

Deposition Testimony of:

Tom Knox

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Page 12:08 to 12:10

00012:08 THOMAS KNOX,
09 having been first duly sworn, testified as
10 follows:

Page 12:13 to 12:22

00012:13 Q. Good morning, Mr. Knox. We spoke
14 a moment ago. I -- you know, my name is Tom
15 Benson. I'm with the United States and I'll
16 be asking you questions today. Could you
17 state your name and -- I'm sorry. Can you
18 state your business address?
19 A. BP?
20 Q. Yes.
21 A. Building H, Chertsey Road, Sunbury
22 on Thames, UK.

Page 13:18 to 14:04

00013:18 Q. Okay. And you understand you're
19 here today answering questions on behalf of
20 BP; is that right?
21 A. I do.
22 Q. Okay. So when I'm -- I'm asking
23 for both what you know about and what you have
24 learned on behalf of the company. You
25 understand that?
00014:01 A. I do.
02 Q. Okay. So you're testifying both
03 for yourself and for the company, right?
04 A. I understand that.

Page 14:10 to 16:23

00014:10 Q. You're not. Okay. Let me ask you
11 to turn to tab 187, and it's going to be
12 binder Number 3. And we're going to mark that
13 as exhibit 9500.
14 (Exhibit Number 9500 marked.)
15 Q. Let me just ask you, Mr. Knox,
16 have you seen this document before?
17 A. I do not believe I have.
18 Q. Okay. Have you seen what's known
19 as the 30(b)(6) deposition notice in this
20 case?
21 A. I have seen a notice regarding my
22 appearance here, which does mention 30(b)(6).
23 Q. Okay. And does -- has it -- did
24 it -- does it lay out the topics that you're
25 going to be testifying on?
00015:01 A. It does.

02 Q. Okay. Let me ask you to turn to
 03 page 10 of the attachment to this document.
 04 And do you see there's a heading 20 at the top
 05 of the page?
 06 A. I do.
 07 Q. Okay. Can you read that topic to
 08 yourself and let me know if you recognize that
 09 topic?
 10 A. I do.
 11 Q. Okay. That is something you
 12 recognize?
 13 A. I do.
 14 Q. Okay. And that's a topic that
 15 you're prepared to testify on today?
 16 A. It is.
 17 Q. Okay. And let me ask you to look
 18 at topic 23 at the bottom of that page. Do
 19 you see that, in all analysis, calculations,
 20 modeling or estimates?
 21 A. I do.
 22 Q. Okay. Can you read that to
 23 yourself? And do you recognize that topic?
 24 A. I do.
 25 Q. And is that another topic you're
 00016:01 prepared to testify on today?
 02 A. It is.
 03 Q. Okay.
 04 MR. COLLIER: Counsel, just to be
 05 clear with respect to topic 23, he's not --
 06 he's not testifying about obstructions in the
 07 wellbore.
 08 Q. Okay. So with respect to 23, Mr.
 09 Knox, you're prepared to testify about
 10 obstruction in the BOP and the riser; is that
 11 correct?
 12 A. That's correct.
 13 Q. Okay. And if I could ask you to
 14 read topic 24 to yourself, which is on the
 15 next page. Do you recognize that topic?
 16 A. I do.
 17 Q. And is that a topic you're
 18 prepared to testify on today?
 19 A. It is.
 20 Q. Okay. Are there any other topics
 21 that you prepared to testify on today other
 22 than the three that we just read?
 23 A. No.

Page 17:09 to 17:10

00017:09 Q. What did you do to prepare for the
 10 deposition you're taking today?

Page 17:15 to 17:22

00017:15 A. Prior to today's deposition, I had
16 a number of sessions with counsel to go over
17 the -- the practice and potentially some of
18 the content of today's deposition. I had
19 three conversations with some individuals
20 about some of the contents and I have my own
21 experience of participating in the incident
22 response.

Page 18:02 to 18:08

00018:02 any counsel. But can you just tell me the
03 names of the counsel that you met with in
04 preparing for this deposition?
05 A. Counsel for the company. So Mr.
06 Paul Collier, Ms. Emily Dempsey and personal
07 counsel, Mr. Sean Casey and Mr.
08 Francisco Navarro.

Page 18:12 to 18:20

00018:12 Q. Okay. You mentioned having three
13 conversations with individuals. Are those
14 non-attorney individuals?
15 A. Yes, they are.
16 Q. Okay. And who are the individuals
17 that you spoke with?
18 A. There were two individuals.
19 Mr. Julian Austin, I had two specific
20 conversations with him, and Mr. Simon Bishop.

Page 19:12 to 21:10

00019:12 Q. Okay. Now, you mentioned you had
13 two conversations with Mr. Julian Austin.
14 When were those conversations?
15 A. They were in the last two weeks.
16 Q. Okay. And, roughly, how long did
17 you talk to Mr. Austin?
18 A. Approximately about an hour in
19 each case, no more.
20 Q. And what was -- what were you
21 talking to Mr. Austin about?
22 A. I was going over some of the
23 documents that Mr. Austin had prepared just to
24 get a better understanding of what was in
25 them.
00020:01 Q. And I guess why -- why
02 particularly Mr. Austin? What was his, sort
03 of, role in the response that it was something
04 you wanted to talk to him about?
05 A. I'm not clear exactly what
06 Mr. role's -- Mr. Austin's role was. But he

07 had done some preparatory work early on on
 08 flow patterns in the riser kink and -- and I
 09 was aware that this may come up in this
 10 conversation.

11 Q. Okay. Any particular questions
 12 that you had for Mr. Austin?

13 A. Largely just some background on
 14 the timing of -- of some of the events. Many
 15 of the documents were produced before I
 16 participated in the event -- in the response
 17 team.

18 Q. And then you mentioned Mr. Bishop.
 19 How -- roughly, how long did you speak with
 20 Mr. Bishop?

21 A. Again, I recollect about an hour
 22 or less.

23 Q. And would that also be in the same
 24 last couple of weeks time period?

25 A. Yes.

00021:01 Q. Okay. What did you talk to
 02 Mr. Bishop about?

03 A. About some work he had done on
 04 modeling the wellbore flow in to it.

05 Q. And what did -- what aspect of
 06 that work did you talk to him about?

07 A. I wanted to understand what work
 08 he had done because I have no background
 09 experience in reservoir production or -- or
 10 well flows.

Page 21:13 to 22:12

00021:13 Q. I'm sorry. What work had he done?

14 A. He had produced a document about
 15 potential flows from the well surface.

16 Q. And was that early on, like in the
 17 late May, early -- I'm sorry. Late April,
 18 early May time period?

19 A. I can't recollect, looking at the
 20 dates on that document.

21 Q. Okay. Was it a particular
 22 document that you wanted to speak to him
 23 about?

24 A. It was a document that had -- he
 25 put in front of me as part of the preparation
 00022:01 and I didn't understand the context for the
 02 documents so I wanted to understand a little
 03 bit more in case it was something that came
 04 up.

05 Q. And it was -- it was a wellbore
 06 modeling document, you said?

07 A. It was a document that talked
 08 about modeling flows from the well into the --
 09 the wellbore and then to the BOP. And I had
 10 understanding of -- or I knew that I was

11 looking at the BOP but I had not been looking
12 at anything below the BOP.

Page 24:10 to 24:12

00024:10 Q. How long have you worked at BP?
11 A. I'm coming up on 28 years with the
12 company.

Page 25:24 to 26:08

00025:24 Q. Okay. And so you're working as
25 a -- as chemical engineer for eight years and
00026:01 then what did you do next?
02 A. I spent -- excuse me. I spent a
03 short period of time working on field trials
04 of a multiphase flowmeter at one of our
05 onshore oil production facilities at Wytch
06 Farm in Dorset. And at the end of that, a
07 temporary assignment, I then moved on to my
08 next substantive role.

Page 28:11 to 29:25

00028:11 Q. Okay. So let's turn to after --
12 we talked about, sort of about eight years
13 working in those two -- those two projects.
14 What did you do after that?
15 A. I then joined the engineering team
16 in refining, responsible for hydrotreating and
17 hydrocracking processes. Initially I was a --
18 I started on modeling of those processes and
19 moved on to support engineer and design
20 engineer in support of a number of refineries.
21 Q. And how long did you do that job?
22 A. I -- I worked in that team on
23 various aspects of -- of those roles all the
24 way through until 2000.
25 Q. Okay. And what -- what was your
00029:01 position starting in 2000?
02 A. In 2000 BP changed the way in
03 which it supported its refineries and
04 outsourced much of that to a company called
05 UOP in Chicago. The majority of people
06 working within refining support then moved to
07 UOP -- or employees of UOP. I was transferred
08 to Chicago as a BP employee to help the
09 transition of the technologies and support
10 services across to UOP.
11 Q. And, roughly, how long was that?
12 A. I spent approximately 11 months in
13 the UOP office as part of that process.
14 Q. And then what position did you

15 take?

16 A. I then moved to the new technology
17 group within refining and was based in
18 Naperville in -- outside Chicago for
19 approximately two years.

20 Q. What does the new technology group
21 do, or what did it do at the time you were
22 working in it?

23 A. Its response -- responsibility was
24 to look for new and emerging technologies that
25 supported refinery and downstream operations.

Page 30:07 to 30:12

00030:07 Q. Where did you go after that?

08 A. In 2003 I returned to the UK. I
09 remained part of the new technology group and
10 the -- the return to the UK was the end of
11 a -- a nominal three-year assignment in
12 Chicago.

Page 30:17 to 31:15

00030:17 Q. And how long were you working on
18 that?

19 A. I continued in -- in that role all
20 the way through to 2009 and -- and worked on a
21 number of different projects.

22 Q. What are some of the projects you
23 worked on in that time?

24 A. I worked on a -- another treatment
25 process for producing low sulphur diesel. And
00031:01 then I took over the leadership of a team that
02 was looking at corrosion following and
03 inspection technologies for refinery
04 equipment.

05 Q. And after 2009, what did you do?

06 A. I -- I had an opportunity to
07 either move back to Chicago on a permanent
08 basis or to join the upstream technology group
09 which was called IRF. And I elected to join
10 the upstream.

11 Q. What do you mean by upstream
12 technology?

13 A. Working for production,
14 development of oil resources as opposed to
15 refining finished products.

Page 31:21 to 33:22

00031:21 Q. Okay. And how long have you been
22 in that -- or how long were you in that job?

23 A. At the -- the upstream?

24 Q. Yeah.
25 A. I -- I joined the IRF team
00032:01 beginning of September 2009 and I have
02 remained in that team under a number of roles
03 since.
04 Q. So what was your job title at the
05 time of the DEEPWATER HORIZON incident?
06 A. I was the theme leader for
07 inspection and diagnostics.
08 Q. What does it mean to be a theme
09 leader?
10 A. The program was split into four
11 things which were four major topic areas and I
12 had responsibility for developing the strategy
13 and implementation plan for the new
14 technologies that we'd like to put into the
15 field.
16 Q. And you're talking about new
17 technologies specifically in the area of
18 inspection and diagnostics?
19 A. Yes.
20 Q. What -- what are some of the
21 issues that -- that you've worked on in that
22 field?
23 A. On the inspection side it's
24 looking at new methodologies or new techniques
25 for doing external inspection, to look for
00033:01 metal or -- or equipment degradation. In the
02 diagnostic field it was looking at online
03 continuous monitoring of rotating equipment
04 such as pumps and compressors.
05 Q. And -- so you said at the time of
06 the incident you were the theme leader. Has
07 that title changed?
08 A. It -- it has changed, yes.
09 Q. Okay. What's your title now?
10 A. I'm director of inherently
11 reliable facilities. Was responsible for
12 materials and inspection.
13 Q. And what does BP mean by
14 inherently reliable facilities?
15 A. It was a -- it was a name of a --
16 a program. The -- the program has four key
17 things. Corrosion, inspection, materials
18 selection and performance and production
19 chemistry.
20 Q. Is this a promotion from your
21 earlier job as theme leader?
22 A. Yes, it was.

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00034:19 Q. And you mentioned that so now
20 you're director specifically for materials and
21 inspection. What's the scope of those? What

22 are you looking at as that job?
23 A. On the inspection side it is
24 developing inspection techniques,
25 methodologies and new technologies to
00035:01 understand potential condition or degradation
02 of structures. And material selection
03 performance is understanding what governs the
04 selection of appropriate materials for use in
05 our developments.

Page 35:14 to 35:22

00035:14 Q. Okay. Tell me your educational
15 background.
16 A. I have a bachelor honours degree
17 in chemistry and Ph.D. in biochemical reactor
18 design under the chemical engineering
19 department.
20 Q. And where did you earn those
21 degrees?
22 A. Paisley, in Scotland.

Page 36:17 to 37:09

00036:17 Q. When did you personally start
18 working on the DEEPWATER HORIZON incident?
19 A. My recollection is it was Monday
20 the 3rd of May 2010.
21 Q. And who asked you or told you that
22 you were going to start working on DEEPWATER?
23 A. I got a phone call from my boss at
24 the time, Simon Webster, who had been
25 approached by the Unified Command team to put
00037:01 together an inspection program in support of
02 that -- of the incident. We had two calls on
03 that day. Simon had one with me and then we
04 had one with the wider group that were done
05 with to me.
06 Q. When you say the Unified Command,
07 is that the group that comprised BP and the
08 Coast Guard and other folks?
09 A. Yes, it is.

Page 37:16 to 38:11

00037:16 Q. Gotcha.
17 And so after the -- after the
18 phone calls that you had on May 3rd, what --
19 what was your task as far as the DEEPWATER
20 incident?
21 A. The initial task was to look to
22 see if we can identify inspection techniques
23 or methods that could be used on either the

24 riser or the BOP at that point with no
25 specific target in mind.
00038:01 Q. When you say no specific target,
02 you mean no specific technology in mind?
03 A. No specific question to be
04 answered.
05 Q. Okay.
06 A. The request was what technologies
07 could be put in the field on short notice.
08 Q. And was that the request that you
09 got from Unified Command?
10 A. That's the request that was
11 relayed to me from -- by Simon Webster.

Page 38:17 to 38:19

00038:17 Q. Why was there interest
18 particularly in the riser and the BOP at that
19 time?

Page 38:21 to 40:08

00038:21 A. At that point I can't really
22 answer that. I -- you know, I was given a
23 task to do. I wasn't a member of the incident
24 team. I -- I didn't directly report in to --
25 in to the incident team. We had a call with
00039:01 the liaison member of that team.
02 Q. Okay. When you say the incident
03 team, who do you mean?
04 A. I mean the Unified Command.
05 Q. Okay. Did you later have an
06 understanding of why there was an emphasis for
07 this initial task on the BOP and the riser?
08 A. Over the -- the coming days I
09 would have a nightly call with the liaison
10 individual on the team and the -- it then
11 became apparent, some of the -- the issues
12 that they were looking for us to investigate.
13 Q. Okay. Who is the liaison
14 individual?
15 A. It was Mr. Graham Openshaw.
16 Q. And can you spell the last name
17 for us?
18 A. O-p-e-n-s-h-a-w.
19 Q. Okay. And what did you learn over
20 those calls about what the issues were that
21 were -- that folks were interested in
22 investigating?
23 A. Initially the appearance of holes
24 in the riser that led to some question of
25 previous assumptions. And the team had now
00040:01 developed a number of potential intervention
02 options. And the selection of the appropriate

03 option required some additional information
04 and we were requested to -- to see if we could
05 determine the answers to those questions.
06 Q. Okay. So the purpose of your work
07 was to sort of provide supporting information
08 in deciding which intervention options to try?

Page 40:10 to 41:06

00040:10 A. The -- the specific response of
11 request was for us to answer specific
12 questions as they were brought to us. There
13 was no particular discussion with us and the
14 incident team as to the nature of -- of -- of
15 the reason behind the question. It was just a
16 bare question, can you answer this.
17 Q. Okay. That's fair.
18 But as to your understanding,
19 it was to support decisions on interventions?
20 A. Yes, it was.
21 Q. Okay. Did your -- we'll talk in
22 more detail about the particular analyses that
23 you did and other people at BP did -- but did
24 your role with the -- with the response change
25 over time?
00041:01 A. I -- I think the -- the only
02 change that I -- I can recollect, really, was
03 forced recovery of the riser, where now it was
04 largely inspection of the riser to understand
05 what was -- what the condition was and what --
06 what that then might tell us about the BOP.

Page 41:12 to 42:06

00041:12 Q. I guess I'm being deliberately
13 general but, you know, can you think of other
14 sort of major tasks that you were -- you were
15 given in your -- in your work on the response?
16 A. The -- the -- the key thrust of
17 what I was doing remained the same, which was
18 there were specific questions around the
19 subject matter at the time before recovery of
20 the riser with specific questions about what
21 techniques we could apply to get answers.
22 Post-recovery of the riser is could I provide
23 specific answers to questions about the riser
24 and what might be in the BOP. I remained at
25 that time largely outside of the incident team
00042:01 in terms of discussing options. It was
02 providing information.
03 Q. Okay. Did you have any experience
04 in deepwater drilling before working on the
05 DEEPWATER HORIZON incident?
06 A. I do not. Did not.

Page 42:10 to 42:23

00042:10 Q. Yes. Sorry. That's a weird
11 question.
12 You said you started on
13 May 3rd. When did your involvement end, if
14 it's ended?
15 A. The -- the involvement in the
16 incident team effectively ended when the --
17 the well was capped.
18 Q. Okay. And that's mid-July?
19 A. That's mid-July.
20 Q. Okay. And you said that's for the
21 involvement with the incident team. Is there
22 any further work you've done related to the
23 DEEPWATER HORIZON?

Page 43:03 to 43:24

00043:03 A. I -- I got in -- I got asked to
04 assist with a response to the government flow
05 estimate document.
06 Q. When you say the government flow
07 estimate document, what do you mean by that?
08 A. I can't remember the name of the
09 document but there was a -- there was a -- a
10 document produced by, I think, the government
11 side on potential flow from Macondo well.
12 Q. Okay. And to narrow it down, are
13 we talking -- did this come out from the
14 government like in late July, early August, or
15 was it later than that?
16 A. I -- I honestly can't remember
17 when this document was put out.
18 Q. Okay. What time period did you
19 work on the response?
20 A. From -- from September, I think,
21 about that time.
22 Q. Until when? I'm sorry.
23 A. Until the end of 2011. It may
24 have been a little earlier.

Page 44:04 to 44:17

00044:04 Q. Okay. Specifically, what work did
05 you do on that response?
06 MR. COLLIER: Objection.
07 Objection, calls for privileged information.
08 I would instruct the witness not to answer.
09 MR. BENSON: Okay. Just so I'm
10 clear, the work that he did in responding to a
11 U.S. Government estimate of flow from roughly

12 September until the end of 2007, it's BP's
13 contention that that's part of a privileged
14 work stream?
15 MR. COLLIER: Correct.
16 MR. BENSON: Okay. I said 2007.
17 I should have said 2011. Thank you.

Page 47:18 to 48:05

00047:18 Q. Okay. Where were you physically
19 during the response?
20 A. The majority of -- of the time I
21 was in Sunbury, in the UK.
22 Q. Any other places you went?
23 A. I occasionally visited Houston, as
24 a number of my team members lived and worked
25 in Houston. So there were occasions where I
00048:01 came across to support them.
02 Q. Okay. Anywhere else you went for
03 the purposes of the incident response team?
04 A. Not for the purposes of the
05 incident response.

Page 48:13 to 48:13

00048:13 (Exhibit Number 9501 marked.)

Page 49:13 to 50:08

00049:13 Q. And who is Danny Keck?
14 A. Danny Keck is -- is and was a
15 member of my team.
16 Q. Okay. And what's his specialty?
17 A. He's an inspection engineer.
18 Q. Do you know specifically what he
19 was doing during the DEEPWATER response?
20 A. He was working on a number of the
21 potential inspection techniques that we were
22 trying to develop as -- as part of the
23 response. And in particular, I'd asked him to
24 lead the effort on radiography.
25 Q. Okay. And was that part of -- I
00050:01 guess, was radiography part of his regular
02 job?
03 A. Mr. Keck is a registered Level 3
04 radiographer.
05 Q. Even before the response, that was
06 something he was experienced in?
07 A. He -- he was well experienced in
08 radiography.

Page 51:13 to 51:13

00051:13 (Exhibit Number 9502 marked.)

Page 52:25 to 53:20

00052:25 In -- in your work on the
00053:01 response, who is your supervisor? Who -- who
02 do you report to, if anyone?
03 A. My immediate supervisor from a
04 line manager point of view was Simon Webster.
05 Within the response team at this point I was
06 still liaising with Graham Openshaw, who was
07 the -- the -- the focal point for any
08 communications that I had with the command
09 team.
10 Q. Okay. And what was Graham
11 Openshaw's role with the company, if you know?
12 A. My -- I -- I -- at the time, I did
13 not know. It --- it was a name given to me
14 and so I -- I answered to. I subsequently
15 found out that Mr. Openshaw was a contractor.
16 Q. Okay. And what was his specialty,
17 if you know?
18 A. Mr. Openshaw's background has been
19 in subsea intervention, particularly in ROV
20 technologies.

Page 54:01 to 58:08

00054:01 Q. Okay. Can you walk me through
02 what some of the -- the tools were that you
03 used -- or that BP used in the response as far
04 as investigating the riser and the BOP?
05 A. I can take you through the tools
06 that I was involved in investigating or trying
07 to mobilize.
08 Q. Sure.
09 A. First and foremost, radiography of
10 the riser, BOP. We also looked directly at
11 ultrasonic measurement to determine wall
12 thickness and round positions. Acoustic
13 emission and videography of both the BOP, the
14 riser and potentially the plumes.
15 Q. Anything else you can think of?
16 A. Not specifically at this point.
17 Q. Can you describe what radiography
18 is?
19 A. Radiography is imaging of an
20 object that utilizes a source of light. In
21 this case, that light could be gamma light or
22 x-ray light, and a suitable detector for that
23 light. So in context of this, it's the
24 equivalent of taking an x-ray.
25 Q. Okay. I was going to ask, you
00055:01 know, what's the sort of layman's version of

02 that. Okay. That's perfect.
03 What's the difference between
04 ultrasonic and acoustic analysis?
05 A. In my understanding of those
06 terms?
07 Q. Uh-huh.
08 A. Ultrasonic means the application
09 of a high -- high frequency sound wave to
10 investigate. My definition of acoustic is a
11 passive listening for sound of -- across a
12 broad range of sound.
13 Q. I see. Okay.
14 And then you also mentioned
15 videography.
16 What was the videography that
17 was done?
18 A. There was a number of pieces of
19 videography done and considered. Looking at
20 the plumes, looking at the riser to determine
21 size and dimensions, looking at the kinked
22 riser, looking at the end of the termination
23 of the riser and the drill strings some way
24 downstream and also the -- the potential use
25 of videography for looking at flow from the
00056:01 plumes.
02 Q. And who did that work for BP? Was
03 it in-house or it was contracted out?
04 A. Which specific piece of --
05 Q. I'm sorry. The videography.
06 A. The -- the videography that I'm
07 aware that was done, I think most of --
08 originally, most of the videos that were taken
09 and used were -- were done by the various
10 ships in the -- the region, so whoever had the
11 ROV in the water. But there was a specific
12 piece of analysis using Welaptega.
13 Q. So was the Welaptega work -- I'm
14 sorry. Can you -- can you spell that for us?
15 A. W-e-l-a-p-t-e-g-a --
16 Q. Thank you.
17 A. -- I think.
18 Q. Yeah.
19 The Welaptega work was
20 videography rather than radiography?
21 A. It -- it was visual technology.
22 Q. Okay.
23 A. Visual light.
24 Q. Okay. Who did radiography work,
25 if anyone, in the BP response -- or in the
00057:01 incident response?
02 A. There were -- I guess there
03 were -- there were two pieces of -- of work
04 that would come under radiographic technique.
05 One was called gamma scan and that was done by
06 a company called Tracerco.

07 Q. And can you spell that for us?
 08 A. T-r-a-c-e-r-c-o.
 09 Q. Thank you.
 10 A. And the second piece was a word
 11 called gamma ray imaging, which was closer to
 12 x-ray imaging. And that was done in-house by
 13 BP, or led by BP. But we had support from Los
 14 Alamos National Laboratory and GE.
 15 Q. Who is the lead person for BP on
 16 the gamma ray imaging?
 17 A. Danny Keck.
 18 Q. Okay. You also mentioned
 19 ultrasonic measurement.
 20 Who -- who did that work,
 21 primarily?
 22 A. The lead for the ultrasound was a
 23 gentleman called Johnny Nyholt.
 24 Q. Okay. And can you spell Nyholt
 25 for us?
 00058:01 A. N-y-h-o-l-t.
 02 Q. Okay.
 03 A. And he was mobilizing and working
 04 with a company called Sonomatic.
 05 Q. I'm going to have to ask you to
 06 spell that.
 07 A. S-o-n-o-m-a-t-i-c. I think it's
 08 Sono, not Sona, but I may be --

Page 58:12 to 59:01

00058:12 And you mentioned the
 13 acoustic emissions.
 14 Who did that work?
 15 A. There were two pieces of acoustic
 16 emissions being considered. One had already
 17 been sourced by Graham Openshaw.
 18 Q. Okay.
 19 A. It was locally called rocket
 20 science. I don't know from whom that service
 21 was obtained but it was put into operation.
 22 Q. Okay.
 23 A. The second piece of acoustic
 24 testing, acoustic emission that we tried to
 25 mobilize was with a company called Physical
 00059:01 Acoustics.

Page 59:18 to 61:14

00059:18 Q. Okay. Thank you, Mr. Knox. I
 19 want to talk about a few of the people who
 20 you -- I think you worked with during the
 21 response and just get a sense of what their
 22 roles were. We already talked about Mr. Keck.
 23 Can you describe what

24 Mr. John Martin did during the response?
 25 A. I believe Mr. Martin provided some
 00060:01 erosion calculations to a number of
 02 individuals on the team.
 03 Q. And is that -- is erosion part of
 04 Mr. Martin's sort of regular work at BP?
 05 A. Yes, it is.
 06 Q. Do you know what his title is, or
 07 what his position is?
 08 A. From memory, I think it is advisor
 09 for materials selection and performance.
 10 Q. Let's see. How about Mr. Julian
 11 Austin, what -- what was he working on during
 12 the response?
 13 A. I believe he was working on
 14 mechanical aspects of the BOP and the riser.
 15 Q. And what's his role in the
 16 company?
 17 A. Do you mean today?
 18 Q. I guess, at the time.
 19 A. He was a mechanical engineer. I
 20 don't know his job title at the time.
 21 Q. Okay. What does he do now?
 22 A. I believe he is a segment engineer
 23 in technical authority. In fact, no, he
 24 may -- may now be chief engineer for
 25 mechanical.
 00061:01 Q. And what does it mean to be chief
 02 engineer for mechanical?
 03 A. It's a -- a level of
 04 responsibility for a discipline leader. A
 05 discipline leader.
 06 Q. So is that for the -- for the
 07 entire company for all mechanical engineering?
 08 A. No, that -- that's for the
 09 upstream side of the business.
 10 Q. Okay. All right. And we -- I
 11 think we talked before, upstream means sort of
 12 production -- I'm sorry -- exploration and?
 13 A. Exploration and production.
 14 Q. And production. Okay.

Page 65:09 to 65:25

00065:09 Q. Okay. And you -- this is an easy
 10 question, I think: You were a BP employee
 11 during the time of the response?
 12 A. I was.
 13 Q. Okay. So other work you were
 14 doing was on -- as part of your BP employment?
 15 A. It was -- it was part of
 16 participating in the response team.
 17 Q. Okay. Which you did on behalf of
 18 BP?
 19 A. I took it as on behalf of the

20 response team. The request was coming from
21 the response team.
22 Q. And the request was coming from
23 your boss at the time, right?
24 A. No. The request was coming
25 directly from the response team.

Page 68:21 to 68:23

00068:21 corner. Okay. If we could mark that as
22 exhibit 9503.
23 (Exhibit Number 9503 marked.)

Page 69:01 to 69:25

00069:01 Q. Mr. Knox, you've had a minute to
02 review this document; is that right?
03 A. That's right.
04 Q. Do you recognize this e-mail?
05 A. I do.
06 Q. Okay. And it's a chain that you
07 were included on from May of 2010?
08 A. That's correct.
09 Q. Okay. And it starts out with a
10 discussion of possible intervention leading up
11 to the top kill. Is that a fair summary?
12 A. That is.
13 Q. Okay. And there's an e-mail from
14 you on the third page of the exhibit to a
15 number of government scientists.
16 Do you see that?
17 A. I see that, yes.
18 Q. And it says the junk shot is no
19 longer on the flow sheet. It is not an option
20 under consideration.
21 A. That's correct.
22 Q. Is that correct?
23 A. Yeah.
24 Q. Okay. And was that your
25 understanding at the time?

Page 70:03 to 70:18

00070:03 A. My understanding at the time was
04 that for the immediate future, meaning the
05 next session of intervention, the junk shot
06 was not being considered and there would be a
07 clear -- there was a clear decision process
08 laid out as to when junk shot or any other
09 intervention would be considered.
10 Q. Okay. And you were responding to
11 an e-mail from Ray Merewether. Do you know
12 who Mr. Merewether is?

13 A. Mr. Merewether who -- was someone
 14 who was on a distribution list that was given
 15 to me to liaise with on another topic. I
 16 didn't question who he was. He was just
 17 someone who was part of the discussion group I
 18 was given to -- to work with.

Page 71:15 to 71:18

00071:15 Q. Okay. And with this particular
 16 e-mail, it looks like there was some flow back
 17 from Jamie Roberts. Do you know who Jamie
 18 Roberts is?

Page 71:21 to 71:25

00071:21 A. I became aware of who Mr. Roberts
 22 was.
 23 Q. Okay. And who is Mr. Roberts?
 24 A. I believe he was executive
 25 assistant to Kent -- Mr. Kent Wells.

Page 72:10 to 73:05

00072:10 Q. Now, what -- so Mr. Roberts writes
 11 to you and says, I was forwarded this stream
 12 of e-mails below. I just wanted you to be
 13 aware that the U.S. Department of Energy
 14 Secretary Chu is on that e-mail chain.
 15 Do you see that?
 16 A. I do.
 17 Q. Okay. And had you known before
 18 Mr. Roberts informed you that Secretary Chu
 19 was on the e-mail chain?
 20 A. I did not.
 21 Q. Okay. And then he -- Mr. Roberts
 22 says, there's a chance that he may take your
 23 comment out of context.
 24 And I take it that
 25 Mr. Roberts's concern is that Secretary Chu
 00073:01 and others might think that the junk shot is
 02 no longer on the table when there were some --
 03 there were still some scenario by which it
 04 might be used. Is that -- is that the essence
 05 of Mr. Roberts's concern?

Page 73:07 to 75:11

00073:07 A. I'm -- I'm sorry. I -- I don't
 08 know what Mr. Roberts's concern was.
 09 Q. Okay.
 10 A. He did call me and did send me
 11 this e-mail.

12 Q. I guess, what's your understanding
13 of what Mr. Roberts's concern was based on the
14 conversation in the e-mail?

15 A. Mr. Roberts had seen my e-mail.
16 He'd called me that evening to understand what
17 I meant by the e-mail and did inform me that
18 it had gone to Secretary Chu and that
19 Secretary Chu and Mr. Tony Hayward had
20 discussed it.

21 Q. Okay. Did he say anything else?

22 A. He asked me for the context behind
23 the e-mail, what I meant by it. I responded
24 and that was it.

25 Q. Okay. And then you send an e-mail
00074:01 back to him and this is the first page of the
02 exhibit where you say -- and I'm sorry, it
03 continues on to the second page.

04 A. Uh-huh.

05 Q. And there you say, I would greatly
06 appreciate guidance on these matters as I am
07 not wholly comfortable with the position.

08 What did you mean by that?

09 A. So my response to -- to
10 Mr. Roberts was in response to his call and
11 previous e-mail to say what was the context of
12 my e-mail. The context was that there had
13 been a daily briefing, which I believe
14 everyone was a party to, that outlined the
15 decision process for the immediate 24 hours,
16 the immediate intervention which was going to
17 be a top kill rather than the so-called junk
18 shot and that the junk shot would be something
19 that would be considered but only after
20 obtaining agreement from all parties concerned
21 as part of Unified Command.

22 I had already appreciated by
23 this time that the e-mail I sent out may be
24 misconstrued. I had, as soon as I got home,
25 immediately informed my supervisor just to let
00075:01 him know that I had sent the e-mail and its
02 content. And -- and within about an hour of
03 that I got the call from Mr. Roberts.

04 Q. Okay. When you said you informed
05 your supervisor of that, is that Mr. Webster?

06 A. That's correct.

07 Q. Okay. And I guess he was still
08 your supervisor during the work you did on the
09 response?

10 A. He was still my line manager for
11 my day job at BP.

Page 75:21 to 77:18

00075:21 Q. You mentioned working with
22 Mr. Merewether with the respect to the Woods

23 Hole incident. I'm sorry. Woods Hole
24 Oceanographic Institute.
25 A. Uh-huh.
00076:01 Q. What was the work you were
02 involved in there?
03 A. My understanding is that Woods
04 Hole had a potential technology that they had
05 put forward. And as I was responsible for
06 looking at a number of other interventions and
07 trying to mobilize interventions, I was asked
08 to assist in communications with Woods Hole.
09 In the first instance, assisting, and soon
10 afterwards I -- I held that liaison.
11 Q. Did Woods Hole get into the field
12 and do any work for BP?
13 A. I don't believe they did.
14 Q. Okay. And why not?
15 A. At the time I was mobilizing with
16 Woods Hole, the feedback from the incident
17 team was that there would be an opportunity to
18 put a number of technologies in the field and
19 one of those was Woods Hole technology.
20 Q. And why wasn't there an
21 opportunity to put them in the field?
22 A. My understanding was that we were
23 now severely limited on ROV time as there was
24 SIMOPS going on at the same time largely
25 around the Cofferdam deployment and the
00077:01 majority of the boats and ROVs had been
02 reassigned to the Cofferdam intervention.
03 Q. Were you involved in communicating
04 that to Woods Hole?
05 A. Yes, I was. I was the prime
06 communicator.
07 Q. And who did -- who did you talk to
08 at Woods Hole?
09 A. My main contact at Woods Hole was
10 Mr. Andy Bowen. There were a number of people
11 involved in the meetings so I can't -- I can't
12 recall. That did change, who was on line at
13 the time.
14 Q. Did you have any involvement in
15 evaluating a flowmeter to be put under sea and
16 measure the flow coming out?
17 A. I don't recollect any conversation
18 about a subsea flowmeter.

Page 78:05 to 80:01

00078:05 Q. I want to turn generally to some
06 of the topics that you've been designated for
07 today. Can you sort of give me an overview of
08 what BP did to analyze erosion and
09 obstructions in the -- in the wellbore, in the
10 BOP and the riser during the response?

11 A. During the response I can really
 12 only give you an overview of those items that
 13 I was directly involved in.

14 Q. Okay.

15 A. The -- initially, the -- the
 16 instigation of my involvement came immediately
 17 after the holes appeared in the riser and so
 18 there was some communication between myself
 19 and John Martin and Jeff Evans to look at
 20 trying to understand how they appeared. There
 21 was work with Danny Keck and John Nyholt,
 22 which we have already touched upon, about
 23 trying to understand the current condition of
 24 the kinked riser.

25 And there were ongoing
 00079:01 discussions with Mr. Graham Openshaw about
 02 what techniques might be deployed to either
 03 understand what may or may not be going on
 04 inside the BOP and also to visualize the
 05 position of some of the locking rams of the
 06 locking devices on the BOP rams.

07 Q. And when you talk about the
 08 techniques, are those the techniques that we
 09 spoke about earlier?

10 A. Yes, they are.

11 Q. Okay. Are there any other
 12 techniques you can think of other than what
 13 we've spoken about so far that BP investigated
 14 to get at the condition of the BOP or the
 15 riser?

16 A. I don't recollect any.

17 Q. Okay. And I think you said you
 18 could only talk about your personal
 19 involvement. Do you have any knowledge or
 20 have you done any preparation on what analyses
 21 BP did relating to erosion or obstructions
 22 outside your personal knowledge?

23 A. As part of the preparation with
 24 counsel I have reviewed a number of documents
 25 and where required I sought additional contact
 00080:01 from the individuals I named earlier.

Page 80:04 to 82:18

00080:04 Do you recognize this
 05 document?

06 A. I do.

07 Q. Okay. And I'll just say for the
 08 record this is ending Bates Number 7434574 and
 09 if we could mark it as exhibit 9504.

10 (Exhibit Number 9504 marked.)

11 Q. And is this -- I'm going to
 12 concentrate on the e-mail from you on May 4th,
 13 2010, to Phil Cole and a number of other folks
 14 on the front page. Mr. Knox, is this -- is

15 this related to the Physical Acoustics work
16 that you mentioned earlier?
17 A. Yes, it is.
18 Q. Okay. And I noticed some of
19 the -- there is a reference to a MISTRAS,
20 m-i-s-t-r-a-s, Group. Is that the same entity
21 as Physical Acoustics?
22 A. My understanding is that it is
23 part of the same organization.
24 Q. Okay. And can you describe in
25 general what -- what your e-mail -- or what
00081:01 stage of the process you were at with Physical
02 Acoustics at this time?
03 A. We'd had a number of discussions
04 both internally and with Physical Acoustics
05 about the usefulness or otherwise of that
06 technique. We had taken a view on what that
07 might be. And we were now at the stage of
08 trying to mobilize Physical Acoustics and
09 their equipment into Louisiana, pending going
10 offshore to make measurements.
11 Q. And did Physical Acoustics
12 actually get out in the field and make
13 measurements?
14 A. No, they didn't.
15 Q. Okay. And what happened?
16 A. Again, all of this was at the same
17 time as the deployment of the Cofferdam. We
18 had arranged four -- or were in the process of
19 mobilizing four techniques to go offshore and
20 we were only allocated sufficient time to
21 deploy one.
22 Q. And when you say sufficient time,
23 do you mean boat time?
24 A. Boat time and ROV time.
25 Q. Okay. What -- what method
00082:01 actually got offshore?
02 A. The subsea digital radiography
03 imaging.
04 Q. Okay. And that's the Welaptega?
05 A. No. That's --
06 Q. Okay.
07 A. That's the Danny Keck x-ray
08 technology with Los Alamos.
09 Q. Okay. Looking at your first
10 paragraph here on page 1, halfway through your
11 paragraph you say, please be aware that our
12 need for speed is great. We have asked to be
13 in the field within 48 hours.
14 Do you see that?
15 A. Yes, I do.
16 Q. Okay. Why were you -- why were
17 you trying to get in the field within
18 48 hours?

Page 82:20 to 83:14

00082:20 A. We were aware of a lot of activity
21 going on and we were given short windows of
22 opportunity. And I was aware that those
23 windows of opportunity could disappear so I
24 tried to get as much into the field as quickly
25 as possible. More importantly, have it by the
00083:01 quayside should it be needed.
02 Q. Okay. And when you're talking
03 about windows of opportunity, is it at -- is
04 that to get on the boats and the ROVs or --
05 A. That -- that is correct.
06 Q. Okay. Looking at your second
07 paragraph you say, the middle of the first
08 sentence is, we are particularly interested in
09 finding any flow restriction between the
10 bottom of the BOP and the riser at the top.
11 Do you see that?
12 A. Yes, I do.
13 Q. Okay. And that was BP's interest
14 at the time?

Page 83:16 to 83:21

00083:16 A. That was one of many interests --
17 Q. Okay.
18 A. -- at the time.
19 Q. Fair enough. And why was that the
20 focus of the work that you were interested in
21 Physical Acoustics doing?

Page 83:23 to 84:17

00083:23 A. We were looking at everything from
24 wellhead all the way down. I was assessing a
25 number of technologies and many of the
00084:01 technologies had absolutely no chance of
02 telling us anything about the BOP and this was
03 one that had an outside chance of doing that
04 and so I was particularly interested.
05 Q. Okay. Why would the other
06 technologies or some of the other technologies
07 not have a chance of telling you anything
08 about the BOP?
09 A. The -- the prime barrier was the
10 thickness of steel of the BOP mechanism and --
11 and through to the main annulus. None of the
12 other techniques were capable of penetrating
13 or getting information that far into a heavy
14 steel body.
15 Q. So Physical Acoustics is the only
16 thing that could get information from the
17 inside of the BOP?

Page 84:20 to 85:12

00084:20 A. I -- of the techniques that I was
21 aware of and working on of -- the acoustic
22 emission was the only one that had any
23 potential, in my view.
24 Q. Okay. And -- and in your
25 preparation for this deposition, are there any
00085:01 other techniques that you're aware of that BP
02 considered that would have been able to get
03 information on the inside of the BOP?
04 A. I'm aware of no technique beyond
05 those that we used and were available at the
06 time.
07 Q. And going back to your e-mail here
08 it says, we are particularly interested in
09 finding any flow restriction between the
10 bottom of the BOP and the riser at the top.
11 Why was the company
12 interested in finding flow restrictions?

Page 85:14 to 86:10

00085:14 A. The -- my understanding of what
15 Unified Command were planning was a series of
16 potential interventions in order to close the
17 well. Each of those interventions had
18 potential to change the system to operate on
19 and there was a major -- there was a concern
20 over doing them more harm. And so before
21 intervening, Unified Command wanted to know as
22 much information as possible about the
23 condition at the point of intervention.
24 Q. And you talk in that sentence
25 about focusing on the bottom of the BOP --
00086:01 from the bottom of the BOP to the riser at the
02 top. And is that because that's where at
03 least some of the interventions would be
04 located or would be -- I'm going to start that
05 question over.
06 The focus on the area from
07 the bottom of the BOP to the top of the riser,
08 was that because the interventions that were
09 on the table might affect flow from those
10 areas?

Page 86:12 to 86:22

00086:12 A. At -- at this point I was given a
13 task to complete. I knew that there were a
14 number of interventions being considered. I
15 was not party to those interventions and --

16 and didn't know necessarily the reason I was
 17 being asked the question. I was asked the
 18 question and I sought to answer it.
 19 Q. Okay. Based on what you know now
 20 and on behalf of the company, what's your
 21 understanding of why there was a focus on the
 22 BOP and the riser?

Page 86:24 to 87:11

00086:24 A. My understanding is that from the
 25 wellhead downstream all the way to the end of
 00087:01 the riser there were potential choke points in
 02 the system. Each of these choke points had
 03 the potential to restrict flow and
 04 intervention at the choke point and removing
 05 that choke point could lead to an increase in
 06 flow. And the incident team wanted to be
 07 aware of potential consequences should they
 08 make a decision on intervention.
 09 Q. And you refer to potential choke
 10 points. What are the potential choke points
 11 that BP was aware of?

Page 87:13 to 89:09

00087:13 A. The -- the choke points that the
 14 Unified Command identified for me were all of
 15 the BOP rams in the system, the drill string
 16 that was present at the end of the riser and
 17 the kinked riser.
 18 Q. Were there any other potential
 19 choke points that BP evaluated during the
 20 response?
 21 A. Those are the ones that I've been
 22 exposed to in terms of working on the BOP and
 23 riser.
 24 Q. Okay. And also in terms of your
 25 preparation as the 30(b)(6) deponent, are you
 00088:01 aware of any other choke points?
 02 A. I'm aware that some individuals
 03 looked at the wellbore and the well itself but
 04 that's beyond my knowledge.
 05 Q. Okay. And what conclusions, if
 06 any, did BP reach about the -- the three choke
 07 points that you just noted, the BOP rams, the
 08 drill string at the end of the riser and the
 09 kinked riser?
 10 A. At the time I wasn't aware, I
 11 wasn't made aware of any of the assumptions
 12 or -- or conclusions made by the Unified
 13 Command team. I was merely inputting
 14 information.
 15 Q. So your task at the time was to

16 get whatever information you could about what
17 was going on at those points and you passed
18 that information on?

19 A. My task at the time was to provide
20 information, if I could, on specific tasks
21 given almost on a daily basis.

22 Q. And with respect to the choke
23 points, you were looking to find out whatever
24 information you could about what was going on
25 inside those closed pipe systems?

00089:01 A. At the time I was not tasked with
02 looking at what was going on inside. I was
03 tasked with looking for evidence that someone
04 else could do analysis on and determine what
05 was going on inside.

06 Q. And as -- as BP's witness today,
07 what -- what is the company's understanding of
08 what those analyses showed on those three
09 potential choke points?

Page 89:12 to 89:14

00089:12 A. Much of the understanding that I
13 have came about from a privileged work
14 process.

Page 89:22 to 89:25

00089:22 Q. Approximately there. Okay. So
23 putting that aside, what conclusions did BP
24 reach about those three chokes that you
25 mentioned?

Page 90:06 to 91:21

00090:06 A. The primary source of information
07 that I had for that was the subsequent
08 analysis of the recovered riser and the BOP
09 and the -- and the reports that came from DNV
10 as part of their investigation.

11 Q. And what -- what were BP's
12 conclusions based on those reports?

13 A. I'm -- I'm not aware of BP's
14 conclusions on that but the -- the reading of
15 the DNV report highlighted that there was
16 flow-induced damage at a number of locations.
17 The -- the variable bore rams, the casing
18 shear ram, the blind shear ram, the upper
19 annular and the kink in the riser.

20 Q. Okay. Anything else on behalf of
21 BP from those reports that's sort of evidence
22 obstructions or erosions at the choke points?

23 A. I'm not aware of erosion outside

24 of those locations that I've mentioned.
25 Q. Okay. And is there any evidence
00091:01 of the erosion other than the reports that
02 you've mentioned, the DNV report and the
03 post-recovery reports on the riser and the
04 BOP?
05 A. Only the physical evidence that
06 they present as part of their reports.
07 Q. Okay. And the DNV report is also
08 based on the recovery of the riser and the BOP
09 after the capping of the well, right?
10 A. Yes, it is.
11 Q. Okay. Do those reports tell
12 you -- tell BP anything about when erosion
13 might have occurred?
14 A. I -- I don't believe that that
15 report in itself does.
16 Q. Okay. And when you say that
17 report, you mean the DNV report?
18 A. The DNV report.
19 Q. Okay. Does BP have any evidence
20 of when erosion may have occurred in the
21 various choke points that you've identified?

Page 91:23 to 92:15

00091:23 A. The only evidence that -- that was
24 available to the incident team throughout the
25 response was the appearance of external damage
00092:01 on the kinked riser some time after collapse
02 of said riser.
03 Q. And when you say the appearance of
04 the external damage, you mean the hole that
05 appeared in the kink?
06 A. I do.
07 Q. Okay. Anything else?
08 A. As -- as evidence of erosive
09 events during the incident, those are the only
10 ones I'm aware of.
11 Q. Okay. Is -- is it fair to say
12 that the -- you can't know when the erosion
13 occurred because you're not looking at the
14 materials until after you recover them from
15 the ocean floor?

Page 92:18 to 93:18

00092:18 A. I would say that throughout all of
19 the incident, the only evidence for erosion is
20 the appearance of those holes. And anything
21 else or erosion anywhere, the extent and the
22 timing cannot be achieved other than that
23 evidence that we saw.
24 Q. And when you say that evidence

25 that we saw, you're talking about the
00093:01 appearance of the holes?
02 A. At -- at that time --
03 Q. Okay.
04 A. -- with the introduction to be the
05 appearance of holes.
06 Q. Okay. And then the only other
07 evidence is the reports or the analysis of the
08 pieces of equipment after they were recovered
09 from the floor?
10 A. The -- the -- the physical
11 recovery and physical investigation of the
12 component parts provides evidence that erosive
13 event occurred at some point.
14 Q. Right. But the physical recovery
15 and physical investigation of the component
16 parts doesn't say anything about when the
17 erosion occurred?
18 A. It doesn't.

Page 93:20 to 95:09

00093:20 Q. Okay. Can I ask you to look at
21 tab 46 in your binder.
22 And this is an e-mail with
23 the Bates number ending 5760440. Can you take
24 a look at that and let me know whether you
25 recognize it?
00094:01 A. I recognize the document.
02 Q. Okay. And this is an e-mail from
03 Graham Openshaw to yourself and some other
04 folks?
05 A. That's correct.
06 Q. Okay. And it includes your boss,
07 Simon Webster?
08 A. That's correct.
09 Q. Okay. And it's dated May 9th,
10 2010, and I want to go through a couple of
11 these points.
12 Mr. Openshaw says, we have
13 had a review of priorities this evening and
14 this is the summary of where we are.
15 Were you part of that review
16 of priorities?
17 A. No, I was not.
18 Q. Okay. Do you know what he's
19 referring to in that statement?
20 A. I -- I can't decipher to what he
21 refers to in the statement. My understanding
22 was that this was the internal review of the
23 Unified Command.
24 Q. And the subject of the e-mail is
25 diagnostics priority assessment. Is this part
00095:01 of what we were talking about earlier of
02 evaluating different diagnostic techniques and

03 deciding which were going to actually be
04 deployed?
05 A. That is correct.
06 Q. Okay. And we talked earlier,
07 Mr. Openshaw, he was the liaison for this
08 project, the diagnostics project, to Unified
09 Command; is that right?

Page 95:11 to 95:19

00095:11 A. That's my understanding, yes.
12 Q. Okay. And the first point is, he
13 says, anything we can find out about the kink
14 in the riser area is considered very
15 important.
16 Do you see that?
17 A. I do.
18 Q. What's your understanding of why
19 that's the case?

Page 95:21 to 98:12

00095:21 A. Actually, I don't know why that's
22 the case. I -- I was given that as a task and
23 so I started to prioritize and review the
24 technologies available to guide the team on
25 what is possible.
00096:01 Q. Okay. Point number two is whether
02 or not the rams are locked is useful,
03 particularly the blind rams.
04 Do you see that?
05 A. I do.
06 Q. And why was -- why was that
07 important?
08 A. Again, Mr. Openshaw, at the time,
09 didn't explain the importance of doing that.
10 He just indicated that he wanted to know the
11 position of the locking rams.
12 Q. Okay. And you don't subsequently
13 have any additional information on whether
14 that was the case?
15 A. Subsequently the position of the
16 locking bars on the rams would give an
17 indication of the position of the rams. And
18 my understanding was that if they could show
19 that the locking bar was in the locked
20 position, it would indicate that the ram had
21 been activated and should have closed.
22 Q. Let me ask you about point number
23 three. It says, there's no further interest
24 in the pressure at the bottom of the BOP as we
25 now have that data.
00097:01 Do you see that?
02 A. I do.

03 Q. Do you know what he's referring to
04 when he says we now have that data?

05 A. Subsequent to this meeting I was
06 aware that a pressure gauge had been installed
07 at the bottom of the BOP.

08 Q. Okay. And when we say the bottom,
09 do we mean the furthest upstream or toward the
10 well?

11 A. Towards the well. Between the
12 wellhead and the -- and the BOP rams.

13 Q. Okay. Thank you.

14 Were there any diagnostic
15 activities that changed because you had -- had
16 a pressure gauge at the bottom of the BOP?

17 A. Other than the changing in the
18 priorities outlined here, I'm not aware of
19 any.

20 Q. I -- I guess that's what I'm
21 getting at, is did putting -- were there
22 diagnostics activities that were designed to
23 do something that were no longer necessary
24 because you had a pressure sensor at the
25 bottom of the BOP?

00098:01 A. Part of the initial conversations
02 that I had with Mr. Openshaw on available
03 techno -- available technologies including
04 trying -- included trying to source pressure
05 gauges to provide pressures in the BOP system.
06 Mr. Openshaw had identified -- identified and
07 sourced the pressure gauge. I -- I ceased
08 trying to find that equipment.

09 Q. Okay. And why was -- why was
10 getting a pressure gauge at the bottom of the
11 BOP important to getting information about the
12 status of the BOP and the riser?

Page 98:14 to 99:05

00098:14 A. At the time it wasn't explained to
15 me why it was -- you know, these are numbers
16 we need to know. Subsequently, an
17 understanding of the pressure in this --
18 across the whole of the system would be useful
19 in trying to identify potential restrictions
20 to flow.

21 Q. Okay. And why is that?

22 A. When fluid flows across an opening
23 or an orifice, it -- it requires pressure to
24 do so. And as it flows over that orifice,
25 pressure is lost. So pressure downstream of
00099:01 an orifice is lower than pressure upstream.

02 Q. And how does the difference --
03 what does the difference in pressure between
04 two points in the -- in the flow path tell you
05 about what's going on between those points?

Page 99:07 to 99:08

00099:07 A. In and of itself, very little,
08 other than there is a restriction.

Page 99:14 to 99:16

00099:14 Q. Okay. And I take it, is it the
15 bigger the pressure difference, the bigger the
16 restriction, all else being equal?

Page 99:19 to 99:23

00099:19 A. There are a large number of
20 parameters in that that absolutely have to not
21 change for that to be close to true.
22 Q. But assuming those parameters
23 don't change, that's the rough idea?

Page 100:01 to 100:08

00100:01 A. I'd say that a -- a pressure drop
02 would indicate some form of restriction.
03 Q. Okay. And I guess I'm just trying
04 to get a sense of which way the directions go.
05 So if a pressure drop indicates some form of
06 restriction, a greater pressure drop would
07 indicate a greater restriction, if nothing
08 else had changed?

Page 100:11 to 100:25

00100:11 A. If absolutely nothing else had
12 changed, there may be a relationship.
13 Q. Okay. You say there may be. Is
14 there anything else that could change that
15 relationship?
16 A. There are a large number of
17 variables in that system, none of which I'm
18 aware of.
19 Q. Okay. And I guess -- I -- I
20 realize this is a hypothetical, but I'm asking
21 you to assume with me that none of those other
22 variables are changing. I just want to make
23 sure we're on the same page of the direction,
24 that bigger pressure drop means -- is evidence
25 of a bigger obstruction.

Page 101:02 to 101:14

00101:02 A. I would say that in general, if

03 nothing else changes, then a larger pressure
04 drop would indicate a larger obstruction to
05 flow.
06 Q. Okay. Now, number four in
07 Mr. Openshaw's e-mail -- say that as well you
08 do -- but it says, there's no further interest
09 in the pressure between the LMRP and the kink.
10 And then parens, if the sensor currently being
11 installed works.
12 Why wasn't there further
13 interest in the pressure between the LMRP and
14 the kink?

Page 101:16 to 101:19

00101:16 A. Beyond what Mr. Openshaw says
17 here, I -- I really can't answer. I wasn't
18 asked to source pressure gauges for use and
19 Mr. Openshaw says he has a sensor.

Page 102:02 to 102:10

00102:02 Q. Right. I guess -- oh, I see what
03 you're saying. So let me ask the question. I
04 was thinking that point four, the part in
05 parentheses, is referring to the sensor
06 that's talked about -- or referenced in
07 number three. But are you thinking that the
08 sensor in the parenthetical is that they're
09 actually installing another pressure gauge
10 between the LMRP and the kink?

Page 102:12 to 102:14

00102:12 A. That was not specified to me at
13 the time but that is my interpretation of that
14 statement.

Page 103:01 to 103:17

00103:01 You've discussed a few times
02 the Unified Command. Describe for me who, to
03 your knowledge, was -- who was the Unified
04 Command?
05 A. My understanding is that that
06 party was headed by Admiral Thad Allen and had
07 representatives from various government
08 bodies, support staff, BP.
09 Q. And who -- who from BP, to your
10 knowledge, was part of the Unified Command?
11 A. A number of -- I'm aware of a
12 number of people who were involved in the
13 response team, a large number of people

14 involved in the response team. In terms of
15 who was making the decisions on -- on Unified
16 Command, I'm not aware. I know that it came
17 out and was approved by Admiral Allen.

Page 105:02 to 105:13

00105:02 Q. Okay. Aside from -- are there --
03 aside from Mr. Openshaw who we're not sure
04 about, are there any non-BP folks at the
05 United -- at the Unified Command that you
06 worked directly with?
07 A. I don't know.
08 Q. And why don't you know?
09 A. I worked with a number of
10 individuals at various stages. I didn't know
11 necessarily who they were. They were
12 presented to me as people that I would work
13 with and I worked with them.

Page 105:23 to 106:14

00105:23 Q. Okay. We had talked before about
24 some of the technologies that you were
25 evaluating, the diagnostic technologies to get
00106:01 in the field.
02 Who ultimately made the
03 decision about whether or not to put those
04 technologies in the field?
05 A. I don't know who made the
06 decision. The decision, when made, was
07 presented to me by Graham Openshaw.
08 Q. Okay. And we'd talked a little
09 bit about the timing, that, you know, it
10 was -- it was just hard to get, boat space and
11 ROV space.
12 Was there any thought to
13 revisiting any of these technologies after top
14 kill?

Page 106:16 to 106:23

00106:16 A. I don't know if there was any
17 thought to that. I wasn't asked to revisit
18 them.
19 Q. Okay. So to -- to your knowledge
20 and your work in preparing for this
21 deposition, you're not aware of any
22 consideration of using those technologies
23 after top kill?

Page 106:25 to 108:02

00106:25 A. I'm not aware of being asked to
00107:01 revisit any of these techniques post the top
02 kill and I can't recollect any documents that
03 I've seen that suggest that they were being
04 reconsidered.
05 Q. Okay. We talked earlier about
06 some of the choke points -- the potential
07 choke points that BP had identified. And one
08 of those is the riser kink; is that -- is that
09 accurate?
10 A. Not entirely. The Unified Command
11 identified the choke points and set the
12 targets.
13 Q. Well, to your knowledge, who at
14 the Unified Command identified the choke
15 points?
16 A. I'm not aware of who was
17 discussing that in Unified Command at this
18 point. I was working outside of Unified
19 Command and was providing input to their
20 investigations and decision-making process.
21 Q. But you -- you identified three
22 sort of areas of potential choke points as
23 being the drill string, the riser kink and the
24 BOP.
25 Do you recall that?
00108:01 A. The Unified Command identified
02 them for me.

Page 108:12 to 108:17

00108:12 We talked about some of the
13 diagnostic methods that BP considered and then
14 eventually put out in the field.
15 When did the information from
16 those diagnostic methods first come back to
17 BP?

Page 108:20 to 108:22

00108:20 A. When any technique was put into
21 the field, that information was immediately
22 put back to the incident command team.

Page 109:19 to 109:25

00109:19 Q. Okay. When did the riser itself
20 collapse?
21 A. From -- from my recollection of
22 the timeline, I believe it was on or around
23 the 22nd of April, 2010.
24 Q. So it's day two?
25 A. I guess so.

Page 110:06 to 111:13

00110:06 Q. Maybe it's not -- that's not
07 helpful.
08 And when did the holes --
09 when did the first holes became visible in the
10 riser kink?
11 A. My recollection says it was the
12 28th.
13 Q. And how many holes came at that
14 time?
15 A. I believe there was one that
16 appeared on the 28th. A second appeared
17 sometime after. I don't know if -- if it was
18 on the 28th or the 29th. But the -- yeah,
19 they -- they appeared at -- from my
20 recollection, at different times.
21 Q. Okay. And ultimately there were
22 six holes; is that right?
23 A. In total, I believe that's
24 correct.
25 Q. Okay. And do you -- roughly,
00111:01 what's the time span that those holes
02 appeared?
03 A. Like I said, I think there were --
04 two holes appeared on or around the 28th. I
05 think holes 3 and 4 appeared sometime after.
06 I can't recollect the -- the exact amount of
07 time. But possibly within a week but that --
08 that really -- unsettled about the date. The
09 last two holes appeared at the end of -- or
10 immediately after the top kill process.
11 Q. Now, when the holes emerged --
12 appeared in the kink, was that a surprise to
13 BP?

Page 111:16 to 111:25

00111:16 A. I think it was a surprise to
17 Unified Command.
18 Q. Does that include BP?
19 A. It was Unified Command. I -- I
20 reported to Unified Command and that was a --
21 a broad team of individuals working on this
22 project.
23 Q. Okay. To your understanding, the
24 folks you worked with at BP, were they
25 surprised when the holes emerged?

Page 112:03 to 112:06

00112:03 A. When the holes appeared, it did
04 not fit any of the assumptions that I

05 understood to have been made at the time.
06 Q. And so what did BP do in response?

Page 112:08 to 112:18

00112:08 A. I don't know the -- the immediate
09 response from the incident team. I didn't
10 actually get involved with the incident
11 response until the 3rd of May, about which
12 time these holes had appeared.
13 Q. Okay. Did you do -- in
14 preparation for this deposition, did you do
15 anything to -- to sort of brush up on the time
16 period from the spill to when you started
17 working the response on May 3rd?
18 A. No, I didn't.

Page 113:06 to 114:03

00113:06 Q. So you should have in front of you
07 an e-mail chain with the first Bates number
08 ending 2204267.
09 Is that right?
10 A. That's correct.
11 Q. Okay. Can you let me know if
12 you've seen this document before?
13 A. I have seen documents -- documents
14 similar to this, so I assume yes.
15 Q. Okay. And on the first page, I'm
16 looking at Mr. Birrell's e-mail to Julian
17 Austin and Paul Tooms.
18 Do you see that?
19 A. Yes, I do.
20 Q. Okay. And in his second paragraph
21 he says, I said we had not assumed large
22 quantities of sand. They seem to agree with
23 that assumption.
24 Do you see that?
25 A. Yes.
00114:01 Q. Okay. And is that consistent with
02 BP's understanding of whether there was sand
03 production in the well?

Page 114:05 to 114:12

00114:05 A. I -- I don't know.
06 Q. Okay. To BP's knowledge, was
07 there any sand in the well -- or sand in the
08 flow?
09 A. I don't know.
10 Q. Is that something you prepared on
11 for this deposition?
12 A. I don't believe so.

Page 115:08 to 115:10

00115:08 Q. Okay. But it's fair to say that
09 at the time of April 25th, BP thought there
10 was a negligible risk of significant erosion?

Page 115:12 to 115:18

00115:12 A. I'm not sure that I agree with
13 that, either. Under the assumptions used to
14 do this analysis, erosion was predicted to be
15 low.
16 Q. Okay. And at the time, those were
17 the best assumptions that BP had, right?
18 A. These --

Page 115:20 to 115:21

00115:20 A. These were the assumptions that I
21 understand Unified Command were working with.

Page 116:03 to 116:12

00116:03 (Exhibit Number 9506 marked.)
04 Q. Let me ask you to turn to tab 13.
05 And this is an e-mail ending
06 4889839; is that right?
07 A. That's correct.
08 Q. If you could take a look at this
09 and let me know whether you've seen this
10 document before.
11 A. I believe I may have seen some of
12 the document before.

Page 116:25 to 117:15

00116:25 Q. Okay. Can you turn to the second
00117:01 page of the exhibit? And there's an e-mail
02 from Pierre Beynet on April 25th at 7:40.
03 Do you see that?
04 A. I do.
05 Q. Okay. Looking to the second
06 paragraph, he says, I question our priorities.
07 They are correct if we think that the kink and
08 the riser are the choke. We do not know. Now
09 that we suspect otherwise, I would raise the
10 priority of finding where the choke is.
11 Do you see that?
12 A. I do.
13 Q. Okay. Was it BP's original
14 hypothesis that the kink was the source of the
15 choke in the flow?

Page 117:17 to 118:02

00117:17 A. As -- as I said before, the
18 development work and the work that was done
19 through that incident command team, I don't
20 know what their assumptions were at this time.
21 This is before I joined the team.
22 Q. Okay. So you don't know whether
23 BP had any -- what BP's initial suspicion was
24 as far as where the choke was?
25 A. I'm not aware of the incident
00118:01 team's suspicions about chokes in the system
02 at this time.

Page 118:17 to 118:19

00118:17 MR. BENSON: Yeah, I guess not.
18 If we could mark that at 9507.
19 (Exhibit Number 9507 marked.)

Page 118:25 to 119:23

00118:25 Q. If we could turn to tab 15. And
00119:01 the first page ends in the Bates
02 number 4835055.
03 Do you see that?
04 A. I do.
05 Q. Okay. Okay. Do you recognize
06 this document?
07 A. I believe I do.
08 Q. Okay. Could we mark this as 9508?
09 (Exhibit Number 9508 marked.)
10 MR. BENSON: Thank you.
11 Q. And the first page is an e-mail
12 that's been forwarded but the -- the original
13 e-mail is from Julian Austin to a number of
14 folks, including Paul Tooms and Trevor Hill;
15 is that right?
16 A. That's correct.
17 Q. Okay. And if we look at
18 Mr. Austin's e-mail, he says in his first
19 paragraph, please find attached a draft
20 technical note on the potential for erosion of
21 the kink in the riser.
22 Do you see that?
23 A. I do.

Page 121:22 to 122:08

00121:22 Q. Okay. And back to the first
23 paragraph of Mr. Austin's e-mail, he says,
24 this note has been subject to peer review by

25 Trevor Hill on flow assurance and John Martin
 00122:01 on erosion.
 02 Do you see that?
 03 A. I do.
 04 Q. What's your understanding of the
 05 phrase peer reviewed as used within BP?
 06 A. My understanding is that it has
 07 been read by other individuals for their
 08 comment.

Page 122:23 to 124:07

00122:23 Q. Okay. Let me ask you to turn to
 24 the first page of the attachment. And at the
 25 top, it says, Brief: To establish the
 00123:01 potential for erosion within the kink at the
 02 base of the DEEPWATER HORIZON riser.
 03 Do you see that?
 04 A. I do.
 05 Q. Okay. Is that a fair description
 06 of what this document does?
 07 A. I -- I believe it does.
 08 Q. Okay. If we go under the -- the
 09 little pictures, it says, the assessment is
 10 based on current estimates for the -- the size
 11 of the flow restriction, the leakage rate, the
 12 pressure upstream of the kink, the fluid
 13 properties, including solids content, the flow
 14 losses in the riser.
 15 Do you see that?
 16 A. I do.
 17 Q. Okay. And then it says, the size
 18 of the flow restriction is first estimated,
 19 then the pressure and leakage rate are used to
 20 develop flow velocities, which are then
 21 assessed for erosion potential.
 22 Do you see that?
 23 A. I do.
 24 Q. Okay. And then there's an entry
 25 on size of the flow restriction and it says,
 00124:01 the size of the flow restriction has been
 02 estimated in three independent ways.
 03 Do you see that?
 04 A. Yes, I do.
 05 Q. Okay. Then it lists the three
 06 ways?
 07 A. Yes.

Page 125:11 to 126:19

00125:11 Q. Let me ask you to turn to the page
 12 ending in 62. And if we look under -- under
 13 method 3, it's describing the analysis. And
 14 the paragraph says at -- at the end it says,

15 assuming an upstream pressure of 7500 psi and
 16 a maximum leakage of 10 MBPD.
 17 What does 10 MBPD mean?
 18 A. I understand it to be
 19 10,000 barrels per day.
 20 Q. Okay. And that's referring to a
 21 flow rate, an oil flow rate?
 22 A. It's referring to a flow rate.
 23 Q. Are you not sure whether it's oil
 24 or oil and gas?
 25 A. It's a flow rate. It doesn't
 00126:01 specify what it is.
 02 Q. Okay. In this context, do you
 03 know what it is?
 04 A. I'm not sure in what terms he's
 05 relating to the flow measured, so it could be
 06 oil or it could be oil and gas.
 07 Q. Okay. So 10 MBPD yields a pair of
 08 circular orifices of .5-inch diameter, or a
 09 total flow aperture of .4 square inches, more
 10 than an order of magnitude less than the
 11 minimum apertures estimated by either the
 12 visual or finite element methods.
 13 Do you see that?
 14 A. I do.
 15 Q. Okay. And what he's saying here
 16 is that if you look at the assumptions they're
 17 making about the well, you need a total flow
 18 hole or aperture of .4 square inches; is that
 19 right?

Page 126:21 to 127:11

00126:21 A. I'm -- I'm not sure that is
 22 correct.
 23 Q. What do you understand it to mean?
 24 A. What I understand Mr. Austin to be
 25 doing here is to be trying to estimate the
 00127:01 orifice at the kink alone. He's used three
 02 methods and one of them is to calculate what
 03 the cross section area or the choke size has
 04 to be for that flow rate, based on all of
 05 the other assumptions in the system.
 06 Q. Okay. And the conclusion that
 07 he's reached here is that to -- if there's
 08 upstream pressure of 7500 psi and a maximum
 09 leakage of 10,000 barrels per day, you need a
 10 flow orifice of at least .4 square inches; is
 11 that right?

Page 127:13 to 128:06

00127:13 A. I -- I'm not sure I understand
 14 what you're saying. What I believe he's

15 saying is that for that flow, if this was the
16 only restriction in the system, then the
17 restriction would be of the size of .5 -- or
18 .4 square inches.
19 Q. Okay. If we go to the next
20 paragraph, do you see the heading Discussion?
21 A. I do.
22 Q. Can you read that paragraph to
23 yourself? And he says there that the flow
24 restriction presented by the most likely range
25 of flow apertures in the kink would barely
00128:01 choke the well flow at all.
02 Do you see that?
03 A. I do.
04 Q. And so Mr. Austin is saying that
05 whatever choke there is has to be somewhere
06 else in the -- in the flow path; is that fair?

Page 128:08 to 129:01

00128:08 A. My interpretation is that that's
09 his -- what that is saying.
10 Q. Okay. And if we turn to the last
11 page of the exhibit, there is a heading
12 Conclusions.
13 Do you see that?
14 A. I do.
15 Q. And it says, the most credible
16 estimate of the minimum flow aperture
17 resulting from the kink in the riser predicts
18 a total flow area of 23 square inches. This
19 represents a negligible flow restriction and
20 will result in an insignificant pressure drop.
21 Do you see that?
22 A. I do.
23 Q. Okay. So it's Mr. Austin's
24 conclusion that an aperture of 23 square
25 inches is not going to create any meaningful
00129:01 flow restrictions; is that right?

Page 129:03 to 129:08

00129:03 A. At this point Mr. Austin is saying
04 if the previous analysis of the cross section
05 area of this kink is correct, then it does not
06 present a significant flow restriction.
07 Q. Okay. Did BP ever revise this
08 analysis?

Page 129:10 to 130:01

00129:10 A. I'm not sure if anyone revised
11 this exact analysis. This analysis is based

12 on an empty riser and once erosion holes
 13 appeared, all of those previous assumptions
 14 were questioned and reviewed.

15 Q. Okay. And why were the previous
 16 assumptions questioned once the erosion holes
 17 appeared?

18 A. This analysis suggested that
 19 erosion would be unlikely. The erosion did
 20 appear and therefore the assumptions were all
 21 questioned.

22 Q. Now, one of the assumptions in
 23 Mr. Austin's analysis that we're looking at
 24 here is that the maximize flow rate was 10
 25 million barrels per day -- oh, I'm sorry.
 00130:01 10,000 barrels per day; is that right?

Page 130:04 to 130:10

00130:04 A. If I -- if I look at his reports,
 05 he comments that he tested and analyzed for
 06 two cases 1,000 and 10,000 barrels.
 07 Q. Okay. And if the flow was greater
 08 than 10,000 barrels, it would have a greater
 09 impact on -- it would have a greater erosive
 10 impact; is that correct?

Page 130:12 to 131:03

00130:12 A. The erosion is a function of the
 13 velocity, the local velocity of the flow. And
 14 my understanding of this is that no realistic
 15 flows with the assumptions of an empty riser
 16 would those velocities be reached.
 17 Q. So even if the flow had been
 18 50,000 barrels -- 50,000 barrels per day, it
 19 wouldn't have been enough to cause the holes
 20 that were seen in the kink?
 21 A. The assumptions of the cross
 22 section area of the flow path was such that
 23 that -- that would not happen.
 24 Q. Okay. So at that point -- at that
 25 point the assumption of the cross sectional
 00131:01 area for the flow path wouldn't have been a
 02 meaningful restriction even at flow rates of
 03 50,000 or 60,000 barrels per day?

Page 131:05 to 131:15

00131:05 A. I can't answer for what Mr. Austin
 06 thought at the time. But I know that the
 07 assumption of the cross section area for flow
 08 path was immediately reassessed.
 09 Q. And when did BP develop a new

10 understanding of what the cross sectional area
11 was in the riser?
12 A. The first point at which BP
13 understood or anyone understood the cross
14 sectional area of the riser was when the riser
15 was recovered from the seabed.

Page 132:10 to 133:09

00132:10 (Exhibit Number 9509 marked.)
11 Q. What was the purpose of this
12 report, to your understanding?
13 A. I -- I have reviewed the document.
14 I would have to -- to read this to understand
15 if I have a few minutes to read this.
16 Q. Sure. Go ahead. Have you had a
17 chance to review it?
18 A. Yes.
19 Q. Okay. What's your understanding
20 of the purpose of this document?
21 A. My understanding is that it is
22 looking at the full system from wellhead
23 through BOP, kinked riser and the riser
24 section to determine what, if any, possible
25 restrictions to flow might be in place and
00133:01 what impact removing those restrictions as
02 part of intervention would do to the
03 underlying flow rate.
04 Q. Okay. And I think that's
05 consistent with what you said earlier about
06 some of the purpose of your work as trying to
07 figure out what was going on in the BOP and
08 the riser to see how that would affect
09 different interventions; is that right?

Page 133:12 to 133:18

00133:12 A. My work was to provide some
13 answers to the incident team that they would
14 use to determine what intervention was to be
15 taken. I wasn't estimating in any way flow
16 rates so I'm not sure exactly what would --
17 would be used with the information. But it
18 was part of the decision-making process.

Page 134:22 to 135:02

00134:22 Q. Okay. And I -- I guess I'm -- I'm
23 not sure that's the same question I'm asking.
24 But if -- and let me ask it this way. Is --
25 is the flow rate determined by the narrowest
00135:01 choke points in the system?
02 A. I don't believe so.

Page 135:05 to 135:11

00135:05 Q. Why not?
 06 A. Flow rate is determined by all of
 07 the physical properties, the choke as well as
 08 the fluid properties. And the fluid
 09 properties change with position in the system
 10 and, therefore, the position of the choke is
 11 important.

Page 136:12 to 136:16

00136:12 Q. Is it fair to say that in this --
 13 at least in this modeling exercise, BP is
 14 using chokes of open pipe one-half inch and
 15 one-quarter inch at the wellhead as a proxy
 16 for other potential obstructions downstream?

Page 136:19 to 136:22

00136:19 A. My understanding of this document
 20 is that the author is representing a choke as
 21 a single event but identifies multiple
 22 potential choke locations.

Page 137:12 to 138:12

00137:12 Q. Okay. Let me ask you to turn to
 13 the page ending 391. And I'm going to ask you
 14 to look to the middle paragraph in that page
 15 and it begins as it is not known.
 16 Do you see that?
 17 A. I do.
 18 Q. Okay. It says, as it is not known
 19 whether there is casing, drill pipe, both or
 20 neither across the BOP, potential flow paths
 21 have been identified for all combinations of
 22 BOP and pipe.
 23 Do you see that?
 24 A. I do.
 25 Q. Okay. Then it says, only flow
 00138:01 restrictions of less than ca. three-inch
 02 equivalent diameter have any material effect
 03 on flow.
 04 Do you see that?
 05 A. I do.
 06 Q. Okay. And the ca. means about,
 07 right?
 08 A. That's my understanding.
 09 Q. Okay. So the sentence here is
 10 saying only flow restrictions of less than
 11 about three inches have any material effect on
 12 flow; is that correct?

Page 138:14 to 138:14

00138:14 A. Yes. That's what it says.

Page 139:14 to 139:17

00139:14 Q. Okay. And you'll agree with me
15 that what it says is flow -- only flow
16 restrictions of less than about three inches
17 have any material effect on flow?

Page 139:19 to 139:23

00139:19 A. That is what is written on this
20 document.
21 Q. Okay. And sitting here today, you
22 don't have any reason to disagree with that
23 conclusion, do you?

Page 140:01 to 140:07

00140:01 A. I have not completed an analysis
02 of the flows around the BOP and of the choke
03 systems in it so I can't agree if that -- if
04 that statement is correct or not.
05 Q. Okay. You're not aware of any
06 analyses BP has done that would contradict
07 this statement, are you?

Page 140:10 to 140:11

00140:10 A. I have not been party to any
11 analysis and I've not seen any analysis.

Page 140:14 to 141:01

00140:14 Q. Let me ask you to turn to the next
15 page.
16 A. Ending 392?
17 Q. Yeah. And at the very bottom of
18 that page do you see it says, finite element
19 modeling of the kink indicates the flow path
20 area should not be small enough to restrict
21 the flow through either drill pipe or
22 annulus -- annulus? Do you see that?
23 A. That's correct, yes.
24 Q. Okay. And that was BP's
25 conclusion at the time?
00141:01 A. That was the --

Page 141:03 to 141:05

00141:03 A. -- author's conclusion.
04 Q. Okay. Do you have any reason to
05 think that was not BP's conclusion?

Page 141:07 to 141:13

00141:07 A. Based -- based on the information
08 available at the time and the assumptions in
09 here, I can only go on what's -- what's
10 written here.
11 Q. And are you aware of any
12 information after this report came out that
13 would call that conclusion into question?

Page 141:15 to 142:11

00141:15 A. This document is predicated from
16 the kink point of view on a single obstruction
17 caused by the piece of casing or piece of
18 drill string. Recovery of the riser from the
19 seabed indicated that two pieces of drill
20 string were present inside the riser.
21 Q. Okay. And why does that matter?
22 A. The cross sectional flow path that
23 is modeled earlier through this using finite
24 element analysis assumes an -- an entry riser.
25 Any presence of obstructions in that riser
00142:01 will lead to restrictions in the cross
02 sectional area.
03 Q. Okay. So if there was a
04 difference in the cross sectional area through
05 the riser, that could affect the flow?
06 A. If the cross sectional area of the
07 riser is lower than had been assumed, it would
08 affect the velocities in the riser.
09 Q. You said it would affect the
10 velocities. Would it affect the flow rate or
11 not?

Page 142:13 to 142:20

00142:13 A. If the velocities is high enough
14 that a pressure drop is observed, that will
15 have an impact on flow rate.
16 Q. And so it depends on the
17 particular analysis of the cross -- cross
18 sectional area that's available?
19 A. That is one of the many parameters
20 that are involved in that calculation.

Page 145:20 to 146:19

00145:20 I guess we've been talking
 21 about choke and what the flow area is for
 22 fluids, right?
 23 A. Correct.
 24 Q. And this is referring to diameter,
 25 correct? It's modeling particular diameters?
 00146:01 A. This is -- this is using a
 02 geometrically precise choke as a proxy for
 03 whatever obstruction is in place.
 04 Q. Okay. And the -- so the
 05 assumptions in the model are one-half inch or
 06 quarter inch diameters, right?
 07 A. That's correct.
 08 Q. Okay. And I guess my question is:
 09 In actually modeling or analyzing a particular
 10 restriction, are you looking at the diameter
 11 or are you looking at the cross-sectional
 12 area?
 13 A. With the tools available to the
 14 team, the -- the models being used accepted
 15 geo- -- geometrically regular shapes. Both
 16 the cross-sectional area and the geometry are
 17 important but the models available did not
 18 allow them to -- to look at non-geometrically
 19 precise shapes.

Page 148:18 to 149:14

00148:18 Q. Let me ask you to turn to -- I'm
 19 going to go to binder 3 and tab 159.
 20 First, let me just ask if
 21 you've seen this document before.
 22 A. I have seen a document similar to
 23 this, though I can't say for certain if it's
 24 the same one.
 25 Q. Okay. Let's -- let's mark this,
 00149:01 then.
 02 (Exhibit Number 9510 marked.)
 03 Q. And it ends with the Bates
 04 number 6295134?
 05 A. Yes.
 06 Q. And the -- the bulk of this
 07 exhibit is an e-mail from Tim Lockett to
 08 Trevor Hill, right?
 09 A. That's correct.
 10 Q. And who's Tim Lockett, if you
 11 know?
 12 A. I know that he's a BP employee. I
 13 believe he works in the flow assurance group
 14 with Trevor Hill.

Page 152:05 to 152:05

00152:05 (Exhibit Number 9511 marked.)

Page 153:06 to 153:21

00153:06 Q. And Mr. Lockett says, I've amended
07 Trevor's note with the details from the
08 modeling we have completed this morning using
09 an integrated model which goes from the
10 reservoir to the sea, including drill string
11 and then restriction and then either drill
12 string or riser.
13 Do you see that?
14 A. I do.
15 Q. Then if you turn to the next page,
16 this is the analysis that he's referring to.
17 And have you seen charts -- at the bottom of
18 the second page -- have you seen charts like
19 this before of orifice size and flow rate?
20 A. I don't recollect seeing that
21 table.

Page 154:05 to 154:09

00154:05 Q. Okay. Well, is it fair to say, at
06 least looking at this analysis, that as you --
07 as you increase -- increase the orifice size,
08 you're getting increased flow rate? Is that
09 what this shows?

Page 154:12 to 155:14

00154:12 A. Not having seen this document, my
13 understanding is it is solving for flow given
14 a pressure drop that is unknown.
15 Q. What do you mean by that?
16 A. The -- the modeler is inputting a
17 series of numbers to see what the -- the model
18 would predict a flow to be with all other
19 components fixed and not verified.
20 Q. When you say all other components,
21 what are you referring to?
22 A. Well, there is discussion around
23 ori -- obstruction, the drill pipe size. I
24 know I saw a reference to inflow from the
25 well.
00155:01 Q. I guess what tripped me up a
02 couple of questions ago is you said solving
03 for flow given a pressure drop that is
04 unknown. What did you mean by a pressure drop
05 that is unknown?
06 A. At this point I don't believe any
07 pressures were known about the system at all.
08 Q. So what's the basis for the

09 wellhead flow and pressure numbers that are in
10 the -- in the model results?
11 A. I believe they're input numbers.
12 Q. Okay. So the -- the -- let's see.
13 Mr. Lockett's best estimate at the time of
14 what the wellhead flow-in pressure would be?

Page 155:17 to 155:23

00155:17 A. I -- I can't answer for
18 Mr. Lockett's selection of numbers.
19 Q. Okay. And so with that, at least
20 for this selection of numbers, we can see that
21 as the orifice size increases, the flow in
22 barrels per day also increases; is that
23 correct?

Page 156:01 to 156:12

00156:01 A. The table would suggest that's the
02 number.
03 Q. Okay. And the -- the increase is
04 greater for the first inch or so. As you can
05 see, it -- it goes up by quarter inches. And
06 there's a significant increase between a
07 quarter inch and a half inch and between a
08 half inch and three-quarters inch and between
09 three-quarters inch and one-inch and between
10 one-inch and two-inch. And then that increase
11 drops between two inches and three and
12 five inches; is that fair?

Page 156:14 to 156:18

00156:14 A. Based on the numbers on that
15 table, that's what the numbers indicate.
16 Q. And is that consistent with BP's
17 understanding of how orifice size affects flow
18 rate?

Page 156:21 to 157:04

00156:21 A. I did not conduct this analysis.
22 I don't know about -- I'm not an expert in
23 flow analysis, so --
24 Q. And I guess I'm just asking on --
25 in your role as testifying on behalf of the
00157:01 company on issues related to obstruction and
02 erosion, what's the company's understanding of
03 how increases in choke size affect flow rate?
04 A. My --

Page 157:06 to 157:13

00157:06 A. My understanding is that choke --
07 choke size does affect flow and that larger
08 chokes restrict flow less. But as to the
09 relative response from one size to the other,
10 I'm not an expert in that area.
11 Q. Okay. And on behalf of BP, you
12 don't have any additional information on that
13 subject today?

Page 157:15 to 157:16

00157:15 A. I'm not being called on behalf of
16 BP to depose on flow rates.

Page 158:03 to 158:05

00158:03 And this is a document that's
04 been previously marked as exhibit 6201 and it
05 ends in the Bates number 1446217.

Page 158:12 to 158:20

00158:12 MR. CASEY: 17 -- 217 --
13 MR. BENSON: Yeah.
14 MR. CASEY: Oh, ending 230. Okay.
15 I'm sorry. I see it.
16 Q. You ready?
17 A. Yes.
18 Q. Sorry.
19 Have you seen this document
20 before?

Page 158:22 to 159:10

00158:22 Q. Okay. Let me ask you to turn to
23 the page that's marked 221. And there's -- it
24 says -- there's a paragraph that says, an
25 absolute worst-case flow rate of
00159:01 60,000 barrels per day was calculated. A more
02 reasonable worst-case scenario of
03 40,000 barrels per day recognizes the
04 following. And there's three bullets there.
05 BOP is in place and may be partially
06 activated.
07 Do you see that?
08 A. I do.
09 Q. What evidence did BP have that the
10 BOP might be partially activated?

Page 159:12 to 159:18

00159:12 A. At this time I'm not aware of any
13 evidence but subsequently I was aware that
14 attempts had been made to intervene and there
15 was some suggestion from reading the Bly
16 report some time after this event that the --
17 some aspects of the BOP response emergency
18 activation was used.

Page 159:22 to 159:22

00159:22 A. I'm not aware of anything.

Page 160:02 to 161:04

00160:02 Q. Okay. At the time or subsequent,
03 anything you're aware of subsequent to the
04 time of this document?
05 A. Well, the radiography that was
06 done on the BOP rams suggested that the tail
07 locking bar was in place and that indicated
08 that the -- the ram had moved away from the
09 position.
10 Q. Okay. Anything else?
11 A. I'm not aware of anything else.
12 Q. And the bullet here says the riser
13 and drill pipe is crushed and kinked.
14 What evidence -- I guess
15 everyone knew about the kink. What evidence
16 did BP have that the -- the -- the drill pipe
17 was crushed?
18 A. I don't know. I'm not sure of the
19 timing of this document.
20 Q. It's May 18th.
21 A. May 19th? Yeah.
22 I'm not aware of any evidence
23 of a riser -- sorry -- of a drill string being
24 kinked. An assumption that the riser may
25 contain a piece of drill string or a casing
00161:01 had been considered by this stage.
02 Q. Okay. But it wasn't -- it wasn't
03 possible to know one way or the other at this
04 point?

Page 161:07 to 161:22

00161:07 A. The confirmation that -- that
08 riser -- that drill string was present in the
09 riser came when the riser was removed. But
10 radiography of the riser in situ suggested
11 that at least in one lobe of the kinked riser
12 there was a piece of drill string. And that
13 was done some time in May.
14 Q. Any other evidence you're aware

15 of?
16 A. Not that I can recollect.
17 Q. And then the third bullet says,
18 restrictions provided by cement in the casing
19 annulus, formation collapse, casing hangers,
20 et cetera, are likely.
21 What evidence does BP have of
22 that?

Page 161:25 to 162:08

00161:25 A. I'm not aware of any discussions
00162:01 around that. It was outside my area of
02 knowledge.
03 Q. And you're not aware of
04 anything -- you didn't learn anything in
05 preparing for this deposition today that's
06 relevant to that question?
07 A. My preparation for this was to --
08 with BOP and riser.

Page 162:23 to 163:01

00162:23 (Exhibit Number 9512 marked.)
24 Q. Okay. So there's -- there's two
25 e-mails here. The first one is from Douglas
00163:01 Wood to Trevor Hill and Tim Lockett.

Page 164:02 to 164:12

00164:02 Q. So Mr. Wood is referring to
03 something that's on the SharePoint site and he
04 says, the work seems to demonstrate that the
05 kink is unlikely to be the cause of the
06 pressure loss in the riser section but does
07 not identify an alternative cause for the,
08 squiggly line, 400 psi differential seen by
09 the pressure measurement.
10 I assume that means about
11 400 psi?
12 A. That's what I would assume.

Page 165:14 to 166:05

00165:14 Q. I guess my question is: Was BP
15 using pressure data to try to analyze whether
16 there were obstructions or erosions within the
17 BOP and the kink?
18 A. I believe the incident team were
19 trying to access pressure data across the hole
20 of the BOP stack and riser to determine if
21 there were obstructions.
22 Q. And what was the conclusion

23 reached?
24 A. My understanding at the time
25 and -- and subsequently is that there was some
00166:01 evidence for multiple restrictions but that
02 they could not be sized.
03 Q. The modeling that's referred to in
04 this e-mail, do you know whether that was
05 shared outside BP?

Page 166:08 to 166:12

00166:08 A. I -- I'm not sure what was done
09 with this modeling in this report. My -- my
10 understanding was that every piece of
11 information that went in to the incident team
12 is shared with the incident team.

Page 166:20 to 167:02

00166:20 Q. Okay. For the work -- for work
21 specifically that you did, do you know whether
22 it was provided to the incident team, to the
23 non-BP members to the incident team, I should
24 say?
25 A. I provided all of my input to
00167:01 Graham Openshaw and it was my understanding
02 that that was then shared.

Page 167:13 to 168:01

00167:13 Q. So I guess for any particular
14 analysis you wouldn't know one way or the
15 other whether it was provided to the non-BP
16 folks or not?
17 A. I was providing information to the
18 incident team, not BP or anyone else.
19 Q. Okay. Well, you were providing
20 information to Graham Openshaw, right?
21 A. That's right.
22 Q. Okay. And you -- you can't be
23 sure what he did with it; is that fair?
24 A. Once I had transferred information
25 in to the incident team, that was my task done
00168:01 and I waited for the next task.

Page 169:11 to 170:20

00169:11 Q. Okay. Let me ask: At any point
12 in time did you transmit information to anyone
13 other than Mr. Openshaw or a BP employee?
14 A. Yes, I did.
15 Q. And when was that?
16 A. Once -- through the other stages

17 of the incident response, my prime contact
18 and -- with respect to inspection of subsea
19 facilities in situ, my prime contact was
20 Graham Openshaw. And as far as I can
21 recollect, all of the data that I transmitted
22 to the incident team was via Graham.

23 Once we moved into the phase
24 of recovering the riser from the seabed and
25 inspecting, my relationship with the incident
00170:01 team changed and I had direct contact either
02 with Mr. Openshaw, with other members of the
03 incident team that included Cheryl Grounds,
04 Paul Tooms, David Brookes, Howard Cook, as
05 well as members of the National Lab's
06 scientists who were supporting.

07 Q. Okay. What information do you
08 recall providing directly to the National Lab
09 scientists?

10 A. I provided them with all of the
11 inspection data that we had available and
12 spent some considerable time with them walking
13 through that data.

14 Q. Okay. Anything else you recall?

15 A. There were some discussions early
16 on around some of the inspection techniques
17 that we tried. And I also briefed members of
18 the Sandia team who were about to go on one of
19 the inspections on the riser on what I
20 understood of the system at that date.

Page 171:03 to 171:20

00171:03 Q. Going back to the exhibit in front
04 of you, do you see Mr. Wood refers -- he's --
05 if we -- we talked earlier, he said the kink
06 is unlikely to be the cause of the pressure
07 loss in the riser section.

08 And then he identifies three
09 things that he thinks might be the cause of
10 the pressure loss.

11 Do you see that?

12 A. I do.

13 Q. Okay. And the first, he says,
14 flow rate is much higher and the kink is the
15 cause of the pressure loss. Kink as modeled
16 by mechanical folk (Julian) does not impose
17 much restriction on flow for any conceivable
18 flow rate, especially if no pipe is in it.

19 Do you see that?

20 A. I do.

Page 172:18 to 173:11

00172:18 For the riser kink, if the

19 flow rate increases, would there be a larger
20 pressure drop?

21 A. If flow rate increases across an
22 orifice and that orifice is a restriction to
23 flow, the pressure drop will go up.

24 Q. All right. Let me ask you to look
25 at the top e-mail from Mr. Hill to Mr. Wood.
00173:01 And Mr. Hill says, we have thought about
02 scenarios but the only modeling done has been
03 on orifice size restrictions. And then
04 parens, which we can place anywhere in the
05 system.

06 Do you see that?

07 A. Yes, I do.

08 Q. Okay. And so I take it that the
09 modeling BP did did not use orifice size as a
10 proxy for restrictions within the flow path;
11 is that fair?

Page 173:13 to 173:23

00173:13 A. I'd say that the modeling done by
14 the team had no understanding at that time of
15 the number or location of any restrictions
16 and, therefore, reverted to a single orifice
17 size as a proxy for a whole system.

18 Q. Okay. Did the modeling that BP
19 had at its fingertips, is it capable of having
20 greater specificity in what the chokes are,
21 that they can say, you know, imagine there's
22 something in-between these rams that's this
23 shape, what effect would that have on flow?

Page 174:01 to 174:04

00174:01 A. The modeling systems available to
02 the incident team at the time, I believe,
03 could not reproduce true geometries and had to
04 rely on standard design geometries.

Page 174:13 to 174:18

00174:13 Q. Okay. I'm just trying to get, in
14 your -- in your role as preparing for this
15 deposition, do you have any knowledge of
16 whether individuals outside BP were performing
17 modeling that looked at obstruction or
18 erosion?

Page 174:20 to 174:22

00174:20 A. I don't recollect seeing any
21 documents relating to what other organizations

22 were doing.

Page 175:06 to 175:06

00175:06 (Exhibit Number 9513 marked.)

Page 175:10 to 175:25

00175:10 Q. And, Mr. Knox, what do you
11 expect -- let me start that over.
12 Mr. Knox, what do you
13 understand this document to be?
14 A. I saw this document as part of my
15 preparation and I've spoken to the author of
16 the document. And it is my understanding that
17 this is an investigation of possible inflow
18 scenarios to the well and the BOP stack and an
19 assessment of the impact of removing the BOP
20 stack or components from the system.
21 Q. Okay. And who's the author of
22 this document?
23 A. My belief is it's Simon Bishop,
24 that it was Simon Bishop that I discussed this
25 with.

Page 176:05 to 177:02

00176:05 Q. Okay. What was the purpose of
06 putting this document together?
07 A. My understanding of the purpose
08 was that a number of scenarios could be seen
09 about intervention around the BOP. Those
10 scenarios may remove sections of that whole
11 stack from riser through to BOP. And the
12 investigation was to understand if the -- if
13 those components were removed and that removed
14 a significant choke to the system, what would
15 the impact on the well.
16 Q. Do you know who this document was
17 shared with?
18 A. I cannot recollect the -- the
19 people it was shared with.
20 Q. Okay. Did it -- did it go to
21 incident command, or Unified Command?
22 A. I -- I cannot recollect who it
23 went to. My understanding is at this stage
24 all documents were copied to incident command.
25 And -- and there was a mailbox specifically
00177:01 set up such that all documents were -- were
02 stored and copied.

Page 177:16 to 177:23

00177:16 Q. Okay. And the analysis that
17 Mr. Bishop did -- and it's reflected up in the
18 upper left part of the cartoon -- is -- and it
19 says, by removing the approximately 1500 psi
20 restriction, flow rate will increase by 15 to
21 30 percent.
22 Do you see that?
23 A. Yes.

Page 178:10 to 178:15

00178:10 Q. And his analysis is based on the
11 fact that if there is a roughly 1500 psi
12 pressure difference between the bottom of the
13 BOP and ambient conditions, you can then
14 figure out, sort of, how removing that
15 pressure drop will affect flow, correct?

Page 178:18 to 179:10

00178:18 A. It's -- it's an input. It's one
19 of the inputs into the model, as are all of
20 the assumptions made about the well flow and
21 productivity.
22 Q. And the analysis here is based on
23 the fact -- or based on the assumption that
24 the 1500 psi pressure differential between the
25 bottom of the BOP and ambient conditions
00179:01 reflect some kind of restriction in the BOP,
02 the LMRP or the riser, correct?
03 A. I believe that Mr. Bishop was
04 using a hard input of three -- 3,800 psi as
05 being the wellhead pressure. The 2270 psi was
06 a calculated or estimated pressure based on
07 the water column. And Mr. Bishop did not look
08 in any way at restrictions within the BOP,
09 LMRP or kink, just looked at the case where
10 that pressure drop went away.

Page 179:16 to 179:23

00179:16 Q. Okay. And is -- is the point of
17 Mr. Bishop's analysis that you don't
18 necessarily need to know what the restrictions
19 are within the flow path if you have a given
20 pressure differential, you know that there's
21 some kind of restriction in that flow path and
22 you can estimate what removing that
23 restriction will do to flow?

Page 180:01 to 180:02

00180:01 A. Discussing this with Mr. Bishop, I

02 do not believe that is correct.

Page 180:05 to 180:16

00180:05 Q. Can you explain what he was trying
06 to do?
07 A. In the subsequent pages,
08 Mr. Bishop has made a number of assumptions
09 about the connectivity of the wellbore to the
10 reservoir. He has gone through a wide range
11 of input parameters and from those input
12 parameters come up with potential flow rates
13 based on that range. And what he is looking
14 at is the response that this model would give
15 if the wellhead pressure significantly
16 changed.

Page 180:24 to 181:16

00180:24 Well, let me ask this:
25 The -- on the second page, Mr. Bishop says, by
00181:01 removing the 1500 psi restriction, flow rate
02 will increase by 15 to 30 percent, correct?
03 A. That's correct.
04 Q. Okay. And what's that analysis
05 based on?
06 A. That's -- that's based on the --
07 his modeling of well performance at a
08 different wellhead pressure.
09 Q. And I -- I think, as we've talked
10 before, a pressure differential can be an
11 indication of an obstruction, correct?
12 A. A pressure differential can be
13 an -- an indication of an obstruction.
14 Q. Okay. And so by removing the
15 pressure differential, Mr. Bishop is
16 identifying what the new flow rate might be?

Page 181:19 to 181:24

00181:19 A. I do not believe that is the case.
20 Mr. Bishop is looking at the inflow potential
21 to the system, not the outflow across the BOP.
22 So his analysis is purely to do with reservoir
23 performance at a given pressure, not about
24 flow restriction.

Page 182:07 to 182:11

00182:07 Q. Okay. So what he's saying is
08 removing the BOP and the riser, to the extent
09 there were restrictions within those
10 components, would increase flow, at the most,

11 by 15 to 30 percent?

Page 182:13 to 182:20

00182:13 A. My understanding is that he is
14 trying to predict what the wellhead -- the
15 wellbore or the well face is capable of or if
16 the restriction's totally removed.
17 Q. And so based on his analysis,
18 the -- whatever restrictions there are in the
19 BOP and the riser can only be a 15 to
20 30 percent effect on flow rate?

Page 182:22 to 183:06

00182:22 A. I -- I don't believe that is what
23 he's doing. He is looking solely at what the
24 well itself, the -- the face of the well could
25 do if the pressure drop was -- the pressure
00183:01 wellhead was changed.
02 Q. And why -- why isn't that
03 establishing what would happen if the
04 maximum -- the maximum change that could
05 result by removing the BOP and the riser?
06 Don't you get to the same answer?

Page 183:08 to 183:18

00183:08 A. Mr. Bishop is not attempting in
09 any sense to model or represent anything
10 within the BOP, the LMRP or the riser section.
11 He is taking as a hard number the wellhead
12 pressure and he's -- he's looking at two
13 conditions. A wellhead pressure, whether it's
14 3,800 pounds per square inch, and a wellhead
15 pressure, whether it's 2270 pounds per square
16 inch.
17 Q. Okay. And that's equivalent to
18 taking off the BOP, LMRP and the riser?

Page 183:20 to 184:05

00183:20 A. In Mr. Bishop's analysis, this is
21 a -- a black box analysis based on two
22 pressure numbers. He's not attempting to or
23 investigating how or what causes that change
24 in pressure. He's merely looking at a change
25 in pressure on the downhole performance.
00184:01 Q. Okay. Did BP have any information
02 subsequent to this analysis that says removing
03 the BOP, LMRP and riser would have a greater
04 impact on flow rate?
05 A. I'm not --

Page 184:07 to 184:07

00184:07 A. -- aware of any such information.

Page 184:18 to 184:20

00184:18 look in binder 3 at tab 184? And this is an
 19 e-mail that has been previously marked
 20 exhibit 9256. Do you see that?

Page 186:13 to 188:14

00186:13 Q. Okay. Did you -- are you aware of
 14 any other BP analyses leading up to top kill
 15 looking at potential erosion in the BOP?

 16 A. I'm not aware of any documents at
 17 this stage.

 18 Q. Okay. And you're not aware of
 19 anything on behalf of the company in preparing
 20 for this deposition?

 21 A. I do not recollect any specific
 22 documents like that.

 23 Q. Let me ask you to go to tab 189.
 24 Let me ask you if you've seen this document
 25 before?

00187:01 A. I don't recollect seeing this
 02 document.

 03 Q. Okay. And it's an exhibit that's
 04 been previously marked as 5066 and it's an
 05 e-mail from Paul Tooms on June 11th; is that
 06 right?

 07 A. That's correct.

 08 Q. Okay. And we talked about this
 09 earlier, but who's Paul Tooms?

 10 A. In -- at this point I believe Paul
 11 Tooms was leading the engineering team within
 12 the Unified Command center.

 13 Q. Okay. And the subject of the
 14 e-mail is historical BOP pressure.

 15 Do you see that?

 16 A. Yes, I do.

 17 Q. Okay. Are you aware of analyses
 18 that BP did looking at BOP pressure around the
 19 time of the top kill?

 20 A. I was not aware of analysis of
 21 pressure around the time of the top kill.

 22 Q. Okay. And in preparing for this
 23 deposition, did you look at any such analyses?

 24 A. I did not.

 25 Q. Okay. If we look to Mr. Tooms's
 00188:01 paragraph number 1, do you see that? And it
 02 begins pressures below and across the BOP.

03 A. Yes, I do.
04 Q. He says, pressure below and across
05 the BOP (with the test rams closed) are
06 broadly the same now as they were prior to the
07 top kill. This suggests that overall flow
08 rates have not changed much, unless there is
09 some unexplained mechanism in the well.
10 Do you see that?
11 A. I do.
12 Q. Okay. And is that consistent with
13 your understanding on behalf of BP as to how
14 the top kill changed flow rate?

Page 188:17 to 189:07

00188:17 A. I'm not aware on behalf of BP
18 about how the flow rate changed or did not
19 change across the BOP at the time of the top
20 kill.
21 Q. Do you have any understanding on
22 behalf of the company as to whether any
23 obstructions within the BOP or the riser
24 changed as a result of top kill?
25 A. As a result of top kill, I'm not
00189:01 aware of any known or -- or verifiable changes
02 within the BOP itself. I, in witnessing the
03 top kill, observed that two additional holes
04 on the kink on the riser appeared at the end
05 or immediately after the top kill operation.
06 Q. And does the company have any
07 knowledge of how those holes were created?

Page 189:09 to 190:05

00189:09 A. At the time of reviewing the video
10 footage and the data from the top kill, it
11 appears, I believe, that the two additional
12 holes were part of an erosive event.
13 Q. And what -- what's the company's
14 understanding of what caused that erosive
15 event?
16 A. I'm not aware of -- on my behalf
17 or the company's behalf that there was any
18 specific identification of what caused that
19 erosive event at the time.
20 Q. Okay. And the next sentence in
21 Mr. Tooms's e-mail, it says, the pressure drop
22 across the BOP has been relatively consistent
23 and it can be inferred that drill pipe is
24 present and that flow through it has remained
25 relatively unchanged.
00190:01 Do you see that?
02 A. I do.
03 Q. Okay. And on behalf of the

04 company, do you have any reason to -- to think
05 that's not the case?

Page 190:07 to 190:25

00190:07 A. At the time in my capacity I
08 was -- excuse me. I was not aware of any
09 pressure data being taken at and around the
10 top kill or any analysis around understanding
11 the impact of top kill on the BOP.
12 Q. Okay. And you said at the time in
13 your capacity. Are you aware of any -- any
14 such analyses now?
15 A. Some analyses was conducted that I
16 participated in as part of a privileged
17 process.
18 Q. Okay. And setting aside the
19 privileged, were any other analyses that
20 you're aware of since top kill around the
21 pressure and how it changed?
22 A. I'm not aware or I do not
23 recollect any exposure to pressure data
24 related to the top kill process that is not
25 part of a privileged conversation.

Page 191:25 to 192:06

00191:25 Q. And I -- I think I'm asking a
00192:01 different question, which is: If there's not
02 a pressure -- if there's not a change in the
03 pressure drop across the BOP, does that
04 indicate that there hasn't been a significant
05 change in whatever instructions --
06 obstructions are within the BOP?

Page 192:08 to 192:14

00192:08 A. The pressure drop across the BOP
09 is an indication of -- of potentially as a
10 result of multiple obstructions within the
11 BOP. And the fact that the total pressure
12 drop does not change does not indicate that
13 there are not significant changes at any one
14 of these restrictions within the BOP.

Page 192:20 to 193:08

00192:20 Q. Okay. And I understand what
21 you're saying, that there could be multiple
22 restrictions and they could have changed in a
23 way that did not change the overall pressure
24 drop. That's what you're saying?
25 A. That is what I'm saying.

00193:01 Q. Okay. So the -- if the -- if the
 02 BOP pressure stayed the same over time, then
 03 the net restriction across the BOP or the
 04 addition, it's -- I'll start this over. If
 05 the BOP pressure stayed the same across the
 06 BOP over time, the cumulative effect of
 07 whatever restrictions were operating within
 08 the BOP stayed the same?

Page 193:10 to 194:16

00193:10 A. I would say that the cumulative
 11 pressure drop across the system has stayed the
 12 same, as evidenced by the pressure drop of --
 13 of pressures. It does not imply at this stage
 14 anything about the physical condition of any
 15 one of those locations.

16 Q. Right. And I'm not asking about
 17 any one of those locations. I'm asking about
 18 the cumulative effect of any restrictions
 19 within the BOP. If there's no change in the
 20 BOP pressure differential, what does that mean
 21 about whether there's any changes in the
 22 restrictions themselves?

23 A. If there's no change in the total
 24 pressure drop across the BOP, then the
 25 pressure drop across the BOP has changed. But
 00194:01 I do not believe you can infer any other
 02 information about individual restrictions
 03 within the BOP.

04 Q. But I'm not asking about
 05 individual restrictions, I'm asking about the
 06 cumulative restriction across the BOP.

07 A. The cumulative restriction is an
 08 additive affect of all of them. The only
 09 cumulative effect that can be inferred from
 10 your statement is that the pressure drop has
 11 stayed the same.

12 Q. And what does that mean?

13 A. That means that when you look at
 14 the -- the additive pressure drops across any
 15 restrictions in the system, the additive
 16 pressure drop has stayed the same.

Page 195:24 to 196:01

00195:24 Q. Okay. Let me ask you to look at
 25 tab 169. Have you seen this document before?

00196:01 A. I -- I have not.

Page 196:03 to 196:08

00196:03 (Exhibit Number 9514 marked.)

04 Q. On the first page there should be
05 an e-mail, which is the first page, from Doug
06 Wood. And it's sending this analysis to
07 Trevor Hill and Paul Tooms; is that right?
08 A. That's correct.

Page 196:16 to 197:14

00196:16 Q. Let me ask you to turn to page 12.
17 And it's 275. And if you see there's a
18 heading there, results interpretation,
19 pressure loss across the shear rams, annulars
20 and riser kink restriction. Do you see that?
21 A. I do.
22 Q. Okay. And Mr. Wood says, the
23 diagnostic pressure measurements at the choke
24 vent indicate a relatively constant pressure
25 loss of between 229 psi and 310 psi.
00197:01 Do you see that?
02 A. I do.
03 Q. He says, in addition, the pressure
04 loss across the blind shear rams is relatively
05 small, between 60 and 120 psi; is that right?
06 A. That's right.
07 Q. Okay. Then he says, this
08 indicates that the pressure loss across the
09 blind shear rams, annulars, riser kink and
10 riser was not a significant component of the
11 pressure loss between the below BOP sensor and
12 the riser outlet.
13 Do you see that?
14 A. I do.

Page 197:22 to 198:12

00197:22 Q. Okay. What do you understand that
23 to mean on behalf of the company?
24 A. I would look at the total pressure
25 drops across those individual rams and
00198:01 consider that it is, in fact, a substantial
02 part of the total pressure drop measured
03 across the BOP.
04 Q. Is it fair to say -- and I think
05 we've talked about this already -- that the
06 smaller the pressure drop across a given piece
07 of equipment, the less obstruction to flow is
08 within that piece of equipment, all else being
09 equal?
10 A. Assuming that everything else
11 could be equal.
12 Q. Okay. Then that would be correct?

Page 198:14 to 198:20

00198:14 A. It would be correct.
 15 Q. I said if everything else is equal
 16 and you repeat that caveat, then is it correct
 17 that the larger the pressure difference -- or
 18 the smaller the pressure difference across a
 19 piece of equipment, the -- the less
 20 obstruction is within that piece of equipment?

Page 198:22 to 199:25

00198:22 A. If everything could be held
 23 constant. But in this case it cannot be
 24 constant.
 25 Q. And why can't it be constant?
 00199:01 A. Because we're talking about a
 02 series of restrictions and any change in one
 03 restriction cascades to the next because it
 04 changes the fluid.
 05 Q. How does that work?
 06 A. This is a pressurized fluid which
 07 contains a significant amount of gas. It has
 08 a pressure envelope. As the pressure of the
 09 liquid drops, gas is released and the
 10 properties of the liquid change.
 11 Q. So if a given obstruction is
 12 removed, the pressure would go down, right?
 13 A. If -- if a -- if a given
 14 restriction is removed, the pressure of the
 15 fluid, the pressure drop will go down.
 16 Q. Okay. And how would that affect
 17 the properties of the fluid?
 18 A. If the fluid pressure in this case
 19 increases because the pressure drop has gone
 20 down, then the amount of gas released changes.
 21 Q. How does it change? Does -- I
 22 mean, just cause --
 23 A. Less -- less gas is released at
 24 that point and it's carried through to the
 25 next point.

Page 200:14 to 200:17

00200:14 Q. On behalf of BP, are you aware of
 15 any analyses that the company did looking at
 16 erosion of any of the BOP rams as a result of
 17 top kill?

Page 200:23 to 201:04

00200:23 A. Outside of what's done under the
 24 legal privilege, I'm not aware of any analyses
 25 that investigates the erosion of the BOP rams.
 00201:01 Q. Okay. Are you aware on behalf of

02 the company of any communications from BP to
03 the United States that discussed how top kill
04 would affect the flow rate?

Page 201:06 to 202:02

00201:06 A. I'm aware that -- I'm not aware of
07 any documents within the incident team at the
08 time that discussed how top kill would change
09 the flow rate.
10 Q. Okay. Whether or not it was
11 within the incident team at the time, are you
12 aware of any such documents?
13 A. I don't recollect documents that
14 discussed a change of flow as a result of top
15 kill.
16 Q. Okay. And to bring it back within
17 the scope, are you aware of any discussions
18 about how top kill would affect obstructions
19 or how it would result -- whether it would
20 result in erosion?
21 A. Outside of -- of privileged
22 process, I'm not aware of any such discussions
23 or analyses.
24 Q. Okay. And you -- you didn't learn
25 of any such discussions or analyses in
00202:01 preparing for this deposition?
02 A. I don't believe so.

Page 202:08 to 202:09

00202:08 Q. Can we mark this as 9515, please?
09 (Exhibit Number 9515 marked.)

Page 203:10 to 203:13

00203:10 Q. Okay. Let me ask you to turn to
11 tab 185. And this is a document that's been
12 previously marked exhibit 9316 and ends with
13 Bates number 58 -- 5870579.

Page 203:18 to 203:21

00203:18 Q. Okay. Who's Bob Merrill, to your
19 knowledge?
20 A. Bob Merrill is a reservoir
21 engineer.

Page 205:15 to 205:25

00205:15 Q. Okay. Let's turn to the first
16 e-mail from Kate Baker at the top of the

17 chain, and she's describing the work that
18 Mr. Merrill did. And she says, he assumes
19 that the flow regime (chokes) did not change
20 with time as the reservoir depletes.
21 Do you see that?
22 A. Yes, I do.
23 Q. Okay. So in this analysis,
24 Mr. Merrill is assuming that there's no
25 erosion in the flow path; is that fair?

Page 206:03 to 206:07

00206:03 A. I don't understand what
04 Mr. Merrill is referring to or --
05 Q. Okay. If the chokes aren't
06 changing over time, it means they're not
07 eroding, right?

Page 206:09 to 206:25

00206:09 A. I'm not sure what chokes
10 Mr. Merrill is referring to.
11 Q. What chokes could he be referring
12 to?
13 A. I'm -- I'm not sure that I
14 understand what chokes he is referring to.
15 From a reservoir perspective, I'm not sure
16 what choke represents.
17 Q. What does choke mean to you?
18 A. A choke is a limitation and a
19 restriction in a flow path.
20 Q. Okay. And we've talked about
21 chokes a lot today, right?
22 A. We have.
23 Q. Okay. Do you have reason to think
24 he's using that in a different way than we
25 talked today?

Page 207:02 to 207:20

00207:02 A. I'm -- I don't know how he's using
03 it. He does not specifically talk about
04 chokes in either the BOP or LMRP, which I
05 would understand. If he's referring to chokes
06 that relate to -- to well -- wellheads or
07 reservoirs, I don't understand those
08 principles.
09 Q. Okay. We've talked a little bit
10 about the cutting of the riser.
11 Did BP do any analysis as to
12 how cutting the riser would affect the flow
13 rate?
14 A. The decision to cut the riser was

15 come to by the incident team. If there was
16 a -- an analysis, I'm not aware of it.
17 Q. Okay. And cutting -- if there
18 were -- if there was any obstruction in the
19 riser, cutting the riser, it would eliminate
20 that obstruction, correct?

Page 207:22 to 209:08

00207:22 A. Can you be specific about cutting
23 and location?
24 Q. Well, if -- if it's cut at the
25 bottom of the riser right where it connects to
00208:01 the LMRP, then that would eliminate any
02 obstruction in the riser itself.
03 A. It would -- it would remove any
04 obstruction downstream of the cut.
05 Q. Okay. And did BP do any analysis
06 of how that would affect -- the removal of
07 that obstruction would affect flow rate?
08 A. I'm not aware that the -- if the
09 incident team conducted any such analysis.
10 Q. Okay. And I'm asking about BP
11 particularly, whether or not it's attached to
12 the incident team or not, did BP do any
13 analysis of whether cutting the riser or
14 removing any obstruction in the area would
15 increase flow rate?
16 A. It is my understanding that all
17 work conducted was conducted under the
18 auspices of the incident team and Unified
19 Command.
20 Q. Okay. And so I take it you're not
21 aware, sitting here today on behalf of the
22 company, of any communications the company had
23 with the United States as to how cutting the
24 riser would affect flow?
25 A. I'm not aware of any analysis or
00209:01 communication within the incident team about
02 how cutting the riser would alter flow.
03 Q. And I think you said a moment ago,
04 you're also -- you're not aware of anything
05 outside the incident team, either?
06 A. As I said before, I believe that
07 all work that was done, was done under the
08 auspices of the incident team.

Page 209:15 to 209:25

00209:15 (Exhibit Number 9516 marked.)
16 Q. Have you seen this document
17 before?
18 A. Yes, I have.
19 Q. And what is this?

20 A. The cover page is an e-mail from
21 me to Paul Tooms, David Brookes, Simon
22 Webster, and John Nyholt, and it introduces
23 the presentation material from inspection of
24 the MC252 riser as it was recovered from the
25 seabed.

Page 210:20 to 211:05

00210:20 Q. And there's no -- there are no
21 conclusions set forth here as to what BP
22 thinks the appearance of the riser means as
23 far as what obstructions were inside it and
24 what -- how it affected flow rate; is that
25 fair?

00211:01 A. That is correct.

02 Q. Okay. Did BP use this document in
03 any further analyses as to identifying
04 obstructions or looking at how the riser
05 affected flow rate?

Page 211:09 to 212:06

00211:09 A. At this stage, my team, members of
10 my team, reviewed the recovered information to
11 understand the current condition in the riser,
12 what was found in the riser, and where it
13 might have come from.

14 Q. And what conclusions did your team
15 reach?

16 A. That the kinked riser contained
17 two pieces of drill string. Those pieces of
18 drill string were badly damaged, crimped,
19 cracked. There was significant erosion of the
20 kink in the riser.

21 We also discovered that there
22 were tool joints, one tool joint in the riser,
23 and that one piece of the drill string
24 terminated some 12 feet from the upstream end
25 of the riser.

00212:01 Q. Anything else that your team
02 concluded as a result of the inspection?

03 A. There was also other pieces of
04 small debris in the riser, some of which were
05 subsequently linked back to the junk-shot
06 intervention.

Page 212:12 to 212:14

00212:12 Your team wasn't able to come
13 to any conclusions about when any of the --
14 the debris or the erosion took place?

Page 212:18 to 216:22

00212:18 A. The external manifestations of the
19 erosion going on inside could be related back
20 to documentary evidence from subsea video of
21 the riser in situ. So there were six holes in
22 the riser. We could identify which of those
23 occurred on which dates and link them back to
24 that event.

25 Q. Okay. And aside from the six
00213:01 holes, was there any way to link what you saw
02 upon reviewing the riser after pulling it up
03 from the water and when a particular event
04 occurred?

05 A. There are a couple of -- as part
06 of subsequent analysis of this, there were a
07 couple of items that could be drawn as part of
08 this.

09 Q. And what were those?

10 A. Firstly, as I -- as I mentioned,
11 identification of six holes on the riser could
12 be linked back to documentary evidence. An
13 open crack was found on the underneath of the
14 riser of -- of -- behind the kink and the
15 surface of the kink. This was through a crack
16 and could be linked back to the removal
17 process of the riser from the BOP.

18 The identification of two
19 pieces of drill string at this point
20 highlighted an issue above the -- where those
21 drill pieces occurred, and subsequent
22 inspections of the -- the riser and the drill
23 strings therein led to some indication of --
24 of when the damage to some portions of the
25 drill string, and the timing of their
00214:01 appearance in the -- at this section of the
02 riser were drawn.

03 Q. Okay. You mentioned an open crack
04 on the underneath -- underneath the kink, and
05 you said that that was linked to removal of
06 the riser from the BOP.

07 How do you know that?

08 A. The -- the crack was a through
09 crack, and it penetrated all the way through
10 to the internal of the riser such that through
11 that crack, you could see the drill pipes.
12 And there is a large body of video evidence
13 that indicated that there was no leak or
14 emission of hydrocarbon from that crack. It
15 was under the same conditions as the rest of
16 the kink, and so the conclusion was that the
17 crack was not present while the riser was
18 in situ.

19 Q. Okay. Because had it been, you
20 would have noticed --

21 A. There would have been a leak of
22 hydrocarbon from it.

23 Q. Okay. And you mentioned the
24 identification of two pieces of drill string,
25 and you talked about how you found additional
00215:01 information later on about when the strings
02 were damaged and how they appeared in the
03 riser.

04 Can you talk about that?

05 A. There were two pieces of drill
06 string. One piece extended from the upstream
07 cut end -- that's the BOP end of the riser
08 section -- all the way through to the
09 downstream cut towards the end furthest from
10 the BOP, and that was a piece of pipe that
11 continued on into the -- the render of the
12 riser on the seabed.

13 The second piece of drill
14 string extended some 12 feet into the -- the
15 riser, and x-ray imaging of it showed that it
16 had been prone to some damage. There was --
17 it was sheared at one end. And in a
18 subsequent inspection when we removed a window
19 in the riser to allow us to inspect that
20 portion, it was found to be a tool joint that
21 was suffering from severe erosion damage.

22 Q. And did BP come to a conclusion
23 about when those pieces of drill pipe got into
24 the riser?

25 A. A conclusion was drawn about the
00216:01 last point at which it could have got into the
02 riser.

03 Q. And when was that?

04 A. Immediately prior to the collapse
05 of the riser.

06 Q. Because once it was kinked,
07 there's no way to get a drill pipe through the
08 kink?

09 A. That's correct.

10 Q. Did BP do any calculation of the
11 cross -- cross-sectional flow area at any
12 point along the riser after pulling it out of
13 the water?

14 A. A model was developed. Part of
15 the inspection on the Olympic Challenger was a
16 photogrammetry study conducted by Welaptega.

17 Q. Okay. And aside from the
18 Welaptega work -- and we'll talk a little bit
19 more about that in a minute -- did BP do
20 anything else to calculate cross-sectional
21 areas?

22 A. Only through the Welaptega model.

00217:01 (Exhibit Number 9517 marked.)
 02 Q. And it -- the first page ends
 03 4621974.
 04 Have you seen this document
 05 before?
 06 A. Yes, I have.
 07 Q. Okay. Can you describe what it
 08 is?
 09 A. I believe it's a -- a series of
 10 slides taken at the second inspection of the
 11 recovered riser conducted at the Michoud
 12 facility in New Orleans.

Page 218:15 to 221:06

00218:15 Q. What -- what techniques were used
 16 in the first investi- -- in the first
 17 inspection?
 18 A. Some ultrasonics were done around
 19 the kink section, photogrammetry was done of
 20 the whole riser, computer radiography of
 21 sections of the riser, and limited internal
 22 visual inspection.
 23 Q. What -- what type of limit -- what
 24 type of internal visual inspection was
 25 possible?
 00219:01 A. Effectively, eyeball visual
 02 inspection. You'll get a look at inside,
 03 point some cameras inside, but we couldn't
 04 get -- there may have been some borescope
 05 work, limited borescope work. I can't
 06 remember. I'd have to refresh myself.
 07 Q. Okay. So are we talking basically
 08 just looking in the -- the outlet and the
 09 inlet of the riser and looking inside either
 10 of the holes? I mean, because there weren't
 11 any other holes cut, were there?
 12 A. No holes were cut. If there
 13 was -- internal inspection initially would be
 14 an eyeball or a camera lens close to orifices.
 15 I would have to remind myself if we actually
 16 had borescope capability on the back of
 17 Olympic Challenger. That may be possible, but
 18 I just can't remember.
 19 Q. And what -- what techniques were
 20 used in the second inspection?
 21 A. I believe there's some
 22 confirmation of the ultrasonics. There was a
 23 repeat radiographic scan of the system using,
 24 instead of a gamma source, a high energy x-ray
 25 source, internal -- definitely internal
 00220:01 borescope and internal videography.
 02 We also were allowed to open
 03 up selected windows on the riser by cutting
 04 out windows, and we could do hardness testing

05 on the drill strings. And we also asked -- or
06 I requested, if we found any debris, if we
07 should recover it or not.

08 Q. Okay. And what was the answer?

09 A. The answer was, if -- if it was --
10 if there was debris there, then absolutely
11 catalog it. And if it could be recovered,
12 then recover and bag it for protection.

13 Q. And what conclusions did BP draw
14 as a result of these two inspections?

15 A. Largely the ones that I covered in
16 the previous answer. We could determine that
17 there was substantial occlusion of the kink by
18 two sections of drill string, that there was
19 internal erosion around the -- the kink in the
20 riser, and that that erosion did, in fact,
21 connect up to the holes that appeared on the
22 riser.

23 We confirmed the size of the
24 drill string to be five-and-a-half inch drill
25 string. And we took both visual and x-ray
00221:01 images of the tool joint that was on the
02 sheared section of riser for further analysis.

03 Q. Okay. And you know that -- all
04 that information, what did that tell the
05 company about how any obstructions within the
06 riser would have affected flow rate?

Page 221:09 to 221:24

00221:09 A. At this stage, all that I could
10 relay back to the incident team was that the
11 erosion holes that had appeared over the
12 period between the 28th of April and recovery
13 or -- or removal of the riser from the stack,
14 the holes that appeared all connected up to a
15 large expansive area of erosion on the
16 internal surfaces and that there were, in
17 fact, two pieces of drill string that were
18 firmly trapped within the kink. Those drill
19 strings were flattened and cracked and had
20 holes in them.

21 Q. And you prefaced that by saying,
22 at this stage.

23 Was there anything else BP
24 concluded at a later date?

Page 222:05 to 223:08

00222:05 A. Outside of any privileged
06 information, analysis of the drill strings and
07 their location led to a conclusion that the
08 left-hand drill string would actually connect
09 to the right-hand drill string and would be

10 positioned underneath it, that the significant
11 damage to the tool joint on the left-hand
12 tool -- drill string did not occur at the
13 location that the drill string was found and
14 had to have occurred elsewhere.

15 Q. And what, if anything, did BP
16 conclude as a result of that about the effect
17 of the riser on flow rate?

18 A. I don't believe that any
19 conclusion was possible with the information
20 available about the impact of the riser on
21 flow rate, other than that the riser did
22 present a resistance to flow, a choke on the
23 flow rate.

24 Q. Okay. And did BP do anything to
25 analyze how significant that choke was?

00223:01 A. As part of this analysis and
02 subsequent analyses of the Welaptega
03 information, it was attempted to determine
04 cross-sectional areas for a number of sections
05 through the -- the collapsed risers.

06 Q. And in doing that, did BP reach
07 any conclusions as to how -- how those
08 cross-sectional areas affected flow rate?

Page 223:12 to 224:07

00223:12 A. At this point, this analysis could
13 only conclude about -- that selected
14 cross-sections, or sections taken through that
15 recovered riser section, either did or did not
16 cause a restriction to flow.

17 Q. And how did BP conclude that some
18 did and some did not?

19 A. By evidence of erosion patterns on
20 them.

21 Q. So if -- if a particular
22 cross-section showed evidence of erosion, then
23 it was concluded that it prevented a
24 restriction to flow?

25 A. It represented a significant
00224:01 restriction to flow.

02 Q. Did BP do anything to quantify
03 those restrictions to flow?

04 A. There was insufficient information
05 available to do that at the time.

06 Q. Okay. Has BP done anything since
07 then to quantify the restrictions to flow?

Page 224:11 to 224:16

00224:11 A. Subsequent analysis that's --
12 that -- that tried to look at that was subject
13 to privilege.

14 Q. Okay. And you said that the
15 company identified areas in which there was
16 evidence of erosion.

Page 224:18 to 225:13

00224:18 knowing whether the -- at what point in time
19 that erosion occurred during the response?
20 A. Some of the erosion could be
21 linked to time. Not all of it.
22 Q. Okay. And how could some of it be
23 linked to time?
24 A. There was two key pieces of
25 information. One was the sheared drill
00225:01 string. The tool joint of that drill string
02 trapped in the riser showed significant
03 erosion damage. That erosion damage could not
04 have occurred in situ and had to have appeared
05 prior to the collapse of the riser.
06 The -- the second piece -- or
07 pieces of information relate to the holes in
08 the riser that appeared over a period of time.
09 And it -- it could be shown that the -- that
10 the erosion part within the riser all
11 connected up. And so there's documentary
12 evidence of when those erosion holes
13 manifested themselves.

Page 226:09 to 227:10

00226:09 Q. Okay. Mr. Knox, I think before
10 the break we had marked 9517, this PowerPoint
11 from Dan Keck.
12 Do you see that?
13 A. I do.
14 Q. Okay. What was the purpose of
15 that document?
16 A. To document and present the
17 physical evidence recovered as part of the
18 second inspection of the recovered riser from
19 Macondo.
20 Q. Okay. And is that specific to
21 Mr. Work's radiography work, or is that
22 broader than that?
23 A. This is a -- Mr. Keck?
24 Q. Keck.
25 A. This is a repeat and extended
00227:01 inspection of the recovered riser and it's not
02 necessarily related to previous subsea
03 radiography work.
04 Q. Okay. Who decided to recover the
05 riser and inspect it?
06 A. The decision on recovery of the
07 riser section came from the command center.

08 Once it was recovered, I was asked to mobilize
09 to do inspection on it. I don't know who made
10 that decision or request within the center.

Page 228:10 to 228:17

00228:10 (Exhibit Number 9518 marked.)
11 A. I believe I have.
12 Q. What do you understand this
13 document to be?
14 A. It's discussing the clearance for
15 individuals to inspect the riser and there's
16 an outline of riser recovery procedure and an
17 outline of techniques to be used.

Page 229:16 to 229:19

00229:16 Q. Yeah. And then going to the
17 attachment.
18 A. The attachment? I believe this
19 came out of Unified Command.

Page 230:02 to 231:02

00230:02 Q. Okay. Looking to the summary on
03 the first page of the attachment, it says,
04 examination of this component after recovery
05 could provide input insight on -- then it
06 lists three things.
07 Do you see that?
08 A. I do.
09 Q. First is, possible configuration
10 of drill pipe and pipe tool joints currently
11 within the BOP.
12 Is that your understanding of
13 one of the purposes of looking at the -- the
14 riser?
15 A. That was one of the stated
16 objectives on this document, yes.
17 Q. Okay. And how -- how does looking
18 at the riser after recovering it provide
19 insight on what's going on within the BOP?
20 A. First of all, it's confirmation
21 that there are, in fact, two pieces of
22 riser -- sorry -- two pieces of drill string
23 within the riser. And an attempt to walk out
24 where those pieces of drill string come from
25 and if they were connected to one another at
00231:01 some point in the past.
02 Q. And why is that important?

Page 231:05 to 231:22

00231:05 A. Knowing where these pieces of
 06 string came from, they give us indications of
 07 where other pieces of string may be. In
 08 particular, was there any connectivity between
 09 these pieces of string and string penetrating
 10 the upper part of the BOP and connecting to
 11 the BOP itself.
 12 Q. And then the second item is flow
 13 rates present when the riser was still
 14 attached to the BOP.
 15 How does looking at the riser
 16 provide insight into the flow rate when the
 17 riser was attached?
 18 A. I don't believe we could draw any
 19 conclusions at -- at this point on flow rate
 20 but we could determine that there was flow
 21 damage within the -- the -- the kink of the
 22 riser.

Page 232:01 to 232:13

00232:01 Q. Okay. And then the third item is
 02 other matters and then in the parentheses it
 03 talks about a few things, including erosion.
 04 And is that the erosion that
 05 we talked about earlier?
 06 A. That is part of it, yes.
 07 Q. Okay. Looking to the next
 08 paragraph, the -- the last sentence says, the
 09 information will also be of value to the
 10 investigation team to refine their lines of
 11 enquiry.
 12 Do you see that?
 13 A. I do.

Page 233:12 to 233:17

00233:12 Q. Okay. And when you got the
 13 e-mail, what did you understand investigation
 14 team to mean?
 15 A. I always understood the
 16 investigation team to mean that Unified
 17 Command.

Page 234:21 to 235:05

00234:21 Q. Okay. Why were these activities
 22 time-critical?
 23 A. My communications with the
 24 incident team were that ongoing discussions on
 25 intervention options required as many answers
 00235:01 as it could get and, therefore, anything --
 02 any information we could provide on the riser,

03 the strings in it, and how that might impact
04 any intervention plan on the BOP was fairly
05 urgent.

Page 235:24 to 235:24

00235:24 (Exhibit Number 9519 marked.)

Page 238:07 to 238:07

00238:07 (Exhibit Number 9520 marked.)

Page 238:15 to 239:12

00238:15 Q. Okay. And is that from the second
16 inspection?
17 A. I believe it is, from the
18 timeline.
19 Q. You say, I do not want to
20 interpret this but it is possible that it is
21 junk shot material and would, therefore, imply
22 communication between the left-hand string and
23 the choke and kill lines.
24 Do you see that?
25 A. Yes, I do.
00239:01 Q. Okay. What did you mean by that?
02 A. This is material that we did not
03 expect to see, of a nature that we did not
04 expect to see. And if it was the -- related
05 to the junk shot, my understanding is that the
06 junk shot process initiated at the choke and
07 kill lines, that's where the material was
08 pumped into the system. And if this was junk
09 shot material, then there is a flow
10 communication between the input into the BOP
11 and the -- the point at which this debris is
12 found.

Page 239:17 to 240:05

00239:17 Q. Okay. What made you think this
18 might be junk shot material?
19 A. The nature of it. It -- it -- it
20 appeared to be woven material.
21 Q. And then you ask, how important is
22 it to you if you -- if you needed to be
23 removed, then I will get on to the lawyers
24 right away to see what can be done. And
25 Mr. Tooms responds, yes, it is very important
00240:01 to know what the debris is.
02 What's your understanding of
03 why it was important to know what the debris
04 was?

05 A. Because it would --

Page 240:08 to 240:12

00240:08 A. As I said, because it would prove
09 a connection, a flow connection between the
10 input of the junk shot and the riser.
11 Q. Any other reasons?
12 A. No.

Page 240:19 to 240:19

00240:19 (Exhibit Number 9521 marked.)

Page 243:11 to 247:22

00243:11 (Exhibit Number 9522 marked.)
12 MR. BENSON: Thank you.
13 Q. You referenced a little while ago
14 a report that you put together after the
15 inspections. Is this the report you were
16 thinking of?
17 A. It is.
18 Q. Okay. And the subject is riser
19 inspection 3 analysis. Was there a third
20 riser inspection?
21 A. Yes, there was.
22 Q. Okay. What was the third
23 inspection?
24 A. The third inspection was a repeat
25 inspection of the riser. At this time led and
00244:01 supervised by members of the Sandia National
02 lab. And in this case a request had been made
03 to open up the riser so that the drill strings
04 themselves could be accessed and investigated
05 further.
06 Q. Okay. When you say open up the
07 riser, is that -- is that the same as there's
08 reference in some of the documents to cutting
09 windows in the riser?
10 A. In inspection 2 we cut windows,
11 which were panels, out. In the third
12 inspection, the request was to section the
13 riser longitudinally so that it could be
14 peeled off and expose the whole length of the
15 drill strings.
16 Q. Is that -- is that what you, in
17 fact, did in this inspection?
18 A. Largely, yes. The -- the -- the
19 riser was sectioned open.
20 Q. Okay. In this first page there's
21 an e-mail from you to a number of folks,
22 including Paul Tooms and Simon Webster; is

23 that right?
24 A. That's correct.
25 Q. Okay. And one of your -- I guess
00245:01 this is the second to last sentence. You say,
02 I have tried not to take the interpretation
03 too far and conscious that Tim has been
04 looking at what happened in the BOP at the
05 time of the incident.
06 Do you see that?
07 A. Yes.
08 Q. Who do you mean by Tim?
09 A. I believe that to be Tim Allen.
10 Q. And what was Mr. Allen doing?
11 A. I'm not sure of all of Mr. Allen's
12 tasks. But as it relates to this e-mail, once
13 we had identified two pieces of drill string
14 in the recovered riser there was an urgent
15 request to try and understand the genesis of
16 these two pieces. And Mr. Allen was trying to
17 gather information about what drill string
18 would have been expected to be in the BOP
19 because the -- the drill string and the hole
20 string had different diameters all the way
21 down. And he was also trying to gather data
22 from Transocean as to the -- the log for
23 the -- the tool joints in the sequence so that
24 we could compare them to the recovered tool
25 joints.
00246:01 Q. And now the report that's the
02 attachment to this e-mail, this is your
03 attempt to summarize the information gathered
04 from the inspection?
05 A. To summarize some of the
06 information.
07 Q. Okay. And you're reporting it to
08 folks including your boss and Paul Tooms?
09 A. Yes.
10 Q. Okay. And if we could go to
11 the -- the second page of the attachment which
12 ends 6962. And do you see table 1?
13 A. I do.
14 Q. What does that reflect?
15 A. That is data which is recovered
16 from, or -- or generated by the Welaptega
17 analysis that we conducted during the first
18 inspection. And what it is referring to,
19 those locations are -- are not from the
20 upstream side of a feature that we could see
21 on the outside of the riser. Inspection of
22 the riser could -- could identify that at a
23 certain point the -- the riser got deeper,
24 that there was something inside it. And this
25 was reflected in the -- the Welaptega model
00247:01 that had been created.
02 Q. And those results are shown?

03 A. Those -- those results shown. The
04 first column is distance from a reference
05 point, which is the upstream extent of that
06 external bulge. And the second column is the
07 difference between the outside dimensions of
08 upper and lower surfaces of the riser at that
09 cross section.

10 Q. Okay. And the -- the height of
11 the cross section ranges from 4.8 inches to,
12 it looks like 7.09?

13 A. That's correct.

14 Q. Okay. And turning to the next
15 page of your report, you say, it is already
16 known that both drill string sections were in
17 their current positions immediately prior to
18 the collapse of the riser.

19 Do you see that? I'm sorry,
20 I'm one page further, under -- on the
21 right-hand page that you --

22 A. Yes.

Page 248:09 to 251:22

00248:09 Q. Okay. And then you say, the riser
10 when it collapsed can, in fact, be considered
11 to have taken a picture of the position of the
12 drill strings?

13 A. Yes.

14 Q. Okay. And that's because once the
15 riser -- once the kink is in the riser, the
16 drill strings can't really move?

17 A. Once the riser has collapsed,
18 there is intimate contact between the strings
19 and the riser and it's impossible for them to
20 move.

21 Q. Okay. And then later on you say,
22 the damage to this tool joint did not occur
23 here and was done prior to the collapse of the
24 riser.

25 Do you see that?

00249:01 A. I do.

02 Q. Okay. And that was your
03 conclusion as well?

04 A. That was.

05 Q. Okay. And again, the riser
06 collapsed roughly on day two after the
07 incident?

08 A. 22nd of April, to my
09 understanding.

10 Q. And then at the -- at the bottom
11 of this page the last sentence says, there are
12 a number of locations within the BOP where
13 such damage could have occurred. And then
14 there's a colon but there's nothing else. Did
15 you -- is there more to it in your original

16 version of this report?
17 A. This is the only version of this
18 report.
19 Q. Okay.
20 A. I -- I had discussed prior to
21 writing this report some of the conclusions
22 that I was coming to with members of the
23 incident team, asked them if this is of value.
24 They asked me to go in and write it up and
25 then bring it back as quickly as possible.

00250:01 I returned to my desk, wrote
02 this up immediately, got to the point -- I was
03 conscious that I was only going to draw
04 conclusions that I could provide substantive
05 evidence for. As -- as activated in this
06 document, I really don't, until the next page,
07 realize that I had stepped away from
08 supportable conclusions to speculation and --
09 and stopped.

10 Q. Okay. And I think you said this
11 but just to be clear. Did anyone tell you to
12 stop or to remove any of the text, or this is
13 your own decision?
14 A. This was all done at a single
15 sitting live edit of this document.

16 Q. Okay. And what is the purpose of
17 this report?
18 A. The purpose of this report was
19 that having now conducted three inspections on
20 the recovered riser, I believe there were some
21 pieces of information about the history of the
22 drill strings in here which could possibly
23 have a bearing on intervention options being
24 considered for the BOP, which is why I
25 approached Mr. Tooms to see if -- if at this

00251:01 stage this was relevant to the decisions they
02 would like me to make.

03 Q. Okay. And he said -- he said yes?
04 A. He asked me to go away and write
05 up my thoughts on the matter and return it to
06 him.

07 Q. Okay. And there's a heading here
08 on this page. It says, initial interpretation
09 and you say, the above discussion is directly
10 verifiable by physical measurement and is,
11 therefore, taken (by the author) as fact?
12 A. Yes.

13 Q. Okay. And that's everything we've
14 talked about so far?
15 A. That's everything we talked about.

16 Q. Okay. And you gave this
17 information to Mr. Tooms and others for them
18 to use in their discussions as part of the
19 Unified Command about well intervention?
20 A. I -- I fed it back in to the

21 engineering design team who were looking at
22 the interventions, yes.

Page 252:08 to 252:11

00252:08 (Exhibit Number 9523 marked.)
09 Q. Have you seen this document
10 before, Mr. Knox?
11 A. I -- I have.

Page 252:17 to 253:12

00252:17 Q. Do you know -- if we turn to the
18 exhibit -- I'm sorry, the attachment, which is
19 the Welaptega report from July 22nd, do you
20 know whether this is the final iteration of
21 the report?
22 A. From memory, I don't.
23 Q. Okay. Do you recall whether there
24 are any versions after -- or when the last
25 version was, roughly?
00253:01 A. I do not.
02 Q. And do you know why the -- the
03 e-mail that's the front of this exhibit from
04 Marie MacCormick is dated August 17th but
05 the -- the report itself is dated July 22nd?
06 Do you know why that is?
07 A. There were a number of questions
08 that I had been looking at trying to resolve
09 so I did have contact with Marie MacCormick
10 beyond the original report --
11 Q. Okay.
12 A. -- of this version.

Page 254:09 to 254:21

00254:09 Q. Okay. And you said you had had
10 discussions with Ms. MacCormick relating to
11 the report. What did you talk to her about?
12 A. The key interest that I had in
13 this report was trying to position the
14 riser -- sorry -- the drill strings inside the
15 riser.
16 Q. Okay. And is that what we were
17 just talking about that was -- you discussed
18 in your report that was our last exhibit?
19 A. The -- it related to positioning
20 of the direct position of the -- the drill
21 strings inside the Welaptega model.

Page 255:12 to 255:15

00255:12 Q. Okay. But I take it drafts were

13 provided to BP for BP to comment on?
14 A. I regularly received draft copies
15 from Tyler de Gier or Marie MacCormick.

Page 257:18 to 260:09

00257:18 Q. Okay. Let me ask you to turn to
19 page 32 of the report itself. And do you see
20 table 4?
21 A. I do.
22 Q. Okay. What was table 4 about?
23 A. The Welaptega model as now
24 constructed provided an external picture of
25 the -- the riser. I had asked Welaptega to
00258:01 insert the drill strings into the riser to
02 account for the approximate riser thickness
03 and once that model was built, I asked them to
04 take cross section areas across the 3D model
05 to give me an approximate readout on cross
06 sectional area.
07 Q. Okay. And so there are three
08 different columns with cross sectional area.
09 And this is cross -- I'm sorry. These are
10 cross sections through the kink; is that
11 right?
12 A. No. These are cross sections
13 through the riser. I'd have to -- we did this
14 in a number of locations.
15 Q. Okay. I think this particular
16 table is through the kink but --
17 A. We would -- I'd have to go back
18 and --
19 Q. -- I'll check that.
20 A. There was a -- yes. This is from
21 upstream of the kink across the kink to
22 downstream of the kink.
23 Q. Okay. And looking at table 4,
24 there's three different cross -- cross
25 sectional areas calculated; is that -- is that
00259:01 correct?
02 A. That's correct.
03 Q. And so the fourth column, it says
04 configuration one unobstructed flow area; is
05 that right?
06 A. That's correct.
07 Q. Okay. And then the sixth column
08 is configuration two obstructed by drill
09 strings flow area; is that right?
10 A. That's right.
11 Q. And that's what you were saying a
12 minute ago, that you asked Welaptega to add
13 that calculation, taking into account the
14 drill strings?
15 A. I didn't -- I believe I asked them
16 to do all of the columns post column 4 because

17 the Welaptega model in principle can only do
 18 up to column 4 because it does external only.
 19 Q. And why did you want them to do --
 20 so you're saying you asked them to do
 21 columns 5, 6 and 7?
 22 A. Yes.
 23 Q. Why did you ask them to do those
 24 columns?
 25 A. Because I'd asked them to take the
 00260:01 existing model, add a wall thickness for the
 02 riser, wall thickness to it, insert drill
 03 strings into it with the appropriate
 04 thickness. And, therefore, columns 5, 6 and 7
 05 were different versions of what I asked them
 06 to do once they had rebuilt the model.
 07 Q. Okay. And why -- why was that
 08 important to you to have them include that
 09 into their analysis?

Page 260:11 to 263:05

00260:11 A. I had the opportunity to test each
 12 of the models in turn. I put the drill string
 13 in there and I was looking to see what
 14 difference the presence of the drill string
 15 and assumptions around the drill string might
 16 have on flow area.
 17 Q. And what effect did they have on
 18 flow area?
 19 A. Each assumption that I made gave a
 20 different answer.
 21 Q. Okay. And adding -- in particular
 22 adding the drill string had the effect of
 23 creating a smaller cross sectional flow area;
 24 is that correct?
 25 A. That's correct.
 00261:01 Q. When you said you had opportunity
 02 to test each of the models in turn, what do
 03 you mean by that?
 04 A. The original model gave me a base
 05 cross section area with no obstruction. As
 06 soon as I put the obstructions in, there were
 07 a number of ways to look at them. I could
 08 look at them as -- as complete obstructions,
 09 i.e., that the drill string had no bore and
 10 had no flow through it, or I could assume that
 11 the drill string that was flattened also had
 12 the ability to carry fluid.
 13 Q. And what assumption did you
 14 choose?
 15 A. Sorry. Can you be more specific?
 16 Q. What -- what assumption did you
 17 choose in terms of either not having a drill
 18 string, a drill string that was flattened, or
 19 a drill string that could carry fluid?

20 A. I did not come to any conclusions.
21 Those were just options available to me.
22 Q. Okay. And are those reflected by
23 the three configurations in table 4?
24 A. Yes, I believe they are.
25 Q. Okay. And in configuration 2,
00262:01 those are in the most -- or the smallest flow
02 areas; is that right?
03 A. That's correct.
04 Q. Okay. And the smallest cross
05 section for configuration 2 is 12.9 inches; is
06 that right?
07 A. That is correct.
08 Q. Okay. And I think we talked about
09 this earlier when we had our high school math
10 interlude. But the -- if we had a -- a
11 three-inch diameter, that's going to be about
12 a seven-square inch cross section?
13 A. Yes.
14 Q. Let me ask you to turn ahead to
15 table 5, which is on page 35 of the report.
16 And this is labeled heights of cross sections
17 through right tool joint. Do you see that?
18 A. Yes, I do.
19 Q. Okay. And this is the same as the
20 data that you set forth in your report that we
21 looked at a few minutes ago?
22 A. That's correct.
23 Q. Okay. And then if we move ahead
24 to table 6, which is on page 37, again,
25 there's calculations of cross sections?
00263:01 A. That's correct.
02 Q. Okay. And these are at the tool
03 joints?
04 A. Some of them are at the tool
05 joints, yes.

Page 263:10 to 264:17

00263:10 Q. Okay. You just said some of them
11 were at the tool joints. Where were the
12 others taken from?
13 A. They -- they were sections along
14 the riser that I -- I chose for comparative
15 reasons.
16 Q. Okay. And why -- why were they --
17 why did you choose these particular sections?
18 A. The particular sections that I was
19 interested in were the ones originally around
20 the tool joints and at the kink, but I also
21 looked at other ones for reference.
22 Q. Okay. And did you -- did you
23 choose all the cross-sections on table six and
24 table four?
25 A. Yes, I did.

00264:01 Q. Okay. And, again, in table six we
02 have cross-sectional flow areas, and in this
03 case they range -- or they're all at least --
04 let's see, 40 square inches or greater; is
05 that right?
06 A. That's right.
07 Q. Based on the cross-sectional flow
08 areas in the Welaptega report, did BP reach
09 any conclusions about how much of a
10 restriction, if any, the riser presented
11 during the flow-in condition?
12 A. I don't believe we did.
13 Q. Okay. Do you know whether this
14 report was provided to the Unified Command at
15 the time it was made?
16 A. I believe this report was to the
17 Unified Command.

Page 264:20 to 264:21

00264:20 Q. Is doing analyses like these part
21 of Welaptega's business?

Page 264:23 to 265:04

00264:23 A. I -- I'm not aware of, in detail,
24 what Welaptega's business is. We requested
25 them to -- to do a photogrammetry study of the
00265:01 riser, which they did. And I interacted with
02 them to see if I could push the analysis one
03 stage further than the basic photogrammetry
04 work that they did.

Page 266:15 to 266:19

00266:15 Q. Okay. So, to your knowledge, I
16 guess you're not sure of what the intervention
17 options are, but you knew that they did not
18 account for having two pieces of drill pipe in
19 the riser?

Page 266:21 to 267:01

00266:21 A. The conversation that I was then
22 engaged with, with the incident team, was that
23 the presence of two pieces of riser -- or two
24 pieces of string in the riser, could
25 theoretically interfere with some of the
00267:01 options they were considering.

Page 267:16 to 267:24

00267:16 (Exhibit Number 9524 marked.)
17 Q. Mr. Knox, have you seen this
18 document before?
19 A. I -- I believe I have.
20 Q. Okay. And what is this?
21 A. My understanding is that these are
22 photographs taken as part of the internal
23 inspection of the BOP as it was recovered from
24 the seabed.

Page 268:12 to 268:14

00268:12 Q. What, if anything, did BP conclude
13 about any obstructions or erosion in the BOP
14 based on this report?

Page 268:18 to 269:18

00268:18 A. I had no access to this
19 information prior to my involvement in
20 privileged work -- work process.
21 Q. Okay. So, to your knowledge, BP
22 didn't -- again, setting aside whatever
23 privileged work there was, to your knowledge,
24 BP didn't do anything with this report in
25 terms of reaching a conclusion about erosion
00269:01 or obstructions in the BOP?
02 A. I had no access to any images or
03 information from the BOP.
04 Q. Okay. And I guess I just want to
05 make sure that, on behalf -- because you're
06 testifying on behalf of the company here --
07 the company didn't have any other analysis
08 based on this document?
09 A. I am not aware of any analysis
10 that was done and I wasn't aware that these
11 images were available at the time.
12 Q. Okay. And you didn't become aware
13 of any such analyses in preparing for this
14 deposition?
15 A. I have not been made aware of any
16 analyses.
17 Q. Okay. What's your understanding
18 of the effect of sand production on erosion?

Page 269:20 to 269:23

00269:20 A. My understanding is that erosion
21 requires a fluid to be moving at significant
22 velocity across the surface and for that fluid
23 to be carrying solids.

Page 270:10 to 270:16

00270:10 Q. That's okay. It should be a -- a
 11 letter that says draft at the top to Pat
 12 Campbell, and the Bates number is 2316364.
 13 Let me know if you've seen
 14 this document before.
 15 A. I have no recollection of seeing
 16 this document.

Page 270:24 to 271:12

00270:24 Q. Okay. Let me ask you to turn to
 25 the second page of this letter. And there's a
 00271:01 heading, additional information PC was not
 02 aware of. Do you see that?
 03 A. I do.
 04 Q. And it says: There are no signs
 05 of general erosion in any surface or recovered
 06 equipment except drill pipe and tool joint in
 07 the kinked riser section.
 08 Do you see that?
 09 A. I do.
 10 Q. And is that consistent with your
 11 knowledge on behalf of the company as to what
 12 erosion occurred in the equipment?

Page 271:14 to 272:12

00271:14 A. My understanding of that statement
 15 is exactly as it says, that -- I'm not aware
 16 of any erosion in any surface other than those
 17 surfaces recovered.
 18 Q. Okay. And then the next statement
 19 is: There is no sand. In fact, no BSNW.
 20 Do you see that?
 21 A. I do.
 22 Q. Okay. What's BSNW?
 23 A. I can't recollect the terminology.
 24 It's used as a production well terminology and
 25 I can't remember what it means.
 00272:01 Q. Okay. Is it related to solids or
 02 is it related to something else?
 03 A. I think it's related to solids and
 04 water, but --
 05 Q. Okay. So as -- as we talked about
 06 before, the category of solids that cause
 07 erosion is broader than sand, right?
 08 A. It is.
 09 Q. Okay. And is -- is the draft
 10 letter here saying that there are no -- there
 11 are no such solids in addition to being no
 12 sand?

Page 272:14 to 272:18

00272:14 A. I can only reflect what's written
15 on that page.
16 Q. Okay. And to your knowledge, was
17 -- was sand ever found in the flow at the
18 Macondo well?

Page 272:20 to 273:02

00272:20 A. I'm not aware of analysis of any
21 of the fluids recovered from the Macondo well.
22 Q. Okay. And as -- as a
23 representative of BP here today testifying on
24 erosion and obstruction, do you have any
25 information on behalf of the company related
00273:01 to whether there's any sand or other solids in
02 the flow?

Page 273:04 to 273:07

00273:04 A. I'm not aware of any analysis,
05 been made aware of any analysis of solid
06 content of Macondo fluids.
07 (Exhibit Number 9525 marked.)

Page 273:19 to 274:21

00273:19 Q. Mr. Knox, do you know whether BP
20 performed any computational fluid dynamics
21 modeling with respect to looking erosion for
22 the Macondo well?
23 A. I'm aware that the incident team
24 did request some CFD modeling.
25 Q. And when you say the incident
00274:01 team, who do you mean? Who in particular
02 requested it?
03 A. I -- I don't know. I -- I know
04 that the -- it was part of the response, and I
05 was aware that it was done.
06 Q. And who performed that modeling?
07 A. I believe the individual was a
08 Mr. Samir Khana.
09 Q. Okay. Can you spell that name for
10 us?
11 A. K-h-a-n-a, I believe.
12 Q. And how about the first name?
13 A. S-a-m-i-r.
14 Q. Okay. And what was the nature of
15 modeling that was performed?
16 A. Computational fluid dynamics,
17 models, model velocities of fluids when
18 constrained inside a physical representation

19 of a flow path.
20 Q. Okay. And do you know what
21 particular model was used?

Page 275:03 to 275:21

00275:03 Q. Okay. And does this relate to
04 looking at the burst disks and whether there
05 was any erosion in the burst disk orifice?
06 A. I believe part of modeling was to
07 do with the bursting disks.
08 Q. Okay. What was the rest of the
09 modeling to do with?
10 A. I -- I believe there might be
11 modeling on the riser.
12 Q. Okay. And it was Mr. Khana who
13 did CFD modeling on the riser?
14 A. I'm not sure. I'm -- I'm -- the
15 only person I know who was involved in CFD
16 modeling was Mr. Khana.
17 Q. Okay. What knowledge do you have
18 on behalf of BP in testifying about erosion
19 and obstruction as to any CFD modeling that
20 was done looking at the riser?
21 A. I --

Page 275:23 to 277:05

00275:23 A. I, as part of preparation for
24 this, was made aware of modeling of the riser
25 post erosion holes to understand the patterns.
00276:01 Q. When you say post erosion holes,
02 you mean after the erosion holes in the kink
03 emerged?
04 A. Yes.
05 Q. Okay. But you're not sure who did
06 that modeling?
07 A. I believe it is Mr. Samir Khana.
08 Q. Okay. Do you know roughly when
09 that modeling was done?
10 A. I -- I don't know the dates. I
11 combined it by being post April 20th of April
12 and pre-removal of the riser.
13 Q. Okay. And what were the
14 conclusions from that modeling?
15 A. My understanding was that the
16 modeling was inconclusive.
17 Q. And why was it inconclusive?
18 A. It could not represent the erosion
19 pattern as exhibited on the outside of the
20 riser.
21 Q. Was that a problem BP had had with
22 erosion modeling in the past?
23 MR. COLLIER: Objection, form.

24 A. I haven't been involved in erosion
 25 modeling in the past, so I -- I can't answer.
 00277:01 Q. Okay. Are you familiar with BP's
 02 erosion model?
 03 A. I am.
 04 Q. Okay. And is that known as SPSS?
 05 A. It's known as SPPS.

Page 277:07 to 277:23

00277:07 Did BP use that model with
 08 respect to the Macondo flow?
 09 A. I believe that model was used on a
 10 number of occasions --
 11 Q. Okay.
 12 A. -- in response.
 13 Q. And what was it used for?
 14 A. To calculate erosion rates at
 15 given velocities.
 16 Q. At which particular point in the
 17 flow?
 18 A. SPPS cannot model particular
 19 points in a flow. Its inputs are fluid
 20 conditions, fluid properties, solid loading
 21 and velocity.
 22 Q. Okay. And what did the SPPS
 23 modeling conclude?

Page 277:25 to 278:11

00277:25 A. The -- the -- the modeling did not
 00278:01 conclude anything. It provides a velocity, a
 02 local velocity, at which erosion will occur.
 03 Q. And did the modeling require a
 04 particular assumption about flow rate?
 05 A. The model does not use flow rate;
 06 it uses local velocity.
 07 Q. Okay. And how is velocity related
 08 to flow rate?
 09 A. The -- the velocity of a fluid is
 10 a function of flow properties, the system
 11 through which it's flowing and its flow rate.

Page 278:21 to 278:21

00278:21 (Exhibit Number 9526 marked.)

Page 279:24 to 280:08

00279:24 Q. And let me know if you've seen
 25 this document before.
 00280:01 (Exhibit Number 9527 marked.)
 02 A. I believe I have.

03 Q. And what's this document?
04 A. It -- it -- it is a photocopy of a
05 page from a notebook. I believe it to be my
06 notebook.
07 Q. Okay. So these are your notes?
08 A. I believe they are.

Page 283:18 to 284:02

00283:18 Q. Okay. What conversations did you
19 have with Mr. Hill related to flow and
20 erosion?
21 MR. COLLIER: Let me instruct the
22 witness -- for grounds of privilege, let me
23 instruct the witness not to answer that.
24 MR. BENSON: Okay. So there --
25 there's nothing aside from the privilege work
00284:01 stream? That's all I'm trying to get at.
02 MR. COLLIER: Correct.

Page 284:15 to 285:03

00284:15 Q. Sure. I just want to make sure
16 that we've sort of covered all the basis on
17 the topics within your -- within your
18 testimony -- or within your scope.
19 So other than the things
20 we've already discussed, did BP conduct any
21 analysis of the effects of erosion within the
22 BOP, wellbore, or riser on flow rate?
23 A. I can't recollect any.
24 Q. Okay. And the same question,
25 other than what we've already discussed, did
00285:01 BP conduct any analysis regarding any
02 obstruction in the wellbore, BOP, or riser and
03 their effects on flow rate?

Page 285:06 to 285:21

00285:06 A. I cannot recollect any.
07 Q. Okay. And other than what we've
08 already discussed, did BP conduct any analysis
09 relating to the size of the apertures from any
10 of the equipment in the MC252 well?
11 A. The only equipment that I had
12 direct access to was the riser.
13 Q. Okay. And other than what we've
14 talked about, any additional information on
15 those apertures?
16 A. No.
17 Q. Okay. And the same kind of
18 question, other than what we've already talked
19 about, does BP have any additional evidence

20 related to the relationship between erosion
21 and flow rate?

Page 285:23 to 286:01

00285:23 A. I'm not aware of any.
24 Q. Okay. And does BP have any
25 additional evidence related to any
00286:01 obstructions and the flow rate from the well?

Page 286:03 to 286:09

00286:03 A. Other than -- other than what
04 we've already discussed, no.
05 Q. Okay. And other than what we've
06 already discussed, does BP have any additional
07 evidence related to the size of the apertures
08 and their effect on flow rate?
09 A. I'm --

Page 286:12 to 287:07

00286:12 A. I'm not aware of any.
13 Q. Okay. Let me ask you to turn back
14 to -- what was our first exhibit? It's 9500.
15 Do you see that?
16 A. Yes, I do.
17 Q. And we started by talking about
18 page 10 and 11, which are your topics for
19 deposition.
20 A. Yes.
21 Q. Okay. And let me ask you,
22 specifically with respect to topic 20, what
23 did you do to prepare for this deposition?
24 A. With respect to 20, I had a number
25 of meetings with counsel.
00287:01 Q. Okay. Anything else?
02 A. There was one or -- no, two
03 conversations with Mr. Julian Austin, which we
04 touched on topic 20.
05 Q. Anything else you can think of?
06 A. Other than my own recollections
07 and my involvement at the time, no.

Page 288:09 to 288:15

00288:09 Q. Okay. And what did you do to
10 prepare for topic 23?
11 A. I had a number of meetings with
12 counsel over documents, and conversations --
13 two conversations with Mr. Julian Austin, and
14 one conversation with Mr. Simon Bishop that
15 would also touch on this one.

Page 288:20 to 289:15

00288:20 Q. Okay. And any -- anything that we
 21 didn't talk about today that relates to
 22 analysis, calculations, modeling, or estimates
 23 by BP, BP's contractors, or anyone under the
 24 direction of BP relating to obstructions in
 25 the BOP or the riser?

00289:01 A. I'm not aware of any.

02 Q. Okay. And finally, topic 24, what
 03 did you do to prepare with respect to
 04 topic 24?

05 A. On topic 24, I had a number of
 06 meetings with counsel and conversations with
 07 Mr. Julian Austin.

08 Q. And other than what we've talked
 09 about today, are there any analyses,
 10 calculations, modeling, or estimates by BP,
 11 BP's contractors, or any entity working under
 12 the direction of BP relating to the effect of
 13 erosion on the rate of flow from the Macondo
 14 Well?

15 A. Not that I'm aware of.

Page 289:24 to 289:24

00289:24 (Exhibit Number 9528 marked.)

Page 290:18 to 291:07

00290:18 (Exhibit Number 9532 marked.)

19 Q. -- exhibit 9532. And it states --
 20 it's from you, Tom Knox dated Sunday,
 21 July 11th, 2010, and it's to Trevor Hill.
 22 Subject: Top kill and pressure.

23 Trevor, can we have a chat in
 24 the morning about the top kill data? It has
 25 been annoying me for a little while and I
 00291:01 couldn't work out why. I had another look
 02 tonight and I have convinced myself that it
 03 was always doomed to failure.

04 Now, that's pretty clear,
 05 what you're saying there. But how did you
 06 determine that it was always doomed to
 07 failure?

Page 291:11 to 292:04

00291:11 A. The -- the date is July the 11th
 12 by which point I now had a large body of
 13 physical evidence from the recovered riser and
 14 as I was -- as I was looking through that

15 information, I -- I came to the conclusion
16 that the damage to the riser at the point that
17 it was recovered suggested to me that the
18 passage through the -- the kink was now too
19 big.

20 Q. Too big for it to ever work -- for
21 the top kill to ever work?

22 A. In hindsight looking at the -- the
23 damage to the riser, I -- my personal belief
24 was it would not have worked.

25 Q. All right. But just so we're
00292:01 clear, the letter that you wrote on July 11th
02 doesn't say in hindsight and it doesn't say
03 after the fact. It says, it was always doomed
04 to failure. Those were your words, correct?

Page 292:06 to 292:17

00292:06 A. Those are the words I've used on
07 this document.

08 Q. All right. And Trevor Hill is
09 who?

10 A. Trevor Hill was a member of the
11 incident team who was looking at some of the
12 engineering options and flow.

13 Q. All right. You would agree with
14 me also that the top kill and the junk shot
15 were doomed for failure because the flow rate
16 was significantly higher than what BP was
17 saying at the time that this project occurred?

Page 292:21 to 293:04

00292:21 A. I would not agree with you.

22 Q. You don't agree with me? Well,
23 you are aware that BP's own scientist have
24 determined that if the flow rate of the oil
25 was greater than 13,000, that it would fail?

00293:01 A. I was not aware of that.

02 Q. Well, you're copied on some of the
03 documents that discussed that. You didn't
04 know that?

Page 293:07 to 293:13

00293:07 A. I was not aware of that.

08 Q. The modeling that was used for the
09 top kill was at -- an assumption of 5,000 for
10 the flow rate, right?

11 A. I was not a member of the team
12 modeling top kill and I do not recollect any
13 conversation about top kill process.

Page 293:19 to 294:23

00293:19 Q. What was your role in the top kill
20 and junk shot project?
21 A. I had no role in the top kill or
22 junk shot project.
23 Q. All right. And I saw you talked
24 earlier about that e-mail that referred on
25 May 25th, the day before the three-day top
00294:01 kill operation was to begin. You assured the
02 government science advisors including the
03 secretary of energy, Steven Chu, and there's a
04 quote that the junk shot is no longer on the
05 flow sheet. It is not an option under
06 consideration. Remember having done that?
07 A. I remember that e-mail.
08 Q. All right, sir. So if you had no
09 role in this, then why are you writing that
10 e-mail?
11 A. I was -- as contributor to the
12 incident team, there was a daily briefing. I
13 was in London and the briefing on the day
14 provided the timeline for the upcoming
15 interventions and on that date the
16 intervention flow sheet was presented to -- to
17 everyone and it was quite clear that for today
18 top kill is going to happen. The junk shot is
19 not planned and the junk shot, if it is used,
20 will be subject to a completely separate
21 discussion at Unified Command level and with
22 the agreement of the government as to the next
23 step.

Page 295:02 to 295:07

00295:02 Q. I mean, why did they choose you to
03 write the e-mail? Not why did you put the
04 words in there that you chose, but why are you
05 the one that's reporting to the United States
06 government and to the secretary of energy,
07 Steven Chu?

Page 295:09 to 295:14

00295:09 A. Firstly, I was not asked to write
10 that e-mail and, two, I was not aware that I
11 was reporting to the government. I was
12 reporting -- reporting to a group that I had
13 ongoing conversations with as part of the
14 incident team.

Page 295:18 to 296:14

00295:18 in? Okay. I'm referring to
 19 BP-HZN-2179MDL07383732 and it is exhibit
 20 number 9530.
 21 (Exhibit Number 9530 marked.)
 22 Q. And it's a string, e-mail string
 23 consisting of six pages. And if you go to the
 24 third page of this sequence,
 25 BP-HZN-2179MDL07383734 of the same exhibit
 00296:01 number, at the very top it says from Tom Knox
 02 dated May 25th, 2010. And then there's a list
 03 of individuals, Ray Merewether, Richard
 04 Garwin, Arun Majumdar, David Keese, George
 05 Cooper, Harold Brown, John Holdren, Fleckman,
 06 Hurst, Marcia McNutt, Cotrell, Bowen,
 07 O'Connor, and then the line on the bottom
 08 Steven Chu.
 09 Do you see Steven Chu?
 10 A. I do.
 11 Q. Okay. And that's from you, Tom
 12 Knox?
 13 A. That -- that is.
 14 Q. That's an e-mail you sent?

Page 296:16 to 297:02

00296:16 A. I sent that e-mail.
 17 Q. And you sent it while working for
 18 BP?
 19 A. I sent it while working for BP.
 20 Q. And it was prepared in the regular
 21 course of business, correct?
 22 A. It was prepared on my interaction
 23 with the -- the incident.
 24 Q. Right. In the regular course of
 25 BP business?
 00297:01 A. Yep.
 02 Q. Is that yes? I'm sorry. I caught

Page 297:05 to 297:13

00297:05 A. Yes.
 06 Q. Okay. And it was prepared at or
 07 about the time indicated in the e-mail?
 08 A. Yes, it was.
 09 Q. And it states, the junk shot is no
 10 longer on the flow sheet. It is not an option
 11 under consideration, regards, Tom.
 12 That's you, right?
 13 A. That is me.

Page 298:07 to 298:10

00298:07 Q. All right. And then if you go to

08 the next page, moving chronologically forward
 09 to page 07383733 on the bottom, it's from
 10 Jamie Roberts. Tell us who Jamie Roberts --

Page 298:13 to 299:11

00298:13 Q. Tell us who Jamie Roberts is.
 14 A. I -- I believe Mr. Roberts was
 15 executive assistant to Mr. Kent Wells.
 16 Q. Do they work for BP?
 17 A. They do.
 18 Q. Okay. And they're writing -- Mr.
 19 Roberts is writing to you, correct?
 20 A. That's correct.
 21 Q. And he says, hi, Tom. I was
 22 forwarded the stream of e-mails below. I just
 23 wanted you to be aware that the United States
 24 Department of Energy, Secretary Chu is on that
 25 e-mail chain. There's a chance that he may
 00299:01 take your comment out of context. I believe
 02 the correct response is that the junk shot is
 03 not on the current approved operations for the
 04 top kill procedure but it is -- but it is it
 05 -- but is it not still an option if needed and
 06 appropriate approvals will be sought as the
 07 time comes, question mark. Correct?
 08 A. I think --
 09 Q. Thanks for clarifying, Jamie.
 10 And you responded to that?
 11 A. I did respond to that.

Page 299:17 to 300:16

00299:17 Q. Yeah, that's his first name.
 18 Thanks for this. I do agree
 19 that the junk shot is not currently a front
 20 runner for the top kill, but it is always a
 21 contingency plan and could be instigated when
 22 needed.
 23 You wrote that, right?
 24 A. I did.
 25 Q. And you had knowledge of what you
 00300:01 were writing at the time?
 02 A. I did have knowledge of what I was
 03 writing.
 04 Q. All right, sir. You wrote it in
 05 your capacity as an employee of BP?
 06 A. I wrote it as -- yes.
 07 Q. And it was prepared in the regular
 08 course of business?
 09 A. Yes.
 10 Q. And it was prepared at or about
 11 the time indicated in the e-mail?
 12 A. Yes.

13 Q. Okay. Who is Andy Inglis? Was he
14 the BP of -- BP CEO of exploration and
15 production?
16 A. I believe he was.

Page 301:01 to 301:04

00301:01 Q. Were you aware that the modeling
02 that was done for the top kill and the junk
03 shot was based on an assumption of a flow rate
04 of 5,000 barrels per day and not greater?

Page 301:07 to 301:19

00301:07 A. I was not aware of any modeling
08 done as part of top kill.
09 Q. All right. All right. Is it your
10 position that no modeling was done, or is it
11 your position that you don't know if any
12 modeling was done?
13 A. It is my position that I was not
14 aware of any modeling being done.
15 Q. Were you aware that BP at its
16 highest level including Tony Hayward confirmed
17 knowing that if the well was flowing above
18 18,000 barrels per day then the top kill
19 operation would not be successful?

Page 301:22 to 302:03

00301:22 A. I was not party to any discussion
23 around the process of top kill.
24 Q. Were you aware that senior
25 administration officials, including BP
00302:01 engineers, acknowledge that if the flow rate
02 was greater than 13,000 barrels per day, the
03 top kill operation would fail?

Page 302:06 to 302:11

00302:06 A. I was not aware of any
07 communication.
08 Q. Now, you agree with me that if the
09 flow rate was significantly higher than what
10 was modeled at the time that that would make
11 the top kill project always doomed to failure?

Page 302:14 to 302:14

00302:14 A. No.

Page 303:21 to 303:21

00303:21 (Exhibit Number 9529 marked.)

Page 307:10 to 307:10

00307:10 (Exhibit Number 9533 marked.)

Page 311:24 to 311:24

00311:24 (Exhibit Number 9531 marked.)

Page 312:07 to 312:14

00312:07 Q. What was your role in people talk?
08 I mean not engineering discussions. What was
09 your role in the top kill?
10 A. I had no direct role in top kill.
11 Q. What was your role in the junk
12 shot?
13 A. I had no direct role in the junk
14 shot.