IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF LOUISIANA

IN RE: THE MACONDO WELL NO. 1 INCIDENT IN THE
GULF OF MEXICO, ON APRIL 20, 2010

EXPERT REPORT OF
DAVID G. CALVERT

SUBMITTED ON BEHALF OF
WEATHERFORD U.S., L.P.

DATED: October 14, 2011

David G. Calvert
Signature: David G. Calvert

TREX-22761

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Introduction

I have been asked to offer my opinions regarding the following in connection with the blowout of the Macondo Well on April 20, 2010:

1) What purposes did the Weatherford M45AP float collar serve in the cementing of the 9 7/8" x 7" production casing on the Macondo Well on April 19 and 20, 2010?
2) Did the Weatherford M45AP float collar serve the purposes for which it was (a) designed by Weatherford; (b) intended and utilized by BP; and (c) intended and utilized in the oil and gas industry in the cementing of production casing?
3) Did the 9 7/8" x 7" production casing cement fail to achieve zonal isolation of the hydrocarbon zones and pay sands in the production interval of the Macondo Well?
4) Was the Weatherford M45AP float collar a cause or contributing cause of any failure of the 9 7/8" x 7" production casing cement to achieve zonal isolation of the hydrocarbon zones and pay sands in the production interval of the Macondo Well?
5) Could hydrocarbons from the pay sands in the production interval of the Macondo Well have flowed through the shoe track cement and have done so without forcing cement out of the shoe track?

Opinions and Conclusions

The documents, reports, and references that I have reviewed address a number of factors pertaining to the production casing cement job that may have caused or contributed to the Macondo Well blowout on April 20, 2010. The loss of life, the loss of the Deepwater Horizon Rig, and the effects on the environment likely make this blowout the worst in U.S. history. On April 19, 2010, BP's well plan called for a Weatherford M45AP Flow-Activated Mid-Bore Auto-Fill Float Collar to be run in the Macondo Well in the cementing of the 9 7/8" x 7" production casing. Based on my review of the facts, circumstances, reports and other data and information, I have reached the following conclusions regarding the cement job in the well, the condition of the cement in the well and the Weatherford float collar:

1) The M45AP auto-fill float collar that was run in the hole by BP served two purposes in the cementing of the 9 7/8" x 7" production casing: (a) a landing profile for the cementing plugs; and (b) preventing flow back of cement slurry into the casing from the annulus.

2) The M45AP auto-fill float collar that was run in the hole by BP for the 9 7/8" x 7" production interval fulfilled the functions for which it was designed by Weatherford, intended and utilized by BP and intended and utilized by the oil and gas industry, namely: (a) providing a landing profile for the cementing plugs; and (b) preventing flow back of cement slurry into the casing from the annulus. The M45AP float collar served its widely accepted, oil and gas industry purpose as a cement placement accessory in the cementing of production casing. Once the cement is properly pumped in place, the float collar assists in keeping the pumped cement in place by preventing wet cement from flowing back into the casing while waiting on the cement to set.

3) The annular production casing cement failed to achieve zonal isolation of the hydrocarbon zones and pay sands in the production interval of the Macondo Well and was not an acceptable barrier to hydrocarbon flow for the temporary abandonment of the well. The failed negative pressure test established that the Macondo Well lacked zonal isolation and that hydrocarbons were entering the well from the pay sands of the formation.

4) The Weatherford M45AP float collar was not a cause or contributing cause of the failure of the annular production casing cement to achieve zonal isolation of the hydrocarbon zones and pay sands in the production interval of the Macondo Well.

5) The annular production casing cement allowed for movement of hydrocarbons from the pay sands, which hydrocarbons could have then moved through the cement in the shoe track. Hydrocarbons can move through cement as a result of, among other things, (a) the cement's reduced hydrostatic head as it transitions from liquid to solid, or (b) mud contamination. Either one of these things could have created flow paths for the movement of formation hydrocarbons through the shoe track cement without displacing the shoe track cement.

Qualifications

I am currently self-employed as a consultant to the oil and gas industry in the areas of well cementing and lost circulation. My qualifications and experience focus on the cementing of oil and gas wells, along with casing hardware and other equipment associated with cementing. I also have experience in the cementing of water wells, geothermal wells and steam wells.

A summary of my qualifications and experience is provided in my CV, which is attached as

Exhibit A. In particular, I authored the "Preface" to the industry text "Well Cementing: Second Edition," and reviewed a number of the chapters within that text for accuracy. "Well Cementing: Second Edition" is a comprehensive review of the scientific fundamentals, engineering considerations and operational procedures associated with cementing.[1] In addition, while chairman of API's Subcommittee 10 – Well Cements, I led the rewrite of "Worldwide Cementing Practices, First Edition January 1991." My CV contains a list of all publications that I have authored. I have testified as an expert witness in one arbitration proceeding and rendered expert opinion in two other cases as shown in Exhibit B.

I have approximately fifty years experience in the oil and gas industry. My focus in the last forty years has been the design, testing, selection, and supervision of cementing services. During this time I have become well versed with industry cementing practices, and the equipment and casing hardware that is used in the running and cementing of wellbore casings, including liners and deepwater cementing operations. I have been a member of the American Petroleum Institute's Committee for Well Cements since 1967 and served as that Committee's chairperson for three years. I have been a member of the Society of Petroleum Engineers (SPE) for over 30 years and served as a member of the Journal of Petroleum Technology's (JPT) editorial committee and as a member of the SPE committee in charge of selection of papers for SPE's Annual Technical Conference. I teach primary cementing and cementing practices for Petro Skills, a training company serving the oil and gas industry. My academic training includes a B.S. in Chemistry from the Northeastern State University in Tahlequah, Oklahoma.

I have held various positions with Mobil Oil, Dowell, and Dowell/Schlumberger, where I gained experience in the design, testing, selection, and supervision of cementing services. I have

[1] "Well Cementing: Second Edition," Erik B. Nelson & Dominique Guillot ed. (2d ed. 2006) at p. 1.

personally tested bow spring centralizers in accordance with applicable API and International Standards Organization (ISO) standards and observed the testing of float collars, using the testing procedures outlined in the API and ISO recommended practices. In May of 2000, I became an independent consultant specializing in well cementing and lost circulation.

<u>Discussion</u>

As stated above, I have been asked to give my opinions on the 9 7/8" x 7" production casing cement job in the Macondo Well, and in particular the use and function of the Weatherford M45AP Flow-Activated Mid-Bore Auto-Fill Float Collar in connection with this cement job. I have also been asked to analyze whether zonal isolation was achieved and to discuss potential avenues in the cement through which hydrocarbons could flow. The opinions in this report are based on my experience in the area of well cementing, published industry standards and practices regarding well cementing, and the documents, depositions, reports, and well data reviewed.

A. BACKGROUND

On April 20, 2010, BP Exploration and Production was in the process of temporarily abandoning the Macondo Well in Mississippi Canyon Block 252, Gulf of Mexico. The well was located in 5,067 feet of water and drilled to a total depth of 18,360 feet. Total depth was originally planned to be 20,600 feet, but lost circulation problems experienced below the 9 7/8" liner caused BP to alter the planned total depth of the well. The amended total depth was 18,360 feet, approximately 2,200 feet shallower than planned.

A total of eight (8) strings of casing had been run and cemented in the well, with the last intermediate casing string being a 9 7/8" drilling liner set at 17,168 feet. The 9 7/8" x 7" production casing was run from the sea floor, through the previous shoe at 17,168 feet, into the open hole to 18,304 feet. The remaining 56 feet of open hole, to the total depth of 18,360 feet, is what is known as the "rathole" in the industry. The production casing was landed at 18,304 feet. The shoe track assembly was from 18,304 feet to 18,115 feet. The production casing was planned to be cemented from 18,304 feet total depth to approximately 17,250 feet.

In the days leading up to the blowout on April 20, 2010, BP and Transocean were engaged in the process of establishing two barriers to hydrocarbon flow so that the Macondo Well could be temporarily abandoned. The barriers were (1) the 9 7/8" x 7" production casing cement,[2] and (2) the surface cement plug.[3] BP's "Zonal Isolation Requirements" set forth in its GP 10-60 require two verified barriers to hydrocarbon flow prior to abandonment of a well. The cementing of a production string is considered a primary cementing operation, the objective of which is to place cement between the casing and the well bore to seal the annulus and achieve zonal isolation of the hydrocarbons in the formation.[4] In the Macondo Well, the primary cementing job was the cementing of the 9 7/8" x 7" production casing. BP's plan called for cementing of the annular space between the casing and well bore and for cementing the shoe track.[5] As stated above, the primary cementing job obtains zonal isolation solely through the placement of cement between the casing and the well bore, thus preventing any hydrocarbon flow from the formation.

Zonal isolation of hydrocarbons in a well is a critical aspect of well construction. The oil and gas industry recognizes that:

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[2] BP Well Program, April 15, 2010 at § 9.2.3, p.6, BP-HZN-MBI 00128345.

[3] BP Well Program, April 15, 2010, at § 9.2.4, p.8, BP-HZN-MBI 00128345-347.

[4] "Petroleum Well Construction," Michael J. Economides, Larry T. Watters and Shari Dunn-Norman, eds. (1998) at p. 215; "Worldwide Cementing Practices: Chapter 4 Primary Cementing," Fred Brooks & W.H. Grant Jr. (1st ed. 1991) at p. 53; "Cementing," Dwight K. Smith ed., Society of Petroleum Engineers, Monograph Vol. 4 (Rev. ed. 1990) at p. 1.

[5] Halliburton 9 7/8" x 7" Production Casing report, April 18, 2010, BP-HZN-CEC 021441, 449; BP Well Program, April 15, 2010 at § 9.2.3, p. 6, BP-HZN-MBI 00128345.

> Of all the operations performed during the drilling and completion of a well, ***none is more important to the safe and efficient operation of the well than a successful primary cement job***.[6]

If zonal isolation is achieved, "the economic, liability, safety, governmental, and other requirements imposed during the life of the well will be met."[7]

B. WEATHERFORD FLOAT COLLAR PURPOSES

In the context of primary cement jobs, a float collar serves as a tool that aids in the placement of cement. First, the float collar provides a landing profile for the cementing plugs.[8] Second, after cement displacement stops, and while waiting on the cement to set, check valves in the float collar temporarily prevent flow back of the wet cement in the event the hydrostatic pressure of the column of fluids in the annulus is greater than it is in the casing.

(i) Landing Profile for the Cementing Plugs

In the cementing of the 9 7/8" x 7" production casing on the Macondo Well, the float collar's first function was to serve as a landing profile for the cementing plugs. The cementing plugs segregate the cement slurry from casing fluids while the slurry is being pumped. The bottom plug is run before the cement. When the bottom plug lands on the float collar, pressure builds up until a diaphragm in the plug shears, allowing cement to be pumped through the bottom plug, into the shoe track and up the annulus. The top plug follows the cement slurry. The top plug lands on the bottom plug, and cement displacement stops.

From the perspective of the cement job, pressure spikes on gauges at the surface demonstrate that the cement plugs landed or "bumped" on the float collar. Here, the bottom plug landed on the float collar at 12:29 am on April 20, 2010, and the top plug landed 11 minutes

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[6] "Worldwide Cementing Practices: Chapter 4 Primary Cementing," § 4.1 at p. 53

[7] "Petroleum Well Construction" at 8-1.1, p. 215.

[8] Worldwide Cementing Practices: Chapter 4 Primary Cementing," § 3.3 at p. 36-37; "Cementing," Dwight K. Smith ed., Society of Petroleum Engineers, Monograph Vol. 4 (Rev. ed. 1990) at p.70-71.

later, 12:40 am.[9] These pressure indications demonstrate that the top plug landed on the bottom plug which was seated in the landing profile of the float collar.[10] It is my opinion that the Weatherford M45AP float collar fulfilled the landing profile function for which it was designed by Weatherford, intended and utilized by BP, and intended and utilized in the oil and gas industry.

(ii) Check Valve Function

The float collar's second function as it relates to the cementing of the Macondo production casing was to serve as a check valve preventing the back flow of wet cement into the casing while the cement was hardening. The check valve function is widely recognized in the industry and is the float collar's main purpose in the well.[11] The Weatherford M45AP's check valve function was its main purpose in the cementing of the production casing in the Macondo Well. (See Figure 1).

Weatherford's M45AP float collar is designed with two spring-loaded aluminum flapper valves, which serve as a dual check valve system. In this instance, for surge reduction reasons, the float collar was in auto-fill mode, i.e. with the flapper valves open, as the production string was run to total depth. Once the production casing was landed, the flapper valves were, according to reports,[12] converted to one way valves.

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[9] Halliburton 9.875" x 7" Foamed Production Casing Post Job Report, April 20, 2010, HAL_0011210, at 213. BP and Transocean both reported that the bottom plug landed with 673 bbls pumped at 2932 psi, and the top plug bumped with 740 psi over-circulating pressure. Transocean IADC Daily Drilling Report, April 20, 2010, BP-HZN-MBI 00136947; BP Daily Operations Report – Partners (Completion), April 19, 2010, BP-HZN-2179 MDL 00004015.

[10] Halliburton 9.875" x 7" Foamed Production Casing Post Job Report, April 20, 2010, HAL_0011210, at 213.

[11] "Petroleum Well Construction" at 8-5.3, p. 246 ("…the main purpose of the float collar is to prevent the cement from flowing back into the casing.").

[12] Deposition of John Guide, Vol. I at p. 211-213.

Conversion of the float collar required that the well be circulated. The Weatherford M45AP float collar was designed to convert upon circulation of drilling mud at 500 – 700 psi which has a corresponding flow rate of 5 to 8 bpm. BP's reports note a difficulty in establishing circulation in the well after the casing was landed, as eight attempts to break circulation had failed. According to the BP Daily Operations Report, circulation in the well was established on the ninth attempt at 3,142 psi.[13] In my opinion, the float collar converted during the ninth attempt to break circulation at 3,142 psi. The pressure surge that occurred across the float collar when circulation was established exceeded the 500 to 700 psi of pressure at which the float collar is designed to convert. This was confirmed by post job testing done for BP by Stress Engineering Services which demonstrated that the float collar would have converted in the 3,142 psi pressure surge.[14] John Guide, BP's Wells Team Leader, testified that the float collar converted.[15]

The details of the primary cement job for the production casing, including the slurry designs and volumes pumped, are set forth in Appendix One.[16] The primary cement job was started on 19 April 2010 at approximately 7:30 PM and the cement was in place at approximately 12:40 AM on 20 April 2010.[17] (See Figure 2).

At the conclusion of the displacement of the primary cement job, BP and Halliburton conducted a float check test. The float check test is a widely accepted method to verify that there is no back flow or U-tubing of the wet cement. The float check test is conducted by pressuring up on the top plug after the cement pumping is completed, then releasing the pressure and

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[13] BP Daily Operations Report to Partners dated 19 April 2010 p. 4 of 7; BP-HZN-2179 MDL 00004015.

[14] Report by Stress Engineering Services, Inc., November 22, 2010, Section 8.

[15] Depo of John Guide, Vol. I at p. 211-213.

[16] Transocean Daily Drilling Report, April 20, 2010, BP-HZN-MBI 00136947; BP's Daily Operations Report – Partners (Completion) p. 6 of 7; BP-HZN-2179 MDL00004017; Halliburton's Foamed Production Casing Post-Job Report dated April 20, 2010, p. 4, HAL_0011213.

[17] Halliburton's Foamed Production Casing Post-Job Report dated April 20, 2010, p. 3 and 4 - HAL _0011212 and HAL _0011213.

comparing the amount of flow back from the casing to the amount of flow back predicted in pre-job modeling. This test considers the compressibility of the fluids in the casing.

Halliburton's 9 7/8" x 7" Production Casing report dated April 18, 2010[18] sets forth the float check test:

23. BUMP PLUG AND PRESSURE UP TO 500 PSI ABOVE CIRCULATING PRESSURE. CHECK FLOATS AND BLEED BACK NO MORE THAN 6 BBLS. IF 6 BBLS ARE BLED BACK TO THE UNIT, PUMP AN ADDITIONAL 6 BLS OF 14.0 PPG MUD AND HOLD PRESSURE. TIME TO BE DECIDED BY BP COMPANY REPS AND ENGINEERS.

Post-job reports from BP, Halliburton, and Transocean all confirmed that the floats held.[19] The amount of measured flow back (5 barrels)[20] was within what was expected in pre-job modeling (up to 6 barrels),[21] indicating that the floats had held. First-hand reports from personnel at the cementing unit who were measuring flow back, further confirms that actual flow back was less than 5.5 bbls.[22] Lee Lambert of BP and Vincent Tabler, a Halliburton cementer, personally observed 5.5 bbls of flow back, and noted that the flow was a pencil stream that eventually stopped.[23]

From the cementing standpoint, the fact that there was no backflow of wet cement during the float check test establishes that the cement remained in place as pumped. Therefore, it is my opinion that the Weatherford M45AP float collar served its main purpose of checking the back flow of cement. The M45AP auto-fill float collar that was run in the hole by BP for the 9 7/8" x

[18] BP-HZN-CEC 021441.

[19] April 21, 2010 e-mail from Lee Lambert, BP-HZN-2179 MDL 00413137; Halliburton's Foamed Production Casing Post-Job Report dated April 20, 2010, HAL_0011213; Transocean Daily Drilling Report, April 20, 2010, BP-HZN-MBI 00136947.

[20] April 21, 2010 e-mail from Lee Lambert, BP-HZN-2179 MDL 00413137; Halliburton's Foamed Production Casing Post-Job Report dated April 20, 2010, p. 4, HAL_0011213.

[21] BP-HZN-CEC 021441.

[22] BP-HZN-2179 MDL 00413137; Tabler Tallybook, BP-HZN-MBI 00139606.

[23] Lambert and Tabler Testimony as set forth Chief Counsel's Report, Ch. 4.3 at p. 93; Bureau of Ocean Energy Management, Regulation and Enforcement Sept. 14, 2011 Report at p. 54.

7" production interval fulfilled the check valve function for which it was designed by Weatherford, intended and utilized by BP, and intended and utilized in the oil and gas industry. The M45AP float collar served its widely accepted, oil and gas industry purpose as a cement placement accessory in the cementing of production casing.

Technically, the float check test does not conclusively establish that the float collar had converted and that the flapper valves had held. The test did conclusively establish that there was no flow back of cement up the casing after the completion of cement displacement. Because there was near perfect hydrostatic balance between the annular fluids and the casing fluids there may have been no flow back even if the float collar had not converted and the flapper valves were open. In this case, Halliburton's pre-job modeling predicted a differential pressure of only 38 psi between the annulus fluid and the casing fluid.[24] According to calculations performed by the Chief Counsel's petroleum engineering expert Steve Lewis, "fluids inside the casing and the annulus may have been in almost perfect balance with only a 0.8 psi differential."[25] This data demonstrates that there may have been no flow back of wet cement for the flapper valves to prevent.

The Transocean Investigative Report suggested that the "internal casing pressure exceeded that of the annulus" by 53 psi.[26] On this basis, Transocean believes "[h]aving a higher pressure inside the casing means that fluid would flow in the opposite direction – into the annulus."[27] Putting aside the validity of this conclusion,[28] float valves are not designed to prevent such forward flow, rather the float valves are designed to prevent back flow.

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[24] 9 7/8" x 7" Production Casing Design Report dated April 18, 2010 at p. 17, BP-HZN-BLY 107716.

[25] Chief Counsel's Report, Chapter 4 – Technical Findings, text of fn. 301 at p. 284.

[26] Transocean Macondo Well Incident Investigation Report, Vol. 1 at p. 68-70.

[27] Id.

Regardless of whether the casing pressure minimally exceeded that of the annulus, whether there was near perfect balance between the casing and the annulus, whether the annulus pressure minimally exceeded that of the casing, or whether the float valves were open or closed, one thing is certain -- *there was no flow back of cement after cement displacement stopped.* Accordingly, the fundamental purpose of the Weatherford float collar -- preventing *any* flow back of cement -- was fulfilled.

Although there was no flow back of cement as detailed above, operators and cementers prepare plans for instances in which a float collar does not convert. Pressure is applied from the surface on the casing while the cement is setting.[29] Here, both BP and Halliburton had plans to prevent U tubing in the event that the floats did not hold.[30] Because there was no flow back, it was not necessary to hold pressure on the casing: This is in accord with industry practices:

> After a well has been primarily cemented, pressure should be bled from the casing. If the float valve(s) are holding, (i.e. there is no backflow) the casing should be left unpressured while waiting on cement (WOC).[31]

BP's well program stated that at this point in the operations a 300 foot surface cement plug would be set in the production casing from 8,367 feet to 8,067 feet as a second barrier as required in BP's Zonal Isolation Requirements, GP 10-60.[32] The surface cement plug, along with the production casing cement job, would therefore serve as the two barriers required for

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[28] This conclusion would mean that fluids within the casing were able to bypass the cementing plugs, which are seated at the landing profile of the float collar. The cementing plugs have a bump pressure rating of 6800 psi. The maximum pressure exerted upon the cementing plugs based upon all evidence never approached this figure. The positive pressure test further confirms the integrity of the casing and the cementing plugs at the landing profile.

[29] "Well Cementing: Second Edition," at § 11-5.2, p. 366; "Worldwide Cementing Practices: Chapter 4 Primary Cementing," § 4.4 at p. 61-62.

[30] BP Gulf of Mexico SPU Recommended Practice for Cement Design and Operations in DW GoM, Deposition Exhibit 790, BP-HZN-2179 MDL 00360844 at 864; Halliburton 9 7/8" x 7" Production Casing Design Report, April 18, 2010, HAL_0011004. The Halliburton report states "[a]pply appropriate back pressure on casing if floating equipment does not hold properly."

[31] "Worldwide Cementing Practices: Chapter 4 Primary Cementing," § 4.4 at p. 61-62.

[32] BP Well Program, April 15, 2010, at § 9.2.4, p.8, BP-HZN-MBI 00128437; BP GP 10-60, Zonal Isolation Requirements BP-HZN-2179 MDL 00269659 *et seq.*

temporary abandonment in GP-10-60. This confirms that BP did not rely upon or utilize the float collar as a barrier to hydrocarbon flow; rather, BP relied upon and used the Weatherford float collar as a cementing tool to aid in the placement of the production casing cement. My opinion is that the float collar performed all of the functions for which it was designed by Weatherford, intended and utilized by BP, and intended and utilized in the oil and gas industry.

C. ZONAL ISOLATION

As detailed above, achieving zonal isolation of hydrocarbons in the well is critically important. Where zonal isolation is not achieved, catastrophic consequences can occur. The float collar, which is only used as a temporary accessory in the placement of the primary cement job, plays no role in zonal isolation.

One means of evaluating whether a cement job has achieved zonal isolation is a cement sheath evaluation, which includes the cement bond log.[33] This evaluates the presence of cement and the percent bonding. A cement sheath evaluation was not performed. BP performed a negative pressure test, or "inflow test."[34] Operators run a negative pressure test to evaluate the integrity of the downhole cement by hydrostatically underbalancing the well to determine whether there is flow. If zonal isolation has been achieved, the operator should see no flow during the negative pressure test.

The negative pressure test was conducted between 3:00 PM and 8:00 PM on April 20, 2010.[35] While the test was ultimately considered successful, the negative pressure test should have been considered a failure. The fact that the negative pressure test failed establishes that the

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[33] "Well Cementing: Second Edition," at § 15, p. 549; "Worldwide Cementing Practices: Chapter 9 Cement Sheath Evaluation," § 9.1 at p. 127; "Petroleum Well Construction" at Ch. 10, p. 270.

[34] "Well Cementing: Second Edition," at § 15, p. 551.

[35] BP-HZN-BLY00103037.

production casing cement job failed to achieve zonal isolation, and that hydrocarbons were flowing from the formation.

From a cementing standpoint, in a well that is being temporarily abandoned, when the negative pressure test establishes a lack of well integrity, operations towards abandonment cannot continue. In my opinion, the failure of the negative pressure test demonstrates a failed production casing cement job in the Macondo Well. In this situation, industry standards require, and a prudent operator should insist, that remediation actions be undertaken to establish well integrity.[36] Two possible remediation actions were to perform a squeeze job or set a bridge plug.

D. FLOAT COLLAR NOT A CAUSE

Based upon the factors outlined above, it is my opinion that the Weatherford float collar was not a cause or contributing cause of the failure of the annular production casing cement to achieve zonal isolation of the hydrocarbon zones and pay sands of the Macondo Well. Because there was no movement of the production casing cement up the casing, and the cement stayed in place -- either due to the converted flapper check valves or the hydrostatic balance existing in the well -- the float collar played no role in the blowout. The cement, which was not moving during the waiting on cement period, should have hardened in place to provide a complete barrier to hydrocarbon flow from the formation. The float collar functioned as designed and intended to prevent the backflow of wet cement. There was no backflow of wet cement.

It is my opinion that float equipment is not designed to provide a seal against hydrocarbons, and should not be used as such.[37] Float collars such as the M45AP are only

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[36] "Well Cementing: Second Edition," at § 15, p. 549; "Worldwide Cementing Practices: Chapter 6 Remedial Cementing," § 6.1 at p. 83; "Petroleum Well Construction" at Ch. 10, p. 270; "Cementing," Dwight K. Smith ed., Society of Petroleum Engineers, Monograph Vol. 4 (Rev. ed. 1990) at p. 123.

[37] E.g., API RP 65 Part 2, § 5.4.3 (Second Edition, Dec. 2010); API RP 96, Table B.4 – Shoetrack (First Edition, Ballot 1 – April 1, 2011; API RP 10F (Third Edition, April 2002).

designed and intended to be used as casing running and casing cementing tools. They are not designed nor intended to be used as well control devices or physical barriers to hydrocarbon flow.[38] Cement is the industry-standard barrier to prevent hydrocarbon flow in a well such as the Macondo Well. In the Macondo Well, the two barriers to hydrocarbon flow for temporary abandonment of the well were the production casing cement job and the 300 foot surface cement plug to be set in the production casing at 8,367 feet. The oil and gas industry uses cement barriers because cement, upon reaching its compressive strength, creates an impermeable barrier to hydrocarbon flow.

In the Macondo Well, the production casing cement job consisted of the annular cement and the shoe track cement. The shoe track cement was intended to prevent hydrocarbon flow up the casing. Had the production casing cement job at the Macondo Well been successful, the annular cement set in the open hole across all production zones would have been the barrier that prevented hydrocarbon flow from the formation. A successful annular cement job is the only way to ensure that zonal isolation exists. The float collar, sitting at the top of the shoe track, is not designed, intended or used to control the well.

E. POTENTIAL HYDROCARBON FLOWPATHS

Once hydrocarbons flowed from the formation due to the failure of the zonal isolation barrier, the hydrocarbons could have flowed through the failed annular cement either up the annulus or down the annulus to the reamer shoe. (Figure 3). I have not been asked, and this report does not address, whether the hydrocarbons that ultimately led to the blowout of the Macondo Well flowed up or down the annulus; rather, this report addresses whether hydrocarbons could have flowed through the shoe track cement.

[38] API RP 65, Part II, section 3.4 dated May 2010; API RP 96, First Edition, Ballot 1 – April 1, 2011.

It is my opinion that hydrocarbon migration through the shoe track cement could have resulted from (1) the cement's reduced hydrostatic head as it transitioned from liquid to solid; or (2) mud contamination. Either one of these could have created flow paths for the movement of formation hydrocarbons through the shoe track cement. Neither would have displaced the cement out of the shoe track.

(1) Reduced Hydrostatic Head During Cement Transition

As cement transitions from a liquid to a solid, it loses measurable hydrostatic head.[39] Thus, during transition, the cement's ability to control pressures exerted from the formation is reduced.[40] Also during transition, cement builds compressive strength. Upon reaching its solid state, it is the cement's compressive strength that gives it the ability to control formation pressures. The negative pressure test was conducted before the cement reached compressive strength.[41] During the negative pressure test, the drilling mud in the production casing was displaced with seawater creating a hydrostatic underbalance of approximately 2,350 psi.[42] The loss of measurable hydrostatic head in the transitioning shoe track cement, coupled with the hydrostatic underbalancing of the production casing during the negative pressure test, allowed for an avenue for hydrocarbons to flow through the shoe track cement and up the shoe track. Because no steps were taken in the base slurry design of the shoe track cement to control hydrocarbon influx as the cement transitioned from liquid to solid, hydrocarbons from the pay sands could have flowed through the shoe track cement. As such, assuming that hydrocarbons flowed to the reamer shoe, the hydrocarbons could have flowed through the shoe track cement

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[39] "Well Cementing, Second Edition," Erich B. Nelson & Dominique Guillot eds., p. 290 at § 9-3.1 (2006).

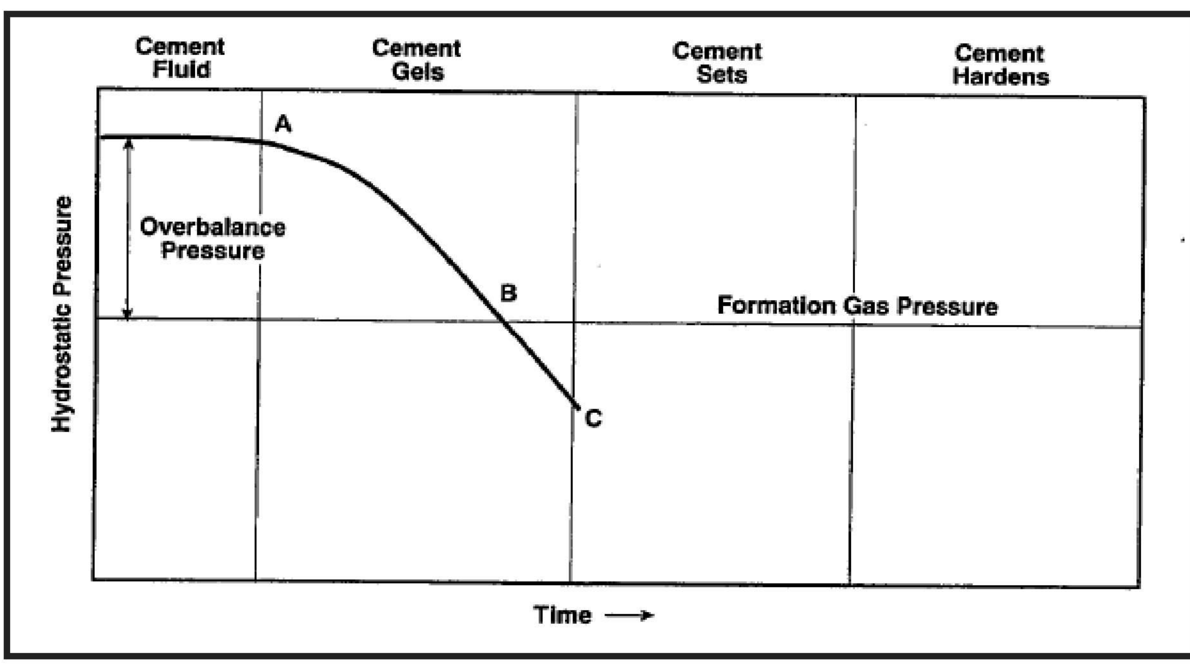
[40] "Well Cementing, Second Edition," p. 290 at § 9-3.1 (2006).; Deposition of Robert M. Beirute, Page 508-511.

[41] Oilfield Testing and Consulting report – Dated August 1, 2011.

[42] Brian Morel ops notes, Exhibit 547, BP-HZN-MBI 00129108 and Exhibit 566, BP-HZN-2179 MDL 00161670

and have done so without forcing cement out of the shoe track. This is explained in further detail below.

Once the cement in a primary cement job is fully displaced, the operator and the drilling contractor must wait on the cement in the well to harden. Cement undergoes a variety of chemical reactions during its transition from a liquid to a solid. During transition, the cement develops compressive strength which allows the set cement to perform its role as a barrier to hydrocarbon flow. However, while the cement is transitioning to a hardened state and building compressive strength, it is also losing its hydrostatic pressure (head). When the hydrostatic head of the transitioning cement falls below the pore pressure of the formation, the cement can no longer control the influx of hydrocarbons from the formation which can then flow through the cement. The charts below illustrate this phenomenon that occurs during the transition of cement as its physical properties change from a fluid, to thickening or gelling, through setting and to hardening, and the corresponding loss in hydrostatic pressure:



[43]

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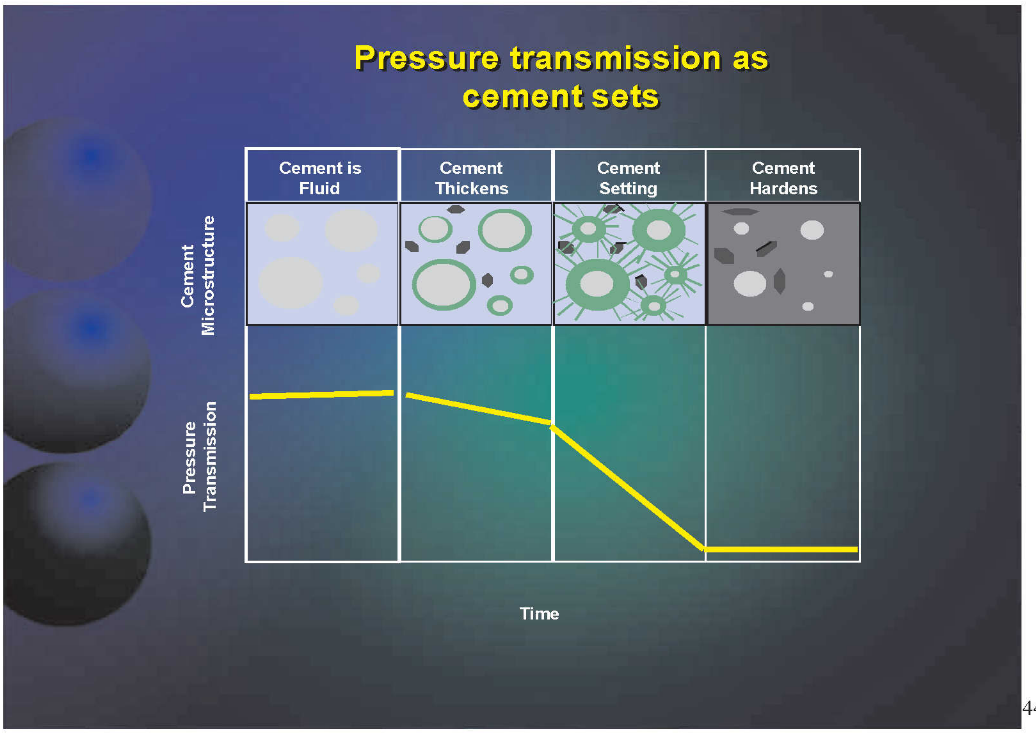
[43] "Petroleum Well Construction" at p. 253, Fig. 9-2.



[44]

As illustrated above, in its liquid phase, cement exhibits full hydrostatic pressure. During the thickening or gel phase, the cement begins to lose hydrostatic pressure. During the setting phase, the cement's loss of hydrostatic pressure rapidly accelerates. At the final phase, when the cement hardens, the cement loses its measurable hydrostatic pressure. At this point, the cement has no effective hydrostatic head but it does have compressive strength which serves as a barrier to flow from the formation.

When cementing a production zone such as the 9 7/8" x 7" production interval in the Macondo Well, the cement slurry must be designed to prevent the migration of formation hydrocarbons that can occur during transitioning of the cement from a liquid to a solid. Steps can be taken in the design of the cement slurry to prevent the migration of formation hydrocarbons into the transitioning cement. If the appropriate steps are not taken in the design of

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[44] Graphic courtesy of BJ Services, Inc.

the cement slurry, as the cement transitions from a liquid to a hardened state, and begins to lose its hydrostatic head, migration paths commonly known as channels can be created by hydrocarbon influx through the cement.[45] The migration paths develop as a result of the hydrocarbons flowing into the transitioning cement as the cement's hydrostatic head falls below the pore pressure of the formation, and occurs without displacing the cement. That is, as the hydrocarbons enter the cement, they create channels or flowpaths. A common place for such channels to occur is at the cement/pipe interface. The cement does not move; rather the hydrocarbons move through the cement.

Halliburton's 9.875" x 7" Foamed Production Casing Post Job Report dated April 20, 2010 sets forth the composition of the base cement slurry that was used in the Macondo Well for the "Lead" cement, "Foamed Tail" cement and "Shoe Track" cement.[46] Hydrocarbon migration was a concern. Different slurry options were available to BP and Halliburton. The requested cement slurry across the zones of interest, or the production zone, was designed with hydrocarbon migration control properties. The decision was made to run a foamed cement slurry across the zones of interest behind the production casing. This was accomplished by the addition of nitrogen to the base cement slurry for the "Foamed Tail" cement.[47] No steps were taken to control hydrocarbon migration in the cement slurry for the "Shoe Track" cement.[48] Thus, the "Shoe Track" cement did not have the ability to prevent the migration of hydrocarbons during its transition from liquid to solid.

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[45] "Well Cementing: Second Edition," at § 9-3, p. 290-92 and § 9-6; "Worldwide Cementing Practices: Chapter 4 Primary Cementing," § 4.7 at p. 66-69; "Petroleum Well Construction" at Ch. 9, § 9-2.1.1, p. 253. Dr. Robert Beirute, a consultant retained by BP, testified to this process, referring to these channels as "wormholes." (Deposition of Dr. Robert Beirute, Vol. II, Aug. 30, 2010 at p. 508);

[46] Halliburton's 9.875" x 7" Foamed Production Casing Post-Job Report, April 20, 2010, p. 2, HAL_0011210, at 11211.

[47] Id.

[48] Id.

As discussed above, the negative pressure test conclusively established that zonal isolation did not exist in the Macondo Well. Thus, hydrocarbons were exiting the formation and entering the annulus because the annular cement did not establish zonal isolation and prevent hydrocarbon migration. The hydrocarbons in the annulus could have moved upwards or downwards to the reamer shoe.[49] Once at the reamer shoe, the hydrocarbons would come into contact with the shoe track cement, which, as discussed above, would have allowed for further migration of hydrocarbons through the shoe track cement without displacing the shoe track cement.

(2) Cement Contamination

The migration of hydrocarbons that can occur during the transitioning of cement can be exacerbated by contamination of the cement. The contamination of cement alone could also compromise the cement job, and allow hydrocarbon flow. With respect to the Shoe Track cement in the Macondo Well, contamination could have occurred due to rat hole inversion. Generally, rat hole inversion occurs when lighter weight mud in the rat hole swaps positions with heavier weight cement in the shoe track, resulting in mud/cement contamination in the shoe track. The mud in the rat hole at the Macondo Well was 14.0 ppg.[50] The Shoe Track cement was 16.74 ppg.[51] Thus, this creates the potential for the 16.74 ppg cement to swap places with the 14.0 ppg mud, contaminating the shoe track cement.

Contamination of the Shoe Track cement can result either in channels in the semi-set cement, or at the interface of the semi-set cement with the interior of the production casing. Again, assuming that the hydrocarbons flowed to the reamer shoe, cement contamination could

[49] Again, I offer no opinion as to whether the hydrocarbons exiting the formation moved up or down the annulus.

[50] BP Daily Operations Report – Partners (Completion), BP-HZN-2179MDL 00004012.

[51] HAL_0011211.

have formed a channel or channels for hydrocarbon flow through the shoe track cement. The hydrocarbons could have flowed through the shoe track cement without forcing cement out of the shoe track.

This concludes my report. I reserve the right to modify or change my opinions and the comments of this report, as new information becomes available.

Converted Shoe Track

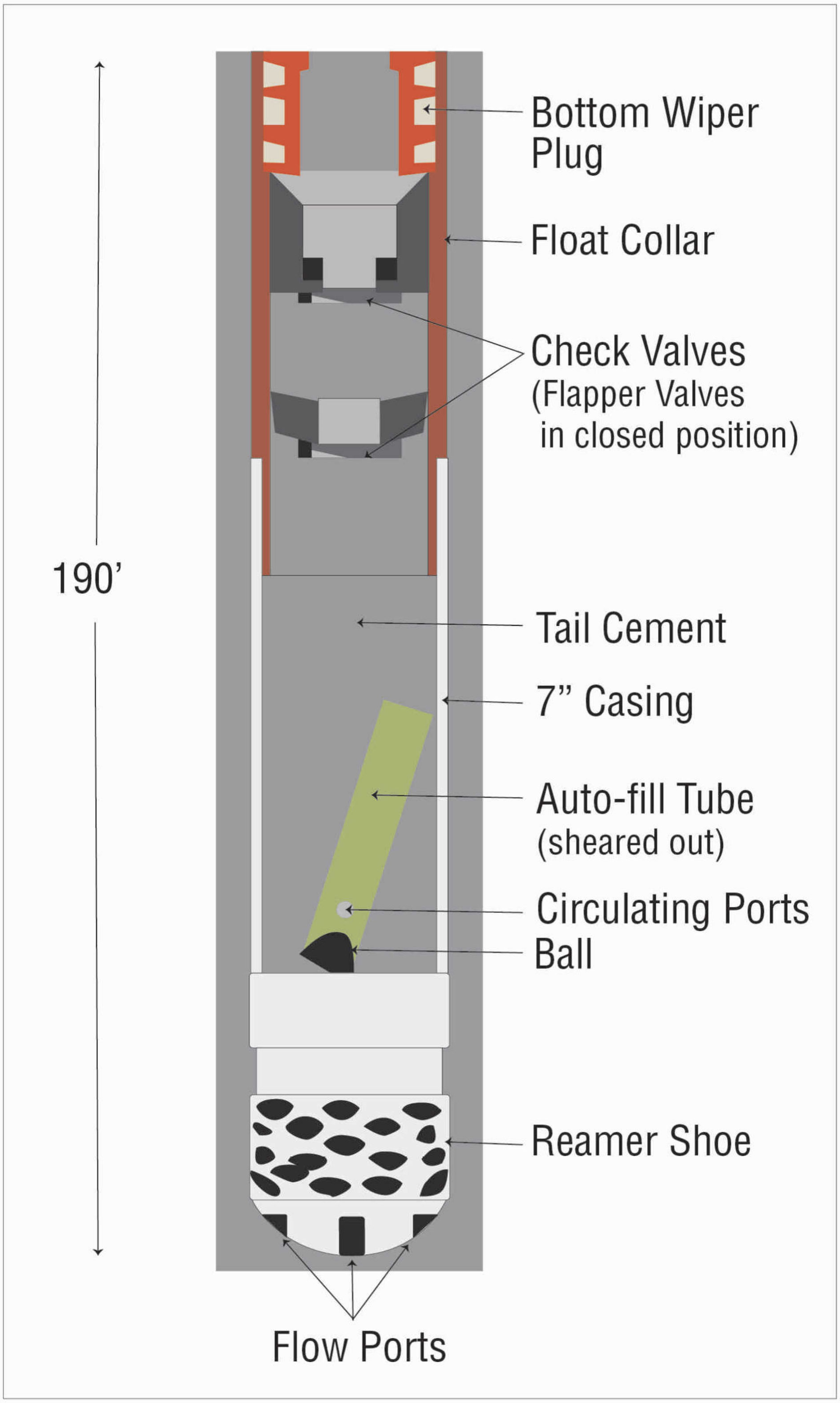


Figure 1

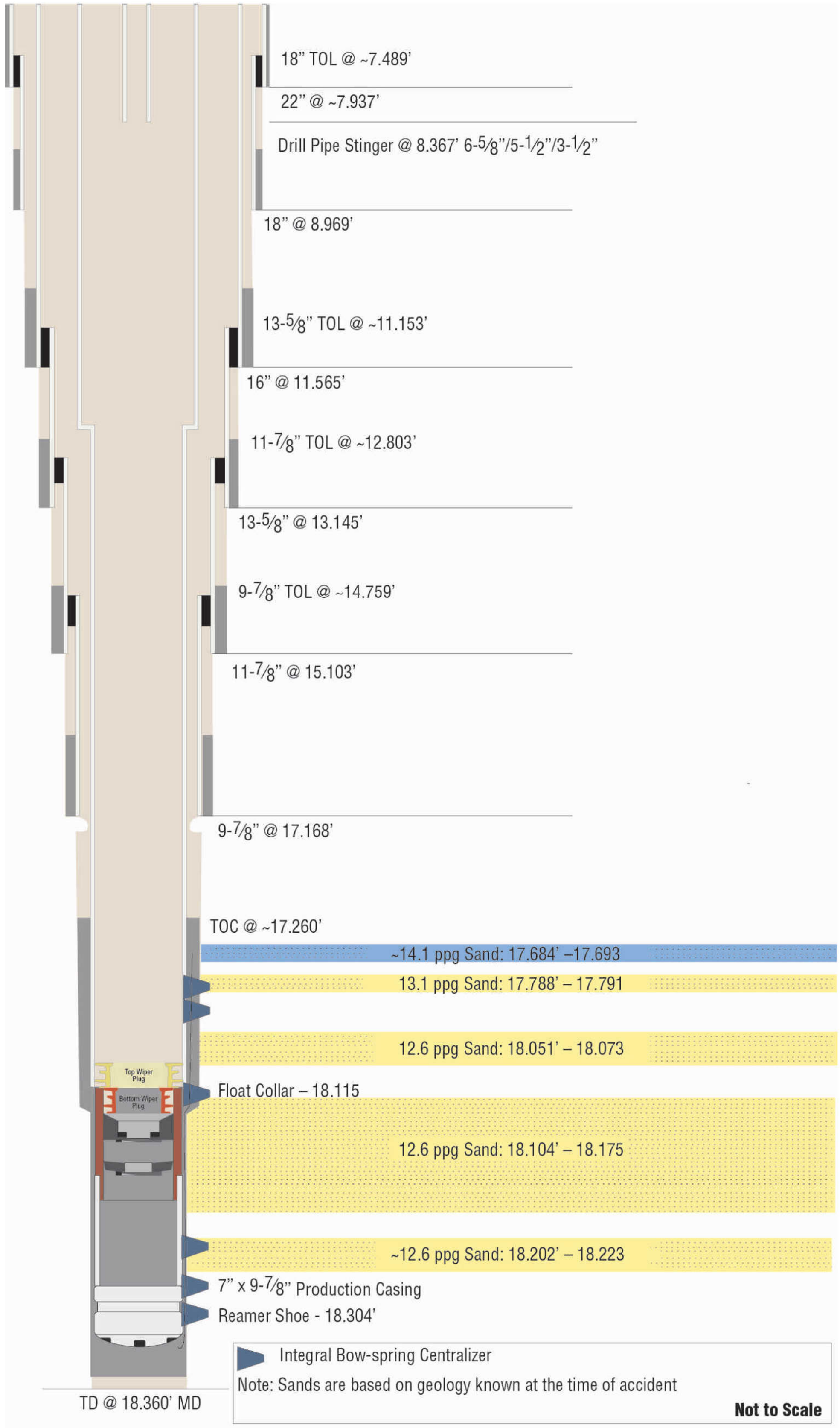
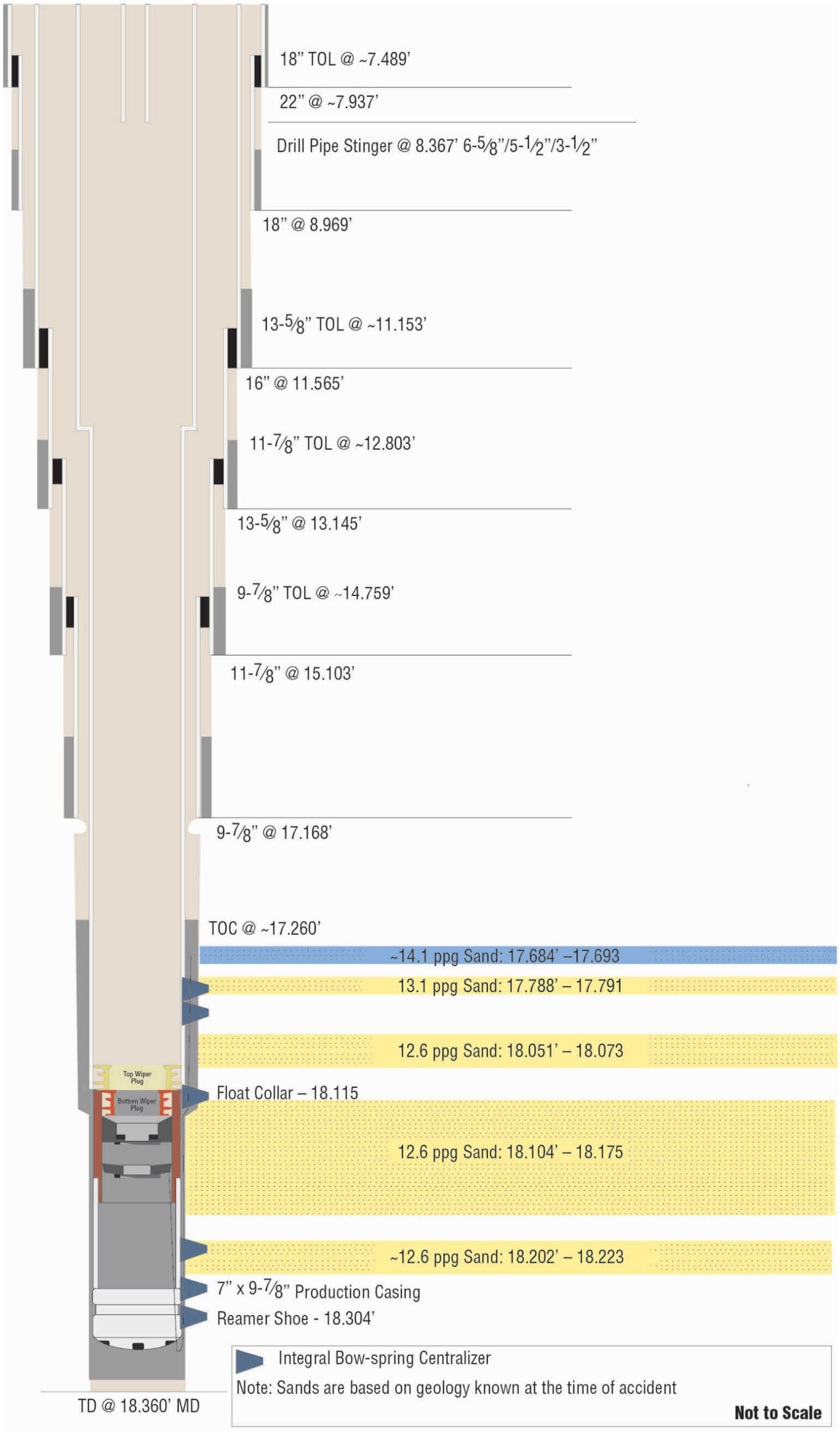

18" TOL @ ~7.489'
22" @ ~7.937'
Drill Pipe Stinger @ 8.367' 6-5/8"/5-1/2"/3-1/2"
18" @ 8.969'
13-5/8" TOL @ ~11.153'
16" @ 11.565'
11-7/8" TOL @ ~12.803'
13-5/8" @ 13.145'
9-7/8" TOL @ ~14.759'
11-7/8" @ 15.103'
9-7/8" @ 17.168'
TOC @ ~17.260'
~14.1 ppg Sand: 17.684' –17.693
13.1 ppg Sand: 17.788' – 17.791
12.6 ppg Sand: 18.051' – 18.073
Top Wiper Plug
Float Collar – 18.115
Bottom Wiper Plug
12.6 ppg Sand: 18.104' – 18.175
~12.6 ppg Sand: 18.202' – 18.223
7" x 9-7/8" Production Casing
Reamer Shoe - 18.304'
TD @ 18.360' MD
Integral Bow-spring Centralizer
Note: Sands are based on geology known at the time of accident
Not to Scale

Figure 2


18" TOL @ ~7.489'
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Top Wiper Plug
Float Collar – 18.115
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7" x 9-7/8" Production Casing
Reamer Shoe - 18.304'
Integral Bow-spring Centralizer
Note: Sands are based on geology known at the time of accident
Not to Scale
TD @ 18.360' MD

Figure 3

APPENDIX ONE

Page 1 of 7

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

Operator:	BP	Event Type:	COM- OFFSHORE	Report:	5
Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Current Well Status

Depth MD:	18,360.00 (ft)	Casing Size:				Rig Accept:	12:00:00AM 4/15/2010
Est TVD:	38,296.25 (ft)	Casing(MD):				Rig Release:	
Progress:	0.00 (ft)	Liner Size:	9.875 (in)	Cost in:		Spud Date:	10/6/2009
Auth Depth:		Liner(MD):	17,168.00 (ft)	Exchange Rate:		WX Date:	3/18/2010
Hole Size:	9.875 (in)	Liner TOP:	14,759.00 (ft)	Daily Mud:	4556	Water Depth:	4,992.00 (ft)
Elev Ref:	R-K-B @75.00ft (above Mean Sea Level)			Cum. Mud:	76,473	KB Elev:	75.00(ft)
DOL/DFS/Target:		Exist Perf Int:	NO	Daily Well:	853,769.00	Total Personnel:	144
Geologist:	BODEK / BONDURANT			Cum. Well:	3,644,930	Wellbore Max Angle:	9.94
Engineer:	HAFLE / MOREL / COCALES			Est Days:			
Day WSL:	R. KALUZA			Rig. Days:	147.56		
Night WSL:	D. VIDRINE, L. LAMBERT(WSLF)						
Weather:	PARTLY CLOUDY, SEAS 1' - 2', WIND 4-8 KNOTS						

Current Status:	DISPLACING CEMENT W 14.0 PPG MUD
24 Hr Summary:	FINISH P/U 7" X 9-7/8" CASING AND RIH ON LANDING STRING, LAND OUT SAME, R/D CSG TOOLS, R/U AND CEMENT CASING STRING
24 Hr Forecast:	FINISH CEMENTING CASING STRING, R/D CEMENT TOOLS, SET SEAL ASSY, POOH W L/S, P/U CMT STINGER, RIH, DISPLACE RISER, SET CMT PLUG, WOC
Update at 06:00:	SEE REMARKS PAGE FOR MIDNIGHT TO 0500 REPORT
Comments:	NO ACCIDENTS, NO INCIDENTS, NO DAMAGE TO THE ENVIRONMENT. TOTAL POB = 144, TOI & CATERING = 92, BP = 6, BP 3RD PARTY = 46, TOI 3RD PARTY = 0

HSE and Well Control

Days Since Last DAFWC: 2,546 — All Free Days: 2,548 (days)

Incident Details:

Last Csg Test Press:	914.00 (psi)	Number of Dropped Objects:		Last H2S Drill:	
Last BOP Pressure Test:	4/10/2010	Last Abandonment Drill:	4/18/2010	Last Trip Drill (D1):	
Next BOP Press Test:	4/24/2010	Last Accum Drill (D4):		Last Safety Meeting:	4/19/2010
Last Diverter Drill (D3):	4/16/2010	Last Spill Drill:	5/10/2009	Last Environmental Incident:	
Stop Cards:	102	Regulatory Agency Insp:	No	Non-compliance Issued:	No
Kick Tolerance:		Kick Volume:			

LOT TVD:	17,158.00 (ft)	BHP:	14,246.0 (psi) @17,158.00 (ft)	MAASSP:	0.0 (psi)
LOT EMW:	15.98 (ppg)	Test Pressure:	1,500.0 (psi)		

No.	Slow Pump Rates (Circ)		Slow Pump Rates (Choke)		Slow Pump Rates (Kill)	
	Stroke Rate	Pressure (psi)	Stroke Rate	Pressure (psi)	Stroke Rate	Pressure (psi)

No Pump Operations with Slow Pump Rates

Performance Measures

	Stop Cards	SOC	JSEA/TOFS	First Aid	Near Miss
Today	102		16		
Total	482		102		

Operational Parameters

ROP Daily:		Rotating Weight:		Daily Bit Hrs:	0.00 (hr)
ROP Cum:		Pick Up Wt:		Daily Sliding Hrs:	0.00 (hr)
WOB (min):		Slack Off Wt:		Cum Bit Hrs:	
WOB (max):		Circ Rate Riser:	0.00 (gpm)		
Min RPM:		Circ Rate Hole:	0.00 (gpm)	Ann. Vel. Riser:	
RPM DH:		Circ Off Bottom:		Ann. Vel. DC:	
Torque on Bottom:		Circ On Bottom:		Ann. Vel. DP:	
Torque off Bottom:		Jar Hrs since Inspect:	(hr)		

Pump Status - Drilling and Riser

No.	Operation Type	Efficiency (%)	SPM (spm)	Liner Size (in)	Cric. Rate (gpm)

4/20/2010 6:27:42AM

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

Operator:	BP	Event Type:	COM- OFFSHORE	Report:	5
Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Drilling Fluid

Type:	SYNTHETIC OBM	10 sec gels:	14.000 (lbf/100ft²)	Ca:		ES:	
Time:	21:00 /PIT	10 min gels:	23.000 (lbf/100ft²)	K+:		Solids:	26.06 (%)
Depth:	18,360.00 (ft)	Fluid Loss:		CaCl2:		Oil:	72.00 (%)
FL Temp.:	(°F)	HTHP Temp:	250.0 (°F)	NaCl:		Water:	28.00 (%)
Density:	14.00 (ppg)	HTHP WL:	2.4 (cc/30min)	Cl-:		Oil/Water:	
Funnel Visc:	93.00 (s/qt)	Cake:		Sand:		Daily Cuttings:	
ECD:		MBT:		HGS:	314.30 (lbm/bbl)	Cum Cuttings:	0.0 (bbl)
PV:	28.00 (cp)	Lime:		LGS:	42.09 (lbm/bbl)	Lost Downhole:	
YP:	14.000 (lbf/100ft²)	PM:		Pf/Mf:		Lost Surface:	

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

Operator:	BP	Event Type:	COM- OFFSHORE	Report:	5
Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Operations Summary (Derrick 1)

From - To Op. Depth (ft)	Hrs (hr)	Phase	Task	Activity	Code	NPT	Operation
00:00 - 00:30 18,360.0	0.50	RUNPRD	CASING	SAFETY	P		HELD PRE-JOB SAFETY MEETING WITH CREW ON PICKING UP CASING. MONITOR WELL ON TRIP TANK, WELL STATIC.
00:30 - 01:30 18,360.0	1.00	RUNPRD	CASING	PU	P		PICK UP 9-7/8", 62.8#, Q-125, HYD 523 CASING FROM 9,833' MD TO 10,810' MD. MONITOR DISPLACEMENT ON TRIP TANK.
01:30 - 02:30 18,360.0	1.00	RUNPRD	CASING	REPEQP	N	SFAL	TROUBLE SHOOT &REPAIR WEATHERFORD'S CASING TONGS (ROLLER PIN HAD TO BE READJUSTED ALLOWING THE HOUSING DOOR TO CLOSE PROPERLY). MONITOR WELL ON TRIP TANK, WELL STATIC.
02:30 - 06:30 18,360.0	4.00	RUNPRD	CASING	PU	P		PICK UP 9-7/8", 62.8#, Q-125, HYD 523 CASING FROM 10,810' MD TO 13,220' MD. TOTAL AMOUNT OF 7" CSG P/U: 126 JTS = 5,816'. TOTAL AMOUNT OF 9-7/8" CSG P/U: 171 JTS = 7,404'. MONITOR DISPLACEMENT ON TRIP TANK.
06:30 - 07:00 18,360.0	0.50	RUNPRD	CASING	RD	P		RIG DOWN ELEVATORS AND OES FLOW BACK TOOL. MONITOR WELL ON TRIP TANK, WELL STATIC.
07:00 - 07:30 18,360.0	0.50	RUNPRD	CASING	PU	P		PICK UP 9-7/8" HANGER FROM 13,220' MD TO 13,296' MD. INSTALL PIP TAG AT 5084'. MONITOR DISPLACEMENT ON TRIP TANK.
07:30 - 09:00 18,360.0	1.50	RUNPRD	CASING	RD	P		RIG DOWN CASING HANDLING EQUIPMENT. MONITOR WELL ON TRIP TANK. WELL STATIC.
09:00 - 13:30 18,360.0	4.50	RUNPRD	CASING	RIH	P		RUN IN THE HOLE WITH 9-7/8", 62.8#, Q-125, HYD 523 CASING ON LANDING STRING AT 3 MINUTES PER STAND FROM 13,296' MD TO 18,294' MD. DROP ALLAMON 1-5/8" BRASS BALL WHEN THE 7" SHOE WAS AT 9-7/8" SHOE 17,168' MD (CSG STRING TOOK 10K WEIGHT BOBBLE AT 18,218' MD --- ONLY TIME THE STRING TOOK WEIGHT IN THE OPEN HOLE). MONITOR PIPE DISPLACEMENT ON TRIP TANK.
13:30 - 14:00 18,360.0	0.50	RUNPRD	CASING	SLHR	P		PICK UP CEMENT HEAD AT 18,294' MD SHOE DEPTH AND SLACK OFF AND LAND CASING IN WH WITH 848K WEIGHT AND TAG 9' IN ON CEMENT STAND. FINAL 7' SHOE DEPTH 18,303', FC DEPTH 18,114' & 7" X 9 7/8" X-O DEPTH 12,484'. CONTINUE TO SLACK OFF AND SHEAR OUT PINS IN HANGER WITH 180K DOWN, CONTINUE TO SLACK OFF TO 450K HOOK LOAD. MONITOR PIPE DISPLACEMENT ON TRIP TANK.
14:00 - 14:30 18,360.0	0.50	RUNPRD	CASING	RU	P		RIG UP HALLIBURTON CHICKSAN LINES AND NITROGEN LINES. MONITOR WELL ON TRIP TANK WELL STATIC.
14:30 - 17:30 18,360.0	3.00	RUNPRD	CASING	CIR	N	DFAL	PRESSURE UP TO 1,000 PSI TO SHIFT DIVERTER, SHEARED AT 2,442 PSI. BALL ON SEAT IN DTD PRESSURED AND SHEARED AT 2,765 PSI. RAMP PUMPS TO 1 BPM TO BREAK CIRC - UNABLE TO CIRCULATE. PRESSURE UP TO 1,800 PSI AT 1BBL PER MINUTE, BLEED OFF. 2ND ATTEMPT PRESSURE UP AT 1BBL PER MINUTE TO 1,900 PSI, BLEED-OFF FAST MONITOR ON TRIP TANK. THIRD ATTEMPT: PRESSURE UP TO 2,000 PSI AT 1 BBL. PRESSURE HELD AT 1,950 PSI. BLED OFF. FOURTH ATTEMPT: PRESSURE UP TO 2,000 PSI @ 1 BBL PER MINUTE, TOOK 6.7 BBLS TO PRESSURE-UP. PRESSURE HELD AT 1940 PSI. BLEED OFF. FIFTH ATTEMPT: PRESSURE UP TO 2,000 PSI @ 1 BBL PER MINUTE , TOOK 6.6 BBLS TO PRESSURE-UP. HELD PRESSURE 10 MIN. BLEED-OFF. SIXTH ATTEMPT: PRESSURE UP TO 2,000 PSI @ 2 BBLS PER MINUTE, BLEED-OFF. SEVENTH ATTEMPT: PRESSURE UP TO 2,250 PSI @ 1 BBL PER MINUTE, TOOK 7.3 BBLS TO PRESSURE-UP. BLEED-OFF FAST.

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

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WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Operations Summary (Derrick 1)

From - To Op. Depth (ft)	Hrs (hr)	Phase	Task	Activity	Code	NPT	Operation
							EIGHTH ATTEMPT: PRESSURE UP TO 2,500 PSI @ 1 BBL PER MINUTE. TOOK 7.8 BBLS TO PRESSURE-UP. PRESSURE HELD AT 2,450 PSI. BLEED-OFF FAST. NINTH ATTEMPT: PRESSURE UP TO 2,750 PSI @ 1BBL PER MINUTE AND HOLD FOR 2 MINUTES, THEN PRESSURE UP TO 3,000 PSI AND HOLD FOR 2 MINUTES AND SHEARED @ 3,142 PSI. CIRCULATE @ 1 BBL PER MINUTE AND STAGE UP PUMPS PUMP TO 4 BBLS PER MINUTE. PUMP # 4 PRESSURES AS FOLLOWS: AT 1BBL PER MINUTE, 125 PSI. AT 2 BBLS PER MINUTE, 170 PSI. AT 2.5 BBLS PER MINUTE, 215 PSI. AT 3 BBLS PER MINUTE, 255 PSI. AT 3.5 BBLS PER MINUTE 295 PSI. AT 4 BBLS PER MINUTE 340 PSI. SHUT DOWN PUMP, PERFORM SURFACE TEST TO IBOP TO 500 PSI (GOOD TEST). SWITCH TO PUMP #3, BRING PUMP UP AND BREAK CIRCULATION @ 1BBL PER MINUTE. STAGE PUMP UP TO 4 BBLS PER MINUTE. PUMP #3 PRESSURES AS FOLLOWS: AT 1 BBL PER MINUTE, 205 PSI. AT 2 BBLS PER MINUTE, 260 PSI. AT 2.5 BBLS PER MINUTE, 290 PSI. AT 3 BBLS PER MINUTE, 320 PSI. AT 3.5 BBLS PER MINUTE, 345 PSI. AT 4 BBLS PER MINUTES 390 PSI. MONITOR ACTIVE SYSTEM FOR GAINS AND LOSSES.
17:30 - 19:00 18,360.0	1.50	RUNPRD	CASING	CIR	P		LINE UP AND TEST CHOKE AND KILL LINES (GOOD TEST). BREAK CIRCULATION ON CHOKE AND KILL LINE. CLOSE LOWER ANNULAR AND LINE UP TO TAKE RETURNS UP CHOKE AND KILL TO VERFIY DIVERTER CLOSED. PUMP DOWN DRILL PIPE, UP CHOKE AND KILL LINE TO VERTICAL GAS SEPARATOR. BRING UP PUMP @ 1 BBL PER MINUTE PRESSURE UP TO 250 PSI. SHUT DOWN. BRING PUMP UP TO 1 BBL PER MINUTE AND BREAK CIRCULATION @ 174 PSI, STAGE UP TO 200 PSI, SLOW BACK TO 1BBL PER MNIUTE WITH 140 PSI. SHUT DOWN PUMP AND OBSERVE FLOW LINE. OPEN ANNULAR. CONFIRMED DIVERTER NOT LEAKING.
19:00 - 19:30 18,360.0	0.50	RUNPRD	CEMT	CIR	P		BREAK CIRCULATION AND STAGE PUMP UP TO 4 BBLS PER MINUTE AND CIRCULATE 111 BBLS. NOTE: HELD PRE-JOB CEMENT MEETING.
19:30 - 20:00 18,360.0	0.50	RUNPRD	CEMT	TSTPRS	P		PRESSURE TEST HALLIBURTON NITROGEN LINES TO 5,000 PSI (GOOD TEST). HALLIBURTON PUMP 7 BBLS OF 6.7 PPG BASE OIL AND 10 BBLS OF 14.3 PPG SPACER TEST LINES TO 5,000 PSI (GOOD TEST). PUMPED 62 BBLS SPACER. MONITOR WELL ON TRIP TANK WELL STATIC.
20:00 - 22:00 18,360.0	2.00	RUNPRD	CEMT	CMT	P		PERFORM CEMENT JOB AS FOLLOWS: PUMP 62 BBLS OF 14.3 PPG TUNED SPACER @ 4 BBLS PER MINUTE. PUMP 4 BBLS OF 16.74 PPG CLASS 'H' CEMENT, PUMP RATE 2 BPM. DROP DART # 1 ON THE RUN. PUMP 4 BBLS OF CEMENT AT < 2 BPM. START PUMPING N2 - PUMP 39 BBLS CEMENT, FOAMED VOLUME 48 BBLS. PUMP 4 BBLS CEMENT: PUMP 3 BBLS OF 14.3 PPG SPACER. DROP DART # 2 ON THE RUN. PUMP 17 BBLS SPACER @ 4 BPM. PUMP 133 BBLS OF 14.0 PPG MUD WITH CEMENT UNIT @ 4 BPM. BOTTOM DART TO DIVERTER: 3,500 PSI SHEARED @ 43 BBLS MUD PUMPED. BOTTOM DART TO DTD: 3,250 PSI, DTD SHEARED- 150 BBLS MUD PUMPED, BOTTOM DART TO PLUG: NO INDICATION OF PLUG SHEAR , TOP DART TO DIVERTER: 3,200 PSI TOP PLUG SHEAR @ 100 BBLS MUD PUMPED, TOP DART TO DTD: 3,400 PSI DTD SHEAR 109 BBLS MUD PUMPED, TOP DART TO PLUG 3,300 PSI SHEAR @ 119 BBLS MUD PUMPED. SWITCH TO

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

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Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Operations Summary (Derrick 1)

From - To Op. Depth (ft)	Hrs (hr)	Phase	Task	Activity	Code	NPT	Operation
							RIG PUMPS. CEMENT RECIPE AS FOLLOWS: SPACER: TUNED SPACER III + 0.6 GAL/BBL SURFACTANT A + 0.6 GAL/BBL SURFACTANT B + 0.6 GAL/BBL SEM-8 + 1 LB/BBL WELLLIFE 734, MIXED WITH FRESH WATER. LEAD CEMENT: 22 SACKS, 5.26 BBLS, 30.14CU.FT. PREMIUM H CMT. + 0.07% EZ-FLO + 0.25% D-AIR 3000 + 1.88 LB/SK KCL + 20% SSA-1+ 15% SSA-2 + 0.2% SA-541 + 11GPHS ZONESEAL 2000 + 9 GPHS SCR-100L + 1LB/BBL WELLLIFE - 734. YIELD = 1.37 CUFT/SK, WATER = 5.13 GAL/SK (FRESH WATER) MIXED AT 16.74 PPG. FOAM TAIL CEMENT: 159 SACKS, 47.75 BBLS, 268.11CU FT. PREMIUM H CMT + 0.07% EZ-FLO + 0.25% D-AIR 3000 + 1.88 LB/SK KCL + 20% SSA-1 + 15 % SSA-2 + 0.2% SA-541 + 11GPHS ZONE SEAL 2000 + 9 GPHS SCR-100L + 1 LB/BBL WELLLIFE-734. YEILD = 1.37 CUFT/SK, WATER = 5.13 GAL/SK (FRESH WATER) MIXED AT 16.74 PPG. FOAMED TO 14.5 PPG. FOAM YIELD = 1.69 CUFT/SK, NITROGEN = 584 SCF/BBL. UNFOAMED TAIL AND SHOE CEMENT: 28 SACKS, 6.93 BBLS, 38.91CU FT PREMIUM H CMT + 0.07% EZ-FLO + 0.25% D-AIR 3000 + 1.88 LB/SK KCL + 20% SSA-1 + 15 % SSA-2 + 0.2% SA-541 + 11 GPHS ZONE SEAL 2000 + 9 GPHS SCR-100L + 1 LB/BBL WELLLIFE-734. YEILD = 1.37 CUFT/SK , WATER = 5.13 GAL/SK (FRESH WATER) MIXED AT 16.74 PPG.
22:00 - 00:00 18,360.0	2.00	RUNPRD	CEMT	DISPL	P		DISPLACE CEMENT WITH 14.0 PPG MUD WITH RIG PUMP @ 4 BPM @ 530 PSI. INDICATION BOTTOM PLUG THROUGH CROSS OVER WITH 830 PSI AND 469 BBLS. MONITOR ACTIVE SYSTEM FOR GAINS AND LOSSES.

Mud Log Information

Formation:	Formation top @:	Max Background Gas:	Max Trip Gas: 0.00 (%)
Lithology:		Max Connection Gas:	Pore Press:

Materials/Consumption

Item	Unit	Usage	On Hand	Item	Unit	Usage	On Hand
DIESEL	BBLS	226	17,118	POTABLE WATER	BBLS	352	4,535
DRILL WATER	BBLS	138	10,756	CEMENT LITE FILL	SACKS		619
BARITE	SACKS		11,879	CEMENT	SACKS		2,582
CEMENT CLASS G	SACKS		254	HELICOPTER FUEL	GAL		0

Personnel

Personnel on Board: 144

Company	No. People	Hours	Company	No. People	Hours
BP	144	1,644.00			

Weather

Temperature H/L:	80.0(°F) /68.0(°F)	Wind Speed:	4.0(knots)	Visibility:	10.00(mi)	Prec Type:	
Bar Press:	30.09(in-Hg)	Wind Direction:	22.50(°)	Ceiling:		Prec Amt:	
Wind Chill:		Gust Speed:	8.0(knots)				

Anchoring/Marine

Rig Heading:	135.00 (°)	Sea Height:	1.00 (ft)	Rig Heave:	0.10 (ft)	Current Speed:	0.4 (knots)
VDL:	8.3 (klbf)	Sea Dir:	22.50 (°)	Rig Roll:	0.20 (°)	Current Direction:	11.00 (°)
Swell Height:	2.00 (ft)	Sea Period:	3 (sec)	Rig Pitch:	0.20(°)		
Comments:							

Cumulative Phase Breakdown

Phase	Planned						Change of Scope						Total Hours
	Prod	% Total	NPT	% Total	WOW	% Total	Prod	% Total	NPT	% Total	WOW	% Total	

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

Operator:	BP	Event Type:	COM- OFFSHORE	Report:	5
Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Cumulative Phase Breakdown

Phase	Planned					Change of Scope			Total Hours
RUNCMP	52.00	80.62	12.50	19.38	0.00	0.00	0.00	0.00	64.50
RUNPRD	43.50	91.58	4.00	8.42	0.00	0.00	0.00	0.00	47.50
Total	95.50	85.27	16.50	14.73	0.00	0.00	0.00	0.00	112.00

Support Craft/Logistics

Arrival	Depart	Type	Number	Comments
00:01	23:59	SUPPLY BOAT	DAMON BANKS	AT RIG BACKLOADING MISC CARGO (Cr: 1)
08:00	08:12	HELICOPTER	PHI 592PH	CREW CHANGE FLIGHT FOR CATERING, 3RD PARTY, TRANSOCEAN (Cr: 1 In: 13 Out: 13)

Remarks

NOTE: RIG EQUIPMENT THAT IS DOWN, WAITING ON PARTS OR BEING REPAIRED:

1. ROTARY TABLE LOCKED OUT UNTIL PARTS ARE RECEIVED.
2. WORK IN THE STBD COLUMN PUMP ROOM - 98% COMPLETE.
3. PS-30'S ARE REPAIRED BUT CAN NOT BE USED UNTIL ROTARY IS REPAIRED.
4. #2 THRUSTER IS OUT OF SERVICE. PARTS ON ORDER
5. # 4 ENGINE DOWN
6. CATWALK, PORCH
7. #2 RISER TENSIONER OUT OF SERVICE

8) #4 DRAWWORKS MOTOR DOWN, TOOK PARTS TO REPAIR TOPDRIVE TORQUE READING

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ROV OPERATIONS: DIVE # 1931: PERFORM RISER & BOP INSPECTION, CURRENT SURVEY, BOTTOM SCAN, #4 TRANSPONDER WAITING TO SET .

****
****

METAL RECOVERED FROM DITCH MAGNETS:
TOTAL METAL RECOVERED THIS HOLE SECTION = 8.47 LBS
TOTAL METAL RECOVERED IN PAST 24 HOURS = 0.00 LBS
TOTAL METAL RECOVERED THIS WELL = 23.46 LBS

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0000 - 0500 UPDATE:

0000 - 0030: CONTINUE DISPLACING CEMENT WITH 727 BBLS OF 14.0 PPG MUD. WITH 4,155 STKS/ 523 BBLS TOP PLUG WENT THROUGH X-O WITH 590 PSI. BOTTOM PLUG LANDED WITH 673 BBLS PUMPED AT 2,932 PSI. WITH 727 BBLS PUMPED, BUMPED TOP PLUG WITH 740 PSI OVER CIRCULATING PRESSURE. BLED PRESSURE OFF, BLED BACK 5 BBLS, FLOATS HOLDING. CEMENT IN PLACE AT 12:35 HRS.

0030 - 0100: RELEASE DRIL-QUIP RUNNING TOOL AND SET SEAL ASSEMBLY AT 5,059'. MONITOR WELL ON TRIP TANK, WELL STATIC.

0100 - 0200: BREAK CIRCULATION DOWN KILL LINE. HALLIBURTON TEST LINES TO 11,000 PSI - GOOD TEST. CLOSED UPPER PIPE RAMS. HALLIBURITON PRESSURE TEST SEAL ASSEMBLY TO 4,000 PSI AND HOLD FOR 30 SEC. PRESSURE UP TO 10,000 PSI AND HOLD FOR 10 SEC. BLEED PRESSURE OFF TO 6,500 PSI AND HOLD FOR 5 MINUTES.

0200 - 0230: SHEAR OUT OF SEAL ASSEMBLY WITH 85K OVER STRING WEIGHT. CIRCULATE 10 MINUTES TO FLUSH OUT HANGER. MONITOR ACTIVE SYSTEM FOR GAINS AND LOSSES.

0230 - 0300: SLACK OFF TO 335K HOOKLOAD, CLOSE UPPER PIPE RAMS. HALLIBURITON PRESSURE UP ON SEAL ASSEMBLY TO 10,000 PSI FOR

North America - North America Exploration - BP

Daily Operations Report - Partners (Completion)

Operator:	BP	Event Type:	COM- OFFSHORE	Report:	5
Well/Wellbore No.:	OCS-G 32306 MC252 #1/01	Event Objective:	OIL WELL PRODUCER	Date:	4/19/2010
WB Objective:	NEW DRILL	Well Type:	EXPLORATION		
Site:	MC252	Job Number:			
Contractor:	TRANSOCEAN OFFSHORE	Rig:	DEEPWATER HORIZON 87		

Remarks

10 SEC. BLEED OFF TO 6,500 PSI AND HOLD FOR 5 MINUTES.

0300 - 0330: RIG DOWN CHIKSAN LINES AND LAY DOWN CEMENT KELLY. MONIOTR WELL ON TRIP TANK, WELL STATIC.

0330 - 0400: PULL OUT OF THE HOLE (WET) FROM 5,059' MD TO 4,770' MD. MONITOR DISPLACEMENT ON TRIP TANK.

0400 - 0500: DROP FOAM WIPER BALL AND CIRCULATE 1-1/2 TIMES THE DRILL PIPE VOLUME. PUMPED 30 BBLS OF 16.3 PPG SLUG. MONITOR ACTIVE SYSTEM FOR GAINS AND LOSSES.

0500 - 0600: PULL OUT OF THE HOLE WITH 6-5/8" LANDING STRING FROM 4,770' MD TO 1,000' MD. MONITOR DISPLACEMENT ON TRIP TANK.

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ADDITIONAL DATA FOR THE MARINE OPERATIONS SUPPORT GROUP:

STACK HEADING: 135°
WIND-UP LIMIT: 000°
PRESENT WIND-UP: 000°
TOTAL POWER AVAILABLE: 14,000 kw
PRESENT POWER USED: 32%
THRUSTERS ONLINE: 4
THRUSTERS AVAILABLE: 2
THRUSTERS BLOCKED: 2
THRUST USED (%) : 2%
ENVIRONMENTAL CURRENT (DP/KONGSBERG CURRENT) : 0.47 kts
ENVIRONMENTAL CURRENT DIRECTION (TOWARDS) : 003° DEGREES
KG MARGIN (FT) (FOR MODU'S): 9.22 FT

MISC COMMENTS:
MARINE EQUIPMENT DOWN / UNAVAILABLE: OPERATIONAL.
DP FAULTS OR ANOMALIES: #2 THRUSTER OUT OF SERVICE WAITING ON PARTS

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4/20/2010 6:27:42AM

CONFIDENTIAL BP-HZN-2179MDL00004018

BP's Daily Operations Report – Partners (Completion) BP-HZN-2179 MDL00004014-18.

GLOSSARY OF TERMS

API - American Petroleum Institute

API Spec – API Specifications

API RP – API Recommended Practice

API Standard – API Standard Practice

API TR – API Technical Report

bbls – barrels – 42 US gallons

bpm – barrels per minute

ISO – International Standard Organization

lb/gal – pounds per gallon

MMS – Minerals Management Service

ppg – pounds per gallon

psi – pounds per square inch per foot

SOBM – Synthetic Oilbase Drilling Fluid

EXHIBIT A

Curriculum Vitae and Selected Publications

DAVID G. CALVERT

June 2011

ADDRESS:

1416 Parkwood Dr
Carrollton, Texas 75007
Telephone: Business: 972 492-4865
Home: 972 492-4865
Cell: 972 742-7804

PERSONAL:

Date of Birth: September 8, 1934
Family: Married, 2 Children
Health: Good

EDUCATION:

B.S. Degree (Chemistry), 1956
Northeastern State University, Tahlequah, Oklahoma

PROFESSIONAL ACTIVITIES:

30-year member of Society of Petroleum Engineers
Past chairperson of API Committee 10--Well Cements and member of the committee since 1967 and current member of Sub-committee 10 (Well Cements)
Past member of the SPE Special Series Committee (served two terms)
Current member ISO Work Group 2--Well Cements

TECHNICAL PAPERS AND PUBLICATIONS:

Author and/or co-author of numerous papers covering cementing, lost circulation and sand control (listed below)

EMPLOYMENT HISTORY:

May 2000—Present: Consultant working in the areas of cementing and loss circulation. Currently working with Noble Energy on cement slurry designs for their deep water projects offshore Israel, McMoRan on their projects in the Gulf of Mexico, Shale gas project for Chief Oil and Gas and a project with Messina Chemical offshore Mexico. Assignments to date have been teaching cementing sessions for Halliburton, Schlumberger(Dowell), Weatherford International, preparation of cementing tenders and technical support for EnCana offshore Eastern Canada(high temperature, high pressure gas wells), deep water wells, remedial cementing work for UPR, gas injection project for Tengizchevroil(TCO), preparation of cementing tenders for Husky Oil White Rose project (east coast of Canada), development of best cementing practices for Kerr-McGee(land operations), contract work for ExxonMobil (World Wide), and for Nexen assisting with the change over of cementing service companies in their Yemen operations as well as their cementing operations in Western Canada and the North Sea area. Presently have a teaching assignment for Petroskills covering their worldwide operations. Developed a cementing and lost circulation document for Burlington Resources for their Western Canada operations. Technical support for BJ Services, Cimarex, and Weatherford International in the area of well cementing. I have been an expert witness covering the areas of cementing techniques, equipment, and cementing materials. Long term cement testing (HTHP) project for BP, America and the drilling of a deep gas well in the Gulf of Mexico was started in 2006 and is on going. A project was conducted in 2007 with Weatherford in Saudi Arabia to study the use of multi-stage cementing equipment in one of Aramco's field operations. A project with Nexen was started in 2007 to assist in the drilling of a deep gas well in the Gulf of Mexico. A lost circulation project with Messina Chemical for work in the Middle East is on going.

July 1992—May 2000: Job Title: Associate Engineering Advisor, MEPTEC, Dallas, Texas. Support Mobil's cement and lost circulation technical services work worldwide. The cementing area covers materials, equipment, and tools. About 60 percent of my time was spent working with the offshore operations (both shallow and deep water). The lost circulation area covers materials, mixing and placement techniques. I have taught classes in the above areas.

August 1979--July 1992: Job Title: Engineering Associate, Mobil Research Laboratory, Dallas, Texas. Support Mobil's worldwide cementing and lost circulation technical services, conduct research in the area of cementing, and taught in-house courses covering cementing and lost circulation.

February 1979--August 1979: Job Title: Development Specialist, Dowell, Tulsa, Oklahoma. Responsible for introduction of all cementing materials and techniques to Dowell operations and operating company laboratories. Advise both laboratory and operations personnel on technical problems in regard to well cementing

December 1977--February 1979: Job Title: Cementing Specialist, Dowell Schlumberger, Contract to Petrobras, Brazil. Responsible for cement slurry designs for the offshore operations of Petrobras. Advise cementing for land operations and supported the Braspetrol international group.

June 1966--December 1977: Job Title: Development Specialist, Dowell, Tulsa,Oklahoma. Worked in the technical services and research area of cementing for Dowell and Dowell-Schlumberger. Presented in-house and customer schools. Served as a Laboratory Group Leader during this time frame also.

October 1964--June 1966: Job Title: District Laboratory Supervisor, Dowell, Houston, Texas. Laboratory duties included the testing of cements, cement slurries, and job design for the Houston operating area.

June 1960--October 1964: Job Title: Chemist, Dowell, Tulsa, Oklahoma. Primary work responsibility covered acidizing, fracturing and sand control from the standpoint of technical service. Worked on the development of new products in acidizing, fracturing and sand control.

August 1956--June 1960: Job Title: Chemist, DX-Sunray Oil Company Tulsa, Oklahoma. Worked in the area of quality control and material processing of refinery products. Conducted customer tours.

ARTICLES, PAPERS AND DOCUMENTS

Primary Cementing Course, materials presented to operating company engineers, (D. G. Calvert); December 10-13, 2007; Dubai, Untied Arab Emirates

Cementing Practices Course, materials presented to ConocoPhillips engineers, (D. G. Calvert and Larry Moran); November 26-30, 2007, Houston, TX

Cementing Practices Course, materials presented to operating company engineers, (D. G. Calvert); October 27-31, 2007, Saudi Arabia

Cementing Practices Course, materials presented to ConocoPhillips engineers, (D. G. Calvert and Larry Moran); August 27-31, 2007, Houston, TX

Cementing Practices Course, materials presented to operating company engineers, (D. G. Calvert); July 23-27, 2007, Houston, TX

Cementing Practices Course, materials presented to operating company engineers, (D. G. Calvert); July 23-28, 2006, Houston, TX

New API Practices for Isolating Potential Flow Zones During Drilling and Cementing Operations; SPE No. 97168; co-author (D.G. Calvert); Oct 9-12 2005; Dallas, TX

Cementing Practices Course, materials presented to operating company engineers, (D. G. Calvert); August 15-19, 2005, Aberdeen, Scotland

Finite Element Analysis Helps Engineer the Cement Sheath for Production Operations; co-author (D.G. Calvert); Halliburton Seminar; 9-10 May 2005; Calgary, Alberta, Canada

Guidelines for Setting Plugs-Vertical to Horizontal; co-author (D.G. Calvert); Halliburton Seminar; 9-10 May 2005; Calgary, Alberta, Canada

Cementing Practices Course, materials presented to ARAMCO, (D. G. Calvert); May 15-19, 2004, Saudi Arabia

Cementing Practices Course, materials presented to operating company engineers, (D.G. Calvert); April 26-30 2004, Houston, TX

Primary Cementing Course, materials presented to operating company engineers; co-author (D.G. Calvert); October 7-8, 2003, Calgary, Alberta, Canada

Cementing: Primary and Remedial Course, materials presented to operating company engineers; (D.G. Calvert); April 2003, Houston, TX

API RP 65-1 Cementing Shallow Water Flow Zones in Deep Water Wells; co-author (D.G. Calvert) issued September 2002

Well Construction Cementing Course, materials presented to operating company engineers; co-author (D.G. Calvert); April 2002, Calgary, Alberta, Canada

Cementing for Operating Company Engineers Course, materials presented to operating company engineers; co-author (D.G. Calvert); May 24-26, 2000, St. Johns, Newfoundland, Canada

Determination of Temperatures for Cementing Wells drilled in Deep Water: SPE/IADC No. 39315; co-author (D.G. Calvert); 3-6 March 1998; Dallas, TX

Plug Cementing; Horizontal to Vertical Conditions; SPE No. 30514; co-author (D.G. Calvert); Oct 22-25, 1995; Dallas, TX

A Laboratory Study of Cement and Resin Plugs Pleaced with Thru-Tubing Dump Bailers; SPE No. 24574; co-author (D.G. Calvert); Oct. 1991; Washington, DC

Improved Cementing Operations-A Field Study; SPE/IADC No. 23987; 11-14 March 1991 co-author (D.G. Calvert)

Special Cementing Conditions; Chapter 10, API Worldwide Cementing Practices co-author (D.G. Calvert); issued January 1991

API Oil Well Cementing Practices; co-author (D.G. Calvert) OTC No. 6210; May 7-10 1990; Houston, TX

Cementing Off, Plugging, and Re-Drilling of Water Wells; co-author (D.G. Calvert); *Water Well Journal,* July 1975

The Use of Sea Water In Well Cementing; co-author (D.G. Calvert); *Journal of Petroleum Technology,* June 1975

Improved Primary and Remedial Cementing With Thixotropic Cement Slurries; co-author (D.G. Calvert); SPE 3833, presented April 10-12, 1972, Denver, Colorado

The Real Story of Cement Expansion; (D.G. Calvert); presented June 2-4, 1971, Billings, Montana

EXHIBIT B

Arbitration and Cases

Approximate Date	Case
10/11/2009	Comanche Exploration Company, LLC vs. BJ Services – Expert Report USDC, Western District, Oklahoma
10/2008	Weatherford vs. Case Tech – Deposition USDC, Southern District, Houston
7/2007	Will-Drill Production vs. BJ Services – Arbitration Proceedings, Houston, TX

EXHIBIT C

Compensation

I am being compensated at a rate of $250/Hour, plus reasonable travel and other expenses. My compensation is not related to the outcome of this case.

EXHIBIT D

List of Materials Reviewed

- API Publications and Materials
    - API Spec 10A Cement and Materials for Well Cement, 2001
    - API RP 10B-2 Testing of Well Cements, 2004
    - API RP 10B-3 Deep Water Cement Testing, 2004
    - API RP 10B-4 Foam Cement Testing at Atmospheric Conditions, 2004
    - API RP 10B-6 Gel Strength Testing, 2010
    - API Spec 10D Testing of Bow Centralizers, 2001
    - API RP 10F Testing of Float Equipment, 2003
    - API RP 65-Part 2, May 2010
    - API Standard 65, December 2010
    - API RP 96 First Edition, First Ballot, Deepwater Well Design and Construction

- Publications
    - "Well Cementing: Second Edition," Erik B. Nelson and Dominique Guillot ed. (2d ed. 2006).
    - "Petroleum Well Construction," Michael J. Economides, Larry T. Watters and Shari Dunn-Norman, eds. (1998)
    - "Worldwide Cementing Practices: Chapter 4 Primary Cementing," Fred Brooks & W.H. Grant Jr. (1st ed. 1991)
    - "Cementing," Dwight K. Smith ed., Society of Petroleum Engineers, Monograph Vol. 4 (Rev. ed. 1990)

- Transocean IADC Daily Drilling Reports
    - 4/1/10 - 4/20/10: TRN-INV-01032773 - TRN-INV-01032859
    - 4/16/10: BP-HZN-MBI00136849 - BP-HZN-MBI00136852
    - 4/17/10: BP-HZN-MBI00136931 - BP-HZN-MBI00136935
    - 4/18/10: BP-HZN-MBI00136936 - BP-HZN-MBI00136939
    - 4/19/10: BP-HZN-MBI00136940 - BP-HZN-MBI00136945
    - 4/20/10: BP-HZN-MBI00136946 - BP-HZN-MBI00136950

- BP Daily Operations Reports - Partners (Completion)
    - 4/01/10: BP-HZN-2179MDL00021053 - BP-HZN-2179MDL00021058
    - 4/02/10: BP-HZN-2179MDL00010446 - BP-HZN-2179MDL00010452
    - 4/03/10: BP-HZN-2179MDL00011493 - BP-HZN-2179MDL00011500
    - 4/0410: BP-HZN-2179MDL00003449 - BP-HZN-2179MDL00003454
    - 4/05/10: BP-HZN-2179MDL00007479 - BP-HZN-2179MDL00007483
    - 4/06/10: BP-HZN-2179MDL00004095 - BP-HZN-2179MDL00004099
    - 4/07/10: BP-HZN-2179MDL03772344 - BP-HZN-2179MDL03772348

- 4/08/10: BP-HZN-2179MDL02055260 - BP-HZN-2179MDL02055268
- 4/09/10: BP-HZN-2179MDL01287507 - BP-HZN-2179MDL01287512
- 4/10/10: BP-HZN-2179MDL01287513 - BP-HZN-2179MDL01287518
- 4/11/10: BP-HZN-2179MDL00001788 - BP-HZN-2179MDL00001791
- 4/12/10: BP-HZN-2179MDL00015911 - BP-HZN-2179MDL00015914
- 4/13/10: BP-HZN-2179MDL03490019 - BP-HZN-2179MDL03490023
- 4/14/10: BP-HZN-2179MDL00002674 - BP-HZN-2179MDL00002678
- 4/15/10: BP-HZN-2179MDL00003614 - BP-HZN-2179MDL00003618
- 4/16/10: BP-HZN-2179MDL00003541 - BP-HZN-2179MDL00003545
- 4/17/10: BP-HZN-2179MDL00005433 - BP-HZN-2179MDL00005438
- 4/18/10: BP-HZN-2179MDL03426590 - BP-HZN-2179MDL03426594
- 4/19/10: BP-HZN-2179MDL00004012 - BP-HZN-2179MDL00004018

- Deposition Testimony
  - Ambrose, Billy
  - Beirute, Robert
  - Chaisson, Nathan
  - Clawson, Bryan
  - Cowie, James
  - Cunningham, Eric
  - Faul, Ronald
  - Gagliano, Jessie
  - Gardner, Craig
  - Guide, John
  - Haire, Christopher
  - Kellingray, Daryl
  - Lambert, Lee
  - Lirette, Brent
  - Little, Ian
  - Morel, Brian
  - O' Bryan, Patrick
  - Quirk, Tim
  - Roth, Thomas
  - Sabins, Fred
  - Sannan, Stuart
  - Sims, David
  - Tabler, Vincent
  - Walz, Greg

- Witness Statements
  - **Exh. 0007**: *Brian Morel Interview Notes,* (4/27/10), BP-HZN-MBI00021304 - BP-HZN-MBI00021347

- **Exh. 4506:** *Brian Morel Interview,* (5/10/10), BP-HZN-CEC020266 - BP-HZN-CEC020275
- **Exh. 004:** *Interview with Don Vidrine*, BP-HZN-MBI00139573 - BP-HZN-MBI00139576, BP-HZN-CEC020346 - BP-HZN-CEC020350
- Exh. 0195: Handwritten Notes - John Guide Interview, (5/12/10), BP-HZN-BLY00104243 - BP-HZN-BLY00104239
- **Exh. 0224:** *BP Incident Investigation Team - Notes of Interview with Erick Cunningham,* (7/16/10), BP-HZN-BLY00061269- BP-HZN-BLY00061272
- **Exh. 0284:** *BP Incident Investigation Team - Notes of Interview with Greg Walz,* (7/29/10), BP-HZN-BLY00111497 - BP-HZN-BLY00111507
- **Exh. 0296:** *Interview with Mark Hafle,* (7/08/10), BP-HZN-BLY00103032- BP-HZN-BLY00103038
- **Exh. 4447:** *Interview with Mark Hafle,* (7/08/10), BP-HZN-BLY00144208 - BP-HZN-BLY00144214
- **Exh. 0358:** *Jim McKay Handwritten Notes - Brian Morel Interview,*(5/10/10),BP-HZN-BLY00061629 - BP-HZN-BLY00061643
- **Exh. 2033:** *Telephone Interview of: Jesse Gagliano,* (6/11/10)
- **Exh. 2158:** *Interview of Lee Lambert,* (4/29/10) (with Handwritten Notes), BP-HZN-BLY00130264 - BP-HZN-BLY00130268
- **Exh. 3572:** *Interview of Robert Kaluza*(4/23/10), TRN-HCJ-00121085 – 21096
- **Exh. 3576:** *Notes from interview of Robert Kaluza* (4/25/10), BP-HZN-BLY00045995 – 45999
- **Exh. 7085:** *Interview with John Guide,* (7/01/10)

- Correspondence

  - **Ex. 547:** April 20, 2010 Brian Morel Email re: Ops Notes, BP-HZN-MBI00129108
  - **Ex. 566:** April 20, 2010 Brian Morel Email re: Ops Notes, BP-HZN-2179MDL00161670
  - April 20, 2010 Email from Nathaniel Chaisson re: 9.875" x 7" Casing Post Job, HAL_0011208
  - April 21, 2010 e-mail from Lee Lambert , BP-HZN-2179 MDL 00413137

- BP DWH Accident Investigation Report and Appendices
- Transocean Investigative Report, Vols. 1 and 2
- *Macondo: The Gulf Oil Disaster, Chief Counsel's Report 2011: National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling*
- Oil Spill Commission Report of Cement Testing
- **Exh. 0806:** *National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling Cement Testing Results*

- *Bureau of Ocean Energy Management Regulation and Enforcement Report Regarding theCauses of the April 20, 2010 Macondo Well Blowout,* September 14, 2011
- Appendix M: *JIT Macondo Well Testing*, Oilfield Testing and Consulting, August 1, 2011
- *Engineering Report on Testing of Weatherford M45AP Float Collar, Report PN 1751225 Prepared for: BP America Inc. Houston, Texas, Stress Engineering Services Inc. November 22, 2010, BP-HZN-2179 MDL 00321996*
- *Horizon Incident Float Collar Study – Analysis, Report PN 1101198 Prepared for: BP America Inc. Houston, Texas, Stress Engineering Services Inc. November 22, 2010, BP-HZN-BLY00126963 - BP-HZN-BLY00127217*
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