Expert Report - Macondo

Gregg S. Perkin, P.E.

Engineering Partners International

August 26, 2011

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RE: DEEPWATER HORIZON Explosion on April 20, 2010
Report of Gregg S. Perkin, P.E.

INTRODUCTION

Engineering Partners International, L.L.C. ("EPI") was retained by the Plaintiffs' Steering Committee (PSC) with respect to the DEEPWATER HORIZON Explosion in the Gulf of Mexico on April 20, 2010. Specifically, you requested that Gregg S. Perkin, P.E. of EPI review and analyze certain facts and issues concerning the design, assembly, testing, installation, maintenance, repair, modifications and use of the subsea blowout preventer ("BOP") and its related control systems ("CS") which had been utilized on the mobile offshore drilling unit ("MODU") DEEPWATER HORIZON ("HORIZON"). You also asked that I review and analyze issues related to the BOP and its CS's role in the explosions and fire which occurred during the evening of April 20, 2010 while the HORIZON was drilling and temporarily abandoning BP's Macondo deepwater well ("Macondo") in the Gulf of Mexico ("GoM"). Further, what roles the BOP and its CS had in preventing the sinking of the HORIZON two days later.

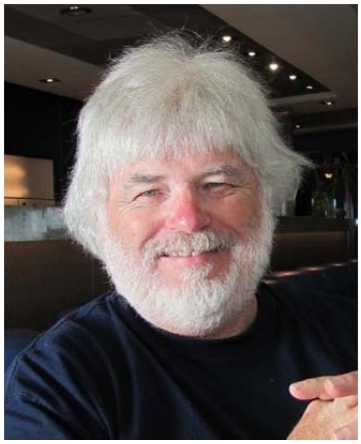
Each of the opinions I express herein are based upon my education, training, knowledge and experience in the areas of mechanical engineering and the design, application and use of oilfield equipment, such as BOPs and their CS, used in both onshore and offshore oil and gas drilling and operations.

My opinions are based upon the information and materials which I have reviewed which are set out in Appendix M and other appendices. They are also based upon certain regulatory requirements governing offshore oil and gas exploration, drilling and production activities as well as industry standards including normal and customary practice for those operating companies ("operators") pursuing these activities. I am familiar with these particular regulations, standards and recommended practices for the relevant time frame between 2001 to the present.

These materials are commonly and routinely relied upon by Operators in the GoM when determining both the configuration and the utilization of their BOP and the CS they choose when planning and conducting the drilling of deepwater wells, such as Macondo. All of the materials cited herein in the both the endnotes and references are materials that are relied upon in the ordinary course of business of Operators, such as BP, and their working interest owners who drill deepwater wells in the GoM.

I have not been asked to make any assumptions, nor have I presumed any facts beyond those which are evidenced by the reliance materials identified in this Expert Report, the endnotes and the appendices.

AUTHOR QUALIFICATIONS



Gregg Perkin has been involved in oil and gas drilling equipment design and oilfield operations since 1968. He has authored technical papers on equipment design, well control and oilfield safety including having developed a number of equipment and systems patents.

While in college, he was employed by a major oil and gas service company. In 1973, he graduated with a Bachelor of Science in Mechanical Engineering from California State University at Long Beach. He became a registered Professional Engineer by examination in the State of California in 1978 and is currently registered as a Professional Engineer in good standing by examination, experience & comity in thirteen (13) states including Louisiana.

Mr. Perkin's Oilfield Service Industry experience included working as a Design Engineer, Engineering Manager, Manager of Technical Services, Chief Engineer, Vice President of Engineering and also as a Director of Manufacturing. Mr. Perkin also worked as a Roughneck or Floorman and Derrickman on an onshore drilling rig and as Serviceman and Field Engineer in both offshore and onshore drilling and completion operations.

In mid-1987, Mr. Perkin began work as an independent professional mechanical engineering consultant. In 1995, Mr. Perkin co-founded Engineering Partners International, L.L.C. ("EPI"). Mr. Perkin is presently employed by EPI as its President and also as an independent consultant and Professional Engineer in the areas of domestic and international onshore and offshore Oil & Gas Drilling and Production operations including the design, use and application of the equipment and systems used in oilfield exploration.

While at EPI, Mr. Perkin has been retained to conduct product design analysis, equipment design, perform failure analysis, review claim elements of intellectual property and provide other independent engineering consulting services related to mechanical equipment and systems including the design, application, use, testing of BOPs and their related CS used both onshore and offshore. Mr. Perkin's full *curriculum vitae* and other biographical materials are attached as Appendix L.

Respectfully Submitted -

Gregg S. Perkin, P.E.
President and Principal Engineer
Engineering Partners International, L.L.C.

Based on my education, training, knowledge and experience in oilfield equipment design, application and use in oilfield operations, such as Deepwater drilling operations, and based upon the information I have reviewed and the work I have conducted, I presently have found the following to be true, supplemented and explained in the remainder of this Expert Report and its appendices, regarding HORIZON'S BOP and its control systems including the subsequent explosion and fire on the HORIZON on April 20, 2010, and major contributing factors leading thereto.

FINDINGS:

1. BP management controlled the configuration, testing, and safety profile of HORIZON'S BOP and its control systems ("CS") under the well control conditions being experienced on April 20, 2010 and before Macondo flowed uncontrollably to the surface ("blowout").
2. BP management knew all of the capabilities and the limitations of the HORIZON'S BOP before the blowout on April 20, 2010.
3. BP management misrepresented data to the Minerals Management Service ("MMS") regarding the well conditions which Macondo could produce.
4. BP management knew that a single BOP component used in HORIZON's BOP, its blind shear ram ("BSR"), was incapable of being successfully actuated under the well control conditions being experienced on April 20, 2010 and knew that Macondo could produce these actual well conditions.
5. Other BOP components used in HORIZON'S BOP included two annular BOPs ("annular"), the single BSR, a casing shear ram ("CSR"), two variable bore rams ("VBR") and a test ram. On April 20, 2010, as the well control emergency became greater in both size and proportion, both annulars and the VBRs were closed. But the emergency continued to grow, exceeding the operational envelope of the BOP. Due to known deficiencies pertaining to both of HORIZON'S annulars and its BSR, BP Management should not have used this BOP as it was configured. The pressures that Macondo produced could and did overwhelm the annulars and could and did overwhelm its BSR.
6. BP and Transocean management failed to competently train and supervise their employees pertaining to deepwater well control issues on the design, use, assembly, testing, application and maintenance of HORIZON'S BOP.

7. [redacted]

8. BP management ignored safety concerns pertaining to the design, use, assembly, testing, application and maintenance of HORIZON'S BOP and failed to recognize its limitations as a well control device.

9. On April 20, 2010, BP management had a faulty well control policy in-place whereby the annulars were to be closed first to shut-in and seal-off Macondo's wellbore. BP management should have known that bottom hole pressures could be as high as 11,000 pounds per square inch ("psi") or more. If the annulars could not shut-in and seal-off Macondo's wellbore, hydrocarbons could reach HORIZON'S rig floor. In the event either/both annulars could not shut-in and seal-off Macondo's wellbore, the BSR below the annulars would be subjected to shut-in wellbore pressures of up to 11,000 psi or more including the unknown flow conditions present within the wellbore. BP management knew that closing the BSR under high flow rates within Macondo's wellbore could jeopardize its ability to shut-in and seal-off Macondo. Under either well control scenario, BP Management's well control policies placed the HORIZON and all of its personnel in grave danger. Had BP management implemented realistic and competent well control policies, Macondo should have been contained on April 20, 2010.

10. [redacted]

11. [redacted]

12. [redacted]

13. The BOP had two (2) redundant and independent operator control systems. Each system utilized one set of Multiplex Electronic Control ("MUX") cables. The rig's MUX cables laid in close proximity to each other in the moon pool,

an area which is classified as a hazardous area. The moon pool is the entrance to the wellbore on the surface of the ocean. On April 20, 2010, explosions knocked-out the MUX cables. Subsequently, there was no BOP control from the rig. BP management failed to provide a backup control system, such as an acoustic trigger, which was available from the BOP's original equipment manufacturer ("OEM"); Cameron International Corporation ("Cameron"). Utilizing an acoustic trigger would have been a realistic and meaningful back-up to control the BOP if the MUX cables were lost. Placing both of the MUX cables in the same hazardous area made it such that a single event, could eliminate both systems. BP management knew that the MUX cables could become a single point of failure ("SPOF") and they should have anticipated and guarded against not only this but all SPOFs;

14. BP management failed to identify all relevant SPOFs in the BOP assembly and its control system. Since BP management failed to do so and because the BOP had limited well control capabilities, other automatic BOP actuation systems, such as the BOP's autoshear and Automatic Mode Function ("AMF"), failed to shut-in and seal-off Macondo.

15. The BSR was the BOP's last resort to shut-it-in and seal-it-off should all else fail to control it. As a result of the blowout, an assembly of pipe was in Macondo's wellbore and its BOP. If the BSR was called-upon with this pipe in the wellbore, this single BSR had to shear this pipe in two, either centered within the BSR or off-center, and then shut-in and seal-off Macondo's wellbore. BP management knew that Macondo's BSR was incapable of shearing certain sizes, weights and grades of pipe under certain and known well control conditions. Further, BP management failed to provide the proper cutting blades within the BSR to completely shear off-centered pipe including having sufficient hydraulic energy available to actuate it.

16. [redacted]

[redacted]

19. The BSR failed because of a) the inability of the accumulator to provide sufficient force; b) the inability of the BSR to shear off-center pipe; and c) erosion washout as a result of dynamic conditions.

BACKGROUND AND DISCUSSION OF THE MACONDO WELL AND HORIZON'S BOP:

1. The DEEPWATER HORIZON ("HORIZON") was a fifth generation, 396 foot long, dynamically positioned MODU owned by Transocean. The HORIZON, built for $350 million in the Hyundai Shipyard in South Korea in 2000, was an ultra-deepwater and dynamically positioned semisubmersible in Transocean's fleet. It was capable of operating in water depths down to 8,000 feet. HORIZON was originally commissioned by R&B Falcon. R&B Falcon later became part of Transocean;
2. Since HORIZON'S maiden voyage in 2001, it was under contract to Vastar and then subsequently, BP. BP later acquired Vastar;
3. BP's leasing of the HORIZON was renewed in 2009 for three more years. Since its commissioning the HORIZON drilled an average of three wells per year. All but one of the wells drilled since 2001 were for BP;
4. A critical and essential safety feature of any MODU involved in deepwater drilling operations is its BOP and control system. Individual BOP elements assembled into the HORIZON's BOP system failed on April 20, 2010;
5. This BOP system was designed to assist in offshore drilling operations to control flows from subsea wellbores, such as the Macondo well, for oil & gas exploration. The opening or cavity through the inside diameter of the HORIZON's BOP system was 18¾". Individual BOP components were assembled together into what is referred to as a subsea BOP stack. The maximum allowable (or operating) working pressure ("MAWP" or "MAOP") of some, not all, of the BOP components was 15,000 pounds per square inch ("psi");
6. Each of HORIZON'S BOP components was a subsea, high pressure valve which can be opened and closed. BOP components are nothing more than shut-off valves used to control the flow of oil and gas.
7. A BOP system on an a MODU such as the HORIZON consisted of a system of integrated BOP components designed to stop any uncontrolled flow of hydrocarbons from reaching the surface and the MODU;
8. The HORIZON's BOP included a Lower Marine Riser Package (LMRP) and a Lower BOP Stack. The LMRP included two annulars. The lower BOP stack included the single BSR, a casing shear ram ("CSR"), two variable bore rams ("VBR") and a test ram as well as various connectors mounted to a structural frame. Refer to the figure below. Also, a more complete explanation of the BOP, its components and how it works is contained in the Appendices.

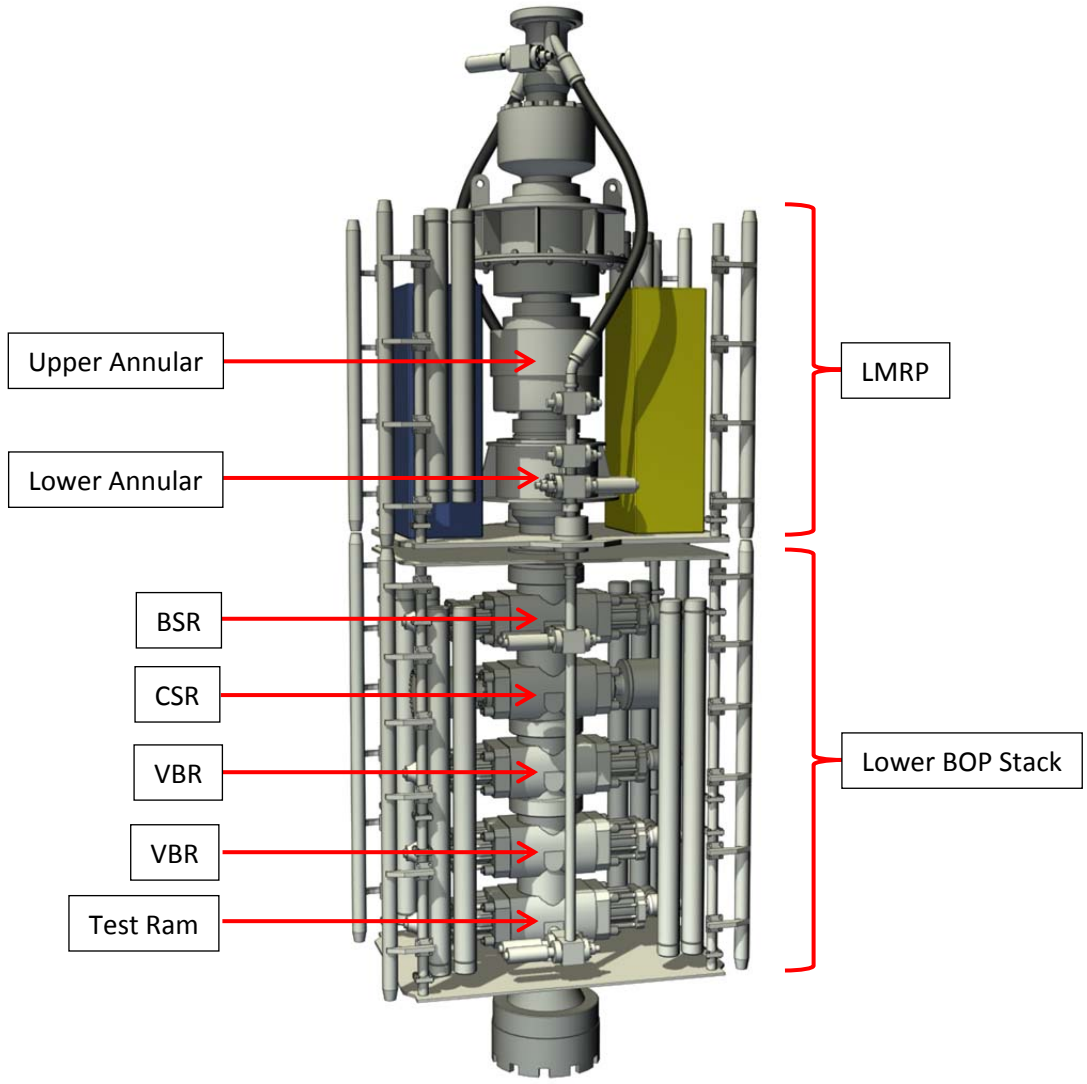


Image Source: Engineering Partners International, LLC

9. Cameron International Corporation ("Cameron") designed, manufactured and sold the BOP system. However, Vastar Resources Incorporated, and its corporate successor BP, were heavily involved in the design, choice of components and control systems and the configuration of the BOP system. Among the decisions made by BP's predecessor in the design and configuration of the BOP, Vastar:

    a. Specified a 5 cavity BOP;

    b. Specified a 30 second LMRP disconnect with the lower BOP Stack in connection with its Automatic Mode Function ("AMF") or Deadman system;

c. Decided against equipping the BOP with an acoustic trigger, i.e., remote control;

d. Required certain adjustments to be made by Cameron before accepting the BOP into service after the factory acceptance test;

e. Specified the location of the MUX cables in a hazardous area;

f. Specified Emergency Disconnect System 1 ("EDS-1") which activates only the BSR instead of EDS-2 which activates of the CSR first, followed by the BSR to shut-in and seal-off the well in primary emergency LMRP disconnect mode.[1]

10. [redacted]

11. BP made all the significant and key decisions regarding HORIZON's BOP on Macondo. With respect to the BOP [redacted] while the HORIZON was under charter to BP, its testing protocol was determined by BP, not Transocean;[2]

12. During the course of the operations of the HORIZON, BP management made modifications to the BOP;

13. Deepwater wells in the GoM present specific risks which are relevant to the requirement for a properly chosen, properly designed and properly functioning BOP and control system. The Macondo well was a deepwater well located in over 5,000 feet of water;

14. In an Application for Permit to Drill ("APD") submitted by BP to the United States Minerals Management Service ("MMS"), BP misrepresented the characteristics of Macondo which were relevant to the kind of BOP system that would be necessary to control the well.

15. BP management sought and subsequently gained their permission to exempt HORIZON'S BOP from certain required tests and testing;

16. BP began drilling the Macondo well in in October of 2009 using the Transocean's MODU MARIANAS, which was another semisubmersible. Because of damage done to the MARIANAS by Hurricane Ida, BP management replaced the MARIANAS with the HORIZON to complete Macondo. HORIZON began its drilling of Macondo on February 6, 2010;

[1] For a more complete discussion of BP's role in the design and configuration of the BOP system, see Appendix F.
[2] For a more complete discussion of BP's role in testing, maintenance and decisions regarding the BOP, see Appendix G.

17. [redacted]

18. On April 9, 2010, Macondo had been drilled to a total depth of 18,360 feet where another kick was experienced. At this time, the well was months behind and well over budget.

19. On April 20, 2010, BP management had already decided to temporarily abandon Macondo. During this process, Macondo went out of control. Despite efforts to activate the BOP, the well suffered a blowout followed by explosions and fires and the ultimate sinking of the HORIZON and release of oil into the GoM.[3]

20. The explosions disabled the MUX communication cables, the means by which the crew would otherwise have been able to activate the BOP's EDS from various locations on the HORIZON. The Autoshear Function, part of the BOP's CS, should have activated the BSR and released the LMRP allowing the HORIZON to drift off site. This did not occur and, as a result, the HORIZON remained connected to Macondo until it sank. The piping which connected the LMRP ("Riser") bent and broke.

21. [redacted]

[3] For a more complete discussion of the events leading up to and following the explosion, see Appendix I & J.

OPINIONS & CONCLUSIONS:

OPINION 1: HORIZON'S BOP AND ITS CONTROL SYSTEM FAILED TO PERFORM ITS INTENDED FUNCTION OF PREVENTING A BLOWOUT.

A. The HORIZON BOP failed to prevent the blowout despite efforts to activate the various BOP components;

B. [redacted]

OPINION 2: BP MANAGEMENT DID NOT ADEQUATELY PERFORM ITS RISK ASSESSMENT REGARDING MACONDO'S WELL CONTROL AND ITS BOP AND CONTROL SYSTEM.

A. BP management's own guidelines required that the risks associated with the drilling of a specific well be identified, evaluated, addressed and mitigated. Even without written guidelines, a prudent operator should, prior to commencing a drilling operation, identify, assess, and manage risks of the operation;

B. BP management did not consider the safety and functionality risks associated with the BOP and its control system in its Risk Register, instead focused on the financial impact of non-productive time. The only risk BP management identified with respect to its BOP and its control system was non-productive time;

C. BP management's risk assessment violated industry standards by failing to consider the risks associated with the hazards of well control, uncontrolled blowout, personal injury, death and environmental damage caused by a blowout;

D. If BP had performed an industry standard risk assessment, the assessment would have identified, assessed and managed at least the following issues;

    1. The adequacy of the design and configuration of the BOP system;
    2. The appropriateness of the HORIZON's BOP for the Macondo well given the characteristics of that well;

E. Had these risks been adequately addressed and managed, the April 20, 2010 blowout of Macondo would have been averted or significantly reduced.

    1. Had these risks been adequately assessed and managed, the BOP would have been upgraded and the blowout would have never happened.

OPINION 3: BP MANAGEMENT KNEW OR REASONABLY SHOULD HAVE KNOWN THAT HORIZON'S BOP AND CONTROL SYSTEM WAS NOT SUITABLE AND SAFE FOR USE IN ALL FORESEEABLE WELL CONTROL AND BLOWOUT CONDITIONS. [redacted]

A. BP management failed in its responsibility to accurately determine critical well conditions and to ensure that the equipment being used, i.e., HORIZON'S BOP and its control system was fit for its intended purpose.

B. As a part of insuring that Macondo could be drilled safely, an operator such as BP must insure that the equipment it is going to use in connection with drilling and well control operations is suitable and safe for the purpose for which it will be used. If it is not suitable to a specific well, the BOP should not be assigned to that well. This requires that the operator determine the conditions of the well to be drilled and given those conditions, choose equipment which is suitable and safe to use;

C. BP management failed to design, assemble, install, test, use and maintain in such a way as to ensure well control under all predictable circumstances. The maximum allowable or operating pressure ratings for each BOP component must be greater the maximum allowable and/or anticipated surface pressure ("MASP"), i.e. the maximum pressure that the well can produce at the wellhead;

D. BP management failed to competently calculate and provide the MMS with Macondo's MASP at the mud line as required by the MMS for permission to drill the Macondo well;

E. BP misrepresented Macondo's MASP to the MMS. BP management represented that the worst-case MASP was 8,904 psi at the mud line. BP knew, from information available, it misrepresented the MASP because the Macondo well was capable of producing pressures in the wellhead in excess of 11,000 psi, or greater;

F. BP management knew that it was probable that the annulars would become less capable of sealing Macondo with wellhead pressures in excess of 10,000 psi;

G. BP management knew that it was probable and highly likely that the BSR would be incapable of cutting the DP in two, shutting-in and sealing-off Macondo, given the drill pipe ("DP") inside the BSR on April 20, 2010, i.e. 5½" outside diameter ("OD"), 21.9 lbs/ft, Grade S135, wellhead pressure in excess in 10,000 psi, and flow;

H. As an operator, BP management was required to determine whether the DP across the BSR, at any time, could be sheared;

I. BP management failed to take reasonable steps to determine the shearability of the DP being utilized on the HORIZON prior to and on April 20, 2010. The following are examples supporting this opinion:

    1. BP management never conducted shear tests on the assemblies of DP, i.e. drill string, being utilized on Macondo even though such tests are a recommended practice and that BP changed from 5½" DP to stronger 6⅝" DP to conduct drilling operations;

    2. BP used an obsolete shearing chart to determine whether the DP was shearable;

    3. The shearing chart employed incorrect calculations. The shearing chart analysis referred to the use of a 5,000 psi accumulator system ("accumulators"). Accumulators provide the hydraulic pressure and flow to actuate all of the BOP components in the BOP. HORIZON's accumulators to actuate the BSR had only 4,000 psi available, perhaps less;

    4. BP Management had to request information, after the explosion, about the shearability of the DP that was being used in Macondo;

    5. BP never investigated the shearability of 6⅝" DP by the HORIZON BOP. 6⅝" DP was specifically requested by BP to be placed on the HORIZON and was the DP primarily used in Macondo's drilling operation.

J. Transocean Management should have verified the shearability of all DP sizes, weights and grades using the BSR in HORIZON's BOP;

K. If BP management would have taken reasonable steps to determine the shearability of its DP, it would have discovered that, given the limitations of the BOP's accumulators and its BSR, and given the wellbore conditions that Macondo could and would produce as it was being drilled, BP management would have reached the conclusion that HORIZON'S BOP could not reliably

shear the DP being used. Therefore, HORIZON'S BOP was not suitable and safe for its intended use;

L. BP management should have upgraded the BOP. The following are specific examples of options which were available to BP from Cameron to upgrade it:

1. Add tandem boosters, which would have effectively doubled the shearing capacity of the blind shear ram. Tandem Boosters which would increase the shearing capability of the BSR and allow for higher forces to shear DP;
2. Add another BSR, a preferable configuration;
3. [redacted]
4. Install a larger subsea Accumulator system thereby giving greater regulated flows and pressures to actuate critical BOP components;
5. Use EDS-2 instead of EDS-1. This modification would have cost BP management nothing. It would also have protected the BSR by closing the CSR first;
6. Install an Acoustic Control System ("ACS") which could have automatically actuated the LMRP disconnect sequence from the HORIZON;
7. [redacted]
8. A 5,000 psi subsea accumulator;

OPINION 4: HORIZON'S BOP AS ORIGINALLY DESIGNED AND CONFIGURED ON APRIL 20, 2010 WAS DEFECTIVE. THESE DEFECTS WERE SIGNIFICANT AND CONTRIBUTING CAUSES TO THE BOP AND ITS CS TO PERFORM ITS INTENDED FUNCTION:

A. The failure of the BOP to have cutting blades that extend across the well bore;

1. Both BP and Cameron knew that off-center pipe within the cavity of a BOP component, such as the BSR, is a common occurrence in offshore drilling. Therefore, Cameron and BP knew or reasonably should have known that it is when pipe is off-center inside the BOP, HORIZON'S BSR would likely not completely shear the pipe and thus not seal the

well. Thus, the failure of the BSR to have cutting blades that do not fully cover and extend across the wellbore was a design flaw rendering the BOP not reasonably safe. The risk of occurrence could have been avoided or significantly reduced by a reasonable alternative design, namely providing a set of BSR cutting blades which extended across the 18¾" opening;

B. [redacted]

C. The failure to properly segregate and/or otherwise protect the MUX cables which provide power to BOP controls so as to preserve the integrity and redundancy of the BOP controls in case of an explosion;

1. HORIZON'S BOP had two independent BOP operating systems. The primary system to operate HORIZON'S BOP on the seafloor was through the use of a multiplex electronic control ("MUX") system. The HORIZON had three separate panels from which personnel could activate certain BOP controls. When activated, the command was transmitted from the panel to a junction box, onto a MUX cable reel and then through MUX cables to two separate control pods on the LMRP; i.e. the yellow and blue pods. Electronic signals were then converted to hydraulic signals which would activate components of HORIZON'S BOP. The separate panels and pods were provided so as to give redundancy to the controls such that the BOP could continue to be operated in the event one of the panels or pods became disabled.

2. However, the MUX cables which transmitted the commands from each of the three panels to the blue and yellow pods were strung through a single and classified hazardous area called the moon pool." The moon

pool is an area at the top of the well above the surface of the ocean, a direct conduit from the well bore and thus an area which is subject to explosion and fire. The design and construction of the system so as to route both the yellow and blue MUX cables through the moon pool created a SPOF. By running both blue and yellow MUX cables through the same hazardous area, both cables are subjected to loss or compromise in the event of an explosion in the moon pool, thus defeating the purpose of these dual and redundant controls. As designed and configured, the BOP and its CS was unreasonably safe.

3. The decision of BP, Transocean and Cameron to place the MUX cables in the moon pool without protection from explosion and fire was unreasonably dangerous;

4. The possibility of an explosion in the moon pool was entirely foreseeable and there were reasonable alternative designs which would have eliminated or significantly reduced the risk of losing the control of HORIZON'S BOP included:

   a. [redacted]

   b. [redacted]

   c. Providing ACS (Acoustic Trigger) as a means of activating the BOP wirelessly.

D. The failure to have a wireless method to activate and control emergency functions;

   1. As explained above, there was a need for a remote control wireless method of activating BOP controls in the event the MUX cables or other elements within the BOP system were disabled or destroyed. Such a method, i.e. an ACS (Acoustic Trigger) was available in 2001, Such a device should have been a part of HORIZON'S BOP and its CS.

E. [redacted]

2. [redacted]

F. The failure to have redundancy in the emergency activation systems by relying on a single component for all pipe shearing and well bore shutting-in and sealing functions, namely the single BSR. There were five emergency activation systems on HORIZON'S BOP. Each system utilized the same BOP component to seal it, namely the BSR and the accumulator necessary to energize it. If the BSR failed to function, for whatever reason, it essentially disables every emergency function of the BOP.

OPINION 5: BP MANAGEMENT FAILED TO HAVE AN ADEQUATE WELL CONTROL POLICY PERTAINING TO HORIZON'S BOP.

A. BP management had a faulty well control policy in-place whereby HORIZON'S annulars were to be closed first to shut-in and seal-off the wellbore;

B. BP management knew that closing the BSR under high flow rates within Macondo's wellbore could jeopardize its ability to shut-in and seal-off the wellbore.

C. By regulation, BP was responsible for competently calculating MASP, a regulatory requirement relating to the BOP per 30 CFR 250.446;

D. By making the lower ram a test ram, BP management violated its own well control policy which stated that: *"the lowermost ram be preserved as a master component and only used to close in the well when no other ram is available for this purpose."*

E. BP failed to adequately supervise and oversee Transocean with regards to BOP operations.

Opinion 6: BP management and Transocean's Management failed to have and enforce a program for training and supervising their personnel who would be responsible to operate HORIZON'S BOP.

A. MMS Regulations require adequate personnel training per 30 CFR 250.1503 and 250.1506;

B. By its own admission, BP management had no enforceable GoM safety system in-place with regard to subsea BOP safety, BOP personnel training, BOP equipment testing, BOP mandatory regulatory compliance, internal BOP audits and/or usage of a BOP such as the one used on Macondo;

C. BP's WSL's and other personnel were not adequately trained regarding BOPs and;

D. BP employees received no training as to whether they should close the Annulars first, or the VBRs first, or close them simultaneously. BP's Well Control Manual states that the annulars should be closed first. BP's manuals also stated that BP should ensure that their contractors follow BP's well control policy. If HORIZON'S upper Annular was rated at 10,000 psi and this well was capable of producing MASP mud line pressures in excess 10,000 psi. Macondo could not have been reliably shut-in and sealed-off.

[redacted]

[redacted]

OPINION 8: THE ACCIDENT OF APRIL 20, 2010 WAS ENTIRELY FORESEEABLE AND PREVENTABLE, AND WAS CAUSED BY THE FAILURES DETAILED ABOVE.

CONCLUSION:

These are my opinions within a reasonable degree of probability, based upon the materials referenced in Appendix M, as well as the other appendices. Further elaboration of my opinions can be found in the chart located at Appendix K and other attached Appendices.