Deposition Testimony of:

Mark Alberty

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Page 9:09 to 9:12

swear in the witness.

MARK WILLIAM ALBERTY,

having been first duly sworn, testified as follows:

Page 9:15 to 9:17

Q. Can you please state your name for the record?
A. Mark William Alberty.

Page 10:14 to 13:09

Q. Can you give us a brief educational background?
A. Right. Grew up here in Louisiana, attended the school systems of Louisiana, went to LSU, graduated from LSU in '73 which a -- with a bachelor's degree in electrical engineering.
I then went into the oil field at that time.
Q. Do you hold any professional licenses?
A. No.
Q. Do you hold any graduate degrees?
A. No.
Q. Who are you currently employed by?
A. Hess Corporation.
Q. Is that an oil company?
A. Yes.
Q. What is your current position with Hess?
A. I'm a senior geophysical adviser.
Q. What is a geophysical adviser?
A. It's -- it's a -- what -- what does the job entail; is that --
Q. Correct.
A. I would be doing pore pressure and fracture gradient prediction for Hess and setting training materials, developing methodologies that go with that.
Q. How long have you been at Hess?
A. Since March 7th of this year.
Q. Where were you employed prior to that?
A. I worked for BP.
Q. How long were you employed at BP?

A. Including my time at Sohio before BP acquired them, 23 years.
THE REPORTER: 23 or 24?
THE WITNESS: 23.
Q. (BY MR. SUMMY) What was your job title at BP?
A. At the end?
Q. At the end.
A. Job title would have been senior adviser.
Q. What was your job title on April 20th, 2010.
A. I guess I need clarity about what you mean by job title. There are a variety of titles --
Q. Okay.
A. -- that could be assigned to it.
Q. What titles did you hold?
A. Senior adviser in drilling and completions, EPT team, and I was also the segment engineering technical authority for pore pressure fracture gradient prediction and detection.
Q. What is the segment engineering technical authority?
A. The individual who oversees a particular engineering practice within the company. I think there were 12 -- I think there were 12. I'm not sure the exact number, 12, we call them SEDAs in drilling and completion for various parts of drilling activities.

Page 13:19 to 14:02

Q. Okay. Were you one of the 12 SEDAs?
A. Yes.
Q. And what discipline did you oversee?
A. I had two. One was pore pressure frac gradient prediction, and then one was pore pressure and frac gradient detection.

Page 14:06 to 15:22

Q. Senior adviser. How long were you a senior adviser and a SEDA for these groups?
A. I think I became a senior adviser around 2001.
Q. And you held that position until you left?

A. Yes. And then I think that SEDAs were created around 2006, but I'm not sure of the exact date.
Q. Were you the most senior advisers at BP when it came to topics such as pore pressure and frac gradient?
A. Yes.
Q. What were your duties and responsibilities as a SEDA on a daily basis?
A. On a daily basis, typically my responsibility was for generating the engineering technical practices, which wouldn't happen daily, so we'd generate those once and update them on a periodic basis. I would -- and then within that there were some duties that had to do with implementing those practices and whether or not there were any deviations from those practices and any deviations required, that I review them and pass an opinion on them. I don't approve them. I just pass an opinion on them.
And within the engineering technical practices there were some requirements for reviewing predictions, and I was one of the people who was authorized to do the reviews.
Q. When you say the word "practices" what do you mean?
A. These would define the things that might be mandatory or might be suggested in the way pressure might be predicted or detected or frac gradient predicted or detected.
Q. Was all of your work focused on pore pressure and frac gradient?

Page 15:24 to 17:02

A. I -- no, I had additional expertise. One was lost circulation, one was wellbore strengthening, which is related to lost circulation, and one was leak off interpretation.
Q. (BY MR. SUMMY) And did you interface and consult with all of the folks at BP that worked in these given areas?
A. Most often. There -- there were some people who would be remotely located. I may not have ever met them or may not have ever talked to them, but there are typically a large number of people in this field.
Q. Were you a resource to folks who were out in the field drilling wells?
A. I was available to consult with them and in some cases did the predictions.

Q. Okay. And so you were a resource on lost circulation, well bore strengthening, leak off tests, pore pressure, and frac gradient?
A. Right, which are all sort of interrelated.
Q. Okay. And were you the top technical person at BP for these five areas?
A. No. For the pore pressure and frac gradient prediction and detection, the top person, but that -- for other areas it was more of a shared responsibility.

Page 17:25 to 18:01

Q. And when did you leave BP?
A. February 28th of this year.

Page 18:12 to 19:04

Q. Did the events of April 20th, 2010, the BP explosion, have anything to do with you leaving BP?
A. No, I -- I guess I -- I'd have to ask for qualifications on what you mean by that. It certainly -- it affected me, but it did not cause me to leave. I began that search about four years ago.
Q. What do you mean it affected you?
A. The press, the treatment by people in public.
Q. How were -- how were you treated?
A. With disdain.
Q. So there was a stigma associated with being employed by BP?
A. For some people, yes.

Page 19:12 to 20:21

Q. Have you heard of the Tiger team?
A. Yes.
Q. What is that?
A. The Tiger is an acronym for totally integrated geoscience engineering resource team. There is one of those in the exploration of the deepwater. And another one in the development unit of the deepwater and some others in other parts of the world.
Q. Are they are subsea specialists on drilling?

A. They're typically subsurface individuals as opposed to subsea. I don't think subsea would be the right word. Typically from petrophysics or geophysics, and their job is to -- to bring their expertise and to assist drilling.
Q. Okay. And did you interface with them?
A. Yes.
Q. And was there a Tiger team that was assigned to the Macondo well?
A. Yes.
Q. Do you recall who was on that team?
A. Do you want to know which individuals on the Tiger team were assigned to that well or who were in the overall Tiger team.
Q. No, who were assigned to the Macondo well.
A. I know that Marty Albertin and Bobby Bodek were assigned. I think these are the two primary ones. John Bellow, I think.

Page 20:24 to 21:02

Q. (BY MR. SUMMY) Now, when you were at BP did you receive any specialized training on health, safety, and -- and environment?

Page 21:04 to 24:03

A. BP had a -- a lot of different programs about health, safety, and environment training, many of which were mandatory and many of which were voluntary, and I would participate in many different versions of HSE-related training.
Q. (BY MR. SUMMY) Okay. And did you provide any training while you were at BP on any topics?
A. I -- I did a number of courses, a course on 21st Century Pore Pressure Principles. I taught a course on lost circulation remediation and prevention. I taught at the Chevron-BP Drilling Alliance School on lost circulation and stress cages. I'm sure there are other courses I taught, I can't think of those at the moment, in past history.
Q. Okay. In the 21st Century Pore Pressure class, who attended those classes?
A. It was -- it was mandatory

training for anyone who would do pore pressure or frac gradient prediction for BP-operated wells and it was available to anyone interested in taking the course and typically taken by people who might be involved in detection, but most detection people were contractors.

Q. Okay. So was it mandatory for employees that worked in prediction area?

A. Correct.

Q. Was it mandatory for BP personnel who worked in detection area?

A. Not mandatory for detection.

Q. Okay. And would individuals that worked on the Tiger team, would they be required to take this course?

A. Yes, and -- and many of those individuals taught the course.

Q. Sorry?

A. Many of those individuals in the Tiger team taught the course.

Q. How long was this course?

A. Four and a half days.

Q. And what would the focus be?

A. There were nine modules. There would be around -- first module was around general principles and pore pressure, second module was on direct measurement of pore pressure, third module was on inferring pore pressure from drilling measurements, fourth one was on inferring pore pressure from log measurements, fifth one was on seismic methods, sixth one was on integration, seventh one was on frac gradient, eighth one was on applying it to the wells.

Q. Okay. And what about the lost circulation course, was that a mandatory course for anyone?

A. No, that was a purely voluntary course.

Q. How often would it be given?

A. It was a relatively new course, and it would be given upon demand. I probably taught it about seven times. There were also others who would teach it.

Q. 21st Century Pore Pressure test, how often was it given -- class how often was it given?

A. It would vary by demand. I think in 2009, which would be the last regular year -- '10 was disrupted by the Macondo incident. So in 2009, probably nine or ten classes taught that year, around the world.

Page 25:11 to 26:03

Q. Now, since your -- most of your work has been specialized in pore pressure and frac gradient, I want to spend some time on those topics. What is pore pressure?
A. Pore pressure would be the pressure of the fluid within the rock.
Q. Okay. And you say "the fluid." Would that be the oil or the hydrocarbons?
A. It would be oil or water or gas.
Q. Okay. And that would be located in the formation that you're drilling in?
A. In all -- all formations would have some kind of fluid pressure, although some have such trace amounts, you can't measure it.
Q. Okay. And it -- is it important to control pore pressure when drilling a well?

Page 26:05 to 26:08

A. Yeah, that's -- I would think that that's true, but that's not -- my expertise is not controlling it. My expertise is quantifying it.

Page 26:11 to 26:23

Q. What do you mean by "quantifying it"?
A. Estimating the magnitude of the pressure.
Q. Why is it important to understand the magnitude of the pressure?
A. It's an important input to the well design and well operations. It's also important to -- to non-drilling activity of prospecting for oil and finding oil.
Q. Okay. Can pore pressure also be a safety issue on a well?
A. Yes.

Page 27:01 to 27:20

Q. (BY MR. SUMMY) Why is that?
A. Because it's a source of energy and could cause the release of fluid to the environment.
Q. What risks are associated with pore pressure on drilling a well?
MR. CHEN: Objection; form.

A. I think there are a number of risks that you might assign to that, but -- but the risk of a blowout, the risk of difficult drilling problems, inducing drilling problems, like wellbore stability is related to those.
Q. (BY MR. SUMMY) And can a blowout cause damage to humans and the environment?
A. Yes.
Q. And so it's important to understand pore pressure on a well, correct?
A. Correct.

Page 29:03 to 29:03

Q. Okay. What is a kick?

Page 29:05 to 29:15

A. A kick is, I think, a generic term that people tend to use to describe the uncontrolled release of fluid into the well.
Q. (BY MR. SUMMY) Does that have anything to do with pore pressure?
A. It -- it's caused because of an imbalance between pore pressure and well pressure.
Q. Okay. And can that present a safety and environmental hazard on a well site?

Page 29:17 to 29:17

A. If not controlled.

Page 29:22 to 30:04

Q. What is frac gradient?
A. So frac gradient is -- is actually a fairly poorly defined term in the industry, but frac gradient refers to the resistance at the rock towards pressure, fluid pressure being applied to it. The point, taken generically means the point at which we create a fracture in the rock.

Page 30:11 to 30:13

Q. (BY MR. SUMMY) What's the effect on the drilling process when a frac develops in the rock?

Page 30:15 to 31:06

A. I think there -- there is a range of different things that can happen there.
Q. (BY MR. SUMMY) And what is that?
A. In -- in many cases the fracturing may be so minor that you don't see it. As the fracturing becomes more severe, you might get wellbore ballooning or wellbore breathing or the well takes fluid in and givers it back if you turn pumps on and off. And then if you keep raising the pressure, you can lose returns and lose mud into the formation.
Q. So during the drilling process mud -- mud is injected into the well, correct?

Page 31:08 to 32:17

A. Mud's circulated through the well.
Q. (BY MR. SUMMY) Okay. And that mud is designed to go into the well and circulate back up to the top, correct?
A. That's correct.
Q. And along the way it will gather fragments from the formation, correct?
A. Correct.
Q. And oftentimes that mud, however, may not return in the same amount that it is injected in because it can leak into a fracture in the rock, correct?
A. There are also other causes of losses into the well besides the fracture. You'll lose fluid in the permeability as well.
Q. Okay.
A. And you can lose fluid into other -- other things besides fracture -- besides induce fracture, natural fracture, faults, plugs, holes in the casing, pore isolation issues, coming up around.
Q. Okay. But a fracture in the rock is one way that you can lose the mud, correct?
A. That's correct.
Q. And is that known as a lost return?
A. I think lost return is a more generic term that we -- referring to not all

the mud being pumped in is returning, but I think its small levels. We normally don't use that term that we say we "lost returns." So, seepage losses we don't include in that.

Page 32:24 to 32:25

Q. (BY MR. SUMMY) Can lost returns be a safety issue?

Page 33:02 to 33:11

A. If it prevents them from maintaining to control the well, it can be a safety issue, yes.
Q. (BY MR. SUMMY) Okay. What does the -- the acronym NPT mean?
A. "NPT"?
Q. NPT.
A. NPT, nonproductive time.
Q. Nonproductive time. And how does that come up on a well?

Page 33:13 to 33:23

A. It's a property that drillers track about the amount of time that would not have been necessary to have been used to take the well down.
Q. (BY MR. SUMMY) To do what?
A. To -- to get the well to "TD."
Q. TD means what?
A. Total depth.
Q. Okay. So this is time that has to be taken out from drilling, for some reason?

Page 33:25 to 34:05

A. It doesn't -- I don't think there is any requirement it be taken out. It's just time with -- they're not progressing in the forward path of the well.
Q. (BY MR. SUMMY) But it's time on a well spent not drilling, correct?

Page 34:07 to 34:13

A. Not progressing the well forward.
Q. (BY MR. SUMMY) Okay. Have you heard of the term "drilling margin"?

A. I have heard of the term drilling margin.
Q. What does that mean?

Page 34:15 to 34:18

A. I don't think I'm -- know the proper definition for drilling margin. For me drilling margin would be the difference between pore pressure and frac gradient.

Page 35:05 to 35:07

Q. Is there a constant need to balance pore pressure and frac gradient when drilling a well?

Page 35:09 to 35:09

A. To balance them?

Page 35:11 to 35:13

A. Try and make them equal.
Q. Not try and make them equal, but to control both of them at the same time?

Page 35:15 to 35:19

A. That's -- typically it's a desire that you operate between, stay between the two of them.
Q. (BY MR. SUMMY) And is that often referred to as a drilling margin?

Page 35:21 to 36:03

A. And I would have used that to -- to -- as a description of drilling margin, but I've never seen a formal definition of that word.
Q. (BY MR. SUMMY) Okay. But let me ask you this: What risk exists on a well if pore pressure -- if pore pressure and frac gradient can't be balanced and controlled?

Page 36:05 to 36:22

A. That -- that -- what risk if they can't be -- well, that will depend upon the type of formation it's in. For instance, if you -- if you were underbalanced to pore pressure in a low, zero permeability formation, the risk would be to failure of the wellbore wall, which is -- would not be a danger to health, safety, or the environment, mainly economic issue. And -- but if you exceed frac gradient, you now induce a fracture, and so you're going to lose mud into the formation. And if you cannot maintain the hydrostatic kick, it reaches a point you can't keep up with it, then you run a danger of being underbalanced and have a kick.

Q. (BY MR. SUMMY) Okay. And can that eventually lead to a blowout?

Page 36:24 to 37:07

A. If not properly managed, it could result in that.

Q. (BY MR. SUMMY) Okay. Is pore pressure expressed in pounds per gallon?

A. We have different ways we express it. So if we're doing it in gradient space, it would be either on a specific gravity or pounds per gallon, depending upon what country you're operating in.

Page 37:13 to 37:15

Q. And how close can pore pressure get to frac gradient on a well to maintain a safe drilling margin?

Page 37:17 to 37:23

A. That's outside of my field of expertise.

Q. (BY MR. SUMMY) Have you ever heard that there should not be a 0.5 difference between pore pressure and frac gradient in order to maintain a safe drilling margin?

Page 37:25 to 38:06

A. I have -- I have seen reference to that, but don't know the -- where that comes from or what's that referenced to, but I have heard people use that term.

Q. (BY MR. SUMMY) And you have not been involved in balancing the two on a well site before?

Page 38:08 to 39:19

00038:08 A. When you say I've not been involved, are you asking me whether or not I -- I have been involved in assessing what the pore pressure value was or vibrating --
Q. (BY MR. SUMMY) Versus.
A. -- or asking me trying to determine what the mud weight should be.
Q. I'm asking you, have you ever been involved on a well site where you were doing the actual calculations determining the difference between pore pressure and frac gradient?
A. I don't know that I would have done the difference. I do pore pressure and I do frac gradient.
Q. But you never compare the two to make any conclusions?
A. I don't do the well design part
00039:01 of it or decide casing points, no.
Q. And it -- do you do any of those calculations when you do your prediction work?
A. The difference between pore pressure and frac gradient?
Q. Yes.
A. Rarely, but there -- there are some -- some of our software, we'll take a look at a screening tool looking at prospects not at the well level, but doing prospects to look at an estimate of how much casing might be required to pursue prospects in certain areas.
Q. Are you aware of any written BP policy that would inform employees that pore pressure and frac gradient should never be below 0.5 pounds per gallon?
A. I'm not aware of --

Page 39:21 to 40:04

00039:21 A. (Continued) I'm not aware of documents of that type that -- not a statement that they don't exist, just that they're not in my domain. I wouldn't be looking at those.
00040:01 Q. (BY MR. SUMMY) But you were the most senior technical person on pore pressure and frac gradient at BP, correct?
A. Correct.

Page 40:22 to 43:07

Q. (BY MR. SUMMY) If you look at tab 1, this has been previously marked as an exhibit in this case, Exhibit 1532. Do you see it on the front page?
A. I do.
Q. First of all, can you identify this document?
A. This is the group practice 10-15, which establishing the engineering technical practices for pore pressure prediction at BP.
Q. Okay. The date of it is July 9th, 2008; do you see that?
A. Yes.
Q. Who drafted this document?
A. I did.
Q. And when did you draft it?
A. This was a multi-year effort. I'm not sure when the first draft was, probably in 2006 or 2005.
Q. Did you draft it alone or have assistance?
A. I did it as a collaborative effort in the community, so I -- I -- I made a -- the first draft and then expanded it and expanded -- expanded the people that reviewed it and input to it and expanded further and further until we encompassed the entire community inputting to the process.
Q. Okay. And this particular document focuses on prediction, correct?
A. That's correct.
Q. If you turn to Page 3, there is a description of risk. Do you see that?
A. Yes.
Q. And could you please read that into the record?
A. The prediction of pore and fracture pressures in wells is considered a zero tolerance activity within BP. Errors associated with the pore and fracture pressures could lead to harm to people, damage to the environment, and undermine BP's operational reputation. For these reasons pressure prediction requires a definition of practices that establish the minimum requirements for performing pore pressure prediction.
Do you want me to read the next two paragraphs?
Q. No, that's okay right there.
And this is language that you drafted, correct?

A. I drafted it. I don't know what -- how much has been modified since my original draft, but the wording is the intent I've written.
Q. And the meaning behind this policy is to stress the importance of pore and fracture pressures on a well?
A. Prediction, correct.

Page 43:15 to 44:06

Q. And it has the custodian of this document being the pore pressure prediction segment engineering technical authority?
A. Yes.
Q. Is that you?
A. Yes.
Q. So you were the custodian of this document?
A. Yes.
Q. And underneath it it has "Maintainer: The pore pressure prediction Segment Engineering Technical Authority." Is that you?
A. Yes.
Q. So you were the custodian and maintainer of this document, correct?
A. Yes.

Page 44:22 to 45:01

Q. And would this document be given, for example, to the Tiger team that dealt with pore pressure and frac gradient issues, on the Macondo well?
A. Yes.

Page 45:06 to 47:13

A. I don't think there is a formal class requirement. It is required that they all be familiar with it, and it could have been handled through one-on-one discussions between them and their management.
Q. (BY MR. SUMMY) Okay. And if you look at the next document. Tab 2 in the notebook.
A. Yes.
Q. It's been previously marked as an exhibit in this case, No. 1533?
A. Can I back up for you on that last question?
Q. Yes, sure.

A. This was you also reviewed in the 21st Century Pore Pressure School --
Q. Okay.
A. -- once this was released. So people who attended the school previous to it being released may not have seen it, but after it was released they would have seen it taking the school.
Q. Okay. Okay. If we go to document tab 2, Exhibit 1533, can you identify this document?
A. Right, this is Group Practice 10-16, which is pore pressure detection during well operations engineering technical practices. So this is geared for realtime detection of pressure.
Q. Okay. And who drafted this document?
A. I did.
Q. Okay. And how is this document 1533 different than the previous document which was marked as 1532?
A. Right. So this -- this -- the expectation is that much of the detection are going to be done by contractors at the well site, mud loggers and LWD, service company personnel. So the establishment of requirements for them is going to have to fit within that contractor framework. So it's a different way that we accomplish the requirements for training here from what we do for BP employees.
Q. Okay. In the first document, GP 10-15, which would be Exhibit 1532, that policy dealt with predicting pore pressure and frac gradient before drilling starts?
A. Correct.
Q. And GP 10-16, Exhibit 1533, deals with detecting pore pressure and frac gradient while drilling?
A. Correct.
Q. Okay. And you authored both documents, correct?
A. Correct.

Page 47:20 to 50:21

Q. Okay. So you drafted those documents?
A. Correct.
Q. And also on Page 3 under "Description of Risk," can you please read that into the record, please?
A. The first paragraph?
Q. Yes, first paragraph.

A. "The real-time detection of pore and fracture pressure in wells is considered zero tolerance activity within BP. Errors associated with the detection of pore and fracture pressures could lead to the harm to people, damage to the environment, and undermine BP's operational reputation. For these reasons pressure detection requires a definition of practices that establish the minimum requirements for performing pressure detection."
Q. And what is meant by "zero tolerance"?
A. "Zero tolerance" means that BP is going to require people to follow certain aspects of this policy.
Q. And this is a policy in this particular instance that applies on a daily basis out on a well site, correct?
A. That's correct.
Q. What if BP employees out on a well site who are in the middle of drilling want to deviate from this policy, what is required?
A. They will have to take that back through their management, through the drilling management to get a deviation.
Q. To obtain a deviation do they have to also speak to you?
A. To -- for a deviation, typically they're required -- the engineering authority who has the authority to grant the deviation, is -- should get the opinion of the SEDA as to that deviation.
Q. And that SEDA in this case is you, correct?
A. Correct.
Q. If you look at the very last page of this document, I believe it's Page 17?
A. Yes.
Q. There is an actual paragraph that deals with deviation from minimum requirements. Do you see that?
A. Uh-huh.
Q. And could you read that into the record, please?
A. A decision not to implement these practices by a business unit or for a given field requires that a risk assessment be conducted and formally peer reviewed. Any risk assessment that results in the decision not to apply this practice shall be formally justified, recorded and authorized by the relevant business unit leader or their

delegated nominee.
Q. Are you aware of any decision by the crew that was drilling the BP Macondo well to deviate from this practice?
A. I'm not.
Q. Was any request made to you by the Macondo BP crew to deviate from this practice?
A. No.
Q. Are you aware of any circumstances that existed on the Macondo well that would justify a deviation from these practices?
A. I'm not --

Page 50:23 to 51:17

A. (Continuing) I'm not aware of any.
Q. (BY MR. SUMMY) Okay. If you look at Page 16 in Annex B it says, "Custodian: The pore pressure Segment Engineering Technical Authority." Is that you?
A. That's me.
Q. So you're the custodian of this particular document as well?
A. At that time.
Q. Okay. And underneath that it said, "Maintainer: The pore pressure Segment Engineering Technical Authority." Do you see that?
A. Yes.
Q. And so you were also the maintainer of this particular document when you -- while you were at BP, correct?
A. Correct.

Page 53:12 to 53:16

Q. You -- you would not be involved in drafting a BP document that would get specific in how to deal with one of these issues, pore pressure and frac gradient, as it arose on a well site?

Page 53:18 to 54:15

Q. (BY MR. SUMMY) Correct?
A. I need -- I need to understand what you mean by "issue." Are you referring to, like, kicks or losses?
Q. Yes.

A. So kicks, no, I would not be involved in that. I have been involved in doc- -- in writing documents about treating losses at the well site.
Q. Okay. And what was your involvement?
A. Again, drafted -- well, created the concepts and involved in getting them written, but there was a team of people writing them.
Q. Okay. And were those policies that were adopted?
A. Those would not be policies because policies are more of a mandated thing. These were guidelines on how you would treat that. So it started with doing it as part of the Chevron school, then I expanded that and used that at BP.

Page 54:21 to 55:09

Q. (BY MR. SUMMY) Okay. Showing you what's been marked as Exhibit 4519. Have you seen this document before?
A. Yes.
Q. And can you identify this document?
A. This is the lost circulation recommended practice. These are the decision trees that go with it that came out of that effort I was describing a minute ago.
Q. Okay. And were you involved in drafting this particular document?
A. Yes, I was one of the contributors to this?

Page 62:24 to 63:03

Q. (BY MR. SUMMY) Mr. Alberty, I want to turn your attention to the Macondo well. As you sit here today, isn't it true that the Macondo well was an extremely problematic well from start to finish?

Page 63:05 to 64:12

A. I'm -- I wasn't involved with the well from start to finish, so I would be unable to make that conclusion.
Q. (BY MR. SUMMY) Well, based on your knowledge and your involvement with the Macondo well, isn't it true that you were brought in on a number of occasions to

evaluate lost return issues?
A. I was contacted on a number of -- of occasions. I wasn't physically brought in about lost circulation events.
Q. But you were consulted regarding those issues, correct?
A. Yes.
Q. And what was your involvement with the Macondo well?
A. I did review of the prediction and then I did answer questions directed to me by the operations team on advice and then I was involved, embedded in the two relief well teams for drilling relief wells.
Q. Okay. And who actually ran the "pre-deal" -- predrilling predictions?
A. Produced them?
Q. Yes.
A. Marty Albertin.
Q. And who is he?
A. Marty is a adviser that works on the Tiger team and -- and does primarily pore pressure and frac gradient prediction.
Q. And do you know if he was the single point accountable person on the well for pore pressure drilling?

Page 64:14 to 64:19

A. For pore pressure prediction or --
Q. (BY MR. SUMMY) Yeah, I'm sorry, for pore pressure prediction.
A. He was the single point of accountability for prediction.

Page 65:10 to 67:06

Q. Okay. And what would Mr. Albertin's role have been in the prediction?
A. He would have collected the analog offset wells, analyzed those wells. He would have collected any seismic data that was used and processed the velocities to do pressure prediction, and he would have integrated those together.
He would have done the prediction of frac gradient, and he would have done the uncertainties associated with those and organized the review of that and turned the validated predictions on over to the drilling team and been a resource for them to consult with.

00066:01
Q. And what's off -- what is an offset well?
A. Offset well, we -- we think -- I used the term "offset." We technically use the term "analog," and we think of them in sort of three ways. One might be a well that might be in direct hydraulic communication with the proposed well location, that they're connected together by permeable sand. Or one might be that they're on a nearby structure, but potentially not directly connected up. Or one might be a well that is analogous to it in a completely different area, but have common geological properties that control pore pressure and that you can use as a -- for calibration and for -- for calibrating your models so that you can do the work at the current location.
Q. Do you recall if there was any offset well in this instance that was used for pore prediction, pore pressure prediction?
A. Well, there would have had to been, or you wouldn't have gotten through. And we would have reviewed those and -- and
00067:01
documented which ones he used.
Q. Do you recall what the names of those wells were?
A. I do not. I'm not sure when the date was we did that, but I think it was 2008. So I -- I just don't remember now.

Page 68:07 to 69:10

00068:07
Q. Okay. And so do you know who all was involved in reviewing his initial pore pressure prediction?
A. I don't recall who did that, but it is documented.
Q. Okay. Were you involved in it?
A. Yes.
Q. And what was your involvement?
A. I was in there -- I don't know if I was the lead auditor. I just don't recall at this point in time. If I was the only auditor in it, then I would have led it. And -- and one of the auditors, and I don't recall if it was me, documented it and then recorded that document.
Q. Okay. And would the review have been in a document?
A. There is a -- there -- there is material Marty would have prepared to present
00069:01
for the review, and then there would be a summary of the review in a one-page document.

Q. Okay. And is there anything that sticks out in your mind that you can recollect about the prediction?
A. Well, I -- what I do recall is that I thought the work was done very well and that there wasn't much required follow-up work to be done on it for them to go through the stage gate to planning a well.

Page 72:19 to 72:22

Q. (BY MR. SUMMY) Okay. So you did not make any warnings to the drilling team about a narrow drilling margin?
A. No.

Page 73:04 to 76:18

Q. Exhibit 4520 appears to be an e-mail from you, dated July 13, 2009, to Brian Morel and Mark Hafle. Do you see that?
A. Yes.
Q. And the subject is "Stresscage Macondo," correct?
A. That's correct.
Q. Would this e-mail have been sent during the drilling process?
A. No.
Q. This is pre-drilling, correct?
A. Yes.
Q. Okay. And who is Brian Morel?
A. Brian Morel is one of the drilling engineers.
Q. So is -- at this point in time, are you involved in the prediction stage?
A. The prediction has been completed, I think, at this point in time.
Q. Okay.
A. And Brian is working on a well design.
Q. Okay.
A. And so he has written me about a depleted sand that is not expected to be at this well, but is on the low probability, very low probability side of being present and -- and what he wants to know is if he drills that sand and it's depleted to the degree that the production is over at that field, can we treat that frac gradient in that sand and manage to prevent lost returns.
Q. Okay. And you're answering that question, correct?
A. Correct.
Q. If you go down to the paragraph

that starts, "The real problem here"; do you see that?

A. Yes.

Q. Can you read that paragraph into the record?

A. "The real problem here is the low Young's modulus. I calculated Young's modulus from both offset logs (Mississippi Canyon 296 #1) and from our global correlations," and "I cannot make a case to substantially raise Young's modulus to get us out of this problem fracture width."

Q. What does that mean?

A. That means if he were to drill this zone with the mud weight he proposed to use, I would anticipate that we would get a fracture that would be almost 2500 microns, and that particles used in the mud would not be able to prevent losses; you would have to use some other method.

Q. And so what happens when the mud is -- weighs too much, does it -- it can create a fracture when it's placed into the well?

A. When it -- when the pressure from the mud exceeds the frac gradient, a fracture will grow.

Q. Okay. And in the next paragraph, the first sentence, can you read the first sentence, please?

A. "So I would propose that we go with a maximum Stresscage formulation and hope that we do not see" this "worst case scenario."

Q. Okay. Now, what is a stress cage formulation?

A. So a stress cage is a method by which we can -- so -- so let me back up.

When we fracture the formation and you get a displacement, we're building stress around the wellbore, but we got -- but we're letting a fracture penetrate through that high stress. Okay? So that physical displacement created by the fracture opening builds stress and raises frac gradient here, but we've got a hole through it here.

So what we do with stress cage is plug that fracture as it forms. And then by plugging and sealing it, we can actually raise the frac gradient around the wellbore. And in this case, we cannot use that method of treating lost circulation because the fracture will be too wide for the particles that can pass through the bit.

Page 77:07 to 79:07

A. (Continuing) It -- it is designed to -- to halt fracture growth when it reaches a design length.
Q. (BY MR. SUMMY) Okay. Except in this case if the worst-case scenario occurred, that would not work?
A. That wouldn't -- would not work.
Q. Okay.
A. Can -- can I give you some clarification?
Q. Yeah, sure.
A. So there -- so in Marty's prediction is a worst case, a most likely, and a high case. Okay. So for the most likely and the high case, there is no fracture. If the worst case pore pressure prediction, this sand somehow or another gets connected back to this distant field, then if we drill with this particular mud weight, stress cage will not stop losses.
Q. Okay. And if you skip down a couple of sentences, it says -- starts with "Our contingency"; do you see that?
A. Yes.
Q. If you could read that into the record.
A. "Our contingency probably needs to be to drill with fibers through the zone and then make a more permanent repair with EZ Squeeze once the full depleted zone has been exposed."
Q. Okay. What does drilling with fibers mean?
A. Fibers are -- there are products that the different vendors have that are fibrous in shape, typically from about 3,000 up to about 15,000 microns in length that we can carry in the mud system. And what will happen with the fibers is that when a fracture starts to form, the fiber will plate over it and will block flow into it, and you get this stress increase from the fracture forming around the hole, and so you actually raise the frac gradient and the fibers block it.
Q. Is -- and is that a stronger way to do it than the stress cage?
A. It -- it is a -- a temporary measure. It is not permanent because every time the bit goes by, it scrapes the fibers off.

Page 79:19 to 80:15

Q. Okay. So the plan, I guess, going forward, if you come across this particular type of fracture gradient is to -- is to try to use stress cage, but if that doesn't work, you drill the fibers?
A. What you would do is you would try to use stress cage, and if the stress cage worked, you -- so -- so we don't have the worst case happens, it's something in between the worst case and the most likely. Something the stress cage came in, you would never even see the losses; you would drill right through it. And the -- and the fibers then would be a -- a product standing by, ready to put in the well if they did encounter losses.
Q. Okay. Now, after drilling had began on the Macondo well, did you have any involvement with the well?
A. I got contacted on several occasions for advice on different things occurring.

Page 81:01 to 82:14

Q. Okay. If you could go to tab 5 in the notebook. We need to mark it as an exhibit.
A. 4521.
Q. Correct. This is a document that purports to be an e-mail from you to John LeBleu, dated November 9th, 2009, the subject is "Macondo"; does that appear to be correct?
A. Correct.
Q. And who is John LeBleu?
A. John LeBleu, I'm -- I'm only hesitating because John originally was an employee of MI.
Q. Okay.
A. And he left MI and joined BP, and I'm not sure if he has done that yet. It's right in this time frame that he left MI to join BP so he's at this point in time either with MI or BP. He is a mud expert, mud operations expert, and he is working the Macondo well.
Q. Okay. And if you could read the couple -- first couple of sentences into the record, first two sentences into the record.
A. "I got your phone message. If the worst case depletion occurs at Macondo, then the expected fracture width is larger than we can treat with stress cage, so the

recommendation is to use the max we can and hope the worst case does not materialize."
Q. Okay. And then go ahead and read the next sentence.
A. "If it does, you will need an alternative treatment, such as drilling with fibers."
Q. Okay. So I take it he left you a message of some sort, a phone message?
A. Yeah, must be.

Page 84:05 to 84:14

Q. (BY MR. SUMMY) Okay. Do you recall if drilling was ever done with fibers at the Macondo well?
A. There were fibers used on the Macondo well on several instances.
Q. Okay. Do you recall any instance where it was brought to your attention that the pore pressure frac gradient predictions that were made were wrong on the Macondo well?

Page 84:16 to 85:03

A. No, that -- I -- that was never -- I'm not aware that they were wrong.
Q. (BY MR. SUMMY) Okay. No one brought that to your attention?
A. No.
Q. Was it brought to your attention that the Macondo well throughout the process of drilling exhibited numerous kicks and lost return events?
A. I know that I was aware of one of the kick events, and I know that I was aware of at least one of the lost circulation events.

Page 85:11 to 86:17

Q. Exhibit 4522 purports to be an e-mail from Randall Sant, to you, dated February 24th, 2010, and the subject line is "Macondo Lost Circulation Event Log Update 2/23"; is that correct?
A. Correct.
Q. Who is Randall Sant?
A. Randall Sant is a engineer that works with me, sits right next to me, that I have been training for years as a pore pressure, frac gradient predictor, lost

circulation mitigator, and stress cage individual. So he trains in all my expertises and formally had been a drilling engineer for BP.

Q. He was your -- you were a mentor to him --

A. Yes.

Q. -- on pore pressure and frac gradient?

A. Yes.

Q. Okay. And if you could read the first sentence into the record.

A. "We" -- "We had a review session with John LeBleu this morning where he went through the sequence of events that led to the losses in the Macondo well."

Q. Okay. Do you reque- -- do you recollect in February of 2010, several months before the explosion, that there was this loss event on the Macondo well?

A. Yes.

Page 86:22 to 87:17

Q. Well, I was just trying to find out how it was brought to your attention.

A. So I was out of the country at the time, teaching a school in Colombia, and so Randall had -- I -- I had been contacted by the Macondo team about a lost circulation event that was taking place there and sought my advice on it.

Q. Okay. And this was during this same time frame, February 2010?

A. Yes.

Q. And "lost circulation" means what?

A. Lost circulation meant that they were losing mud to the formation.

Q. In other words, they were putting mud into the formation as they were drilling, but that same mud may not be coming back up to the top?

A. That's correct, some of it's not coming back up.

Page 87:25 to 89:11

Q. Okay. And if you could read the last paragraph -- his last paragraph to you into the record.

A. We have also requested the mud reports to determine the concentration of StressCage material in the system. John indicated that the, quote, bear formulation you provided to them was definitely not maintained because the team could not support this logistically nor did they want to put 20 mesh screens on the shakers or even bypass them. Even with StressCage material, if the weak point is indeed the marl/shale just below the shoe, this couldn't be strengthened using conventional application methodology, question mark.

Q. All right. What's the bear formulation?

A. There is a maximum formulation that we can use in stress cage that -- that beyond that we can't treat fractures any larger than that. So we have a systematic way we calculate concentrations to make sure that the right size particle shows up at the fracture when it's at the right length, I guess, and there's published papers on this.

Q. And so had you -- had you previously provided the -- the engineers out on Macondo the bear formulation?

A. Yes.

Q. And in this e-mail, he is telling you that the bear formulation you provided was not maintained and they couldn't support it logistically?

A. Correct.

Q. Why couldn't they support it logistically?

Page 89:13 to 90:07

A. So I -- I think there is an important issue that has to be discussed here, but -- but -- so the losses aren't in a sand and stress cage is for a sand. So -- so, really, it's not relevant to the losses in this interval, but they were carrying the losses in case they encountered the depletion -- that depleted zone.

And the -- the reason why they can't keep up with it is it is a high concentration and if you put the higher mesh screens, you're taking it out and so you can't -- at the rate they're pumping, they can't add it back in fast enough to meet the minimum concentrations, to keep the concentrations up where we would want them to be if we hit that depleted sand.

Q. (BY MR. SUMMY) And the concentrations need to be too high to repair the fracture?

Page 90:09 to 90:18

A. The concentrations needed to meet a minimum level in order to prevent the fracture from growing, if it stayed within the width range that we could treat.
Q. (BY MR. SUMMY) Okay. So what happens when you can't use the bear formulation to keep the strac- -- the fracture from growing?
A. Then you go to the contingency plan, which I expected to be the fibers.

Page 91:08 to 91:23

Q. Okay. So do you know -- were you involved in remedying this situation?
A. Where the team followed the decision trees that we had developed in the school, that they may or may not, I don't know, have modified for this well; but I do know that they pumped the fiber pill and that it worked.
Q. Okay. And was that -- did they do that based on your advice?
A. No, that was just in their decision trees, which I had helped generate as part of the recommended practice.
Q. Okay. And that's how the -- the February lost return issue was remedied L?
A. No, ultimately the --

Page 91:25 to 92:17

A. The -- the fibers are temporary. If you remember back -- you had to go do a permanent repair to it. So they had to go do a permanent repair.
Q. (BY MR. SUMMY) And how do you do that?
A. Well, there are different options about ways to do it, and the one that we talked about in the previous e-mail was with E Z Squeeze.
Q. And what's E Z Squeeze?
A. E Z Squeeze is a commercial product made by Turbo-Chem that is -- I think they somewhat guard the -- the way they make this up for competitive reasons, but it's primarily diatomaceous earth and sodium silicate cement that when you dewater, it sets and forms a very hard plug.

Page 93:15 to 94:01

Q. And what is marl? You've used it before. Could you describe what that term means?
A. Yeah. Marl is, again, a poorly defined term used in the subsurface. It usually refers to a shale that contains calcium carbonate, and normally that calcium carbonate is -- are -- are foram fossils that have been at high concentration. Marls can be permeable, and marls can be impermeable, depending upon the growth of concentration and the calcium carbonate in it.

Page 94:17 to 95:12

Q. What does a "flash cement job" mean?
A. A flash cement job is where you pump a catalyst and then you pump cement and when the two meet, the cement immediately sets.
Q. And that's one way to repair a frac gradient?
A. Yes.
Q. And is this discussion also related to the February lost return -- or lost circulation that the previous e-mail dealt with?
A. Yes, which I think was the previous day, wasn't it?
Q. Right, I think that's right. Okay. And the e-mail above that from Mr. Wagner to you, he references that Hafle had mentioned your recommendation to him last week, correct?
A. Correct.

Page 96:06 to 96:12

Q. Okay. And so do you know if they actually did a flash set cement job or they did something else?
A. They did something else.
Q. Okay. And what is it they did?
A. I don't really know the details of what they did.

Page 97:20 to 98:02

Q. Okay. And what is a leak off test?

A. A leak off test is -- is a generic term used for a test conducted when you drill out the casing shoe to test the integrity of the cement and to potentially get a measurement of frac gradient in the formation.

Page 100:06 to 100:07

Q. Okay. And when is a leak off test needed?

Page 100:09 to 100:21

A. When is a leak off test needed? A leak off test -- a test of the casing shoe is required to be run to some pressure by both BP policy and the MMS policies in place at the time.

So when you first drill out the shoe, you test it to some pressure to make sure that the cement integrity is good.

Q. (BY MR. SUMMY) Okay. And can you be drilling while you do the leak off test?

A. No, you have to stop to run the test.

Page 102:11 to 105:11

Q. (BY MR. SUMMY) Okay. Let's look at the next tab. We'll mark it as an exhibit.

A. 4525.

Q. Okay. I'll give you a chance to look at it.

A. All right.

Q. It purports to be a -- an e-mail from you to Nigel Last --

A. Correct.

Q. -- dated March 11th, 2010, which is five or six weeks prior to the explosion. The subject line is "ERA Summit Check-in," correct?

A. Correct.

Q. What is the ERA Summit?

A. So the -- I -- I sit in the R&D team for drilling and completion in -- in the exploration, production and technology group, and the R&D project is called ERA, which is Efficient Reservoir Access. And we're getting ready to hold a summit over in Sunbury, and they wanted me to bring a study

of a -- a well for us to review to look at to identify R&D opportunities that we can pursue to -- to -- to improve our drilling methods.
Q. Okay. And is ERA, is this related to BP only?
A. Yes.
Q. Okay. And you're looking for a case study that you can present as a potential way to find something that can be researched and developed?
A. R&D opportunities, right.
Q. Uh-huh. Okay.
If you could, go down about four lines, it says, "I'm nearly finished"...
Do you see that?
A. Yes.
Q. And read the rest of that
00104:01 paragraph into the record, please.
A. I'm nearly finished with the case study of Macondo. It is a well currently drilling and is --- and is currently in a 2-million-dollar or so flat -- NPT flat spot. I got their leak offs, pore pressure prediction, pore pressure real-time data, lost circulation history, LWD time lapse log, et cetera. It will be a good case to give thought as to how ERA could impact one of the subsurfacing wells related NPT train wrecks.
Q. Okay. You say there, It is a well currently drilling and is currently in a 20 million or so NPT flat spot. What does that mean?
A. That means that the well has been remediating -- they've been stopped at one point remediating a problem, and at this point, they've spent roughly $20 million doing that.
Q. And so what you're pointing out here is that throughout the course of drilling the Macondo well, there have had to be so many stops that it has cost the company
00105:01 approximately 20 million or so in lost production time?
A. Well, I'm talking about one -- one spot, and it's not production time, it's just -- well, productive, so there is no producing fluids going on. But they have one spot that has lasted about 20 days.
Q. Okay. And that -- and that one spot alone had cost the company 20 million or so in NPT time?
A. Correct.

Page 105:20 to 106:02

Q. And you say that, The Macondo well would be a good case to give thought as to how ERA could impact one of these subsurface and well related NPT train wrecks, correct?
A. Correct.
Q. So you were labeling the Macondo well as a train wreck?

Page 106:04 to 106:18

A. No. I was -- they were asking me to bring examples to look at over there, and they were having us -- a session to look at train wrecks, and I had proposed to look at this with the Macondo, but I am not labeling it a train wreck.
Q. (BY MR. SUMMY) But certainly you were characterizing it as a train wreck and one that can be used as an example to look at because it was a well that had lost a lot of money due to downtime?
MR. CHEN: Objection; form.
A. I -- I am look -- I am suggesting that this is a well we can look at to prevent future train wrecks, yes.

Page 107:06 to 107:12

Q. And this one's previously been marked as an exhibit. It's Exhibit 1552. And I'm going to focus your attention, to begin with, on the first two pages, and starting with the e-mail that's down at the bottom from Jonathan Bellow. So I'll give you a chance to look at that.

Page 107:24 to 108:17

Q. (BY MR. SUMMY) This purports to be an e-mail from Jonathan Bellow to Stuart Lacy and a whole bunch of other folks, dated March 12th, 2010.
Could you read the first two sentences into the record?
A. All: As we have some time while we recover from a Macondo stuck pipe and kick event, I want to spend some time re-evaluating how we manage real time pore pressure detection for Macondo type wells. By Macondo type wells, I mean those wells without thick salt sections that usually have narrow drilling windows for a large part of

the well.

Q. Okay. Who is Jonathan Bellow?

A. Jonathan Bellow is an ops geologist that works in the Tiger team in Gulf of Mexico.

Page 108:20 to 109:09

Q. Okay. And at some point, did you become aware that there had been a -- a kick event and a stuck pipe?

A. I -- I think at the time that this occurred, I'm -- I'm not sure I ever knew that happened, but I do know after the fact that that had happened. I don't think I was consulted on this.

Q. Okay.

A. I don't recall having been consulted.

Q. Were you notified that the drilling team was finding that the drilling margin and the drilling margin windows were very narrow?

Page 109:11 to 109:19

A. I -- I don't -- I don't think I was part of those discussions.

Q. (BY MR. SUMMY) Okay. You weren't notified of that, based on your recollection?

A. Based on my recollection, I don't think so. This was a -- an exploration well, and they usually limit who they share information with.

Page 110:14 to 110:17

Q. You -- did you get involved in any decisions related to how to deal with a tight or narrow drilling margin out at the Macondo well?

Page 110:19 to 110:20

A. I don't recall participating in a conversation on that.

Page 111:09 to 113:01

Q. (BY MR. SUMMY) Mr. Alberty, when we went off the record we were

discussing Exhibit 1552, and if you would please turn to Page 2. First full -- first full paragraph, could you read the first three sentences for the record?
A. Talking about the one that begins, "As for our initial thoughts?
Q. Yes.
A. As for our initial thoughts, in looking at the kick events, there were signs of pore pressure with all events. They were in some cases subtle. And, again, considering the type wells we usually drill, we get away with having some connection gas or sonic showing a pore pressure increase. With these tighter margin wells, I want to get to a place where we are considering all the data -- the -- all data suggesting pore pressure change much more carefully in Macondo type wells. We need to have larger conversations on all signs of pore pressure change with these wells and as soon as the change is observed. We need to be prepared to use dummy connections, D exponent, sonic, and any other indicator with more rigor. We can perhaps afford, wait longer to raise the flag and watch for pore pressure trend. We were confident in thicker salt wells. However, in these narrow window wells we believe we need to have pore pressure conversations as soon as any indicator shows a change in pore pressure. We also need to be prepared to have some false alarms and not be afraid of it. We need to have the entire team more aware and focused on all pore pressure indicators with the mentality that a couple of dummy connections and a circulation time costs far less than three kick events.
Q. Now, my question to you is was it brought to your attention that the drilling margin had become very tight on the Macondo well in March of 2010?

Page 113:03 to 113:07

A. Not that I'm aware of.
Q. (BY MR. SUMMY) Was it brought to your attention that pore pressure was tighter than predicted on the Macondo well in March of 2010?

Page 113:09 to 113:13

A. Not to my recollection.
Q. (BY MR. SUMMY) Was it brought

to your attention that pore pressure was becoming a problem on the Macondo well, in March of 2010?

Page 113:15 to 113:21

A. Not to my knowledge -- memory.
Q. (BY MR. SUMMY) And even though you're -- you were the single most senior person on pore pressure at BP, these issues were not brought to your attention six weeks or so prior to the explosion, correct?
A. Correct.

Page 113:23 to 113:24

Q. (BY MR. SUMMY) That's your testimony, correct?

Page 114:06 to 114:06

A. That's correct.

Page 114:13 to 116:13

Q. I actually want to focus your attention on the next page, No. 3. Mr. Bellow is -- memo here is outlining the lessons learned from the Macondo subsurface events.
A. So -- so let me catch up. This is one of the attached documents; is that --
Q. That's correct, attached to 1552 is a document that's entitled "Lessons learned and path forward." Do you see that?
A. I see that up here.
Q. Okay. And if you go to the next page, Paragraph 3 it starts out, "The application." Do you see that?
A. Yes.
Q. Okay. Could you read No. 3 for the record?
A. Can I get the context first? I --
Q. Yeah, go ahead.
A. I've seen this.
Q. Yeah, take your time.
A. All right. So the --
Q. The -- let me ask you this first: The document that Mr. Bellow put together that's titled "Lessons learned and path forward: Macondo subsurface NPT events," had you seen this document before

today?

A. Not to my recollection. Do you want me to read that paragraph?

Q. Yeah, Paragraph 3, please, if you could read that into the record.

A. "The application of some traditional exploration drilling practices needs to be considered. In wells with narrow drilling margins, drilling techniques such as drilling at reduced ROP, only having one connection in the hole at one time, simulating connections, performing flow checks when a sand interval is cut, and circulating manage ECD should be employed."

Q. Okay. What is ROP?

A. Rate of penetration.

Q. Okay. And what is ECD?

A. The equivalent circulating density.

Q. Okay. And what does that mean?

A. That is the apparent pressure of the wellbore with the pumps on and with any cutting load that may be in the hole.

Page 116:24 to 117:19

Q. Yes, that's what I'd like to hear, your interpretation of this.

A. So there is -- there is different methods that one can use to enhance the ability to detect pressure and -- and to reduce the risk of a -- of a kick, and so he's suggesting some of these. The one connection in the hole at a time means that you can't drill more than 90 feet before you get a full circulation of the mud system and that you can simulate connections to make them even more frequent and you can stop at sands and turn the pumps off and see if you get flow back and you can circulate at a higher rate to reduce the cutting flow. So these are just different common techniques that are used in the industry.

Q. Mr. Alberty, are there times when the drilling margin on a well is so tight that the BP crew can't manage it effectively due to the fast pace of drilling?

Page 117:21 to 118:01

A. I need to understand what you mean by "drilling margin."

Q. (BY MR. SUMMY) Where the pore pressure and frac gradient issues intercept one another and they arise and give concern to the crew.

Page 118:03 to 119:01

A. Yeah, that -- I mean, I don't think we can ever allow the pore pressure and the frac gradient to -- to become a common value; that -- that is, no margin at all. And I'm not sure what -- what John Bellow is meaning by "narrow drilling margin" as he's used it here, because, as I've stated before, from a pore pressure frac gradient point of view there is a drilling margin at a single depth, where there is a difference between pore pressure and frac gradient. But a drilling margin open interval is a function of casing design and what's at the bottom of the interval, what's -- where the highest pore pressure, where the lowest pore pressure is in the well, so it's a well design issue.
Q. (BY MR. SUMMY) Well, we -- we've looked at about seven or eight exhibits in a row where narrow drilling margin, that term narrow drilling margin is used. And you're -- you're not claiming that you don't understand what a narrow drilling margin is, are you?
A. I don't know --

Page 119:03 to 119:07

A. (Continuing) I don't know what his definition of it is, not what --
Q. (BY MR. SUMMY) Well, what's the common definition of a narrow drilling margin --

Page 119:09 to 119:10

Q. (BY MR. SUMMY) -- that's used in the industry all the time?

Page 119:12 to 119:18

A. I don't think there is a common definition from country to country or place to place or operator to operator.
Q. (BY MR. SUMMY) You're claiming as the single highest level pore pressure employee at BP that you don't understand the term narrow drilling margin?

Page 119:20 to 120:01

A. I'm saying that I don't know what the definition -- I've never seen the definition for that term.
Q. (BY MR. SUMMY) You've never seen the definition of narrow drilling margin?
A. No.

Page 120:08 to 120:12

Q. (BY MR. SUMMY) And what is your understanding of the term "drilling margin"?
A. For me it -- a drilling margin would be for me the difference between pore pressure and frac gradient.

Page 120:16 to 120:17

Q. And isn't that something that you would be concerned about on every well?

Page 120:19 to 121:04

A. My job is to tell you what the pore pressure and frac gradient are, not -- not what can and can't be drilled or how to drill it.
Q. (BY MR. SUMMY) Understood, but certainly in the drilling process as the single senior person at BP on pore pressure and frac gradient you would be very concerned if the drilling margin narrows and the pore pressure fracture gradient intercept each other, wouldn't you?

Page 121:06 to 121:15

A. That would be the concern of the drilling leadership and all. If I was working a well and saw they were coming, I would raise it as a flag, but I normally don't work wells.
Q. (BY MR. SUMMY) Right. But even though you're not -- you don't work the wells, certainly as an adviser to those who do, the drilling margin is something you have to be concerned with, isn't it?

Page 121:17 to 121:22

A. Normally I don't get involved in drilling margin. That's a well design issue.
Q. (BY MR. SUMMY) And you're not involved with those folks who may encounter a tight drilling margin, you're not involved with those folks at all?

Page 121:24 to 122:16

A. I -- I talk to those people who do have to deal with that, but I don't offer advice on that.
Q. (BY MR. SUMMY) But would it raise a concern to you if the drilling was occurring at a pace so fast that those who were having to track pore pressure and frac gradient were having trouble keeping up with it?
A. If -- if -- if I thought we couldn't keep up with it, I would -- everybody has the right to stop the job, and I would be stopping or slowing the job down, yes. If I thought I couldn't -- if I was drilling a well and couldn't keep up with it or thought that somebody doing pore pressure detection was having trouble, to stop the job, yes, or slow it down?

Page 123:08 to 123:24

Q. (BY MR. SUMMY) If you look down at that paragraph on the same page that says, "In retrospect." Do you see that?
A. Yes.
Q. Could you read that paragraph into the record?
A. In retrospect, after compiling the above list of observations from various individuals, it seems that the accelerated rate of penetration and the resulting, quote, onslaught, end quote, of drilling indicators exceed the ability of all team members to effectively recognize, properly communicate, and decisively act upon available data.
Q. What is your interpretation of what Mr. Bellow is attempting to say on lessons learned at the Macondo well?

Page 124:01 to 124:09

A. It looks to me like in hindsight Bellow is concerned about drilling fast, but I don't know, other than the words here, without a conversation to hear from him; and this is the first time I've seen these words.

Q. (BY MR. SUMMY) Does BP have a policy to make sure that the rate of penetration does not exceed the crew's ability to manage the drilling margin?

Page 124:11 to 124:22

A. I -- I am not aware of a policy within my domain about that.

Q. (BY MR. SUMMY) Are you aware of any BP policy regarding this issue?

A. Not that I'm aware of.

Q. Who at BP has the authority on a well site to slow down the rate of drilling?

A. If there is -- if there is a safety issue, any individual on the well site has the right to -- to -- to approach the leadership at the well site and to express that concern and request it.

Page 125:04 to 125:09

Q. (BY MR. SUMMY) Are you aware of any BP policy, written policy that states if the rate of drilling out-paces the ability of the crew to manage pore pressure and frac gradient, that there is a right to slow down the drilling?

Page 125:11 to 125:17

A. I'm not aware of a specific worded policy to that effect.

Q. (BY MR. SUMMY) Was the pace of drilling being a safety concern because of pore pressure and frac gradient issues ever brought to your attention related to the Macondo well?

Page 125:19 to 125:22

A. No, it was not.

Q. (BY MR. SUMMY) Who was the person that was involved in the Macondo well that you dealt with the most on pore --

Page 125:24 to 126:09

Q. I'm sorry, on pore pressure and frac gradient issues.

A. Marty Albertin.
Q. And at any time during the drilling of this well, with you being the single most senior person at BP related to pore pressure and frac gradient, did Mr. Albertin express to you that the pace of drilling was so fast that the team could not keep up with pore pressure and frac gradient issues?

Page 126:11 to 126:11

A. No, Marty did not.

Page 126:22 to 126:24

Q. Okay. If you will look at tab 11, and we'll mark this as an exhibit.
A. 4526.

Page 127:06 to 127:20

Q. If you look down at the bottom of the first page, I believe it's an e-mail from you to John LeBleu and Mark Hafle, dated March 13th, 2010, the subject line "Macondo mud loss incident investigation." And if you could read that e-mail for the record.
A. "Also, I've been looking at the facts as well as part of the ERA effort to develop technology to assist drilling. We are using this as a case example to generate ideas for new technology, so I have had to become familiar with the facts. Hence the need for cumulative losses."
So this is referring back to the losses in February.

Page 129:01 to 129:22

Q. Okay. And if you look on the first page of Exhibit 4526, this is a listing of -- of the mud that was lost by day; is that correct?
A. Yes.
Q. And can you tell from this document, how much mud was lost through the month of February?
A. So there was 6,804 barrels --
Q. Okay.
A. -- lost -- wait a minute, let me -- let me check something here.
I think it's a little bit

ambiguous what John said. I may have asked for clarification later. But he's recording 6,804 barrels lost and then he's talks about losing some additional barrels from running and cementing the casing and I don't know if those are included or not included.

Q. Okay. So were you able to determine what the cumulative loss of mud was throughout the month of February?

Page 129:24 to 130:08

A. I was able to come up with a number from John that I used in my presentation.

Q. (BY MR. SUMMY) That was 6804?

A. I'd really have to check the presentation, but I think that's the correct number.

Q. And how is that 6804 measured? Is it by gallons or what?

A. That's barrels.

Page 132:22 to 133:05

Q. And is it common to artificially strengthen a particular formation-- so that you can drill ahead?

A. That's something that happens naturally, and you can enhance it using stress cages.

Q. Okay. Does that present a problem later if you artificially strengthen it?

Page 133:07 to 133:13

A. We don't have any recorded cases of having resulted in a problem later.

Q. (BY MR. SUMMY) Is it acceptable at BP to artificially strengthen a formation so that drilling can go past that point?

A. It is a practice we do in depleted sands in sand drilling.

Page 135:14 to 135:19

Q. (BY MR. SUMMY) Well, what I'm trying to figure out is in early April, just weeks before this explosion occurred, were you notified that the drilling margin was so tight that drilling could not be obtained down to the anticipated total depth?

Page 135:21 to 136:01

A. No, I was not notified of that.
Q. (BY MR. SUMMY) Were you notified in early April, just weeks before the explosion, that the drilling margin had become a problem due to the inability to balance pore pressure and frac gradient?

Page 136:03 to 136:10

A. I knew that there was a lost circulation event that occurred in those sands.
Q. (BY MR. SUMMY) Okay. If you look at page -- if you look at exhibit -- or tab 15, and we'll have to mark this as an exhibit.
A. 4528.

Page 136:14 to 137:11

Q. This is a -- an e-mail from John LeBleu to a number of people, including yourself, dated April 4th, 2010, subject line, "Macondo Update 5am." Do you see that?
A. Correct, although this is an e-mail from John LeBleu only to myself and Jianguo Zhang. So the e-mail below that is from -- he's forwarding an e-mail that was sent to all of us.
Q. Right, right, this is an e-mail from John LeBleu to you and Jianguo Zhang.
A. Yes.
Q. Okay. And it's forwarding an e-mail from Bennett Gord to a whole host of other people, correct?
A. Correct.
Q. Okay. And who is Bennett Gord?
A. I do not know Bennett Gord. Or Gord Bennett, I think is his name.
Q. Okay, Gord Bennett, okay. Do you recall receiving this in early April 2010?
A. I was on vacation at that time.

Page 137:21 to 138:15

Q. And if you look at the second page, if you would, read the comments into the record, please.
A. While decreasing of the mud

weight to 14.3 ppg and circulating the 14.5 mud weight out of the hole, there was mud taken by the formation. After the 14 -- do you want the whole paragraph, right?

Q. Yes, please.

A. After the 14.3 ppg was around the pumps were shut off and the flowback was monitored. Mud did flow back to the well. When that mud was circulated to the surface at 02:30 there was a gas peak at 525 units. Currently gas has dropped to drilling background of 30 units. The drilling is getting rougher with more torque due to the increase in thin sands we are encounters. We have not encountering a target -- the target sandstone as of 18,080.

Page 138:24 to 139:08

Q. (BY MR. SUMMY) What is -- what is your understanding of the hole depth at this point when this update is given?

A. The hole depth is recorded as 18082, and I don't recall what the total depth of the hole was or where the Macondo sands were on this.

Q. Do you recall what the target total depth was for the Macondo well?

A. I do not.

Page 139:13 to 139:15

Q. (BY MR. SUMMY) What does it mean when it says there was mud taken by the formation?

Page 139:17 to 140:01

A. I would have taken that to mean that there were losses to the formation.

Q. (BY MR. SUMMY) Did you do anything in response to receiving this?

A. I don't recall.

Q. Did this particular update when you read it cause you in concern?

A. I don't know if I actually read it. Being on vacation, I don't even know if I got it or whether or not --

Page 140:06 to 143:06

Q. Would you have read this when you returned?

A. It would depend upon whether or not -- I mean, I would have gone through it, but it would have been a case of was Randall handling this or not. Normally Randall would have been handling this interval.
Q. Who is Randall?
A. Sant.
Q. Sant, your -- the -- protege?
A. Yes.
Q. Do you know if he received this?
A. I do not know.
Q. Do you recall doing anything in response to receiving this?
A. I do not recall what was done in response to this.
Q. Let's go to tab 16.
A. All right.
Q. Make it an exhibit.
A. 4529.
Q. Correct.
A. All right.
Q. This is a series of e-mails, all dated April 5, 2010, correct?
A. Correct.
Q. And the one down at the bottom is from Randall Sant to Brian Morel and Martin Albertin, correct, and you're cc'd?
A. Yes.
Q. And it has -- the subject line is "Macondo sand pressures," correct?
A. Correct.
Q. And it appears that they are talking about whether or not they can use StressCage as a solution for a particular fracture, correct?
A. Uh-huh.
Q. And the middle e-mail is from Randall Sant to you, dated April 5, and if you'd read that for the record.
A. If they did manage to drop the mud weight below the minimum horizontal stresses and losses were curtailed, would this be a candidate for StressCage?
Q. And then on the same date you responded to Mr. Sant, and could you read that for the record?
A. "There will be some mudcake in the fractures. We'll have to beef it up more than the calculation suggests."
Q. Okay. So does this refresh your recollection that you did answer some e-mails on vacation?
A. Yes.
Q. And what is being discussed here between you and Mr. Sant?

A. The issue is that -- that I -- that Randall's trying to figure out whether or not we can apply StressCages to this zone that's already had losses, and the issue is that there is -- because there is already losses, there is filter cake in the fractures already, which can hamper your ability to build stress cages. So I'm saying to him you're going to have to take the model up. You're effectively going to have to model a longer fracture.
Q. And do you know where this fracture was located at?
00143:01 A. I'm presuming in my e-mail that this is in -- no, at the time that this is done I don't have a picture of the well. I haven't been given the cross-section of the well. But in hindsight, looking back at it, I assume this was done in the Macondo sands.

Page 144:15 to 144:22

00144:15 Q. Let's mark it as an exhibit.
A. 4530.
Q. Exhibit -- Exhibit 4530 purports to be an e-mail from Robert Bodek to Michael Beirne, dated April 13th, 2010, one week prior to the explosion. Who is Mr. Bodek?
A. Bobby Bodek is in the Tiger team and working with the Macondo well.

Page 145:01 to 145:04

00145:01 Q. Okay. If you go quite a ways down in this particular e-mail, you come to a sentence that starts with, "We had one major problem."

Page 145:13 to 145:23

00145:13 A. Okay. We had one major problem, however, that the sand -- the sand that we took the initial GeoTap pressure in was measured 14.15 ppg.
Q. Okay. If you could read a few more sentences.
A. The absolute minimum surface mud weight we could use to cover the pore pressure of the sand is 14.0. This this would give us approximately a 14.2 ESD over the aforementioned sand.

Page 147:03 to 147:19

Q. (BY MR. SUMMY) But he -- what he's attempting to say is that he's got to have mud that weighs 14.0 ppg at least, because otherwise he can't control the pore pressure or the hydrocarbons, correct?
A. That's what he's suggesting. I don't know if that's correct, but that's what --
Q. Okay. That's what he's suggesting, correct?
A. Yeah.
Q. Okay. And at the same time that you've got to control the pore pressure, you don't want the mud to weight so much that it creates a gradient fracture, correct?
A. Well, you don't want the pore pressure and frac gradient to equal, right.

Page 147:23 to 148:11

Q. (BY MR. SUMMY) And you may have to read a few sentence. If you would read into the record the next few sentences where it says, "That would give us approximately 14.2."
A. This would give us approximately a 14.2 ESD over the aforementioned sand. If we would drill ahead with the 14.0 MUD surface mud weight/14.2 ESD, our equivalent circulating density would be approximately 14.4 to 14.5. We had already experienced static losses with a 14.5 ESD.
Q. Okay. And he puts an exclamation point there. Do you see that?

Page 148:13 to 148:17

Q. Okay. And so he's saying that the mud weight must be at least 14, but when they have used mud weight that is -- that has an ESD of 14.2 or even 14.5, it resulted in fracture gradient, correct?

Page 148:19 to 148:21

A. I don't know if that's correct.
Q. (BY MR. SUMMY) But that's what he's stating?

Page 148:23 to 149:02

A. That's what he's stating.

Q. (BY MR. SUMMY) And, in essence, he's talking about a situation here where the pore pressure and the frac gradient are within 0.5 ppg of each other, correct?

Page 149:04 to 149:09

A. I don't know if that -- I -- he's stating that. I don't know that that is correct.
Q. (BY MR. SUMMY) But that's what he's stating, correct?
A. That's what he's stating.

Page 149:17 to 149:24

Q. (BY MR. SUMMY) And if you read the next sentence where it says, "It appeared" as well.
A. "It appeared as if we had minimal, if any, drilling margin."
Q. Were you notified of this situation one week prior to the explosion?
A. No.

Page 150:09 to 150:16

Q. (BY MR. SUMMY) Are you aware of any BP policy as you sit here today, being the senior, single most technical person at BP on pore pressure and frac gradient, are you aware of any BP policy that would prohibit drilling when the difference between pore pressure and frac gradient is less than 0.5 ppg?

Page 150:18 to 150:25

A. I know there are policies about what margins are required. I don't know what those policies are. They are not within the area that I oversee.
Q. (BY MR. SUMMY) But as the senior most technical person at BP you can't point to a single BP policy that deals with that issue, as we sit here today?

Page 151:02 to 151:14

A. I -- I -- I do know they exist. I don't know the policy and can't name it, can't quote it to you or tell you the name of it.

Q. (BY MR. SUMMY) If you read the -- if you could, read the next sentence as well where it says, "It was decided." Do you see that?

A. "It was decided a trip back into the hole with a simplified BHA, no underreamer, and very slowly and cautiously drill the requisite 100 additional feet of formation."

Page 151:17 to 151:21

Q. (BY MR. SUMMY) Okay. Is it your interpretation, then, that despite this extremely narrow drilling margin, that the decision was made to drill an additional hundred feet?

Page 151:23 to 152:01

A. No, not me -- I don't know the answer to that.

Q. (BY MR. SUMMY) That's what he certainly has expressed here?

Page 152:03 to 152:04

A. That would be his interpretation, yeah.

Page 152:10 to 152:17

Q. Okay. And then if you would look at -- if you would look at -- if you would read the last three sentences of this e-mail. It starts with, "We had simply"...

A. We had simply run out of drilling margin. At this point it became a well integrity and safety issue. TD was called at 18360 measured depth.

Page 153:14 to 153:19

Q. (BY MR. SUMMY) But you're sitting here, saying that, as the senior most technical person in the entire company of BP on pore pressure and frac gradient, you don't know what it means to run out of drilling margin?

Page 153:21 to 153:21

A. I don't know what he means.

Page 157:17 to 158:02

Q. (BY MR. SUMMY) But certainly pore pressure can have an impact on one's ability to control a well, correct?
A. Pore pressure is a property, so it's not going to change, so it's -- the well control is the function of the well design and the operations, but the pore pressure is a fixed property.
Q. But pore pressure must be managed properly as part of well control when drilling a well, correct?

Page 158:05 to 158:09

A. (Continuing) It -- it needs to be managed, yes.
Q. (BY MR. SUMMY) And frac gradient needs to be managed as part of well control in drilling a well, correct?

Page 158:11 to 158:15

A. I'm not sure you can manage frac gradient like you can pore pressure. It's not a moving object, but -- but, yes, your well design has to account for frac gradient in operating.

Page 158:23 to 159:04

Q. (BY MR. SUMMY) Can it -- can pore pressure become something that still must be dealt with, even though there is no longer drilling on the well?
A. It must still be managed, yes, and -- and to completion and life of the well, right.

Page 159:16 to 160:01

Q. (BY MR. SUMMY) Let me ask it this way: Once a well has been completely drilled, can hydrocarbons still enter the well?
A. If -- if there is a flow path for them to do that, yes.

Q. And because of that, there still remains a safety issue due to hydrocarbons and the pore pressure that forces hydrocarbons into the well after drilling is complete, correct?

Page 160:03 to 160:04

A. Safety is an issue for the life of the well.

Page 161:06 to 161:11

Q. (BY MR. SUMMY) Well, let me ask it this way: Is pore pressure and frac gradient, should they be taken into consideration in completing a well and cementing that well?
A. Yes.

Page 162:08 to 162:17

Q. How many wells have you in your career been involved in predicting pore pressure and frac gradient?
A. To var- -- to various degrees, you know, I guess you might say thousands, that I've influenced or -- or, you know, gone all the way from directly doing it myself to some part to setting policies for the way they -- pore pressure and frac gradient would be characterized .

Page 163:15 to 163:19

Q. Okay. But in some form or fashion, you've been involved with pore pressure and frac gradient most of your career?
A. To some degree, correct.

Page 164:05 to 164:16

Q. (BY MR. SUMMY) Well, what I'm trying to figure out is, is once a well -- well is being cemented, can that cement actually flow into a fracture that's in the formation?
A. Can the cement generate a fracture?
Q. Yes.
A. Yes.

Q. And does that happen when the cement is heavier than what the formation will take?

Page 164:18 to 165:12

A. I -- I don't think it's a question about what the weight of the cement is. It's a question about the pressure that's generated by the cement, weight's a factor in that, but there are other things that would impact the pressure generated by the cement.

Q. (BY MR. SUMMY) Okay. So in cementing a well, consideration must be given to the pressure of the cement and consideration must also be given to the pore pressure that's required to keep hydrocarbons out of the well, correct?

A. That's correct. To keep hydrocarbons in the formation.

Q. Right, and out of -- out of the well?

A. Well, I guess there are two ends of the well, so we don't want it out of the other end.

Page 165:24 to 166:21

Q. Okay. In the final two weeks preceding the explosion, how much involvement did you have with the Macondo oil well?

A. I don't think I had any. I don't recall having any.

Q. You don't recall anyone calling you or attempting to consult with you regarding any of the issues that were going on out at the well?

A. Then I'd need to understand the timing, because I don't know the timing of the two weeks. So -- so at what point in well construction?

Q. Well, it would be approximately April 6th through April 20th.

A. So we looked at some e-mails that were on the 6th before lunch, and I -- I don't recall any e-mails after the 6th, but I just don't recall any communications that were going on on it.

Q. Okay. Were you difficult to get in touch with during that time?

A. If they needed --

Page 166:23 to 167:25

A. (Continuing) If -- if they needed to reach me, I was available by cell phone.
Q. (BY MR. SUMMY) Who -- was your cell phone number widely distributed?
A. It's in the BP global directory.
Q. And who all has a copy of that global directory?
A. All BP employees can access it.
Q. And so were you available to consult on wells pretty much seven days a week, 24 hours?
A. I always made myself available. I would -- if there was a need for me to come off vacation, I would do that, but I think because of the shear number of wells I get involved in, people are selective about when they contact me.
Q. And how many wells would you be working on or consulting on at a given time?
A. Maybe at any one point in time, five or so at any -- any week might be a typical number.
Q. Would -- would you be consulted on wells that were being drilled in deepwater as well as wells that were being drilled on land?
A. Yes.

Page 172:04 to 172:10

Q. (BY MR. SUMMY) Are you aware of any policy at BP where when a well sustains a certain number of kicks and lost return events, that there is a policy that BP says, stop, stop drilling, and let's do a risk assessment on the well to see what is creating all of this risk?

Page 172:13 to 172:14

A. (Continuing) Yeah, I'm not aware of a policy along that line.

Page 174:07 to 174:16

Q. (BY MR. SUMMY) Okay. You were only involved in the relief wells?
A. Correct.
Q. And how did you get involved in the relief wells?

A. When -- when -- when my manager came to me and told me that they're going to tem- -- you know, temporarily embed me into the two relief well teams to help them plan and drill the wells.

Page 176:21 to 176:25

Q. And what was your role on the team?
A. My job was to -- to do -- take -- to look at -- prevent lost circulation from occurring and to review all

Page 179:14 to 179:21

Q. And what is it that they asked you to advise them on?
A. What the frac gradient was at the 16-inch shoe.
Q. And what did you advise them?
A. I gave them the number that came from Marty Albertin's work and confirmed that against what we saw on leak off data.

Page 181:12 to 182:08

Q. You talked about that your job on the relief wells was to prevent lost circulation and to review leak off tests, correct?
A. Correct.
Q. How did you go about doing this? Did you go back and look at previous data on -- that was available on the Macondo well?
A. Yes.
Q. And what did you look at?
A. Looked at leak off data collected on shoes. And, again, I want to be careful because leak off has multiple meanings. But formation pressure integrity tests run at the shoes. And I looked at -- at Jianguo Zhang and Randall Sant doing an analysis of the -- the diagnostic tools on the lost circulation to see what the probable root causes of those were so that we could put together a decision tree and prevention plan to mitigate and prevent those on relief wells.

Page 185:19 to 186:08

Q. Isn't it true that these relief

wells were very important tasks at BP during this time?
A. I think so, personally, yes.
Q. In fact, they probably were the most important tasks and drilling tasks that was going on at BP during this given time, correct?
A. It was certainly in -- in Houston.
Q. And wouldn't you agree that greater effort as far as resources are concerned went into these relief wells than went into the Macondo well when it comes to pore pressure and fracture gradient?

Page 186:10 to 186:21

A. When it comes to pore pressure and fracture gradient, we -- we used the same resources in -- that Marty Albertin did -- did on both wells.
Q. (BY MR. SUMMY) Right, but as far as monitoring and being involved with the relief wells, your time and the time of many others was done on a daily basis, whereas that was not the case in the Macondo well?
A. Certainly for me, I was instructed to make the Macondo relief wells my No. 1 priority, yes.

Page 187:19 to 189:02

Q. You used the term "formation pressure integrity test." What does that mean to you?
A. That means that we test the strength of the formation and -- and to determine at that depth what that strength is.
Q. Are you familiar with the acronym PIT to refer to a formation pressure integrity test?
A. Yes, I believe PIT is the abbreviation MMS has used in their documents, if I'm not mistaken.
Q. Are you familiar with the term leak off test?
A. Yes.
Q. Do you know that to be a type of PIT?
A. I think a leak off, term leak off test has been used in multiple ways but multiple people, and so it's -- it -- people have used that term to encompass all the

different types of pits and also used it to describe a particular type of pressure integrity test.
Q. What about formation integrity test, are you familiar with that term?
A. Yes. And, again, I think that's been used multiple way, but it's also been used to describe a particular one as well.
Q. Am I correct that there are two types of PITs, leak off tests and formation integrity tests and they mean different things?

Page 189:04 to 191:16

A. I would -- I would have said that there are four different types of tests that together collectively make up the formation pressure integrity family of tests.
Q. (BY MR. SPIRO) And what are those four tests?
A. That if you do pressure up to departure of linearity, that would be a FIT, formation integrity test. If you did a test that stopped between departure from linearity up to peak pressure, that would be a leak off test. If you went to peak pressure and over -- or up to peak pressure and over, that would be a formation breakdown test. And if you continued pumping until you came out onto a flat plateau, that would be an extended leak off test. So we've got the leak off term showing back up. And I like to include a fifth one where you would repeat that peak leak off test and do a repeat extended leak off test as a sort of a fifth option.
Q. Are you familiar with situations where well operators stop even before they break linearity?
A. Yes.
Q. What do you call that type of test?
A. FIT.
Q. I guess I misunderstood you. I thought that you said they stop at the point where it departs from linearity, that is called an FIT?
A. An FIT can be stopping at any point up to the break from linearity, and leak off between the break in linearity anywhere up to the peak pressure.
Q. Okay. Well, I'm just going to refer to PITs to encompass all of the above. Is that okay?
A. I'm comfortable with that.

Q. Why do well operators do them other than the fact that MMS requires them?

A. Right. Well, there is -- is the family of tests can give you different information, but the primary purpose of doing a generic test of any of the four types is to demonstrate that the shoe can contain the pressure -- to establish what pressure the shoe can hold.

Q. Do you do this also to obtain information about the open hole beneath the shoe?

A. You -- you -- if you -- to find out what pressure integrity the well can hold, you can do that at any length of section below the shoe and get information about that. But are you trying to ask me if you can get other information besides that integrity from the -- from -- from the test?

Q. I'm asking you if one of the purposes of a PIT is to determine the strength of the interval that you're about to drill?

Page 191:18 to 192:20

A. There are form of the PIT that you can run to establish the properties about the stress state of the formation, but an FIT probably would not give you much information about that.

Q. (BY MR. SPIRO) What about some other types of PITS aside from the FIT?

A. So the departure linearity tells us about -- so the leak off point tells us about the pressure at which the first fracture forms at the wellbore wall, which is in the most disturbed portion of the formation.

Q. Why is that considered the most disturbed portion of the formation?

A. Because it's -- it's near the wellbore where we've removed material, we've had dilation of the wellbore towards the hole, we've had thermal things occur, temperature differences between the mud in the formation that impact that fracture gradient, and we've also had interaction between salinity of the mud and the bore hole that can impact the apparent stress state of that nearest wellbore.

Q. Is the assumption that the area at the top of an interval will have the lowest fracture gradient in that interval?

Page 192:22 to 193:06

A. There -- I don't think there is an assumption about that. That is a generality that probably is true more times than it's not true, but it's certainly no rule that -- or it's not a law of nature that the weakest is going to be at the top.

Q. (BY MR. SPIRO) Is it customary to conduct a PIT 10 to 50 feet under each casing shoe?

A. It --

Page 193:08 to 193:13

A. (Continued) It -- it's customary that you drill 10 to 50 feet of pressure formation below each casing shoe before you do a FIT.

Q. (BY MR. SPIRO) Why is it done at that particular part of an interval?

Page 193:15 to 193:19

A. The intention is to expose formation that had not been already previously exposed to chemicals such as cement from setting the casing shoe, that may have altered the frac gradient.

Page 193:24 to 194:04

Q. (BY MR. SPIRO) Do you view conducting a PIT as a well control tool?

A. The pressure integrity test provides us information that is going to be used by people who are doing well control planning?

Page 194:23 to 195:03

Q. (BY MR. SPIRO) Have you conducted training courses in which the attendees included BP personnel in which you've discussed the purposes of doing a pressure integrity test?

A. Yes, we have a --

Page 195:05 to 195:17

A. (Continuing) -- a -- one of the

sessions in the 21st century pore pressure principles course is about frac gradient determination and included there is leak off -- the uses leak off information or PIT information.

Q. (BY MR. SPIRO) Did any of the individuals that worked on the Macondo Tiger team attend that course?

A. Yes.

Q. Do you remember any names?

A. It's frequent -- frequently taught by Pinky Vinson.

Page 195:24 to 196:04

Q. Have you personally taught that course to any individuals who were involved in the Macondo Tiger team?

A. I -- I would have taught it the first time to Pinky and those guys that now teach it.

Page 196:17 to 196:20

Q. Is it your understanding that one purpose of doing a PIT is to get the most reliable possible indication of the strength of the interval's weakest point?

Page 196:22 to 197:04

A. So let me make sure I understand the question. You're asking me whether or not the purpose of a PIT is to determine the weakest part of the hole.

Q. (BY MR. SPIRO) I'm asking you if one purpose of doing a PIT is to get the most reliable possible indication of the strength of an interval's weakest point.

Page 197:06 to 197:16

A. It -- I think it would be possible to conduct a PIT to find that out, but I don't think you could do it when you've only drilled 10 feet of hole.

Q. (BY MR. SPIRO) So the assumption when you -- excuse me. When you drill only 10 feet of hole is it not your assumption that you're about to discern that interval's weakest point when you conduct a PIT.

A. Certainly not.

Page 199:16 to 199:19

Q. So my question is what fraction of the time at BP were you only conducting a single PIT over the entire course of the interval?

Page 199:21 to 199:23

A. Yeah, I don't have the numbers on that, but it would be --
Q. (BY MR. SPIRO) Approximately.

Page 199:25 to 200:08

A. Small percentage.
Q. (BY MR. SPIRO) Normally you would conduct multiple PITs?
A. No, I'm sorry I misunderstood the question. Normally we would conduct one pressure integrity test, correct.
Q. And you didn't retest at the same place, correct? You only did one per interval?

Page 200:10 to 200:14

A. We only retest if there was an indication of -- of some problem.
Q. (BY MR. SPIRO) Can you estimate the fraction of the time that you retested because there was a problem?

Page 200:16 to 200:21

A. I don't have the numbers. I could -- I could make a very rough estimate, and I would say less than 10 percent.
Q. (BY MR. SPIRO) What percentage of the time approximately did you conduct more than two for a particular interval?

Page 200:23 to 200:25

A. So that would be something on the order of less than 10 percent of the time.

Page 201:18 to 202:09

Q. Are you aware that on the Macondo, eight tests were conducted for the 20 -- the interval below the 22-inch hole?
A. Yes.
Q. Are you aware that at the Macondo six tests were conducted for the interval below the 18-inch hole?
A. Yes.
Q. Are you --
A. Six or five?
Q. Five or -- let's say five or six. Well, how common is that to happen in consecutive holes in a well, based on your experience, that they would conduct at least five PITs per interval?
A. That -- I don't think that happens very often at all.

Page 202:11 to 203:15

Q. (BY MR. SPIRO) Have you heard of that happening, besides this situation?
A. I can't think of one.
Q. Was that a concern for you at the time?
A. When I saw the data I could see that there was a presence of a sand, and that always creates a confusion about how you would interpret a leak off, because sand causes departure from linearity immediately, the presence of sand.
Q. Were you involved when this happened in October? Did they bring you into the process?
A. I -- I'd have to check e-mails about timing, but I think that on -- on both those shoes I saw those leak offs were forwarded to me to look at.
Q. When you say they were forwarded to you, you mean at the time, correct?
A. Or shortly thereafter.
Q. Were you asked to investigate the cause of the problem?
A. I was asked for an opinion as to what was causing the problem.
Q. And what was that opinion?
A. That there was permeability exposed either below or above the shoe.
Q. Well, is that unusual that there would be sand involved in a PIT?

Page 203:17 to 203:25

A. I -- I think that that occurs

on -- on a much more common basis than -- than people recognize, that people don't really look for it.
Q. (BY MR. SPIRO) So if it's not unusual that there would be sand involved in a pressure integrity test, why were there so many pressure integrity tests done in these two consecutive intervals, on the Macondo?

Page 204:02 to 204:13

A. And I do not know the answer to why they ran so many.
Q. (BY MR. SPIRO) Did anybody, to your knowledge, investigate that at the time?
A. Not to my knowledge.
Q. Were you aware of situations where a PIT generated results that were much lower than expected?
A. Yes.
Q. At BP when this happened was it the customary response to retest the formation in these situations?

Page 204:15 to 206:01

A. I think that I don't -- I don't know what would be customary. I don't think that I've looked at that sort of deal, but I do know that if it had -- if I was conducting the test and I saw that, I would repeat it to try to see if it would -- see if I had a problem with the plumbing hookup on the well.
Q. (BY MR. SPIRO) So if you had been asked for your opinion and you knew that the PITs were generating results that were lower than expected, you would have said go ahead and retest?
A. I would have said, you know, reconnect everything up to make sure you don't have a plumbing problem on the surface and re-conduct the test.
Q. Is the idea to make absolutely sure that your PIT is as reliable as possible?
A. The purposes is to try and diagnose what -- what the issue is so that we can go forward. So I want to first make sure that it's not a problem with the plumbing, you know, the way we connect up a leak in the pipe or something like that that's making it came -- look like a low test. And then I would ask them to put some other things in the mud to help us diagnose if it is

permeability whether or not it's below the shoe or behind the shoe. Where if it's below the shoe, there's nothing we're going to be able to do about that and no need to do any remediation to the shoe. And if it's behind the shoe, above the shoe, then we can go ahead and recognize that the cement job is not right, and we can go ahead and squeeze that shoe and isolate that sand off.

Page 207:25 to 208:04

Q. (BY MR. SPIRO) Are you familiar with situations where a PIT score was obtained that was significantly higher than what was expected?

A. Yes.

Page 209:15 to 209:18

Q. (BY MR. SPIRO) Do you give advice as to whether to conduct a retest if the PIT score is a lot higher than the expected figure?

Page 209:20 to 210:08

A. I -- I might be ask for advice on that. I don't think I was in this case, but if I was, I -- I would like to know that we definitely were in communication with the formation, and to know whether or not you were definitely in communication with the formation, you'd either have to take a look at some -- you'd have to see the departure from linearity or you need to know that the bottom of the hole was open at the time that the test was conducted, so you would have to look as you go back down the well to make sure that you don't have fill on bottom that covered it up or something to this effect.

Page 210:11 to 210:14

When you say you don't think you were asked for your advice in this case, do you mean you don't think you were asked for your advice with respect to the Macondo well?

Page 210:17 to 211:10

A. (Continuing) Yeah, I don't

think that on the Macondo well I was asked whether or not they should repeat those high formation pressure integrity tests.

Q. (BY MR. SPIRO) And one of the things you also said was you would need to see a departure from linearity. Can you explain what you meant by that?

A. If -- if an -- I need to see some evidence that -- that -- that the formation, that the pressure was communicating to the formation. So -- so if all I did was have a straight-up line that followed the casing test, then I don't know that I communicated; but if I see that break over, then that tells me we induced a fracture and that means we have to have formation exposed at the time the test was run.

Page 211:19 to 212:09

Q. (BY MR. SPIRO) Okay. And you said that you would look to see if there was enough open hole. What are you referring to there?

A. So if -- if I -- all I got was a -- a test that paralleled the casing test and didn't break any place, then I'd want to know that -- that when I pulled back up, that the hole didn't collapse or fill in below me so that the pressure didn't communicate with the formation.

Q. How would you see that?

A. When you'd drop the bit back down, whether or not it goes right back to bottom or whether or not it sits down on something.

Page 213:11 to 213:15

Q. (BY MR. SPIRO) Change in the slope meaning that the PIT cure should not have the same slope as the casing test; is that what you're saying?

A. Right. So if I -- so the slope

Page 218:02 to 218:03

Q. How was it reported to MMS, by the tenth or the hundredth?

Page 218:05 to 218:08

00218:05 A. I don't see it reported to the MMS, but the point on the spreadsheet that produces the value for reporting to the MMS has it printed out to the hundredths.

Page 219:09 to 219:10

00219:09 Q. Was the mud weight calculated to the tenth or the hundredth at BP?

Page 219:12 to 219:24

00219:12 A. I don't know that the mud weight is calculated. The mud weight is measured typically, and frequently it's -- it's typically measured by PWD to the hundredth and -- and in most cases by surface measurement to the hundredth, but not always.

Q. (BY MR. SPIRO) Okay. Some wells in the Gulf of Mexico have thick salt sections and others don't; is that correct?

A. Some have thick salt sections, others don't have any salt at all.

Q. Was the Macondo considered a no-salt well?

Page 220:01 to 220:07

00220:01 A. My understanding is that there was no salt present in the Macondo well.

Q. (BY MR. SPIRO) Okay. Other than in the Macondo how often have you seen no salt wells in the Gulf have a PIT score above the overburden gradient for any interval?

Page 220:09 to 220:22

00220:09 A. I -- I -- what I would have said is that I don't think very often people record it up above overburden. I think it was unusual in the Macondo well that they carried it up that far. Most of the time they would stop.

Q. (BY MR. SPIRO) Why?

A. I don't know the answer why they recorded it that way.

Q. No, I guess I'm confused as to why you wouldn't keep going if you have a fracture gradient that's above the overburden. Why would you stop at overburden?

Page 220:24 to 220:25

Q. (BY MR. SPIRO) Can you help me with that?

Page 221:02 to 222:06

A. The -- the -- in general terms.
Q. (BY MR. SUMMY) Yeah.
A. Not speaking to the Macondo.
Q. Yeah.
A. Once you exceed the expected fracture gradient curve, you're not going to be able to take the benefit of that above it in well planning unless you run an open FIT to prove it's present up and down the well.
Q. Why not?
A. Because our guidelines are that you would -- you would use the predicted fracture gradient and rather than a higher measurement, because the measurement may only be for a couple feet and not the whole interval.
Q. Well, how often have you seen PIT scores, then, equally the overburden gradient?
A. In most cases they would have stopped it once they exceeded the expected fracture gradient, but I see it exceed on, you know, maybe 10 percent. I -- but I'm guessing. Exceed the predicted fracture gradient.
Q. Understood. But what percentage of the time do they actually each overburden?
A. Not very often.
Q. What do you mean by "not very often"?

Page 222:08 to 222:08

A. A small percentage.

Page 222:19 to 222:22

Q. Okay. Leaving the Macondo aside, can you think of any other situation where this happened with a no-salt well in the Gulf of Mexico?

Page 222:24 to 222:25

A. I cannot name one. I'm just

not -- I can't think of any.

Page 224:05 to 224:07

00224:05 Q. In other words, why would anybody take their fracture gradient figure, their PIT figure, and go over the overburden?

Page 224:10 to 225:04

00224:10 A. (Continuing) I do not know why people would do that.
Q. (BY MR. SPIRO) And I thought, I heard you say if they do an open hole lot, that could actually confirm that the fracture gradient exceeded the overburden gradient?
A. I thought that I said that if they exceeded the predicted fracture gradient curve and they wanted to use that now as a basis for well operations, they would need to conduct an open hole FIT to prove that that whole interval was higher.
Q. Okay.
A. As a matter of policy, I don't ever recommend mud weights be below overburden.
00225:01 Q. When you obtain a result over the overburden, as has happened in Macondo, is one of the concerns that you may have not tested enough open hole?

Page 225:06 to 227:02

00225:06 A. Is one of my concerns for which purpose? The purpose of testing the shoe, and demonstrating the integrity of the shoe, I don't see where exposing any more open hole would add any more benefit to it.
But if the -- if the objective was to find a frac gradient measurement that I could use to calibrate a frac gradient curve, then -- then -- it would be useful to take another measurement when you're farther down the well.
Q. (BY MR. SPIRO) You mean farther down in the interval?
A. Yes, correct.
Q. Well, I guess I'm confused then, because I'm trying to figure out if there's one purpose of doing a PIT or two. Clearly you're saying, tell me if I'm wrong, that one purpose of doing a PIT is to determine the integrity of the shoe above the open hole?

A. That's correct.

Q. Is another purpose of doing a PIT to get a reliable indicator of the formation strength of the interval you're about to drill?

A. So -- so if what I wanted to do was get a reliable indicator of the formation strength at that level to use in calculating my curve for going forward, there -- there are two different concerns here. One is that I don't think that a FIT or LOT is reliable in indicator of what the structure. The minimum horizontal stress you have to run a breakdown test or extended leak off test to get a good indication of that.

The second thing is that I don't -- I don't think a single measurement of a single 10-foot zone would be a basis for shifting our prediction of a fracture gradient on the entire well. So I don't think by having a single measurement that I would actually move our prediction of fracture gradient down the well.

Q. So at BP did you not use your PIT results to estimate the formation strength of the interval you're about to drill?

Page 227:04 to 227:12

A. So -- so at BP we estimate the -- the strength of the interval by our tools to predict fracture gradient, which are calibrated to a family of curves, not a single one.

Q. (BY MR. SPIRO) So the primary means that you use to predict the formation strength in the interval you're about to drill is your predrill numbers?

Page 227:14 to 228:07

A. Not -- well, yes. As we get ready before we drill the interval, but we may update it with -- well, let me back up.

That depends upon whether our predrill estimations of overburden were correct, so if we get a revised indication of overburden pressure, prove that you might revise the frac gradient based on that. So the frac gradient is a function of pore pressure and overburden prediction so if those predrill numbers are now being altered because of the well, then you would alter the frac gradient prediction with it. But I would not alter it from a single measurement of one 10-foot section of formation, because that formation goes up and down and we're trying to predict sort of the -- the valleys of that measurement, not the average and not the peak.

Page 229:16 to 230:10

Q. (BY MR. SPIRO) What you're going to use for purposes of estimating your fracture gradient for the interval you're about to drill, that's what I'm concerned about. Do you -- are you following me?
A. Yes.
Q. And are you saying that your primary tools for doing that would be your assessment of the overburden gradient and your assessment of pore pressures?
A. Yes.
Q. Not the single PIT that was conducted at the top of that interval, correct?
A. That's -- that's correct.
Q. Have you encountered situations where you get a PIT score well above your estimated fracture gradient and then you start ballooning or otherwise fracturing an interval?

Page 230:12 to 230:22

A. I have seen cases where we've had leak off measurements that are higher than predicted and yet we had initiation of fractures at lower numbers than that, yes.
Q. (BY MR. SPIRO) At that point do you recommend doing a open hole pressure integrity test?
A. Well, I -- well, I think at that point we have just conducted an open hole pressure integrity test, if I'm starting to do fracture which is what ballooning are.

Page 232:25 to 233:08

Q. I'm talking about an induced fracture. And let me set the question again. You've done a PIT at the top of the interval, and your PIT well exceeded your expected PIT. Then while your drilling, you induced a substantial fracture. Would you drill again in that interval at a mud weight higher than the mud weight that induced the fracture without doing a second PIT?

Page 233:10 to 233:18

A. I -- you know, would I? I -- you know, I don't know why I would expect to get a different result if I repeated what happened the first time. So unless I did something to alter the fracture gradient or raise it or to repair the near wellbore damage, I would -- my expectation would be to get the same result, that I would induce a fracture again.

Page 235:03 to 235:07

Q. So you would need evidence that there was some repair of the well's fracture gradient after the induced fracture in order to justify drilling at a weight above the mud weight that induced the fracture?

Page 235:09 to 236:05

A. I guess I really kind of -- I need to understand the particulars of the problem in order to really give you the right answer on that, but -- but what I'm hearing you say is that if I broke down my shoe, got a lower frac gradient, repaired the frac gradient, I needed to demonstrated, I'd got my frac gradient back before I could put my mud weight back up, yes.
Q. (BY MR. SPIRO) If you fractured a 13.0, hypothetically, and you could not demonstrate that you repaired the well to increase your fracture gradient, you would assume that the fracture gradient would be no higher than 13.0, correct?
A. I -- if I had lost returns at 13.0 and induced fracture, I would -- I would take the assumption that my fracture gradient was 13.0.
Q. Or lower?
A. Or lower, well, whatever it took to close it up, right.

Page 239:08 to 239:18

Q. (BY MR. SPIRO) I want you to turn to tab 2, and we're going to label this

Exhibit 4532, the Bates stamp at the bottom BP-HZN-2179MDL017920075. Ask you if you recognize this document, Mr. Alberty?
A. I do not recall ever receiving this document before reviewing it in preparation for this testimony.
Q. It has your name on the first page next to Terry Jordan's name.
A. Yes, it does.

Page 241:09 to 241:22

Q. (BY MR. SPIRO) Do you know how this document was used at BP?
A. My understanding, from looking at the material in the cover letter what -- that was with it, was that this was prepared for presentation to give to the MMS, but I don't recall that as knowledge I had beforehand.
Q. Page 5 has "Major Issues of Differences." Do you see that?
A. Yes.
Q. And one of the items here is "what value is leak off." Was that a disputed issue at BP when you were there?

Page 241:25 to 242:05

A. (Continuing) There is a concern about picking leak off that occurs when permeability is present in a formation, because permeability creates a part of linearity that has nothing to do with the initiation of a fracture.

Page 242:19 to 242:21

Q. (BY MR. SPIRO) Were there internal debates within BP as to what the value should be for the leak off pressure?

Page 242:23 to 243:16

A. There are -- two experts could look at the same plots in permeability present and come up with two different PITs for values in leak off.
Q. (BY MR. SPIRO) I gather one of those values would be the place where the curve departed from linearity?
A. Correct.
Q. And what would be the other?

A. Where -- well, people would pick -- if permeability is present, departure from linearity happens almost down to zero point. So -- so some people could pick as low as that, other people pick it anywhere as long and may look for an anomaly in it. But when permeability is present picking a leak off value is problematic. You can't find a departure from linearity. There is no linearity.

Page 244:17 to 244:22

Q. (BY MR. SPIRO) We were talking about major issues of differences, and there is an item, this is Page 5, that says, "What does the MMS want reported?"

What were the debates within BP about what the MMS wanted reported?

Page 244:24 to 245:12

A. Are you -- are you asking about the debates that I witnessed?

Q. (BY MR. SPIRO) That you know about.

A. That I know about. So I know that there was people asking whether or not MMS wants reported a leak off value or a peak pressure or formation breakdown or minimal horizontal stress or -- or what pressure they're looking for.

Q. When you said "leak off pressure," are you referring to the place where the curve departs from linearity?

A. Yes.

Page 245:23 to 246:21

Q. Okay. So why don't you turn to Page 11. It says, "What does the MMS say?" And the first thing you see are 250.427. Do you see that?

A. Yes.

Q. Is that referring to the regulation that we just looked at in tab 1?

A. I do not know for sure, but I would assume so. I didn't generate this pol- -- this page.

Q. Okay.

A. Nor was it lifted from my material.

Q. What is your understanding of

the last bullet? First of all, why don't you just read it out loud, so we're talking about the same thing, and then tell me what you think it means.
A. "You must test to either formation leak off pressure or to an equivalent drilling fluid weight if identified in an approved APD."
Q. That's a requirement in 250.427, correct?

Page 246:23 to 247:06

00246:23 A. I -- I cannot answer whether there's a requirement in that. I'd have to go back and compare.
00247:01 Q. (BY MR. SPIRO) Well, why don't we go back to tab 1 momentarily, put your finger right where it is, and look at the last sentence of the first paragraph.
A. Yes, that does match.
Q. So what does that mean to you?

Page 247:10 to 249:21

00247:10 A. (Continuing) That mean -- to me, it means that you must have taken the pressure up to the mud weight you've identified for appropriate APD or up to leak off.
Q. (BY MR. SPIRO) And what do you mean by "leak off"?
A. That will be departure from linearity.
Q. I want you to take a look at tab 6, which has been marked Exhibit 1319. And do you see the second e-mail?
Subject is "Alberty e-mail," but it's written by Martin Albertin.
A. Yes.
Q. And I want you to start reading
00248:01 with the third sentence beginning, "We intend to use"... This is dated, by the way, October 22nd of 2009.
A. "We intend to use a with stress cage mix in a cement slurry to try to (1) patch any channel that might exist, and 2) strengthen any exposed sand that we have damaged with our testing. Hopefully we can approve our leak off -- our lot (pun).
Q. Okay, you can stop at that. A little levity here, right?
A. Improve our LOT.
Q. Is this suggesting that there

may have been damaging of the formation due to the pressure integrity testing?
MR. CHEN: Objection; form.
A. I -- I don't think I was copied on this e-mail, so I really don't know the context of what this e-mail is about.
Q. (BY MR. SPIRO) Well, are you familiar with situations where formations were damaged because of excessive PITs?
A. I -- I -- I am not familiar with where we've damaged formation with successive PITs, but I am familiar where we might have
00249:01 damaged the shoe, the cement integrity of the shoe with excessive PITs.
Q. Is that a concern with doing multiple PITs?
A. I think it's -- for me?
Q. Yes, for you.
A. If -- if I didn't get the -- the PIT I wanted the first time, I don't think I'm going to get a higher PIT by running more of them, but I do think I could get diagnostic information.
Q. Well, is it a concern that you may damage the well -- or the shoe, excuse me, if you do several PITs beneath a given shoe?
A. If -- if -- if the shoe -- if you fail the shoe, doing successful PITs will -- can make it get worse. Doing successive PITs, not successful, I'm sorry.
Q. Did you train BP personnel on that point?

Page 249:23 to 250:02

00249:23 A. Yeah, I would -- I mean, I -- if -- if -- if BP people called and asked me about that, we could have had discussions,
00250:01 but there -- there was no formalized course for that.

Page 252:16 to 252:23

00252:16 Q. (BY MR. SPIRO) I want you to turn to tab 7, Exhibit 3731, and ask you to read the very top e-mail from Mark Hafle to Martin Albertin.
A. We are considering an FIT and not breaking anything else down, like the marl and the rathole, which will commit us to the contingency liner.

Page 253:23 to 254:09

Q. (BY MR. SPIRO) Okay. Why would you only do an FIT instead of a leak off?

A. If I -- if I knew what -- what well pressure was required to drill the interval, as stated in the regulations, then I'd only have to do an FIT to -- to demonstrate that I could use that well pressure, and that may be less than leak off.

Q. But those would be typically situations where you would not be having tight margins between pore pressures and fracture gradients, correct?

Page 254:11 to 254:14

A. Those would be situations where you knew, had pretty good certainty about what pore pressure -- what mud weight was going to be required in the interval.

Page 254:22 to 255:23

Q. Can a pressure integrity test damage permeable formation, in your view?

A. A -- a -- a pressure integrity test can initiate fractures in permeable formations and -- and -- or I take that back.

A -- if you have tensile strength, if the rock has tensile strength -- so -- so -- so fracture resistance is the sum of the stress state plus the -- the strength of the rock to break apart, like if I had a rod and pulled it -- tried to pull a rod apart, that's the tensile strength. And you sum those two together to come up with a fracture resistance. And if I initiate a fracture to crack that tensile strength, it doesn't come back. It's gone, and you're back to just the stresses as your resistance to fracture.

So -- so the answer to the question is, if there's tensile strength and I -- and -- and typically you see tensile strength in crystallin rocks, and marl is limestone, and limestone can be a crystalline rock, so Mark might be thinking in those terms.

Q. If there is tensile strength, a lot can damage a permeable formation?

Page 255:25 to 256:06

A. If there's tensile strength, a -- taking it to fracture will re- -- result in the loss of that tensile strength.

Q. (BY MR. SPIRO) What about going to the top point of a leak off -- excuse me, a pressure integrity test curve, could that damage a formation?

Page 256:08 to 256:17

A. And -- and taking a leak off to breakdown will result in the loss of tensile strength, but in non-crystallin rocks, tensile strength is a very small number, probably below the resolution of the test itself.

Q. (BY MR. SPIRO) If there is damage to the formation, how would that affect the amount of mud weight you could use in drilling the next interval?

Page 256:19 to 256:24

A. And, again, it depends on what you define by damage. But if you had a high tensile strength rock, and you lost the tensile strength, you're going to reduce your available frac gradient by that tensile strength.

Page 259:15 to 259:20

Q. Okay. Let's take a look at tab 15, and we will have to label this Exhibit 4533. See, this appears to be an e-mail from you to Kurt Mix and Jonathan Bellow. Do you see that?

A. I do.

Page 260:02 to 261:13

Q. So it's really the attachment that I want to focus on.

A. Okay. But this is during the relief well period?

Q. Correct.

A. September of 2010.

Q. Correct. So can you take a look at the attachment that begins "Document Produced Natively."

A. Okay.

Q. And I want to call to your

attention on Page 2 of the attachment that you are identified as the "Segment Technical Authority." Do you see that at the top?

A. Yes.

Q. Do you recognize this document?

A. Yes.

Q. And how do you recognize it?

A. This is a document that I developed for the -- for Terry Jordan for his team effort to standardize PIT procedures in the Gulf of Mexico.

Q. And you notice underneath this are lots and lots of LOTs?

A. Yes.

Q. Otherwise known as Pressure Integrity Test curves?

A. Yes.

Q. Have you seen these curves before?

A. Yes.

Q. Did you see them during the drilling of this well or only during the relief well part of the process?

A. I believe I was sent some of them during the drilling of the well, but not all.

Page 264:05 to 264:17

Q. So maybe I'm asking a more generic question. When you designed the software and you have two different rows here --

A. Correct.

Q. -- one that says "MMS Value Measured PIT" and the other that says "Measured LOT" --

A. Correct.

Q. -- am I correct that the measured LOT is supposed to refer to the pressure at which the curve departs from linearity represented in terms of ppg?

Page 264:19 to 265:20

A. So -- so the -- the measured LOT curve, the user of the -- of the -- for the MMS picked value, the user has no control over what the software finds for that. But for the leak off or sometimes they interpret it as closure pressure, so we're trying to get it minimum horizontal stress, the user gets to pick that number and put that in that yellow cell. So what goes in the purple cells, he cannot alter. They are software controlled. But what goes in the yellow cells, he can alter. And so he's picked that value, that 592, and somebody's plugged that in there, and that has produced the 12.48.

Q. (BY MR. SPIRO) Okay.

A. But neither a leak off nor a closure stress happened in this case, and this is one of my concerns that have been here, that if you ask people to pick the leak off, they don't necessarily pick the right number.

Q. My question, then, is in that yellow space where it says "Initial Shut-In or LOT Press," is that supposed to represent the point at which it departs from linearity if this were a test where it actually did depart from linearity?

Page 265:22 to 266:13

A. So -- so they would have a choice of putting there either departure from linearity or the picked value for closure pressure if it was a breakdown test.

Q. (BY MR. SPIRO) All right. Okay. Now, how can they be confident, given this curve, that they were testing the formation and not casing or cement?

A. This -- this -- you cannot tell by looking at this curve alone, without any other information about it, and show that we actually broke down the formation, but the regulations, as we saw a minute ago, said you can do an FIT or a leak off, and anytime you do an FIT, you would never get any positive indication that you were in communication with the formation.

Page 272:02 to 272:18

Q. Okay. Let's go higher up in this tab to the very first spreadsheet.

A. The first recorded case.

Q. Yeah.

A. So this would be on the Marianas on October 19th and the 22-inch shoe?

Q. Yes. Does this appear to you to be a valid test?

A. That test would concern me a lot.

Q. Why?

A. Because it's very irregular. It turned flat. Its curve -- appears to have a curved nature to it. It's not following the slope of the casing test. So this would look like to me there's permeability exposed in the hole.

Page 272:25 to 275:15

Q. (BY MR. SPIRO) But you mentioned several features that would cause this -- would cause you to be concerned about the validity of this test?
A. That's correct.
Q. Let's go to the next page. This is the same date.
A. Right.
Q. And it says for identifying purposes, MMS value 10.15 and no measured LOT.
A. Right.
Q. So it's a little higher than the last one, but does -- is this one a valid test, in your view?
A. A valid test, I guess I need to understand, again, what you mean by "valid." I think this test is recording what it saw, so it's a valid recording of the events that happened, and that this test would demonstrate that this shoe could hold 10.15 ppg without failing the cement.
But, again, it looks to me like it shows that there is permeability present and that there is a sand exposed someplace, either below the shoe or above the shoe.
Q. Now, you notice that it said "Projected FIT LOT 11"?
A. Yes.
Q. Is it surprising to you that this test was fully .85 ppg below the projected FIT LOT?
A. Yes, be- -- I mean, it's not a surprise to me because the projected FIT or LOT is trying to predict the shale frac gradient, and there's a sand exposed, so this is seeing the sand frac gradient, if it's seeing frac gradient at all. There -- this may not be -- you may -- may not be seeing a fracture start at all.
Q. Let's go to the next -- next item. This says "10.16 MMS Value." Does this appear to be a valid test, or would this concern you?
A. This looks to me like we did not initiate a fracture and that a sand is exposed at this point in time.
Q. Okay. Let's go to the next one.

"10.24 MMS Value, Measured LOT 10.22." How do you assess this one?
A.   So we're still on the 22-inch shoe. I think we're kind of getting a consistent answer. It's still curved over and going flat and still at a different slope and -- and -- but the permeability looks like it might be less, but you'd -- you'd have to sort of model that up to see.
Q.   Does this look like a valid test?
A.   It looks like a proper recording of the data, but I do not know that it demonstrates we initiated fracture.
Q.   Would you at this point stop, or would you advise continuing to do LOT tests or do you have enough information to say?
A.   Right.

Page 275:17 to 277:21

A.   (Continuing) If -- if I'd been asked what to do here, and I don't know if I was or wasn't, my suggestion would have been we need to know if the sands below the shoe are above the shoe. So let's spot a pill in the open hole and rerun the test and see if it impacts it. And if the sand -- we put a -- we put a -- a pill, who -- who -- we'll try to plug up any permeability. If the sand is below the shoe, we would see this come up. And if it's behind the shoe, the pill wouldn't be at the sand, so it would continue to roll over; and it would allow me to say you need to go in and squeeze the shoe.
Q.   (BY MR. SPIRO) Okay. Let's go to the next page. This says "MMS Value 10.25, Measured LOT 10.2." What's your reaction to this curve?
A.   And this one, you know, now we're not even seeing the curvature. Again, this is a issue of they read the zero volume before they open the gauge. So the zero is probably up here around 70 psi or something and -- and it's almost immediately gone flat. So the formation's taking all fluid as fast as he can pump it.
Q.   Well, would this one give you concerns for the same reason?
A.   Yeah, it still looks to me like there's a sand exposed.
Q.   But do you view this as a more or less reliable test as the -- compared to the last one?
A.   I -- I don't know what they're

00277:01 doing, whether they're doing some diagnostics and spotting pills, but if there -- you know, I'm assuming there's some reason why they're doing this and it may be spotting pills to determine whether or not this is behind casing.

And -- and, you know, a lot of times -- and I don't know that this is the case on Macondo, but a lot of times, they're waiting on equipment to come to the rig, and so they're just running other tests.

Q. So the fact that it's going up and then down and then up again doesn't concern you?

A. Oh, in here?

Q. Yeah.

A. That -- that -- I would think that is the case of the -- of the man reading the gauge, recording it got slightly off on his sequences or something. I don't know. The gauge is doing this.

Page 278:02 to 279:05

00278:02 Q. Okay. Do you want to turn to the next one? Have any reaction to that one? It says 10.14?

A. Still more of the same, I think. It still -- it still -- I don't -- doesn't look to me like they fixed it yet.

Q. How about the one after that, 10.06?

A. Still lots of permeability present.

Q. How about the next one, 10.09?

A. Can I look at the stack on the following?

Q. Yes, in a minute, but can you please answer this question?

A. This -- this one's looking more interesting.

Q. Why is that?

A. Because it looks like there's less permeability present.

Q. Okay. Well, this is actually the last one that they did.

A. This is after a cement squeeze?

Q. Yeah. Yes, that's my

00279:01 understanding. And if you go to the next page, you will see they put them all together. Which of these would you report as the pressure integrity test result for this shoe?

Page 279:11 to 279:17

A. I -- I -- I probably would report the last.
Q. (BY MR. SPIRO) Why is that?
A. Because that's the state of the well at the time we left it, at the time we -- you know, at the time -- the latest measurement.

Page 279:25 to 280:02

Q. (BY MR. SPIRO) Whose job was it with respect to the Macondo to report this test?

Page 280:04 to 280:05

A. It -- it's typically the job of the well site leader to report it.

Page 284:03 to 284:04

Q. Okay. Let's look at tab 12, and this is Exhibit 1343.

Page 289:12 to 290:03

Q. Is that part of your general training of -- or was that part of your general training of BP personnel about conducting pressure integrity tests?
A. So I -- I would do training on interpreting and recording leak off tests, but I didn't do -- in the stuff I did, I didn't do any training about when to repeat a test. That would have been wherever that was managed in -- in management, someplace else for me. I'm not -- just not aware of what training was done there.
Q. Do you know who would have conducted that training at BP?
A. I do not.
Q. So you didn't address the topic at all about when to conduct LOT tests?

Page 290:08 to 290:10

A. No, I -- I did not on my training on how to interpret a test address repeating tests.

Page 290:16 to 290:17

Q. But did you address how to report them to MMS?

Page 290:19 to 291:05

A. The -- the team, Terry Jordan's team creating the standardized format for the Gulf of Mexico as in that slide back there was addressing how to report them to the MMS. I simply put what they requested in the software to generate that number.
Q. (BY MR. SPIRO) Did you address the issue of which tests to report to MMS?
A. Did I personally address that issue?
Q. Yes.
A. No.

Page 291:07 to 291:08

Q. (BY MR. SPIRO) Were you involved in that issue at all?

Page 291:10 to 291:15

A. I was present when it was decided.
Q. (BY MR. SPIRO) But were you involved in it in terms of something you said about it, or did you simply watch other people talk about it?

Page 291:17 to 291:19

A. I partic- -- I participated in discussions about trying to figure out what the MMS wanted.

Page 299:06 to 299:24

Q. Well, if we want to go back to tab 15, at the -- at the very end, we see a curve. Do you see the curve at the very end, the last curve? This is actually the 9-and-7/8 shoe.
A. Okay, my apology. I'm thinking of the --
Q. Well, let's go back to the 9-and-7/8. Sorry.
A. Yeah. Yeah.

Q. Very last one. Does that have
an issue of being a valid test?
A. That -- that has a -- 9-and-7/8
has a very straight and parallel curve to it.
We have no proof that you didn't do anything
more than a casing test again by the behavior
of the curve.
Q. So there is nothing there that
would reassure you that this is a valid test?

Page 300:01 to 300:25

Q. (BY MR. SPIRO) That you can
identify?
A. There is nothing there that
would indicate to me it's not a valid test,
either.
Q. So both of those statements
would be true?
A. Correct.
Q. Okay. And you were looking at
the --
A. 11-and-7/8s.
Q. -- 11.
A. He says --
Q. This is just -- this is -- two
sheets above that, correct, dated March 21st,
2010, the one you're about to look at?
A. Well, the -- he said
11-and-7/8s.
Q. Right. So the one we were just
talking about was dated April 2nd, 2010,
correct?
A. Correct.
Q. And that one you said you can't
tell whether it's testing casing or not?
A. Correct.

Page 302:19 to 303:12

Q. (BY MR. SPIRO) And I ask you to
look at tab 14, which is being marked 4536.
I'll read the Bates at the bottom,
BP-HZN-2179MDL00004060. And I'm going to ask
you to really look at the lithology report.
Very briefly.
A. Right.
Q. Can you rule out from this that
BP tested not merely formation, but cement or
casing?
A. Can I rule out from this, that
BP tested mainly formation, and not cement or
casing.
Q. Let me ask you the question

again. Can you rule out from this that BP tested cement or casing -- yeah, I'll leave it at that, that BP tested cement or casing at least in part when they did their final PIT?

Page 303:14 to 304:02

A. I don't think that on this evidence you, because cuttings from drilling 10 feet, get very strung out in the well, that you can draw much conclusion about what lithology was drilled in that 10 feet and this is an issue we've looked at many times about can we identify what lithology we drilled at 10 feet. The cuttings get so spread out and you get lots of other things mixed in with it, it's hard to tell.
Q. (BY MR. SPIRO) Is it safe to say that this lithology report is consistent with either a valid test or a non-valid test; you just can't tell?

Page 304:05 to 304:07

A. (Continuing) I don't think I could personally use this to draw a conclusion about what lithology was tested.

Page 306:05 to 307:02

Q. All right. Why don't we look at tab 16, which is Exhibit 1967. And I want you to focus on the second line in the section called "Additional Observations."
A. Uh-huh.
Q. Can you read that Geotap?
A. Oh, I'm sorry. "Geotap at 18079 TVD, 12.58 ppg, which has a corresponding sand frac gradient of 14.4 ppg."
Q. So I gather what they do is they calculate when they do the Geotap a pore pressure of 12.58; is that what that's saying?
A. Geotap directly measures the pore pressure.
Q. And that that has a corresponding fracture gradient associated with it?
A. That's running it through a model to determine that. Geotap does not measure the frac gradient.
Q. Okay. How reliable are those

models?

Page 307:04 to 307:13

A. You know, it's our best fit of the data. I don't know -- I don't recall what the sort of standard deviation is on those.
Q. (BY MR. SPIRO) Okay. Are they more or less reliable than the PIT tests done at the top of an interval in terms of, you know, predicting the fracture gradient, you know, in the interval?
A. So -- so --

Page 307:15 to 307:19

A. (Continuing) -- the estimate of fracture gradient from the algorithm at the sand would be much more accurate than what you might get from a FIT test in a shale 2,000 feet up the hole.

Page 308:12 to 308:21

Q. Can you use stress cages when you lose total returns?
A. Once you lose returns you have to restore -- bring it back to a -- a steady -- a -- a stable state before you could apply stress cages and -- and I think our history of success on having done that is not a lot of cases to look at. Most of the time we want to do stress cages before we induce fractures in there.

Page 310:22 to 311:03

Q. Okay. All right. We're going to give you another document. It's going to be Exhibit 4538, and I'll read at the bottom Bates stamp BP-HZN-2179MDL03072952. I apologize for how small the writing is. And I want us -- I want to look at the section -- you can see the date is April 15th.

Page 311:08 to 312:05

Q. (BY MR. SPIRO) And this is a memorandum of change, or purports to be. And can you read the risk mitigation section beginning -- well, just -- just read the

whole thing. It's short. Just the first paragraph.
A. Lost circulation during the cement job. The model estimates, the maximum ECD to be 14.583 ppg. The FIT on the previous shoe was 16.0. There have been two lost circulation events in this hole section. The first occurred when ECD exceeded 14.9 prior to drilling the pay sands. The second event, major losses occurred when ECD exceeded 14.7. Losses for this event were cured with Form-a-Set and mud weight reduction. Since that second event we have been using a 14.5, (I think that is,) arbitrary frac gradient that we are attempting to abide by based on actual circulating conditions. We have put the wellbore under since having losses and fixing them.

Page 312:11 to 313:08

Q. Does Form-a-Set increase your fracture gradient?
A. It can be used to increase the frac gradient. Form-a-Set is a cross-linked polymer, and what you can do is squeeze it into the formation and if -- if you can create some displacement with it, you can raise the stresses in the wellbore.
Q. Is it -- is it a type of lost circulation material?
A. It is commonly used for lost circulation to plug holes up, so natural frac -- my preferred use of Form-a-Set is for natural fractures and bugs and those sorts of issues. It's not my preferred method for repairing induced fractures in sand, but I know that it has been used successfully to do that.
Q. Do you look at this as something that sort of is a temporary measure, or is this a permanent fix to increase the fracture gradient?
A. It's -- a good question --

Page 313:10 to 313:18

A. (Continuing) I'm thinking about it yes.
Q. (BY MR. SPIRO) Well, is that -- is the answer you don't know?
A. I think the answer is probably I don't know, that Form-a-Set is a -- is a low

compressive strength material, and I would prefer to have a higher compressive strength material in there.

Page 322:06 to 322:09

Q. Yes, but are they requiring you to report a pressure that corresponds to the place where the break -- the curve breaks from linearity or some higher pressure?

Page 322:11 to 323:15

A. So -- so the -- the effort of the Terry Jordan team was to understand what the MMS wanted us to report, whether they wanted us to report the departure from linearity or the peak value; and the understanding that came out of that meeting, which I was not present at, was that they want us to report the peak value we took the test to.

Q. (BY MR. SPIRO) By "peak value," let me see if I can restate that. You mean that if you conduct a pressure integrity test and you take the curve above linearity and then at some point it stops increasing, that maximum level is what MMS wants you to report?

A. That's my understanding, coming out of the -- of the -- of the team effort to get clarity around what the MMS wanted, that's what came -- I wasn't present, but that's what came back from it. That is what they want. That's what we put on the spreadsheet. That's what we issued as instructions for what to report.

Q. Did you read that or did you hear that?

A. I know that because I'm the one who assembled the instructions and wrote them up from them, and that's what I was instructed to do.

Page 326:20 to 327:02

Q. So why don't you tell me as precisely as possible what Terry Jordan said MMS told him about the reporting about the reporting of this?

A. What he told me was there was no need for me to change the spreadsheet with the wording that says report this value to the MMS.

Page 332:02 to 333:18

Q. Okay. I want you to turn to tab 18, which has been marked Exhibit 3737 previously.
A. Yes.
Q. The Bates stamp is BP-HZN-2179MDL00004909. Do you see this e-mail from Martin Albertin, dated -- well, it's the one on the bottom, dated April 5th, 11:20 a.m.
A. Yes.
Q. Do you recognize that? Oh, do you -- do you see him copied on it?
A. I see him copied on it. I don't know that I processed that. April 5th is while I'm on vacation.
Q. And there is an e-mail at the top on the very front which indicates there was an error in the numbers, and you're also copied on that. Do you see that?
A. Uh-huh.
Q. Do you recall that?
A. I don't know that I looked at this. So I'm on vacation. Randall is filling in for me.
Q. Okay. Are you able to convert psi to mud weight?
A. Yes.
Q. Would you mind doing that?
A. I need -- I need a calculator.
Q. You got one. And I'm particularly --
A. So what do you want me --
Q. Thank you. I'm particularly interested in the 18004 depth, and you'll see the fracture gradient estimated at what? What does that say, 13476? Am I reading that correctly? You tell me.
A. No, that's -- oh, fracture gradient, yes, it is.
Q. Okay. Could you convert that to a ppg?
A. So I get a 14.34.

Page 334:24 to 335:06

Q. Okay. Is this -- well, again, we're talking about a Geotap measurement converted to a frac gradient, correct?
A. Yes.
Q. Is this surface equivalent or a

downhole equivalent measurement?
A. This would be a downhole equivalent.