for us what happens as the rig sinks.

15:27 **A.** We're looking at the animation up on the board right now. The rig is sank. The riser is, of course, bending over, kinking this in there; and we did a shear and a saw cut through this section.

So on the screen is that end of the riser I was alluding to earlier, showing these two pieces of pipe. That would be 1-A-1-F and 1-B-2-D showing at the end of that cut.

So, again, we know exactly where that was because here it is in the actual piece. These were cut out of that riser joint so we could have them separately.

15:27 **Q.** Now, Mr. Childs, what does that -- the fact that these sections of pipe were located in the kinked section of the riser, what does that tell us, if we look at D-6678, about the possible times that -- the only possible times that the blind shear ram could have been activated?
15:28 **A.** Since we've had the separation here, we've had increased

15:28 erosion here and eventually enough erosion that this pipe could come through the annular. The bow in this pipe is gone. So the bow is no longer holding the pipe to the edge of the bore. So if -- we know the shear ram closed on the pipe on this side of the bore. So it had to have been bowed here.

It was no longer bowed. By the time we get to this position, the pipe is no longer in a bowed position.

Q. Could those sections of pipe have been pushed up into the section of the riser kink after the rig sank?

A. No. It was a very severe kink. In fact, this break we see at 1-B-1 E-2 right here occurred from this severe bend at that position.

Q. Okay. Related question still standing there at D-6636: What sections of pipe were recovered between the blind shear ram and the variable bore rams?

A. That would be the Section 94 and 148.

Q. And were Sections 94 and 83 the sections of the pipe that were at the level of blind shear ram?

A. Yes. 94 was originally connected to 83. B would be the sheared or partially-sheared section.

Q. Okay. Mr. Childs, you testified earlier that those sections of pipe were in the bowed condition at the level of the blind shear ram.

What position were they recovered in, bowed or straight?

15:29 **A.** They were found in the straight condition.
15:29 **Q.** And how do you account for that fact?
15:29 **A.** Back to our elastic buckling. Our simple ruler, they were
15:30 buckled by all the forces and flow as soon. As they were
15:30 released from that, the piece went straight and these pieces
15:30 were found in the straight condition.
15:30 **Q.** Is this concept of --
15:30 **THE COURT:** Wait. Let me ask a question. You said
15:30 this was a helical buckling. That is sort of twisted, too;
15:30 right?
15:30 **THE WITNESS:** Not really twisted.
15:30 **THE COURT:** It looks like a spring, sort of?
15:30 **THE WITNESS:** Right. Well, in this case, of course
15:30 it just goes in one plane.
15:30 **THE COURT:** Right.
15:30 **THE WITNESS:** When this pipe is being pushed up and
15:30 buckled inside of a bore, it has to follow the bore. So it
15:30 ends up going in a spiral or helical.
15:30 **THE COURT:** So when I say twisted --
15:30 **THE WITNESS:** Yes, twisted, helical.
15:30 **THE COURT:** It would still, in your opinion,
15:30 straighten out once the pressure is released?
15:30 **THE WITNESS:** Yes. It was elastic buckling. This
15:30 happens in drill pipe all the time. It goes into a helical or
15:30 spiral condition, and it's not yielded. It's not bent that

far. It only is deflected. Then it comes back to the straight condition.

BY MR. BAAY:

Q. Is this concept of elastic buckling something that you came up with just for this case and your analysis in this case?

A. No. Of course, the phenomena has existed forever. Euler came up with the equations we use today to analyze this. He came up with those in the mid-1700s.

Q. In fact, you think the pipe was buckled on April 20th but then was recovered in a straight condition. Is it possible that the drill pipe would have still been off-center until the time that the ROV activated the autoshear on April 22nd?

A. I do not believe so, no.

Q. And describe for us very clearly why you don't believe that.

A. Well, we went through a little of that -- I'm keeping my head down -- this was in a helically-buckled position, putting it to the side so that the shear ram closed on the side with the pipe on the side.

We had continued erosion. We have the separation, which nobody disagrees with. We have the separation at 1-B-1 E, 39-E.

Once that separated, this 100,000 pounds of drill pipe load above has gone away. We don't have that force pushing down on this -- this part anymore. Continued erosion

here.

Again, this erosion was eventually sufficient enough that this pipe shot through the annular packer. So with that releasing of the load, this pipe went back to its original condition of straight.

Q. So once you lose the weight of the drill string going from the BOP to the rig and once your annular opens up and your pipe moves up, is that when the pipe becomes straight in your opinion?

A. That's when it becomes straight, yes.

Q. When do you think that occurred?

A. It didn't take very long. Of course, this happened within 10 minutes. So we've lost that load already. So a little bit more erosion here, and you would have lost it. So on the 20th, fairly soon after all these actions occurred.

Q. So you believe it buckled on the 20th at the time of the AMF activation, but sometime later on the 20th the pipe straightens?

A. Yes, after, again, the actions we've walked through, including this separation above the annular.

Q. Now, Mr. Stevick, who is Halliburton's BOP expert, also opines that the flow from the blowout may have buckled the pipe on April 20th. Do you recall that opinion?

A. I do.

Q. But he believes the buckle remained until April 22nd at

15:33 the time of autoshear activation, at the time of blind shear activation.

Do you agree with that opinion?

A. No, I do not.

Q. For the reasons you just indicated?

A. For all those same reasons, that by that time it could not still be buckled.

Q. You can take a seat. Thank you, Mr. Childs.

MR. BAAY: Let's put up D-6678 one more time.

BY MR. BAAY:

Q. Can you recap for the Court, what does the unbuckling of the drill pipe mean with respect to possible closure time of the blind shear ram?

A. Well, since we know the pipe was sheared in an off-center condition, that leaves us only the AMF time on the 20th that the pipe was in that position, that the pipe could have been attempted to be sheared.

Q. So there's no dispute that the pipe was off-center at the time of the blind shear ram activation?

A. That's correct.

Q. And the only two times that the blind shear ram could possibly have been activated are AMF and autoshear prior to the rig sinking. Is that true?

A. That's also correct.

Q. Do you believe that the pipe would have been off-center by

April 22nd at the time of autoshear activation?

A. No, sir.

MR. BAAY: You can pull that down. Thank you.

BY MR. BAAY:

Q. I want to now talk about -- go back to our discussion of ST locks.

Did the operation of ST locks factor into your opinion that it was the AMF that functioned or activated the blind shear ram?

A. Yes, they did.

MR. BAAY: Now, if we can pull up D-6674.

BY MR. BAAY:

Q. Explain to us why you believe the ST locks support your opinion that it was the AMF that activated the blind shear ram.

A. Once we have closed the VBRs, we found the locks activated on the VBRs when we were at Michoud. For them to be locked, the rams have to be in enough of a closed position, which we described earlier.

Once the explosion's occurred, there's no more hydraulic pressure holding the VBRs closed. So we would have 33 hours for flow to be coming up in the well. We know the VBRs eventually did start leaking. They did get a very good seal initially, but they did start leaking.

So now we have this flow coming by the VBRs that would have tended to push them back, and the mechanical

15:35 interference we discussed earlier between the tail rod and the wedge would have kept the locks from being able to be activated.

Q. What position were the ST locks found in when the *Deepwater Horizon* blowout preventer was pulled to surface?

A. They were found locked.

Q. And could the crew, in your opinion, have activated the ST locks at the time they functioned the variable bore rams?

A. It would have not been their policy. They do have a button they could have pushed, but it would not have been their policy. They were in well control, and they didn't know what next steps they might need to take.

Q. And it's your opinion that had the ST locks not been activated by AMF, the variable bore rams would not have remained in the closed position.

A. That's correct.

Q. Does the autoshear also -- and to be clear, the AMF does operate the ST locks?

A. Yes. That's the same thing. In fact, both of them activate all ST locks.

Q. And does the autoshear also activate the ST locks?

A. Yes. Autoshear and AMF activate all ST locks.

Q. If the variable bore rams had come open in the two days between April 20th and April 22nd, would it have been possible for the ST locks to fully close as -- if the autoshear

operation had triggered them?
A. If we opened them up and we had the interference I talked about, you could not have locked the locks.
Q. Mr. Childs, did you do anything to determine whether the flow rate from the well was sufficient to buckle the pipe, as you've just described?
A. We did.
Q. And what did you do?
A. As part of the Transocean investigation team, we contracted with Stress Engineering to do the analysis of the flow and various other aspects of the incident.
Q. Okay. So you and the Transocean internal investigation team hired Stress to do these calculations?
A. Yes, sir.
Q. Now, why did you and the Transocean internal team look to Stress to perform these calculations?
A. They are experts in the field. They know more about blowouts, flow-through wells around tubulars, about the actions that happened to this, the helical buckling.

And Dr. Garrett is renowned for an understanding of this. He teaches on flow around tubulars and the effects on those tubulars.
Q. You mentioned Dr. Garrett. Is that Dave Garrett, with Stress Engineering?
A. Dr. David or Dave Garrett, yes, sir.

15:38 **Q.** As you met Mr. Garrett and walked through these calculations with him, did you gain a lot of confidence that he knew exactly what he was doing as he performed these flow rate calculations?

15:38 **A.** Very much so. Of course, I started with confidence in Stress Engineering. My own company, when we work and need data that's beyond or capacity, we employ Stress Engineering.

15:38 **Q.** Is there any question that Stress is an expert in the field, in the oil and gas industry?

15:38 **A.** None at all.

15:38 **Q.** Now, what data did Stress rely on in performing its calculations?

15:38 **A.** Every bit of the data that we got from the well, that being "we," Transocean, got from the well was passed on to Stress Engineering.

15:38 **Q.** And what did Stress' calculations tell you about whether or not the flow rate was sufficient to buckle the drill pipe, as you've described for the Court?

15:38 **A.** As I've already stated, right prior to the time of annular closure at 9:43, there was sufficient force to begin lifting up the pipe and lifting up the tool joint.

15:39 **Q.** What did Stress' calculations tell you about as to when the flow rate was sufficient to lift the drill pipe?

15:39 **A.** 9:42, 9:43, right there, right prior to annular BOP closure.

15:39 **Q.** In your opinion, was the flow rate enough to move the drill pipe off-center?
15:39 **A.** Yes, it was.
15:39 **Q.** Let's pull up -- excuse me. Strike that.
15:39 Now, I want to talk -- there's obviously -- as the Court is well aware, there's a dispute as to the timing of activation of the blind shear ram.
15:39 **THE COURT:** Let's -- maybe this is a good time to take a recess. It's 3:40. Let's take a 15-minute recess.
15:39 **THE WITNESS:** Thank you, Judge.
15:39 **THE DEPUTY CLERK:** All rise.
15:39 (WHEREUPON, the Court took a recess.)
15:56 **THE DEPUTY CLERK:** All rise.
15:56 **THE COURT:** Please be seated, everyone.
15:57 **MR. BAAY:** May I proceed, Your Honor?
15:57 **THE COURT:** Yes.
15:57 **MR. BAAY:** Thank you very much.
15:57 **BY MR. BAAY:**
15:57 **Q.** Mr. Childs, as we've described, your opinion is that the blind shear ram operated on April 20th. Is that true?
15:57 **A.** That's correct.
15:57 **MR. BAAY:** If we could pull up D-6661.
15:57 **BY MR. BAAY:**
15:57 **Q.** There are opinions from other experts that the blind shear ram activated on April 22nd. Are you aware of those opinions?

15:57 **A.** Yes, I am.
15:57 **Q.** Are you familiar with the theory of one of BP's BOP experts, Mr. Shanks, as to how he believes the drill pipe was pushed off-center?
15:57 **A.** Yes, I am.
15:57 **Q.** Describe for the Court what you believe his theory to be.
15:57 **A.** That when the traveling block fell, it imparted a downward force on the drill pipe that helically buckled it, but plastically helically buckled the pipe in the bore.
15:58 **Q.** Do you believe this theory is possible?
15:58 **A.** No, sir.
15:58 **Q.** Why not?
15:58 **A.** We've discussed at length the separation that occurred at E on our board over here. When that separation occurred, anything that happens with the pipe above cannot have any effect on the pipe below the annular BOP.
15:58 **Q.** And your reference is Section E on D-6636?
15:58 **A.** Yes, this section here.
15:58 **Q.** And did Mr. Shanks agree that the drill pipe broke at that section?
15:58 **A.** Yes.
15:58 **THE COURT:** What do you mean by "classically helically buckled"?
15:58 **THE WITNESS:** Plastically.
15:58 **THE COURT:** Oh, plastically.

15:58 **THE WITNESS:** The phenomenon we were discussing earlier. If I had taken that ruler and kept bending it, it would have taken a permanent bend. That would have been plastic. It wouldn't come back.

15:58 **THE COURT:** I gotcha.

15:58 **BY MR. BAAY:**

15:58 **Q.** So Mr. Shanks believes that the traveling block falls, imparts weight to the upper section of the drill pipe, which then puts a force into the drill pipe at the level of the BOP and buckles that drill pipe?

15:58 **A.** Yes, sir.

15:59 **Q.** How does Mr. Shanks explain his theory that the upper pipe could impart that pressure if there is no longer a connection between 39 E and 1-B-1 E?

15:59 **A.** That possibly the upper and lower sections could reconnect and still apply a downward force on the lower drill pipe.

15:59 **Q.** And do you have an animation that illustrates how he believes that might happen?

15:59 **A.** Yes.

15:59 **Q.** Okay. Describe for us what we see here in D-6696.

15:59 **A.** The traveling block is up in the derrick, a very large, heavy device. The drill pipe is connected to it. It falls, and as it's falling, the drill pipe is falling with it. So as we see, the pipe comes down and, as we know, lands on top of the upper annular, causing this massive deformation we have on

this 39 E section.

THE COURT: When did the traveling block fall? Was that when the rig capsized?

THE WITNESS: About 30 minutes after the explosions or after --

THE COURT: 30 minutes after the explosion.

THE WITNESS: Eyewitnesses say about 30 minutes after the explosions.

BY MR. BAAY:

Q. And that would have been on April 20th?

A. On April 20th, of course, yes, sir.

MR. BAAY: Can I steal this section back, Your Honor?

THE COURT: You can have it all.

BY MR. BAAY:

Q. All right. So Mr. Shanks testified that if the pipe does separate at 39 E and 1-B-1 E, his theory is still somehow possible because the pipe could have come down and slammed into 1-B-1 E. Is that how you understand it?

A. That's how I understand it.

MR. BAAY: Now, let's look at D-6637-B.

BY MR. BAAY:

Q. Is there anything about the forensic evidence related to that section of pipe in 1-B-1 E that supports Mr. Shanks' theory?

A. No. There is no indication of any kind of contact. This

16:00 is a pristine tensile failure, no damage area here. So if the other pipe had landed on this and pushed down, we would have had some kind of rolling-over deformation of this piece.

It is pristine. That's the way it failed at tension.

Q. If 39 E had slammed into 1-B-1 E, would you see these spires that you see on 1-B-1 E from the original?

A. No. They all would have been folded over, broken off, or damaged in some other way.

Q. Looking at the model from 39 E, what do you believe this roll-under was caused from?

A. This is the bottom of the 39 E section. When it came down -- this part here would be what would have come from this lower area here on this section. This would have been connected somewhere similar to this.

This section would have matched more with this 1-B-1 E. So when this fell, a very flat surface area landed on top of the metal part of the annular. We know the annular top is all those inserts we saw earlier, and it's all metal. It landed on that and did this deformation, as we saw here.

Q. Would it be in a position similar to what we see on the screen in D-6696?

A. Yes, somewhere to the side of the center. It would be on the metal inserts. We show it on the left and then on the right. It really doesn't matter.

MR. BAAY: If we could play D-6697, please.

16:02 **BY MR. BAAY:**
16:02 **Q.** Describe for us what wee see here.
16:02 **A.** These are the two sections we were just looking at. The laser scans of 1-B-1 E on the right and 39 E on the left.
16:02 **Q.** Are these actual photos of those sections of pipe, 39 E and 1-B-1 E?
16:02 **A.** We've transitioned from the scans to the actual photos now.
16:02 **Q.** Now, does the forensic evidence, as we've just reviewed it, support Mr. Shanks' theory that these two sections of pipe could have clashed into one another and imparted a force in the section of pipe below the upper annular?
16:03 **A.** No, they could not have come in contact.
16:03 **Q.** Let's assume for a minute that we don't have separation of pipe at 39 E and 1-B-1 E. Okay?
16:03 **A.** Okay.
16:03 **Q.** If the pipe remains intact, how long does Mr. Shanks need for the traveling block to have continued to exert the downward buckling force on the drill pipe for his theory to even be possible?
16:03 **A.** About 33 1/2 hours.
16:03 **Q.** And do you think that is possible?
16:03 **A.** No, sir.
16:03 **Q.** Why not?
16:03 **A.** Part of what would make his theory work is, when you're

pushing down on this drill pipe, it's been -- being resisted by the VBRs below. The VBRs have lost closing pressure. They're not locked, lost closing pressure.

So I believe if this had remained intact and the force would have come down, the pipe would have been pushed through the VBRs, and our tool joint that was in the annular probably would have ended up very close or right on top of the VBRs.

Q. As the rig lost power on April 20th and began to drift over those two days, would it have been possible for the force of the falling traveling block to continue to impart a downward force on the drill pipe at the level of the blowout preventer?

A. Very unlikely.

Q. Now, are you also familiar with Mr. Shanks' testimony that he viewed the footage from the ROV cutting the autoshear pin and he somehow believes that was an indication of blind shear ram activation?

A. Yes, I've heard that.

Q. And you've seen that ROV footage?

A. Multiple times, yes, sir.

Q. I believe you saw it as they played it in court last week.

A. Yes. I did again.

Q. And you reviewed in preparation for your report?

A. That is correct.

Q. What does Mr. Shanks believe happens once the ROV cuts the

autoshear pin?
A. He believes that there is shaking of the stack that indicates an action like closing the shear rams.
Q. You reviewed the video. Did you see anything that was indicative of the blind shear ram operation?
A. No, I did not.
Q. What would you expect to see once the ROV -- strike that.
Would you expect to see the ROV move once it made its cut through the autoshear pin?
A. Precisely. This is a very massive BOP stack. 750,000 pounds were connected to the wellhead. There's a small ROV. The camera's attached to the ROV. And as soon as this arm finally cut through that pin, there would have been a release of load and the ROV moved.
So the movement we see is not of the stack; it's of the camera on the ROV viewing the stack -- the stationary stack.
Q. So to be clear, you didn't see any movement related to the blowout preventer stack of the *Deepwater Horizon* during that footage of the ROV cut that would indicate to you that the blind shear ram might have activated at that time?
A. That's correct.
THE COURT: Let me ask a question. Where was the -- do you know who decided and why were they cutting the pin at that time?

16:06 **THE WITNESS:** I don't know who made the final decision, but it's one more way to activate the shear ram. At that point in time, we didn't know what had happened and why we hadn't sealed off. So we wanted one more try.

I'm speculating because I was not there. They wanted one more try. One way to activate the autoshear to simulate the LMRP being removed is to cut that pin mechanically. It then sets off autoshear.

THE COURT: Okay. Thank you.

BY MR. BAAY:

Q. I believe I asked you earlier, Mr. Childs, but let me do so again just to be sure.

If you have separation of the pipe on April 20th at the level of 39 E and 1-B-1 E, is it possible that rig drift would have imparted a force on the drill pipe at the level of the blind shear ram to bend the pipe on April 22nd?

A. No. Same reasoning, there's no connection between the pipe above and the pipe below. So anything that happens above does not affect the pipe below the annular.

Q. And just to summarize before we move into maintenance, does the forensic evidence support your opinion that the pipe could only have been off-center on April 20th?

A. Yes. Everything I've seen shows it had to be on the 20th.

Q. Is the forensic evidence consistent with any of the theories that put the pipe off-center on April 22?

16:07 **A.** No, they're not.
16:07 **Q.** And in your opinion, the blind shear rams closed at the time of AMF activation on April 20th, 2010?
16:07 **A.** Yes, shortly after the explosions.
16:07 **MR. BAAY:** If we could put up D-6686.
16:08 **BY MR. BAAY:**
16:08 **Q.** We've been through your first two opinions. I now want to move to Opinion No. 3, which is maintenance played no role in the BOP's inability to shut in the well.
16:08 **A.** Okay.
16:08 **Q.** Why is that your opinion?
16:08 **A.** Nothing I found in any of the maintenance history had any effect on the inability of that shear ram to close on the off-center pipe.
16:08 **Q.** Let's first, before we get into a discussion of solenoids and batteries, get into a brief overview of the control systems and the control pods.
16:08 **MR. BAAY:** Pull up D-6675.
16:08 **BY MR. BAAY:**
16:08 **Q.** Describe for the Court where the control pods are located on the *Deepwater Horizon* stack.
16:08 **A.** On all BOP stacks they're located on the LMRP. In this view, we are seeing the -- all right -- I've just lost -- oh, is it showing? There it is -- the blue pod is showing in this view, and if Gary will rotate -- and on the other side of the

16:09 stack is the yellow pod.
16:09 **Q.** What is the purpose of these control pods?
16:09 **A.** Redundancy. There's two pods for redundancy.
16:09 They receive the electrical signals from the surface
16:09 through this MUX cable, electrical section then translates that
16:09 into a hydraulic signal that the hydraulic signal then goes to
16:09 the BOP stack and functions whatever function you're trying to
16:09 operate.
16:09 **Q.** Do both pods perform identical functions?
16:09 **A.** They are identical. They're totally redundant, just
16:09 separate.
16:09 **Q.** And as we'll discuss, are there redundant systems within
16:09 the redundant pods?
16:09 **A.** Even within them, there are more redundancies.
16:09 **Q.** How did the crew send instructions to the pods from the
16:09 rig in normal operation?
16:09 **A.** There are several control panels where they would have an
16:09 enable button they would push first and then the function they
16:09 want it to operate.
16:09 The enable button is there so that nobody can
16:09 inadvertently come by and lean or push on a button and operate
16:10 something. You have to have the awareness to push the enable
16:10 button and then push the function button.
16:10 **MR. BAAY:** If we could look at D-6676.

16:10 **BY MR. BAAY:**
16:10 **Q.** Are these MUX cables what connect the pod and allow it to communicate up to the rig?
16:10 **A.** Yes. As we're seeing here -- this is, in fact, the yellow pod we're looking at. And the MUX cable is connected up the side of the riser all the way to the surface.
16:10 **Q.** I'm going to give you my laser pointer.
16:10 **A.** This one has gotten weak. I have one more.
16:10 **Q.** Try this one. This one works.
16:10 **THE WITNESS:** That's a little better, isn't it, Judge? Let's see.
16:10 **BY MR. BAAY:**
16:10 **Q.** When we lose that connection to the rig, how does the blowout preventer operate?
16:10 **A.** Without MUX cable connection, you're saying, sir?
16:10 **Q.** Yes.
16:10 **A.** It would have to be automated functions, emergency functions only.
16:11 **Q.** As you described it, the AMF senses the loss of that connection, and that's when it triggers the activation of the blind shear ram?
16:11 **A.** AMF -- when you basically lose everything -- hydraulics, electrical connection, and communication -- AMF would then fire.
16:11 **Q.** On April 20th, 2010, do you have an opinion as to which

particular pod activated the blind shear ram?
A. Either could have.
MR. BAAY: Let's pull up D-6698, please.
BY MR. BAAY:
Q. What are we looking at here, Mr. Childs?
A. Very basic parts within the pods, not all of them, of course; but we're seeing that within the pods, there are two SEMs in each pod. A SEM is a subsea electronic module. There's an A and B in yellow and an A and B in blue.
Q. And can the blind shear ram be activated by any one of the four SEMs? That's my question.
A. Yes, yes. Sorry.
Within the SEM, there is an AMF for SEM A and an AMF for SEM B. The same for the other side. There's a 9-volt battery for each SEM as well. And then the two pods share a 27-volt battery.
Q. In normal operating conditions, what powers the SEMs?
A. In normal operation condition, when they're drilling ahead, it's powered from the surface through to the MUX cable.
Q. When the SEMs sense the loss of power and communication from the rig, is that when they're triggered into the AMF mode of operation?
A. The AMF, and then the batteries take over.
Q. As you've testified -- or remind me, how many SEMs are required to function the blind shear ram?

16:12 **A.** Only one.
16:12 **Q.** And how many solenoids are required to activate the blind shear ram?
16:12 **A.** One as well.
16:12 **Q.** And either pod, it's your testimony, could activate the blind shear ram, and it just takes one SEM to function it?
16:13 **A.** That is correct.
16:13 **Q.** There's been testimony that the AMF might not have functioned on April 20th because the wiring to the coils of the yellow pod Solenoid 103 were reversed.

Are you familiar with that testimony?

16:13 **A.** I am.

MR. BAAY: If we could pull that back up for one minute.

BY MR. BAAY:

16:13 **Q.** What is a solenoid coil?
16:13 **A.** First of all, the solenoids would exist between this point and the BOP.
16:13 **Q.** So as you've described, there's one solenoid per pod that could activate the blind shear ram?
16:13 **A.** Basically, in this area between the SEMs and the BOP.

And the solenoid is an electrical device. It has coils, in this case two coils, wound around a piece of metal. And you electrify -- when you send back current through the coil, that gets magni- -- magnetic effect --

16:13 **Q.** Magnetic force?
16:13 **A.** Magnetic force. There you go -- magnetic force that would then move that valve.
16:14 **THE COURT:** So you only have one solenoid on each pod; correct?
16:14 **THE WITNESS:** One solenoid for 103 on blue and one on yellow, that is true.
16:14 **BY MR. BAAY:**
16:14 **Q.** And 103 is dedicated solely to the function of the blind shear ram?
16:14 **A.** Correct. And each solenoid has dual coils, one for the A and one for the B.
16:14 **Q.** Can the solenoid activate the blind shear ram with one coil energized?
16:14 **A.** Yes, it can.
16:14 **Q.** Can it activate it with two coils energized?
16:14 **A.** Yes, it can.
16:14 **Q.** Are the two coils just another example of redundancy within the system?
16:14 **A.** Yes.
16:14 **Q.** Can a solenoid, Mr. Childs, that is reverse-wired still function the blind shear ram?
16:14 **A.** In a SEM operation, yes.
16:14 **Q.** And now what is the basis for your opinion that a miswired solenoid can still be activated if one of those coils is

16:14 reversed?
16:14 **A.** I've seen testing from Michoud on SEM-actuated testing.
16:15 And the Transocean investigation team also went out to a rig
16:15 and purposely miswired a solenoid and performed 15 tests. And
16:15 all 15 tests through the SEM, the solenoid did actuate.
16:15 **Q.** Let's first talk about the tests that were performed at
16:15 Michoud.
16:15 **A.** Yes, sir.
16:15 **Q.** We've heard testimony that there were many tests performed
16:15 on 103Y while the investigation was conducted at Michoud; is
16:15 that true?
16:15 **A.** That's correct.
16:15 **Q.** How many tests of those performed at Michoud did you rely
16:15 on for your opinion that the reverse-wired solenoid could still
16:15 properly function?
16:15 **A.** My reliance is on the tests that were operated through the
16:15 SEM, where the SEM actuated the solenoid -- or the AMF through
16:15 the SEM -- actuated the solenoid more like it would be used in
16:15 real life.
16:15 **Q.** You've anticipated my next question. Why did you select
16:15 those three tests?
16:15 **A.** Because my normal mode and my company's normal mode is
16:15 test it as you're going to use it. It's the only practical way
16:16 to do it. Many other tests you can do, but to use it as it
16:16 actually will be functioning in the field is the best way to

check -- to verify.
Q. You've referred to those tests that mimic the subsea conditions as AMF tests.
A. AMF testing.
Q. And what about the test setup and procedure mimics subsea conditions?
A. You arm the AMF, you remove all power, which -- it's just like cutting the MUX cable. You already do not have connections to your transducers that read pressure. So you have no pressure, you have no communication, power's gone, AMF fires, because it's met all of the requirements.
Q. In those types of tests, the AMF test we're referring to, does it use software that is similar to what would be used on the pod?
A. It is, in this case, the software from the pod.
Q. And how many AMF tests were performed at Michoud?
A. Of the type I'm talking about, there were three done -- three performed.
Q. And that was of the original 103Y; is that true?
A. Very true. Using 103Y, still miswired as it was found originally.
Q. Of these three AMF tests, how many were successful?
A. All three operated the solenoid.
Q. Now, the other tests that you referred to that were performed at Michoud, why is it that you did not rely on those

16:17 results?
16:17 **A.** The other tests were run using the portable electronic
16:17 test unit. We've already heard in here about some difficulties
16:17 with the PETUs, that what you asked it to do wasn't necessarily
16:17 what it did. So I discounted it for that, in the first place.
16:17 In the second place, I wanted to see how it would
16:17 operate in field conditions being -- through the AMF.
16:17 **Q.** Have other experts who have examined the blowout preventer
16:17 in this litigation agreed with your opinion that the PETU test,
16:18 or the PETU units, had problems?
16:18 **A.** Yes. I think it's fully agreed.
16:18 **Q.** You also mentioned that Transocean did its own testing.
16:18 Describe for the Court how Transocean performed its test of the
16:18 solenoids.
16:18 **A.** Yes. I worked with my expert, Chris Tolleson, on the
16:18 electronics and software. We devised a test. I sent him out
16:18 to the *Enterprise*, Transocean *Enterprise*. It's a sister rig to
16:18 the *Horizon*. It's a Mark II control system. It has a
16:18 functioning equivalent AMF system, with the goal here being:
16:18 Can we repeat this? Can we see this same thing? What will
16:18 happen in real life, again?
16:18 **Q.** And you mentioned that you picked the *Enterprise* to
16:18 perform these tests?
16:18 **A.** Yes, sir.
16:18 **Q.** And did your team do the necessary diligence to make sure

16:18 the *Enterprise* was close in type to *Deepwater Horizon*?
16:18 **A.** Well, I think "close" is a little bit less than it is.
16:19 It's almost exactly. It's the same manufacturer, of course,
16:19 same design, same functionality of the AMF system. Same -- by
16:19 the way, same solenoids, of course.
16:19 **Q.** Same type of solenoids as manufactured by the original
16:19 equipment manufacturer?
16:19 **A.** Same -63 Solenoids.
16:19 **MR. BAAY:** Dennis, let's pull up TREX-7670.
16:32 **BY MR. BAAY:**
16:32 **Q.** Mr. Childs, do you recognize this document?
16:19 **A.** Yes. It's Mr. Tolleson's report on testing.
16:19 **Q.** So this is a document created as a result of the testing
16:19 he performed on the *Enterprise*?
16:19 **A.** That is correct.
16:19 **Q.** And you may have mentioned, but let me ask you again.
16:19 How many tests did Transocean perform, in total, as
16:19 are reflected in this agreement -- in this document?
16:19 **A.** While he was on the rig, he actually performed a total of
16:19 18 tests. Three of those he performed with the solenoid
16:19 properly wired.
16:19 **Q.** And we'll get into it. But of the 15 potentially miswired
16:19 tests, how many successfully activated the solenoid?
16:20 **A.** In all 15 tests where he himself miswired the solenoid,
16:20 all 15 operated the solenoid.

16:20 **MR. BAAY:** Let's pull up TREX-7670.1.1.TO.

16:32 **BY MR. BAAY:**

16:32 **Q.** Describe for us how Transocean documented these tests and what we see here in this exhibit.

16:20 **A.** We'll go ahead and start with the top. In his report, he had to let us know that on the first day of his testing, for six tests he could not get the equipment to cooperate to capture the results. Not to perform the tests. The tests were performed, they were flawless, just like he wanted to perform them, but he could not get a hard copy printout.

16:20 Overnight, he was able to upload some new software on his personal computer, reconfigure such that for the second day, the tests we see listed here with the miswired solenoid all -- did also operate. He had backup data and was able to print out the test results.

16:21 **Q.** So the table we see here in 7670 records his testing activity and the results that the solenoid activated in each of those tests?

16:21 **A.** Yes. And there's more to this test report. There's actually printouts from the testing from the second-line tests, but not from the first.

16:21 The only problem with the first day, as we see on the six, is he could not capture the results to be able to put them in the report.

16:21 **MR. BAAY:** If we can pull up TREX-7670.2.1.TO.

16:32 **BY MR. BAAY:**
16:32 **Q.** Just for the sake of completeness, what were the other
16:21 three tests that you indicated Mr. Tolleson performed?
16:21 **A.** Carried out through his testing, we see his Tests 4, 7,
16:21 and 11. He switched back periodically to correctly-wired
16:21 solenoid. He got exactly the same results using the
16:21 correctly-wired solenoid as he did a miswired solenoid.
16:21 **Q.** Mr. Childs, did the AMF testing performed at Michoud and
16:22 by Transocean indicate that the yellow pod Solenoid 103Y could
16:22 have functioned the AMF at the time of the incident?
16:22 **A.** Yes, sir.
16:22 **Q.** Other than Transocean, have any of the experts or parties
16:22 in this case submitted any solenoid tests that they conducted
16:22 to this Court?
16:22 **A.** No, sir.
16:22 **Q.** Now, when the tests were performed at Michoud on the
16:22 solenoid, did they find that there was sufficient battery power
16:22 in the yellow pod to operate the AMF?
16:22 **A.** Yes.
16:22 **Q.** Is there any reason, in your opinion, why the yellow pod
16:22 would not have activated the blind shear ram on April 20th?
16:22 **A.** I'm sorry. I was coughing.
16:22 Would you say it over, please.
16:22 **Q.** Sure. Is there any reason, in your opinion, why the
16:22 yellow pod would not have activated the blind shear ram on

April 20th?
A. No.
Q. You were here last week, I believe, when Mr. Doyen asked Dr. Davis about the testing done by Mr. Guidry on Solenoid 103 after its installation.
Do you remember that testimony?
A. I do.
MR. BAAY: Let's pull up 3797.2.1.TO.
And, Your Honor, this is an e-mail that we've seen quite a bit, so I'll cover it just very briefly. I won't go through all these bullet points.
BY MR. BAAY:
Q. Mr. Childs, just a few questions from this.
Have you reviewed this e-mail string?
A. I have.
Q. And was that what you've undertaken as part of your work on Transocean's internal investigation team?
A. It was.
Q. Who do you understand Mr. Guidry to be?
A. He is an electronics MUX expert that works for Transocean.
Q. What does this e-mail indicate that he completes?
A. He did travel to the *Horizon*. He did check out the pods. And in his testing, every time he found an issue, he repaired that issue, and he continued to test through all these issues replacing solenoids and parts as necessary until he came out

16:24 with no issues at the end of all his testing.
16:24 **Q.** Now, if you know, did Mr. Guidry also keep a contemporaneous account of his testings in his tally book?
16:24 **A.** Yes. As is very typical for a rig worker, he keeps a tally book.
16:24 **Q.** Go ahead. You were about to do it. What is a tally book?
16:24 **A.** A tally book fits in their pocket. They carry it around on the rig with them. Obviously, they can't carry their computer around the rig with them. It's not a safe place for a computer.

They write everything in their tally book. And later they can take that information and insert it into the computer system.

16:24 **MR. BAAY:** Let's pull up TREX-4823.5.1.TO, please.
16:32 **BY MR. BAAY:**
16:32 **Q.** Now, do you recognize this document, Mr. Childs?
16:24 **A.** Very well.
16:24 **Q.** Would this be Mr. Guidry's tally book?
16:24 **A.** These are excerpts out of his tally book.
16:24 **Q.** Did you review the testing, as he sets it out in his tally book?
16:24 **A.** Yes. And this shows us that one of the solenoids that he replaced right prior to Macondo was Solenoid 103.
16:25 **MR. BAAY:** If we can go back to the e-mail quickly, which is TREX-3797.3.1.TO.

16:32 **BY MR. BAAY:**
16:32 **Q.** You also have testified that you reviewed the testing that
16:25 Mr. Guidry describes in this exhibit we're looking at.
16:25 **A.** I did.
16:25 **Q.** If you can just read for me the top call-out there, the
16:25 first bullet, the highlighted language.
16:25 **A.** "We then moved the pod back onto the LMRP and performed
16:25 another function test of all functions using the full
16:25 system...tested again, with no coil breaks, no faults, and all
16:25 corresponding functions operating as they should."
16:25 **Q.** Will you jump to the last call-out and read the
16:25 highlighted language, please.
16:25 **A.** "They did do all of the normal pre-deployment function
16:25 testing of the system and found no faults at all. No pod
16:26 mismatches, no coil faults, system okay indication on the CCU
16:26 screen, and all functions operating the correct component on
16:26 the system as verified by sight."
16:26 I'd like to add that you know the CCU is a central
16:26 control unit.
16:26 **Q.** Mr. Childs -- excuse me.
16:26 Based on your review of Mr. Guidry's e-mail and his
16:26 tally book, did it appear to you that Mr. Guidry made proper
16:26 efforts to test this solenoid after he installed it?
16:26 **A.** Yes. It appears he did every effort he could. He
16:26 continued to test. As he saw any issue, he tested more,

16:26 corrected that and tested again, until he ended up with what we just read.
Q. To be clear, he installed Solenoid 103 on the yellow pod at this time?
A. Yes, he did.
Q. And that was 90 days prior to the Macondo incident; is that true?
A. Correct.
Q. Now, some of the experts in this case have opined that there was debris found in Solenoid 103Y after the incident, and that indicates that Transocean did not properly maintain the solenoid.
Are you familiar with this opinion?
A. Yes, I am.
Q. Where do you think this debris might have come from?
A. I believe the problem would come -- does come from improper storage of the pods, as we were waiting to be able to work on them.
Q. And was that -- the conditions of storage -- acknowledged by DNV as one of the events that might have caused the debris?
A. The issue -- yes. This issue was seen there. And I know, by personal experience, many rigs try to flush through the pods weekly to ensure there's clean fluid and you don't get growth.
Q. Now, we've talked earlier about portable electronic testing units, sometimes referred to as PETUs.

16:27 **A.** Yes.
16:27 **Q.** Remind us just exactly what those do.
16:27 **A.** It is a device supplied by Cameron that you can hook up to the pod to allow you to activate functions on the pod when you're not in the full stack condition where you can operate through the control panel.
16:28 **Q.** Are PETUs typically used on a drilling rig to test solenoids?
16:28 **A.** They use it -- during the installation test of the solenoid into the pod they're used, yes.
16:28 **Q.** And you testified earlier that there was a problem with the PETUs, or the PETUs, as used at Michoud.
16:28 **A.** Yes.
16:28 **Q.** Just briefly describe what the problem was.
16:28 **A.** There is a way on the PETU to ask it to supply electricity to either A or B or to both, three choices. One of the PETUs, when you said do it to A, let's say, it did it to both. We didn't know that at the time.

The other one, when you said do it do both, which is a good test to do, it sent the power to only one function.

16:28 **Q.** What would be the result, Mr. Childs, if a solenoid with reversed wiring was tested by a PETU with those same issues?
16:29 **A.** If you had a PETU that only sent the power to one coil when you were trying to check for miswiring, which wouldn't be when you were using both coils, you would miss that issue.

16:29 **Q.** Now, Dr. Davis testified last week that Mr. Guidry might have experienced a problem, quote, because we don't know what variety PETU he was using, and it may not have done every single function.

Do you recall that testimony?

16:29 **A.** Yes, sir.

16:29 **Q.** Do you agree that the units can lead to results that have -- strike that.

Dr. Davis also testified that DNV initially tested the solenoid using the PETU and that the results were inexplicable because of the problems of WEST testing the units.

Do you recall that testimony?

16:29 **A.** Yes, I do.

16:29 **Q.** Do you agree that these units can lead to results that could have confused the experts in this case?

16:29 **A.** They did, yes, sir.

16:29 **Q.** You also agree with Dr. Davis that the unit Mr. Guidry used may not have done every single function, even though it appeared at the time to be a full-function test?

16:30 **A.** It appears we have a 50/50 chance, yes.

16:30 **Q.** Now, have there been changes in the industry awareness related to reverse polarity since the time of the Macondo incident?

16:30 **A.** Yes, there has.

16:30 **Q.** Tell the Court what you found in your review on that

16:30 issue.
16:30 **A.** We found a Cameron field performance report, otherwise known as an FPR, where another rig, five -- I think five months later -- had an issue with solenoids.
16:30 A field performance report is used to document a problem, send the problem to the OEM -- in this case, Cameron -- get them to find the root cause of the problem, find a mitigation to the problem, and supply that back to the user or customer, so that they could fix that problem from there forth.
16:30 **MR. BAAY:** Let's look at TREX-5165.
16:32 **BY MR. BAAY:**
16:32 **Q.** Are you familiar with this document, Mr. Childs?
16:31 **A.** Yes. It's a letter that came out in response to that FPR.
16:31 **Q.** I believe this is document we saw with Mr. Perkin and Dr. Davis, I believe.
16:31 What is the purpose of this letter, as you understand it?
16:31 **A.** It describes what they found in their testing, and shows in their conclusions that there are -- there's an added test, an added table they want to add, an added test they want to add to their own procedures, to ensure they are finding all miswired solenoids.
16:31 **Q.** And just to be clear, this letter comes --
16:31 **MR. BAAY:** If you can call that out, Dennis, that

16:31 date on the top there.
16:32 **BY MR. BAAY:**
16:32 **Q.** This comes some five months after the Macondo incident; is
16:31 that correct?
16:31 **A.** Correct, and unrelated.
16:31 **Q.** And just clarify for me again. Cameron is doing this
16:31 testing at the request of a customer. Is that your
16:31 understanding?
16:31 **A.** Yes. Again, a field performance report, it comes from the
16:31 field. You have an issue, you want the manufacturer to figure
16:32 out the root cause and get you an answer.
16:32 So you send the equipment to them, they test it. In
16:32 this case they did. They found miswired solenoids. And from
16:32 this, they added something to their own procedures to try to
16:32 avoid any more miswired solenoids.
16:32 **Q.** And was the letter and the testing -- the letter that
16:32 Cameron produced and the testing that they did, all a result of
16:32 the fact that a customer of theirs found miswired solenoids on
16:32 their rig?
16:32 **MS. KARIS:** Objection, Your Honor, leading.
16:32 **THE COURT:** It is.
16:32 **MR. BAAY:** I can restate it, Your Honor.
16:32 **THE COURT:** Okay. Go ahead.
16:32 **BY MR. BAAY:**
16:32 **Q.** Mr. Childs, what is your understanding as to why Cameron

16:32 issued this letter and why they conducted this testing?
16:32 **A.** It would be part of the answer to this FPR. I think I've described the process of the FPR fairly well.
16:32 And then this is alerting, in this case, to whom it may concern. Other people, obviously, are using solenoids. So this alerts others that we found an issue and we are fixing this by adding a better table to record all the information, and another check that you can add to make sure if you've got a miswired solenoid.
16:33 **Q.** And in your opinion, what was the underlying event that triggered the testing in the letter?
16:33 **A.** That on the rig out in the field the subsea engineer noticed an anomaly with his solenoids.
16:33 **Q.** And this is on a non-Transocean rig, different rig, submitted to Cameron?
16:33 **A.** Yeah. The name of the rig is in here. But, yes, it's not Transocean.
16:33 **Q.** Some experts in this case have opined that the clog filters for hydraulic fluid in the yellow pod indicate that Transocean did not properly maintain the yellow pod.
16:33 Are you familiar with these opinions?
16:33 **A.** I have heard that.
16:33 **Q.** Do you agree with them?
16:33 **A.** I do not.
16:33 **MR. BAAY:** Dennis, let's pull up TREX-51245.225.1.TO.

16:32 **BY MR. BAAY:**
16:32 **Q.** Did you review this document, Mr. Childs?
16:34 **A.** I did.
16:34 **Q.** What is it?
16:34 **A.** That the pod filters were changed out on both pods January 31st, which is right prior to running the BOP stack on Macondo.
16:34 **Q.** Okay. And what is the underlying document where you reviewed this entry?
16:34 **A.** This all comes from what Transocean calls a departmental activity consolidation report -- consolidation report. And in this particular case, we have separated out all the subsea equipment report comments.
16:34 **Q.** And based on this entry, you have concluded that Transocean changed out their pod filters on the rig move prior to Macondo?
16:34 **A.** Yes, sir.
16:34 **MR. BAAY:** You can pull that down. Thank you.
16:32 **BY MR. BAAY:**
16:32 **Q.** Let's turn to batteries, Mr. Childs.
16:34 Did you review any records to determine when the blue pod battery was last changed?
16:34 **A.** Yes.
16:34 **Q.** When do you believe it was last changed?
16:34 **A.** It was changed by Cameron in a repair cycle that ended

November 2007.

MR. BAAY: Let's pull TREX-50377, please.

BY MR. BAAY:

Q. Are you familiar with this document, Mr. Childs?

A. Yes, I am.

Q. And what is it?

A. It's a document the team put together to track all three SEMs and all three pods to understand where each one was located.

Q. Did you and your team create this document when you created your rebuttal report in an effort to determine the life of the blue pod battery?

A. Yes. We wanted to know more precisely about when the batteries went in and where they were located.

Q. Did you personally review all of the documents underlying this report and as cited as footnotes in this report?

A. I did.

MR. BAAY: Let's put the cover slide for TREX-33273, TREX-3299, and TREX-36711.

MS. KARIS: Your Honor, I'm going to renew my objection that I stated earlier, when we started, and the Court asked me at the appropriate time. The document we just saw -- and Mr. Childs just testified that he reviewed all of the underlying documents.

Unfortunately, those underlying documents have

not all been produced, and we have not had an opportunity to review those to confirm that what's in the handwritten notes of the folks who were actually at those tests, in fact, validate what's in the summary note that was prepared one year after the tests in conjunction with Mr. Childs' rebuttal report.

MR. BAAY: Your Honor, each of the documents cited in the footnotes are the TREX numbers we're about to go into. To the extent there are any non-produced, non-TREX documents in the summary document, we'll redact those.

MS. KARIS: I'm happy to look at what documents we're going into, but at least Mr. Childs established at his deposition that that summary document was prepared in part on his review of handwritten notes of the folks that were at those tests.

THE COURT: Those have not been produced? Never been produced?

MS. KARIS: Have not been produced.

THE COURT: And they were requested, I assume.

MS. KARIS: Correct.

THE WITNESS: Actually, these are not from handwritten notes. I'm sorry.

THE COURT: Wait, wait.

MR. BAAY: I think there's some confusion here. I may be misstating where you're going. But the handwritten notes related to our independent battery testing --

16:37 **MS. KARIS:** Correct.
16:37 **MR. BAAY:** -- was not related to the summary document, I believe.
16:37 **MS. KARIS:** If it's not related to this document, then I'll withhold my objection until the appropriate time. But the summary document, the first one, is the one I was referencing. But if it's not in connection with the handwritten notes, I'll withhold my objection.
16:37 **THE COURT:** Let's see where he goes.
16:37 **BY MR. BAAY:**
16:37 **Q.** Take a step back. Were these documents made part of the summary document we just reviewed, TREX-50377?
16:37 **A.** Yes. All of these documents I noted in that document are as we see.
16:37 **Q.** And did you review each of these documents?
16:37 **A.** Each one of them.
16:37 **Q.** Do these documents, as shown in this demonstrative -- or excuse me, in these cover slides, do they support your report on the blue pod batteries?
16:38 **A.** They do.
16:38 **Q.** Was there anything in your summary document, TREX-50377, that you determined to be inaccurate?
16:38 **A.** There was one date that we stated as April, and it ended up being March. We were incorrect on one date.
16:38 **Q.** So in your summary document, you stated the opinion that

16:38 the blue pod battery was put into service in April 2009?
16:38 **A.** Correct.
16:38 **Q.** And that was a mistake?
16:38 **A.** It was actually March. I was off a month.
16:38 **MR. BAAY:** We can pull that down. Thank you.
16:38 **BY MR. BAAY:**
16:38 **Q.** When, in your opinion, Mr. Childs, was the pod with the
16:38 new batteries installed on the *Deepwater Horizon* BOP?
16:38 **A.** March 2009.
16:38 **MR. BAAY:** Let's pull TREX-4617.66.1.TO.
16:38 **BY MR. BAAY:**
16:38 **Q.** Are you familiar with this document, Mr. Childs?
16:38 **A.** Yes, I am.
16:38 **Q.** What is the underlying document, before we get to the
16:39 entry.
16:39 **A.** This is the Transocean maintenance system document showing
16:39 work done on various devices, components.
16:39 **Q.** If we read the highlighting in the entry, what does it
16:39 say?
16:39 **A.** "This pod was just overhauled and put into service on
16:39 March 14th, '09. Entire pod tested to maximum pressure."
16:39 **Q.** Did you come to an understanding that this entry referred
16:39 to the blue pod battery?
16:39 **A.** Yes.
16:39 **MR. BAAY:** Let's also put up TREX-51245.199.2.TO.

16:39 **BY MR. BAAY:**
16:39 **Q.** What is the underlying document here, Mr. Childs?
16:39 **A.** On the next -- I'm sorry. This is the departmental activity report, consolidation report for the subsea equipment.
16:39 **Q.** Is this another one of the documents you relied upon in forming your opinion that the battery was installed or that the pod was put in service in March of 2009?
16:40 **A.** It is.
16:40 **Q.** What does the entry say?
16:40 **A.** "Installed blue pod on BOP and did a complete function test."
16:40 **MR. BAAY:** Okay. You can pull that down. Thank you.
16:40 **BY MR. BAAY:**
16:40 **Q.** What was the status of the pod in the intervening time between the battery change in November of 2007 and the time the pod is put into service in March of 2009?
16:40 **A.** I'm sorry, I think I lost part of that. Would you restate it, please.
16:40 **Q.** Sure. Do you know the status of the pod in the intervening time, between the battery replacement in November of 2007 and the time the pod was put into service in March of 2009?
16:40 **A.** In the entire intervening time, the pod was in a spare position, out of service.
16:40 **Q.** Did Mr. Zatarain, another BP BOP expert, agree that the

16:40 Pod 3 was in the spare pod position since the time the battery was changed in 2007?
A. He did.
Q. Now, you've opined in your report that Transocean replaced AMF batteries in accordance with Cameron recommendations.
Do you recall that opinion?
A. Yes, I do.
Q. Is that still your opinion as you sit here today?
A. I still believe that. Yes, sir.
MR. BAAY: Let's pull up TREX-3605, please.
BY MR. BAAY:
Q. It's another document we've seen in evidence during this trial. Are you familiar with this document?
A. Yes. It's their EB -- or Cameron's EB 819D.
Q. And "EB" stands for "engineering bulletin"?
A. That's correct.
Q. What's the subject of this Cameron engineering bulletin?
A. This one is on AMF/deadman battery replacement.
Q. Does this contain Cameron's recommendations for battery replacement?
A. It does.
MR. BAAY: Let's turn to TREX-3605.2.1.TO.
BY MR. BAAY:
Q. As we see in this call-out -- Mr. Childs, remind us what Cameron's recommendations are on battery replacement.

16:41 **A.** "It is recommended that the 9-volt DC and 27-volt DC
16:42 battery packs be replaced after" -- and it lists several -- the
16:42 first being "one year of on-time operation; when the number of
16:42 actuations has been exceeded for that year" -- which is 33 --
16:42 "five years after date of purchase" or "whichever of the above
16:42 events happens first."
16:42 **Q.** Mr. Childs, do you have an opinion as to whether these
16:42 battery recommendations as put forward by Cameron are
16:42 conservative?
16:42 **A.** Yes, I believe they are conservative.
16:42 **Q.** What's your basis for saying that?
16:42 **A.** Testimony and -- deposition testimony of David McWhorter
16:42 of Cameron.
16:42 **Q.** Remind us of who Mr. McWhorter is.
16:42 **A.** He's vice president of, I think, controls and quality.
16:42 **Q.** Let's take the third bullet first, five years after date
16:42 of purchase. Maybe I asked you, but I might have forgotten.
16:42 What does it mean for a battery recommendation to be
16:42 conservative?
16:43 **A.** That the battery could last longer than the stated
16:43 recommendations.
16:43 **Q.** Now, you just testified that the batteries for the blue
16:43 pod for the *Deepwater Horizon* BOP were changed in November of
16:43 2007; is that right?
16:43 **A.** That's correct.

16:43 **Q.** So in April of 2010, do you have an opinion as to whether the blue pod batteries were still in their five-year shelf life?
16:43 **A.** They were still within their life.
16:43 **Q.** Now, there's been a suggestion in this case that the crew should have changed out the pod batteries again before installing the blue pod on the BOP.
Do you agree with that opinion?
16:43 **A.** I do not.
MR. BAAY: Let's turn now to TREX-3605.2.2.TO.
16:43 **BY MR. BAAY:**
16:43 **Q.** Just looking now at the second recommendation from Cameron, this one relating to number of actuations.
What is Cameron's recommendation as it relates to the number of actuations for battery life?
16:44 **A.** 33 in a year's period.
16:44 **Q.** Do you have an opinion as to whether the blue pod battery for the *Deepwater Horizon* was within the 33-actuation limit?
16:44 **A.** I do.
16:44 **Q.** What is your opinion?
16:44 **A.** It would be within. 33 actuations in a year is not realistic. And we test the AMF only on the surface. That means the stack would have had to have been on surface 33 different times during a year.
If we look back at the records, we got only three --

some people get four wells drilled in a year. So it would be impossible it get this many actuations.

Q. In your experience at WEST and Cameron, have you ever seen or heard about an AMF being actuated 33 times in a year?

A. No, sir.

Q. Now, let's look at that top bullet point, "one year of on-time operation."

MR. BAAY: If we could go to 3605.2.3.TO.

BY MR. BAAY:

Q. What is your opinion, Mr. Childs, as to when batteries begin on-time operation?

A. In my opinion, when they first began -- what we call "on-time operation" is when the battery is installed and the AMF is turned on.

Q. And you're aware, aren't you, Mr. Childs, that Cameron has taken the position that on-time operation, as used in this document, TREX-3605, begins when the batteries are installed in the SEM?

A. I have seen that and heard that, yes.

Q. Do you agree with that interpretation?

A. My engineering logic tells me that if the battery's not being used, on-time operation begins when you start using it. It's just like with a flashlight I keep in the kitchen drawer. If it's not being used, I take it out, I turn it on, it's being used, it's using up it's operational life. I turn it off, it

goes back in the drawer, it's using up now its shelf life.
Q. So to use your analogy, when you arm an AMF, is that equivalent to turning on the flashlight?
A. Exactly.
Q. And when is the AMF typically armed?
A. After the BOP stack is on the bottom and latched up to the wellhead.
Q. Did you review the *Deepwater Horizon*'s departmental activity reports to determine how many days the blue pod on the BOP had of on-time operation at the time of the incident?
A. Yes. After we had changed to the March date, I wanted to really understand how much use this battery had gone through. We went back and looked at the three wells, their starting times when the stack was on the bottom, when they were pulled, so the actual time the AMF was armed.
MR. BAAY: Let's pull up TREX-51245.1189.1.TO, which is another entry from the departmental activity report.
BY MR. BAAY:
Q. What did this report tell you, Mr. Childs?
A. This is one we used to know that that's when -- the date, March 20th, they latched up to the BOP stack on the ocean floor.
Q. Did you go on to examine the various times when the BOP was latched up and when it was pulled in the year preceding the Macondo incident?

16:47 **A.** Yes. I looked at each time it was latched, unlatched, latched, relatched on each well.

MR. BAAY: Let's look at TREX-51245.216.1.TO.

BY MR. BAAY:

Q. Did you also examine these entries, Mr. Childs, in your review?

A. Very similar. We see we're pulling riser. That means we've unlatched the BOP stack. The stack is coming up off the surface. The second one, finished running the BOP back down and latched up on the wellhead.

MR. BAAY: Let's put up D-6716.

BY MR. BAAY:

Q. So just to understand this, you started the clock in March of 2009, when the SEM was armed?

A. The first time it was armed, yes, sir.

Q. You didn't count on-time operation for any days where the BOP was pulled and not latched up?

A. When the AMF was turned off, or disarmed.

Q. And in the -- from the time the pod was put on the BOP to the date of the incident, how many days did you determine of on-time operation related to the blue pod battery?

A. By doing it this way, we determined there were only 349 days of actual use, or on-time.

Q. And does the slide we have in D-6716 accurately reflect your review of the departmental activity reports from

Transocean?
A. Yes. Precisely.
Q. So in sum total, you found on-time operation of 349 days, or less than a year?
A. Less than a year's total use. That's correct.
Q. And it -- is that your opinion, Mr. Childs, even though the BOP was latched in March of 2009, some 13 months before the incident?
A. Again, I did this so I could know exactly what use it had. It was over a calendar year, yes, but it had less than a year's use.
MR. BAAY: All right. Let's look at TREX-22729.15.1.TO.
BY MR. BAAY:
Q. Have you seen this chart before, Mr. Childs?
A. Yes, I have.
Q. What is it?
A. It's out of Mr. Zatarain's report on some battery processes that he went through.
Q. As you've described, Mr. Zatarain is one of BP's BOP experts.
A. That's correct.
Q. I believe we saw this chart during Dr. Davis's examination. Do you recall that?
A. Yes. I saw it last week.

16:49 **Q.** Describe for us -- describe for the Court what the column on the left is indicating.
16:49 **A.** Well, of course, the first column is on the case number, so we'll disregard that. But the first three main columns, as he's titled them, it's Starting Battery Condition, so it shows 9-volt A and 9-volt B and 27-volt.
16:50 **Q.** And so this is starting battery condition.

What does the column on the right tell us?

16:50 **A.** On the far right, after he's gone through the scenario, it shows ending battery conditions. So if it started in the way he has on the left, this is, on the right -- the ending condition is the way it would end up.
16:50 **Q.** Do you have any criticisms, Mr. Childs, of the analysis that Mr. Zatarain lays out in his chart here?
16:50 **A.** No. No, I do not.
16:50 **Q.** What does this table in his analysis related to the batteries tell you?
16:50 **A.** Well, it shows me this. There has been a lot of talk about the yellow pod battery must -- or excuse me -- the blue pod battery must have been bad, very bad to start with. If it started bad, the only way you could end up, in his three scenarios here, is with the ending condition being all batteries bad. And that is not the ending condition we had. The 27-volt was bad, but the 9-volts were not.
16:51 **Q.** Does this analysis allow you to conclude that the blue pod

27-volt battery had to be somewhere between good and weak on the date of the incident?
A. Precisely. It could not have been bad to start. It might have been weak; it could have been good.
Q. Is there any way to know what the range was between good and weak on that date?
A. No. We cannot have a reading on that.
Q. And what was the status of the 27-volt battery as tested at Michoud?
A. It was very weak.
Q. And that testing happened almost 10 months or 11 months following the Macondo incident?
A. Exactly.
Q. If the battery was dead when it was tested -- or very weak, or it was dead when it was tested at Michoud, can we conclude that it had to be somewhere between good and weak at the time of the incident?
A. It had to be much better, and the fact that it was so dead, there had to have been another mechanism that would have drawn it down this far.
Q. Now, we know that you had performed some testing to analyze those mechanisms. Have other experts in this litigation identified ways that the 27-volt battery might have drained itself?
A. Yes.

16:52 **Q.** Who else undertook that evaluation?
16:52 **A.** InterLink did some work for BP that also determined other mechanisms by which it could be drawn down.
16:52 **Q.** Now, do you believe, because of this mechanism or the fact that the battery could drain -- is it your opinion that the blue pod 27-volt battery likely had sufficient charge at the time of the incident on April 20th, 2010?
16:52 **A.** That is my belief, yes.
16:52 **Q.** And that it drained itself somehow through one of the mechanisms, either through what Transocean discovered or through what the other testing identified as a possible draining mechanism?
16:53 **A.** That is correct.
16:53 **Q.** So just to summarize, Mr. Childs, based on your review of the evidence, when do you believe that the -- strike that. Excuse me.

In your opinion, if the blind shear rams closed on April 20th, with the AMF, does that mean that either the blue pod or the yellow pod successfully completed the AMF sequence?
16:53 **A.** Yes, it does.
16:53 **Q.** And it doesn't matter which pod actually completed the sequence; is that true?
16:53 **A.** That's true. Any of the four could have.
16:53 **Q.** Does the AMF testing performed by DNV and Transocean indicate to you that the yellow pod solenoid likely worked?

16:53 **A.** Yes, it does.

16:53 **MS. KARIS:** Your Honor, I'm going to renew my motion with respect to the testing performed by Transocean. This goes to the same issue we addressed previously.

16:53 **THE COURT:** I will -- you can bring it out in cross-examination. I certainly will consider that when I have to make certain judgments in this case.

16:54 **MS. KARIS:** Thank you, Your Honor.

16:54 **THE COURT:** Okay.

16:54 **BY MR. BAAY:**

16:54 **Q.** Okay. Mr. Childs, I want to spend some time looking at Transocean's subsea maintenance responsibility -- maintenance related to the blowout preventer. Okay?

16:54 **A.** Yes, sir.

16:54 **Q.** Did you review the maintenance tasks for the blowout preventer that were outstanding at the time of the incident?

16:54 **A.** I did.

16:54 **Q.** Did you determine whether any of those outstanding tasks affected the BOP's ability to operate?

16:54 **A.** I did.

16:54 **Q.** Was that review part of your work done while you were on the Transocean internal investigation team?

16:54 **A.** It was.

16:54 **Q.** Do you recall, Mr. Childs, approximately how many preventative maintenance tasks were performed just on BOP

components during the one year prior to the Macondo incident?
A. Probably about 750.
MR. BAAY: If we could pull up TREX-52665, which is a *Deepwater Horizon* well control preventive maintenance task summary chart.

BY MR. BAAY:
Q. Did you undertake a review of this chart and the underlying documents to determine whether it accurately reflects the 748 BOP-related preventative maintenance tasks that were completed in the year before the incident?
A. I did.
Q. And were there any outstanding preventative maintenance tasks at the time of the incident, by your review?
A. Yes. In this case we found five that were more than 30 days overdue.
Q. Did you also find a few additional that were less than 30 days overdue?
A. Yes, we did. They're not on this chart.
Q. Let's look at Exhibit 933.
Are you familiar with this document, Mr. Childs?
A. Yes.
Q. What is it?
A. It's an RMS report, which is Transocean's maintenance system report on activities.

16:55 **Q.** Did you review it in preparation for your testimony here today?
16:55 **A.** I did.
16:55 **Q.** And does this document identify the overview of maintenance tasks that were outstanding at the time of the incident?
16:56 **A.** Yes, it does.
16:56 **Q.** Let's discuss a few of those.
16:56 **MR. BAAY:** Exhibit 933.23.1.TO.
16:56 **BY MR. BAAY:**
16:56 **Q.** What is "365-day riser tensioner NDT," Mr. Childs?
16:56 **A.** Let me start with NDT. That stands for nondestructive testing. So nonintrusive, we're not taking things and doing anything that would harm them. We're just visually inspecting or doing external measurements that we can do to determine the condition, in this case of the riser tensioner.
16:56 **Q.** What is the riser tensioner?
16:56 **A.** The riser tensioner applies tension to the drilling riser to hold it up during the drilling operations.
16:56 **Q.** Did the fact that this task was overdue by more than 30 days in any way contribute to the incident on April 20th, in your opinion?
16:56 **A.** It did not.
16:56 **MR. BAAY:** Let's look to 933.24.1.TO.

16:57 **BY MR. BAAY:**
16:57 **Q.** Entry labeled "RPM 1825 days - perform rated load test." What is this task?
16:57 **A.** This is actually a load test on the bridge crane that moves the BOP stack around the rig when the stack is on the surface.
16:57 **Q.** And this is one of the BOP maintenance tasks related to the blowout preventer?
16:57 **A.** That's correct.
16:57 **Q.** And does the fact that this task was overdue in any way contribute to the incident on April 20th, in your opinion?
16:57 **A.** It did not. It was not in use.
16:57 **MR. BAAY:** Let's look at 933.25.1.TO.
16:57 **BY MR. BAAY:**
16:57 **Q.** We have three additional tasks here that are overdue, outstanding preventative maintenance tasks. Let's start at the top.
16:57 **A.** Okay.
16:57 **Q.** "RPM 730-day testing of relief valves."
16:57 Describe for us what that task is.
16:57 **A.** That would be a test to verify the relief valves did relieve at the proper pressure.
16:57 **Q.** And relief valves located on the blowout preventer?
16:57 **A.** These were on the control system for the blowout
16:58 preventer.

16:58 **Q.** Were these in any way involved at the time of the incident on April 20th?

MS. HANKEY: Your Honor, I'm going to object. This is part of the United States' motion; and this is not in Mr. Childs' considerative materials. And part of our motion was the fact that Mr. Childs testified at his deposition that he relied on a summary report prepared by Transocean employees.

And the materials that those Transocean employees were not identified in his report, including this one.

MR. BAAY: Your Honor, he has an entire section in his main report about maintenance; and as part of his work on the Transocean internal investigation team, they undertook a review of all outstanding maintenance items related to the blowout preventer. And it does identify overdue tasks in his report.

MS. HANKEY: And this document is not cited.

THE COURT: She's saying that he's now relying on documents and information that he previously didn't identify; is that correct?

MR. BAAY: I don't know, as I stand here, whether this is actually a reliance document. I'm going to have to check that.

THE COURT: Yeah. I'll sustain the objection.

16:59 **BY MR. BAAY:**
16:59 **Q.** Mr. Childs, as we just discussed, as part of your work on
16:59 Transocean's internal investigation team, did you identify
16:59 outstanding maintenance tasks -- preventative maintenance tasks
16:59 related to the BOP?
16:59 **A.** I did.
16:59 **Q.** And did you include discussion of outstanding preventative
16:59 maintenance tasks in your report?
16:59 **A.** I did.
16:59 **MR. BAAY:** Let's pull up TREX-22342.388.1.TO.
16:59 **BY MR. BAAY**
16:59 **Q.** And do you recognize this, Mr. Childs, as an entry from
17:00 Transocean's internal investigation report?
17:00 **A.** I do.
17:00 **Q.** And is this overdue maintenance task something that you
17:00 reference in your report, if you recall?
17:00 **A.** It is.
17:00 **Q.** What does the task relate to?
17:00 **A.** It relates to the LMRP connector and some testing and
17:00 checking on the connector to verify its condition.
17:00 **Q.** And when did it become overdue?
17:00 **A.** It was scheduled for March 30th, 2010.
17:00 **Q.** So at the time of the incident, it was some 21 days
17:00 overdue?
17:00 **A.** Precisely.

17:00 **Q.** And the fact that this task was 20 days overdue, in your opinion, did that contribute to the incident?
17:00 **A.** No. There was no issue with the LMRP connector at all.
17:00 **MR. BAAY:** Let's look at TREX-22342.388.2.TO.
17:00 **BY MR. BAAY:**
17:00 **Q.** Another task identified in Transocean's internal investigation report and referenced in your report; is that true?
17:00 **A.** It is.
17:00 **Q.** What does this task involve?
17:01 **A.** It's on the BOP choke control unit, a weekly inspection, service check on that control unit.
17:01 **Q.** According to this entry, how many days overdue was it?
17:01 **A.** It was scheduled again for April 16th.
17:01 **Q.** So on the date of the incident, some four days overdue?
17:01 **A.** Four days overdue.
17:01 **Q.** The fact that this task was overdue, did that, in your opinion, contribute to the incident or the BOP not shutting in the well on April 20th, 2010?
17:01 **A.** No. It was not utilized in the incident.
17:01 **MR. BAAY:** Let's look at TREX-22342.389.1.TO.
17:01 **BY MR. BAAY:**
17:01 **Q.** What does this task involve, Mr. Childs?
17:01 **A.** This is inspection -- a visual inspection mainly of the choke and kill high-pressure pipe work on the rig itself.

17:01 **Q.** Was this the final task that you and the Transocean internal investigation team identified as an overdue outstanding task?
17:01 **A.** Yes, it is.
17:01 **Q.** And according to this entry, how many days overdue was it?
17:02 **A.** One day.
17:02 **Q.** Now, the fact that this task is one day overdue, did that prevent the BOP, in your opinion, the blowout preventer from shutting in the well on April 20th, 2010?
17:02 **A.** It did not.
17:02 **Q.** I want to briefly discuss Transocean's overall maintenance philosophy.
17:02 **A.** Okay.
17:02 **MR. BAAY:** Pull up TREX-1469.
17:02 **BY MR. BAAY**
17:02 **Q.** Are you familiar with this document?
17:02 **A.** I am.
17:02 **Q.** And describe for us what it is.
17:02 **A.** It's Transocean's Subsea Maintenance Philosophy issued in May of '07.
17:02 **Q.** Did you review it in preparation for your testimony?
17:02 **A.** Yes, sir.
17:02 **Q.** Did you review it as part of your review of Transocean's maintenance on its blowout preventers?
17:02 **A.** I did.

17:02 **Q.** From your view, what do you understand Transocean's maintenance philosophy to involve for their blowout preventers?
17:03 **A.** It encompasses many areas of maintenance: preventive maintenance; condition-based maintenance; corrective maintenance; between-well maintenance, of course; five yearly survey-type maintenance; API requirements; OEM requirements -- that's original equipment manufacturer requirements; the regulatory requirements. The whole spectrum.
17:03 **Q.** So you're saying all of those aspects of maintenance were incorporated as part of Transocean's maintenance philosophy?
17:03 **A.** Yes, they utilized each part.
17:03 **MR. BAAY:** If we look at TREX-1469.4.1.TO.
17:03 **BY MR. BAAY:**
17:03 **Q.** This is section is labeled, "Subsea Planned Maintenance Tasks." What does that involve?
17:03 **A.** Of course, most of your subsea equipment spends a lot of time on the ocean floor. So you do plan maintenance to do on these devices when they're available on deck.
17:03 **Q.** So is planned maintenance similar to preventative maintenance or calendared maintenance?
17:04 **A.** It would also be -- it could be calendar basis. Well, it happens when you have access, and it is preventative maintenance as well.
17:04 **MR. BAAY:** All right. Let's pull up, please, 1469.7.1.TO.

17:04 **BY MR. BAAY**
17:04 **Q.** What does this section discuss?
17:04 **A.** When any shortfalls are found or design issues are found, you schedule and do a corrective maintenance.
17:04 **Q.** What does that mean? If you find an out-of-service part or what? Describe for us what that means.
17:04 **A.** Not working at the level you wish it to or you'll possibly even issue an alert that shows there is a design issue.
17:04 **MR. BAAY:** Let's look at TREX-1469.4.2.TO.
17:04 **BY MR. BAAY**
17:04 **Q.** This section is labeled as -- or identified as "Planning Subsea Between Well Maintenance." What does that relate to?
17:04 **A.** The maintenance we were discussing on this equipment must be planned. We have -- between wells there's a set period of time, and each time a plan is made about all the maintenance that needs to be done. This plan is then reviewed by a contractor and operator.
17:05 **BY MR. BAAY:**
17:05 **Q.** Is between-well maintenance also referred to in the industry as "rig move maintenance"?
17:05 **A.** It can be.
17:05 **Q.** And did you review the rig move maintenance that was conducted on the *Deepwater Horizon* for their BOP prior to the splashing at Macondo?
17:05 **A.** Yes. I reviewed the plan.

17:05 **Q.** In your experience, do operators like BP have involvement in rig move maintenance?
17:05 **A.** Yes. In between wells there's discussions on the maintenance that is scheduled and what we can do with each element of it.
17:05 **Q.** From your specific review related to the *Deepwater Horizon*, did BP have input on Transocean's rig move maintenance of its BOP?
17:05 **A.** Yes, they did.
17:05 **MR. BAAY:** Let's look at TREX-3338.1.1.TO.
17:05 **BY MR. BAAY**
17:05 **Q.** Are you familiar with this document, Mr. Childs?
17:05 **A.** Yes, I am.
17:05 **Q.** What is it?
17:05 **A.** A document where Transocean has sent their work list to BP and they're discussing this. They want to look at it and decide which way BP wants to go, about which way to go with the two plans that were sent by Transocean.
17:06 **Q.** Did you take it from the discussion in this e-mail that BP was commenting on the events or the maintenance that was going to be conducted for the rig move for the *Deepwater Horizon*?
17:06 **A.** Yes. Yes, trying to make a decision on which way to go.
17:06 **MR. BAAY:** Let's look also at 3338.1.2.TO.
17:06 **BY MR. BAAY**
17:06 **Q.** It's another e-mail chain. This one is involving Brett

Cocales. You know him to be a BP employee, don't you?
A. Yes.
Q. And he is discussing stack maintenance to be done before Macondo; is that true?
A. That is correct.
Q. Is this another -- or let me ask you: What does this e-mail string indicate to you in terms of BP's involvement in Transocean's rig move maintenance on its blowout preventer?
A. It shows that they were preferring to do a lot of the stack -- normal stack maintenance prior to Macondo so that it doesn't interfere with a later connector changeout they had scheduled.
MR. BAAY: Okay. We go back to the Subsea Maintenance Philosophy document, 1469.7.2.TO.
BY MR. BAAY:
Q. Are there also sections in Transocean's philosophy related to the testing on the BOP?
A. Yes. Function testing and pressure testing are both parts of the maintenance.
Q. Do you understand those tests to be required by regulation?
A. Yes.
Q. And the regulation is on the operator in most cases; is that true?
A. To properly function-test and pressure-test their

17:07 equipment.
17:07 **Q.** We'll get to it in a minute, but did you review all the function testing and pressure testing related to the BOP for the *Deepwater Horizon*?
17:07 **A.** Yes, I did.
17:07 **Q.** And was -- were the series of function and pressure tests all successful for the *Deepwater Horizon* BOP?
17:07 **A.** Yes, they were.
17:07 **Q.** Is a function or -- a function in a pressure test the best indicator of a blowout preventer's health while the BOP is subsea?
17:08 **A.** Yes, sir. You have no other way to evaluate it except verifying that it does function as you requested and that it passes both low and high pressure tests when you pressure-test it.
17:08 **MR. BAAY:** All right. Two final entries from the maintenance philosophy. Go to 1469.8.1.TO.
17:08 **BY MR. BAAY** *
17:08 **Q.** This section is headlined, 180 -- "1825-day major overhauls."
17:08 What -- were major overhauls a part of Transocean philosophy, and what did they involve?
17:08 **A.** Yes. Of course, they're a part of it. A five-yearly major overhaul might be possible. They will base this on the results of a full test and inspection of that device to

17:08 determine if they will do a full overhaul.
17:08 **MR. BAAY:** Now, let's finally look at 1469.7.3.TO.
17:08 **BY MR. BAAY:**
17:08 **Q.** The header "Component Condition Evaluation," what does this involve?
17:08 **A.** It's basically the part we talked about before, condition-based maintenance. There's a number of ways you can determine the current condition of a piece of equipment by certain pressure tests, certain other inspections you can do, and you determine its condition.
17:09 If it's in perfectly good condition, there would be no reason to tear it apart and repair it.
17:09 **Q.** We've heard some testimony in this case that conditioned-based maintenance is nothing more than running it until it breaks.
17:09 Do you agree with that assessment or that testimony?
17:09 **A.** That is not what this is.
17:09 **Q.** In your experience, are you aware of other companies that use elements of condition-based maintenance?
17:09 **A.** Yes. We know the Air Force does, the Coast Guard, the aircraft industry all utilize these.
17:09 **Q.** In your time at WEST, are you familiar -- can you offer examples of operators or entities you're familiar with who perform conditioned-based maintenance on their blowout prevention equipment?

17:09 **A.** Yes. WEST was requested by ExxonMobil several years ago
17:10 to determine trend analysis, predictive tests, condition-based
17:10 type tests performed on all of their major equipment so that
17:10 they could determine when it actually needed repair rather than
17:10 just doing a time-based maintenance where they might be
17:10 repairing a perfectly good piece of equipment.
17:10 **Q.** If you do -- describe for us what the concept of "infant
17:10 mortality" means.
17:10 **A.** Infant mortality is -- comes into play when you take a
17:10 brand-new device off the shelf or maybe just a brand-new
17:10 rebuilt device off the shelf, install it into the system and it
17:10 has issues. Maybe an O-ring was cut on installation. Maybe a
17:10 scratch was introduced when you reassembled.
17:10 So once it's installed, if you have a problem, you
17:10 then have to fix that issue. So it's like teething problems.
17:10 So we look at it as infant mortality. If it's brand-new, it
17:10 has trouble, you have to get past all those issues before it's
17:10 ready to use.
17:10 **Q.** How is that relevant to condition-based maintenance?
17:11 **A.** When you have a piece of equipment that is in perfectly
17:11 good condition, it passes all predictive or trend analysis-type
17:11 tests, there's no reason to replace it, because you might be
17:11 introducing this infant mortality issue where the new part you
17:11 pull off doesn't work.
17:11 I've seen a number of daily reports from my men in

17:11 the field. They had a problem. They're repairing their stack
17:11 or they're replacing a valve. They took a valve off the shelf.
17:11 They ended up having to put the old valve back in because the
17:11 other valve would not work properly.
17:11 **Q.** Mr. Childs, based on your review of Transocean's subsea
17:11 maintenance philosophy and the maintenance program that they
17:11 put in place for their BOPs, do you believe that their document
17:11 and their philosophy was consistent with industry standards for
17:11 BOP maintenance at the time of the incident?
17:11 **A.** I'm sorry?
17:11 **Q.** At the time of the incident?
17:11 **A.** Yes, I do believe so.
17:11 **Q.** Now, there's been opinions offered and testimony provided
17:11 that Transocean should have been required to follow API RP 53
17:12 in its BOP maintenance.
17:12 Are you familiar with that testimony?
17:12 **A.** I am.
17:12 **Q.** And are you familiar with the provisions of API RP 53?
17:12 **A.** I am.
17:12 **MR. BAAY:** Let's look quickly at TREX-7030. Can we
17:12 blow up just that top header, Dennis?
17:12 **BY MR. BAAY**
17:12 **Q.** Are you familiar with this document, Mr. Childs?
17:12 **A.** I am.
17:12 **Q.** What is it?

17:12 **A.** It's Cameron's Engineering Bulletin 902D concerning well control equipment and periodic -- excuse me -- periodic inspection/recertification.
17:12 **Q.** As we know well, Cameron was the manufacturer of the *Deepwater Horizon* BOP; is that right?
17:12 **A.** That's correct.
17:12 **MR. BAAY:** Let's turn to 7030.4.1.TO.
17:13 **BY MR. BAAY**
17:13 **Q.** Read for us Cameron's position statement in the highlighted language as to they how they viewed API RP 53 at the time of incident.
17:13 **A.** "API RP 53 is not considered to be an industry standard."
17:13 **Q.** And similar to Cameron, are you familiar with what BP's position was or how they viewed API RP 53 at the time of the incident?
17:13 **A.** Yes, I am.
17:13 **Q.** And what was their position?
17:13 **A.** Very close to Cameron's.
17:13 **Q.** Which was what?
17:13 **A.** That it was not an industry standard.
17:13 **MR. BAAY:** Can we also look at 7030.4.2.TO?
17:13 **BY MR. BAAY**
17:13 **Q.** According to this call-out and from Cameron's engineering bulletin, what is your opinion as to how Cameron viewed the idea of certification of major BOP components?

17:13 **A.** Reading the highlighted sections: "It is a recommended practice and, as such, is intended to be a guideline . . . . It is not possible to 'certify' that any maintenance or inspection of any equipment can be 'in compliance' with API RP 53."

17:14 **Q.** Given these statements and given your experience in the industry and dealing with blowout prevention equipment, do you believe it was reasonable for Transocean to review API RP 53 as a recommended practice?

17:14 **A.** Yes, I do.

17:14 **Q.** Switching topics slightly, Mr. Childs -- I'm nearing the end -- I'd like to ask you about your opinions related to the *Deepwater Horizon* stack over the five years leading up to the Macondo incident. All right?

17:14 **A.** Yes, sir.

17:14 **MR. BAAY:** Let's look at TREX-526628, which is a summary chart of the *Deepwater Horizon* maintenance from 2005 to 2010.

17:14 **BY MR. BAAY**

17:14 **Q.** Have you had a chance to review this document before your testimony here today?

17:14 **A.** I have.

17:14 **Q.** And have you had a chance to review the underlying maintenance records to determine whether this chart accurately summarizes the maintenance that was performed from 2005 to

2010?
A. I have.
Q. And is this an accurate representation of those documents?
A. Yes, it is.
Q. Or an accurate summary, I should say.
MR. BAAY: Let's pull TREX-52662-A.3.1.TO.
BY MR. BAAY:
Q. Describe for the Court briefly what kind of maintenance was done on the *Deepwater Horizon*'s rams prior to moving to Macondo.
A. As we're seeing here, we have functioning rams. They're doing operator tests; they're opening up the ram cavities, getting access to the ram cavities. They're replacing all the rubber goods on the rams; they're doing more operator testing.
They removed the blind shear ram blocks and pulled the seal carrier, as well. Moved various other parts, prepping these for more work. New ram packers installed.
By the way, I'm reading from the bottom up because that's the way the dates run.
Q. Let me jump in here.
If we call out those last two entries, what testing was performed on the *Deepwater Horizon* BOP's rams prior to splashing the Macondo?
A. On these two dates they functioned blind and super shear rams, and they performed operator testing on the bonnets.

17:16 **Q.** Let's move to 52662A.1.1.TO.

And what is this -- what are these entries describing, Mr. Childs?

A. It shows that the -- both of the super shear bonnets received a recertification document.

Q. What does that mean?

A. That the super shear rams were disassembled, inspected, rebuilt, and recertified.

Q. And we know that the super shears would also be the casing shears?

A. That is the other name. Cameron's name for it is super shear. The generic name for the rest of the industry is casing shear rams.

Q. Why is it possible that we have an April 2010 recertification date for these rams when we know that the BOP was in service in the Macondo on those dates?

A. I think this is just basically the date they got the recertification documents.

Q. In your experience, is it typical practice for Cameron to recertify a piece of equipment and then sign the certification at a later date?

A. I don't know that it's practice, but I know it happens. Paperwork, as we all can understand, is usually the last to occur.

MR. BAAY: Look to 52662A.9.1.TO.

16:32 **BY MR. BAAY:**
17:15 **Q.** Did you also review, Mr. Childs, the rig move maintenance
17:17 work that was performed on the *Deepwater Horizon* BOP prior to
17:17 the Kodiak well?
17:17 **A.** I did.
17:17 **Q.** What did you find?
17:17 **A.** Generally, some of the same things we saw on the last,
17:17 where they opened up the bonnets, replaced all the rubber goods
17:17 and all the rams, retested and tested the operators again.
17:18 **Q.** And that was five months before the same -- the very same
17:18 work was done at Macondo; is that right?
17:18 **A.** That is correct.
17:18 **Q.** Were there any regulatory requirements that you're
17:18 familiar with that required Transocean to do this type of work
17:18 with their rams and with their bonnets every six months?
17:18 **A.** No, sir.
17:18 **MR. BAAY:** Let's look at TREX-52662A.10.1.TO.
16:32 **BY MR. BAAY:**
17:15 **Q.** Same set of documents for the rig move prior to the Tiber
17:18 well. Did you review those documents?
17:18 **A.** I did.
17:18 **Q.** Does it appear that the same ram maintenance was occurring
17:18 on the rig move prior to Tiber?
17:18 **A.** Basically the same thing again. Rubber goods were changed
17:18 and bonnet doors were closed. So they replaced the ram rubber

goods again.
Q. In your opinion, based on these examples, did Transocean's maintenance of its rams and bonnets meet industry standards?
A. Yes.
Q. Have you also, Mr. Childs, reviewed the maintenance performed on other of the key BOP components of the *Deepwater Horizon*?
A. I did.
Q. And those are reflected in the chart we just saw?
A. They are.
Q. In your opinion, does the maintenance of these components comply with industry standards?
A. It does.
Q. And was there any maintenance that was not performed related to these major components that would have made a difference in the ability of the blind shear ram to shut in the well on April 20th, 2010?
A. No, sir.
Q. We just looked at Transocean subsea maintenance philosophy related to function and pressure testing.

Let me ask you, what does a successful subsea function test indicate?
A. It means that through your control system you can function each and every device that you've tested. They are -- they would be there for you when you hit the button.

17:20 **Q.** Does a successful function test indicate that all the rams on the stack will open and close?
17:20 **A.** Exactly what it's testing: full function.
17:20 **Q.** Same question for a pressure test. What does a successful pressure test indicate to you?
17:20 **A.** It indicates that the device tested has full pressure capability. And as I mentioned before, we test them at low pressure and high pressure.
17:20 **Q.** And did you review the records, the maintenance records, to determine if the function of pressure tests were regularly performed while the BOP was on Macondo?
17:20 **A.** I did.
17:20 **MR. BAAY:** If we look at TREX-52664.1.1.TO.
16:32 **BY MR. BAAY:**
17:15 **Q.** Mr. Childs, does this chart accurately reflect the dates on which, according to your review, the *Deepwater Horizon* BOP was function- and pressure-tested?
17:20 **A.** Yes, it does.
17:20 **Q.** If we look at --
17:20 **MR. BAAY:** Can we call out, Dennis, that entry from 4-17-2010 -- let me back that up.
17:21 Let's call out 52664.2.1.TO.
16:32 **BY MR. BAAY:**
17:21 **Q.** I'll ask you, as it's coming up, did the *Horizon*'s function testing include a function test of the BOP on

April 17th, three days prior to the Macondo incident?
A. Yes. It was listed on 4-17-2010.
Q. Was there a separate function test of the blind shear ram, according to your review, on April 17th, 2010?
A. Yes, it was separate.
Q. Why would you have a separate test of your blind shear ram?
A. You must remove the drill pipe before you close and test the shear ram against pressure.
Q. So based on these tests, what can you conclude about the functionality of the *Deepwater Horizon* BOP as of April 17th, 2010?
A. It was fully functional.
Q. Okay. Switching topics. I want to talk about configuration, which brings us to the last of your four opinions.

MR. BAAY: Go to Slide D-6686.

BY MR. BAAY:
Q. Your opinion is that the BOP was configured in accordance with industry practice at the time of the incident; is that right?
A. Yes, sir.
Q. If we could pull up -- well, let me back up.

Did you make a determination as to who decided on the initial configuration of the *Deepwater Horizon* BOP?

17:22 **A.** Yes.
17:22 **Q.** By "configuration," we mean which components you're going to have and how many cavities you're going to have on your blowout preventer; is that true?
17:22 **A.** That's correct.
17:22 **MR. BAAY:** If we could go to TREX-7687.25.1.TO.
16:32 **BY MR. BAAY:**
17:15 **Q.** While that's coming up, I'll ask you the question, is it typical, in your experience, for the operator to decide and specify blowout preventer configuration?
17:22 **A.** Yes. As I've stated here, of course, the operator knows where they're going to drill, knows what they might encounter. They know the geology, they know -- if not exactly that formation, but related formations in area. So they know the pressure capability, the temperature capability, etc., of the BOP stack that they would need.
17:23 **Q.** And the exhibit we've just called out is a section from your report?
17:23 **A.** Yes, it is.
17:23 **Q.** And does the highlighting language basically say what you just testified to?
17:23 **A.** Yes. I paraphrased and added to that.
17:23 **Q.** And the summary there is that BP had the unique access to the well data to determine the proper configuration?
17:23 **A.** Yes.

17:23 **MR. BAAY:** Turn to TREX-7691.
16:32 **BY MR. BAAY:**
17:15 **Q.** Which is a report prepared by WEST Engineering, which is
17:23 your operation. Is that true, Mr. Childs?
17:23 **A.** My company, yes, sir.
17:23 **Q.** Dated April 26th, 2001, entitled "Acceptance of Well
17:24 Control Equipment."
17:24 Were you involved in the preparation of this report?
17:24 **A.** I was. I performed the technical review.
17:24 **Q.** And who else was involved in preparing this report with
17:24 you?
17:24 **A.** The gentleman that went on the actual survey was Gary
17:24 Eastveld.
17:24 **Q.** Tell the Court what the purpose of this report was.
17:24 **A.** Transocean called us out to the rig to review a couple
17:24 anomalies on the rig and do a general check of the rig.
17:24 **Q.** Did the review by WEST include a review of the
17:24 configuration and design of the BOP?
17:24 **A.** Yes. When you're on the rig, you're verifying the
17:24 configuration of the stack.
17:24 **Q.** And you might have said it, but to be clear, this was the
17:24 *Deepwater Horizon* BOP stack?
17:24 **A.** Yes. It says so on the top. The subject line is
17:24 *Deepwater Horizon*.
17:24 **MR. BAAY:** If we could call that out, Dennis, the

17:24 subject line.
17:25 And if we could go to 7691.10.1.TO.
16:32 **BY MR. BAAY:**
17:15 **Q.** And as a result of your review and preparation of this
17:25 report, did you conclude that the stack configuration on the
17:25 *Deepwater Horizon* was consistent with industry practice at the
17:25 time?
17:25 **A.** Yes.
17:25 **Q.** And what do you say -- what is the language that we have
17:25 pulled out in the highlighting that's called out?
17:25 **A.** What Mr. Eastveld said, and I agreed with, that *"Deepwater*
17:25 *Horizon* should have a very reliable subsea BOP stack and
17:25 control system."
17:25 **Q.** Why do you use "should have"? Is this a looking-forward
17:25 report?
17:25 **A.** Yes. This is a brand-new rig. We're looking to its
17:25 future.
17:25 **Q.** So you're doing a review and you're making a forecast as
17:25 to what your conclusion is after reviewing the systems?
17:25 **A.** Right. It is a forecast. Because, again, it was
17:25 brand-new.
17:25 **MR. BAAY:** Let's turn to 7691.10.2.TO.
16:32 **BY MR. BAAY:**
17:15 **Q.** Read for us what Mr. Eastveld concludes in the WEST
17:26 report.

17:26 **A.** "The rig is one of the best setups and problem-free startups this surveyor has seen."
17:26 **Q.** Do you agree with those conclusions?
17:26 **A.** Yes. I know Mr. Eastveld very well. He's worked for me for years. He worked with me at Cameron. He's an ex-Cameron service hand. He put several rigs together in the field at the shipyards, and he understands. And that's why he saw how good the startup was here, meaning the beginning of this rig going into service.
17:26 **Q.** Thank you, Mr. Childs.
17:26 **MR. BAAY:** We can pull that down.
16:32 **BY MR. BAAY:**
17:15 **Q.** Now, there's been some testimony or suggestion by some of the parties that the BOP for the *Deepwater Horizon* should have been modified at some point to add another blind shearing ram.
17:26 Are you familiar with that opinion?
17:26 **A.** I'm familiar with it.
17:26 **Q.** Are you familiar with the regulatory requirements regarding best available and safest technology, or BAST?
17:27 **A.** Yes, I am.
17:27 **Q.** In your opinion, did BAST require the addition of a second blind shear ram on the *Deepwater Horizon* stack?
17:27 **A.** No.
17:27 **Q.** Why not?
17:27 **A.** Every time a new possibility occurs doesn't mean you have

17:27 to do that possibility. You must do a complete risk assessment, management of change, to determine if this is the best thing to change and why.

Q. In preparing your report, did you look to see if other rigs had the same BOP configuration as the *Deepwater Horizon* BOP configuration?

A. Yes. I actually limited my search to equivalent Cameron rigs, and we found 36 other rigs so configured.

Q. In your opinion, did compliance with the industry practice at the time require the addition of a second blind shear ram?

A. No. Standard at the time was five cavities, and not multiple sealing shear rams. We did have a sealing shear ram and a casing shear ram.

Q. Have you seen any analysis from any expert in this case to determine whether a second blind shearing ram would have made a difference on April 20, 2010, to shut in the well?

A. No, I have not.

Q. Are you aware that other experts have pointed out that Transocean operates other rigs with BOPs having six cavities in their stacks?

A. Yes, I've seen that.

Q. Is it your opinion that BOPs with five ram cavities still remain in use and are still industry standard and were industry standard at the time of the incident?

A. That is correct.

17:28 **Q.** When a BOP has six ram cavities, are there enough cavities to have two blind shear rams and one casing shear ram?
17:28 **A.** Yes. If you go from five to six cavities, it's very easy, then, to have two sealing shear rams or casing shear rams and still have three of your VBRs, or variable bore rams.
17:29 **Q.** But again, are there practicality considerations in reconfiguring your BOP stack to add a sixth cavity?
17:29 **A.** You must have room for it on the rig. Some rigs are built around the height of the BOP stack. And if you add 3 feet or more to the height, you may not be able to store your stack.

You would have to add accumulators which, of course, are possible, so that you could operate one more cavity. You would have to have control functions available. You would have to reconfigure controls, etc.

It takes a lot of planning, and it may not fit in your area on the rig.

17:29 **Q.** Mr. Childs, just a few more topics.

What kind of blade configuration did the *Deepwater Horizon* blind shear ram have?

17:29 **A.** As we've seen before, we have the shearing blind ram that had the upper blade with a V-shape and the lower blade with a straight shape.
17:30 **Q.** And tell us the difference between a shearing blind ram and what's been referred to as a DVS, or a double-V shearing ram.

17:30 **A.** Double-V, both the upper and the lower blade have a V-shape.
17:30 **Q.** Now, there's been testimony that the DVS ram requires less shear force. Do you agree with that assessment?
17:30 **A.** That is correct.
17:30 **Q.** Why is it your opinion that the DVS rams are better than the SBR rams?
17:30 **A.** Well, the DVS rams were not required in this case because we could shear the 5 1/2-inch drill pipe that we were needing to shear.
17:30 The SBRs are shown in Cameron's EB to have good fatigue life. The DVSs are not listed, so that they have better fatigue life. So it again is a place where you do an MOC, or management of change, and determine if that new device really is required or needed.
17:31 **Q.** As between the SBR and the DVS ram design, which Cameron design was most common in the industry at the time of the incident?
17:31 **A.** The SBR.
17:31 **Q.** Is the SBR still in use on rigs today?
17:31 **A.** And it's still in use.
17:31 **Q.** There's been also some talk about CDVS blades. You're familiar with that design?
17:31 **A.** I am.
17:31 **Q.** Tell us the difference between those and the single-bore

17:31 ram.
17:31 **A.** We go to the derivation from the SBR to the DVS; then the next derivation is the CDVS, the C standing for cable.
17:31 They were devised for completions use, not necessarily drilling use, so that they had a capacity to shear cable or wireline, where this is made out of small strands of wire.
17:31 This necessitated having the blades be held in very intimate contact so that they could cut even 30,000ths-diameter wire.
17:32 **Q.** In your opinion, would CDVS blades have been appropriate on the -- to use on the *Deepwater Horizon* BOP stack?
17:32 **A.** No, sir.
17:32 **Q.** Was there a safety alert issued by Cameron, that we've seen put up on the big board here, at the time of the incident?
17:32 **A.** Yes. And that points out one of my thoughts about it. Just because this comes out doesn't mean you need to use it. First, it was mainly for completion; second, it had a sealing issue and a pressure issue.
17:32 **Q.** I want to talk to you about tandem boosters for a minute. What is a tandem booster?
17:32 **A.** A tandem booster is, as an operator, you can add to your BOP to basically double your shearing capacity or shearing force.
17:32 **Q.** Did BAST, as you understand it, require the installation

or the addition of tandem boosters at the time of the incident?
A. No, it did not.
Q. Would you have been -- what would have been required to install a tandem booster on the *Deepwater Horizon*?
A. It fits in the same place as the standard bonnet, so it could have gone in that place. But then we have an issue on the rig because of the width that's made -- or created in the full BOP stack.

It was so wide that you could not do maintenance on the tandem boosters when the stack was in the storage position. To do any maintenance on the tandem boosters, you would have to move the stack into the moon pool area, hanging in the moon pool, which makes it a dangerous place to work. Plus, that meant no other activities could occur in the moon pool, so you've stopped critical path work. So it would have created many more issues.

And it wasn't needed to shear the piece of pipe -- or the pipe, the 5 1/2-inch drill pipe we're talking about.
Q. Would the additional shearing force, in your opinion, made available by the tandem booster, have made any difference at all on April 20th, 2010?
A. No, sir.
Q. Why do you say that?
A. I've seen studies where they applied equivalent to 52- or 5300 psi instead of the 4000 psi that we were were limited, and

made no difference.

You still had solid pieces of pipe between the two ram blocks keeping the blocks from being able to come together and complete a shear or a seal.

Q. Now, I want to ask you about control pod systems. Okay?

What is the Mark III control pod system?

A. It's one of the later versions of Cameron's system. The *Horizon* had the Mark II system.

Q. At the time of the incident, did BAST require the switch to a Mark III control system?

A. No, it did not.

Q. Did any regulation at the time of the incident require a change from the Mark II to the Mark III?

A. No, it did not.

Q. Did industry practice require that change?

A. No, sir.

Q. Would you have -- you, as WEST, advising a client, have recommended that change?

A. No. They would have gone through the same process we've mentioned. You do a full MOC, full risk evaluation.

In this case, there were single-wound coils instead of dual, and so you've lost some redundancy in your coils.

Q. So is what you're saying, there are tradeoffs between the Mark II and the Mark III system?

A. Again, that's why you never take something on face. Just

because it's new doesn't mean I want to go and start using it.
Q. And were you also aware that there was a safety alert issued for the Mark III control pod system?
A. Yes, sir.
Q. MUX cables. There's been some testimony offered in this case regarding the routing of the MUX cables. Are you familiar with those opinions?
A. I am.
Q. Where were the MUX cables located on the *Deepwater Horizon*?
A. In the moon pool area. From right beside the moon pool area, down onto the riser, down the riser to the BOP stack, as we saw on our graphic earlier.
Q. As you've testified, the MUX cables -- the purpose of the MUX cables is to provide power and communications to your BOP?
A. To the pods on the BOP stack, yes, sir.
Q. And what was the industry practice at the time of the incident as to where you would route your MUX cables?
A. Exactly as I just mentioned, through the moon pool.
Q. In your 38 years of dealing with blowout preventers, have you ever seen MUX cables located anywhere else but the moon pool of a rig?
A. I have not.
Q. Acoustic control systems.
A. Yes, sir.

17:36 **Q.** What is an acoustic control system?
17:36 **A.** It is a tertiary control system that utilizes acoustic waves to provide a chance to operate a function acoustically.
17:36 **Q.** Are they common? Are they in frequent use in the Gulf of Mexico on rigs?
17:36 **A.** They are not.
17:36 **MR. BAAY:** If we could look at TREX-3298.
17:40 **BY MR. BAAY:**
17:40 **Q.** Are you familiar with this document from WEST Engineering?
17:36 **A.** I am.
17:37 **Q.** What is this document?
17:37 **A.** Evaluations we were requested to make by the MMS service on secondary intervention methods in well control.
17:37 **Q.** And does part of this evaluation include a review of acoustic control systems?
17:37 **A.** Yes, being a secondary intervention system in this case.
17:37 **MR. BAAY:** Let's look at 3298.60.1.TO.
17:40 **BY MR. BAAY:**
17:40 **Q.** Just read that highlighted language there for me, please.
17:37 **A.** "Even with widely-spaced dual-stacked mounted transceivers, communication cannot be relied upon in the presence of mud clouds or gas plumes."
17:37 **MR. BAAY:** Go to TREX-3298.61.2.TO.
17:40 **BY MR. BAAY:**
17:40 **Q.** Read the highlighting there for me, please, Mr. Childs.

17:37 **A.** "Operating in a wide range of water depths has caused
17:38 problems in the GOM," or Gulf of Mexico . . . . The
17:38 transmitted commands would reverberate between the surface and
17:38 seafloor - a condition known as 'multipath.' The
17:38 BOP-mounted" -- excuse me, misread -- "The BOP-mounted
17:38 receivers could not decode the commands and thus did not
17:38 function . . . ."
17:38 **Q.** In your opinion, Mr. Childs, do acoustic control systems
17:38 have reliability issues?
17:38 **A.** Yes, they do.
17:38 **Q.** Is the language we've read from one of your WEST
17:38 Engineering reports consistent with that opinion?
17:38 **A.** It is.
17:38 **MR. BAAY:** You can pull that down.
17:40 **BY MR. BAAY:**
17:40 **Q.** Now, we -- at the beginning of your examination, we pulled
17:38 up many animations, and the speed of those animations I want to
17:38 ask you about.
17:38 Were those sped up for our purpose here, or was
17:38 that actual operation time for a closure of, say, a blind shear
17:39 and a VBR?
17:39 **A.** They were very much speeded up. Ram BOP on the *Horizon*,
17:39 by our own literature we got from the testing, is about
17:39 16 seconds. It doesn't sound like a lot, but if you were
17:39 sitting here watching it, it would barely move across the

screen.

For the annular BOP it was closer to 26 seconds. Again, to watch that close in 26 seconds would be rather boring.

Q. So if we look back at D-6686, Mr. Childs, just the summary slide of your opinions in this case. I'll take them in reverse order.

Was the design and configuration of the BOP in compliance with industry standards, in your opinion?

A. Yes, it was.

Q. And did the maintenance contribute in any way to the incident, in your opinion?

A. It did not.

Q. And under that category, did either the blue pod 27 battery or the yellow pod Solenoid 103 successfully function the AMF on April 20th, 2010?

A. If either one did, we don't know which one.

Q. Do you believe, after reviewing the forensic evidence as collected by DNV, that it's possible that the pipe could have been off-center on April 22nd?

A. I do not believe that.

MS. KARIS: Your Honor, I'm going to object. Asked and answered. This has all been gone over before.

MR. BAAY: I'm almost done.

THE COURT: Well, it is. This is where we started.

17:40 **MR. BAAY:** It is, but we're bringing it to a close.
17:40 **THE COURT:** Okay. Go ahead.
17:40 **BY MR. BAAY:**
17:40 **Q.** Just the final two questions.
17:40 Is there any dispute that the blind shear ram closes an off-center pipe?
17:40 **A.** No, sir.
17:40 **Q.** And does the forensic evidence, in your opinion, support your conclusion that the AMF operated on April 20th, 2010?
17:40 **A.** Yes, it does.
17:40 **MR. BAAY:** I'll pass the witness.
17:40 Thank you, Your Honor.
17:40 **THE COURT:** All right. I think we're going to quit a little early today.
17:40 **MS. KARIS:** You have a lot of upset people in this room, Your Honor.
17:41 **THE COURT:** I can tell.
17:41 All right. We'll recess until 8:00 a.m. tomorrow morning. Okay?
17:41 **THE DEPUTY CLERK:** All rise.
17:41 (WHEREUPON, the proceedings were concluded.)

*****

CERTIFICATE

I, Jodi Simcox, RMR, FCRR, Official Court Reporter for the United States District Court, Eastern District of Louisiana, do hereby certify that the foregoing is a true and correct transcript, to the best of my ability and understanding, from the record of the proceedings in the above-entitled and numbered matter.

s/Jodi Simcox, RMR, FCRR
Jodi Simcox, RMR, FCRR
Official Court Reporter