IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF LOUISIANA
In re: Oil Spill by the Oil Rig "*Deepwater Horizon*"
in the Gulf of Mexico, on April 20, 2010 (MDL No. 2179)
Before the Honorable Judge Carl J. Barbier

Expert Report

Prepared by
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Introduction

I have prepared this report as an in-house expert for Cameron International Corporation ("Cameron") in connection with the litigation captioned In re: Oil Spill by the Oil Rig "*Deepwater Horizon*" in the Gulf of Mexico, on April 20, 2010 (MDL No. 2179), currently pending in the United States District Court for the Eastern District of Louisiana. My observations and opinions in this report are stated to a reasonable degree of engineering probability based on the information available to me to date.

My experience and qualifications are provided in the curriculum vitae attached as Appendix 1. I have a Bachelor of Science in Electrical Engineering degree from University of Houston. I have worked for Cameron for roughly thirteen years (1998-present).

- For the last five years (2006-present), I have worked as an Engineering Manager for Cameron Drilling Systems managing a group of software engineers responsible for the development and modification of software for Cameron's Mark 1, 2 and 3 drilling control systems for Blowout Preventers ("BOPs").

- From 2001-2006, I was employed as an Advanced Product Design Engineer working with a team of engineers in developing and testing hardware and software for Cameron's new generation drilling controls equipment. In this capacity, I was also responsible for maintaining the hardware/software of legacy Cameron drilling controls systems. This experience gave me significant expertise in the electrical components and software used in Cameron Mark 1, 2 and 3 drilling control systems.

- From 2000-2001, I worked as a Senior Product Design Engineer managing a team of engineers within the Umbilical Product Group associated with Cameron production control systems.

- From 1998-2000, I was a Senior Project Design Engineer responsible for the design of the electrical components and assemblies (control panels, HPU/Diverter/Mixing controls panels, subsea junction boxes, subsea riser controls boxes and subsea electronic module) associated with Cameron Mark 1 and 2 drilling controls systems.

Beginning in 1998, I worked as Cameron's Lead Electrical Design Engineer for the Deepwater Horizon project. In this capacity, I was responsible for supervising Cameron's design of the Deepwater Horizon's Mark 2 electrical control system in accordance with customer specifications. I attended weekly design meetings between Cameron Controls personnel and representatives of the customer (R&B Falcon/Transocean) and its client (Vastar/BP) from around the time I started working on the project through the time the Deepwater Horizon's BOP stack was constructed at Cameron's Berwick, LA facility. After this time, I continued to work on the Deepwater Horizon project on-and-off, particularly in tailoring its Mark 2 control system to meet customer specifications.

Based on my education, professional experience, and knowledge, I believe I am qualified to provide expert opinions concerning the following:

- The design and function of Cameron subsea BOP control systems, including the Mark 2 control system used on the Deepwater Horizon and the Cameron Mark 3 control system.
- The compliance of Cameron subsea BOP control systems with relevant industry standards.
- The design and function of AMF/deadman system hardware and software to include AMF batteries, solenoid valves, and internal circuitry.
- Electronic control system development techniques and approaches.
- PETU design and function.
- Alternative subsea BOP control system components.
- The respective roles of Cameron and its customers in the specification of the Deepwater Horizon's BOP stack configuration, as well as the Deepwater Horizon's control system features (including its EDS and AMF sequences).

The material and information that I considered in forming my opinions is provided in Appendix 2. I reserve the right to supplement and/or revise any of my analysis and opinions should additional information become available, or to the extent that any opinions provided by the expert reports discussed in this report (or any other expert reports) are not adequately addressed by this report.

I have never testified as an expert at a deposition or trial.

Executive Summary

After reviewing the available evidence, I have reached the following conclusions which I discuss at greater length in later sections of this report:

- Cameron's AMF system complied with the requirements of API 16D, contrary to the contention made in the expert report submitted by Arthur Zatarain on behalf of BP.

- The Zatarain Report's discussion of the fault tolerance of the Cameron control system used on the Deepwater Horizon (the Mark 2 control system) is based on a flawed understanding and application of the fault tolerance concept.[1]

- The expert reports submitted on behalf of the other parties in the litigation uniformly fail to provide a meaningful discussion of the feasibility or significant trade-offs involved in adopting their preferred alternative BOP control system technologies. Consequently, these other expert reports fail to demonstrate that their preferred design alternatives would be acceptable alternatives for rig operators, or even that the presence of these design alternatives could reduce the risk of a blowout of similar magnitude to the Macondo blowout on April 20, 2010.

  Among the various alternative technologies discussed are the following:

  - Rechargeable AMF batteries with real-time remote battery monitoring.
  - Real-time battery monitoring for non-rechargeable AMF batteries.
  - Dedicated 27V battery pack for each SEM.
  - Single-Coil Solenoid Valves.
  - AC-Coil Solenoid Valves.
  - Alternative AMF and EDS Sequences and BOP Stack Configuration.

[1] Cameron's first multiplex ("MUX") BOP control system was the Mark 1 ("Mk 1") control system. Cameron's second multiplex control system was the Mark 2 ("Mk 2"); this control system was used on the Deepwater Horizon. Cameron also offers a Mark 3 ("Mk 3") control system which was developed several years after the Deepwater Horizon was commissioned.

Discussion

I. Cameron's AMF System Does Not Violate API 16D's Deadman Provision

API 16D describes a deadman system[2] as an "optional safety system . . . designed to automatically shut in the well during unplanned emergency events" by "automatically clos[ing] the wellbore in the event of a simultaneous absence of hydraulic supply and signal transmission capacity in both subsea control pods."[3] The Zatarain Report claims that Cameron's AMF system is not compliant with this particular API provision because

- Cameron's AMF system requires the satisfaction of an additional criterion—loss of power from the surface—that is not mentioned in API 16D, and
- Cameron's AMF system does not involve the "direct" monitoring of parameters identified in API 16D.[4]

However, this conclusion is in error for a number of reasons:

- The Zatarain Report's reading of API 16D's deadman provision is not supported by the text and gives rise to an absurdity—an *optional* piece of equipment with *mandatory* requirements. The Zatarain Report acknowledges deadman systems are optional equipment for subsea BOPs.[5] Nevertheless, the Zatarain Report proceeds to characterize API's generic description of the purpose of these optional deadman systems as a "definition" and criticizes Cameron's AMF system for non-compliance with the elements of this supposed definition by adding an additional triggering condition: loss of topside power.[6]

  However, the API 16D deadman provision is less a definition with exclusive terms than a generic description of a deadman system's function. API 16D's deadman provision appears nowhere in the API 16D "definitions" section set forth at the beginning of the standard. Consistent with its characterization of a deadman system as being optional, the imperative mood ("shall") appears nowhere in API 16D's deadman provision even as the imperative appears liberally in the mandatory provisions of the standard.

  With these considerations in mind, API clearly did not intend for its deadman provision to function as a binding definition with exclusive terms as the Zatarain Report claims. Moreover, because API 16D's generic description of a deadman system does not limit the criteria for deadman activation, Cameron would not be prohibited by API 16D from incorporating additional criteria for activation of its deadman system.

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[2] The deadman system in Cameron BOP control systems is referred to as the Automatic Mode Function ("AMF system").

[3] American Petroleum Institute (API), API SPECIFICATION 16D: SPECIFICATION FOR CONTROL SYSTEMS FOR DRILLING WELL CONTROL EQUIPMENT AND CONTROL SYSTEMS FOR DIVERTING EQUIPMENT 41 (2d. ed. 2004).

[4] Expert Report of Arthur Zatarain at 39-41.

[5] *Id.* at 39.

[6] *Id.*

- Even if API 16D's deadman provision bars additional criteria for deadman activation, Cameron's AMF system does not add an additional criterion. Because the design of Cameron's AMF system dictates that a loss of surface power *necessarily* entails a loss of communications capacity for the subsea pods, Cameron's AMF system does not add an additional criterion to the deadman activation conditions listed in API 16D.[7]

- The Zatarain Report's discussion of API 16D's deadman provision inserts a word– "directly" –that appears nowhere in API 16D's text. The Zatarain Report asserts that API 16D's deadman provision requires that deadman systems *directly* sense surface communications capability and that Cameron's AMF system is in violation of this requirement because the SEM heartbeats monitored by Cameron's AMF system are not "direct" indications of surface communications capability.[8] However, the Zatarain Report's standard — "*direct* sensing of surface communications capability" – is pure invention. The text of API 16D's deadman provision refers only to a loss of "signal transmission capacity in both subsea pods"; the word "directly" appears nowhere in this provision. Nor, moreover, does the Zatarain Report explain why API 16D's generic description of a deadman system hints of an implicit "directness" requirement.

- The Zatarain Report's interpretation of API 16D's reference to "signal transmission capacity in both pods" distorts API 16D's meaning in a manner unreasonable for subsea BOPs. The Zatarain Report asserts that the API 16D deadman provision requires that deadman systems sense *surface communications capability* and that Cameron's AMF system is in violation of this requirement because Cameron's AMF system does not monitor the ability of the SEMs to receive orders from the surface so much as it monitors communications (the "heartbeats") between the SEMs themselves.[9] However, the Zatarain Report's reading of API 16D's deadman provision takes a number of significant liberties with the text:

    - API 16D does not contain the language "*surface* communications capability." API 16D instead uses the phrase "signal transmission capacity in both subsea pods"; it contains no reference to the ability of the subsea pods to communicate with surface equipment.

    - The text of API 16D's deadman provision is in tension with the Zatarain Report's interpretation of its language in another respect: while the Zatarain Report repeatedly characterizes API 16D as referring to the *communications* capability of the subsea pod, API 16D's text actually uses the phrase "signal *transmission* capacity in both subsea control pods." The difference between these two phrases is subtle but important. While the Zatarain Report's preferred choice of words (*"communication")* implies that the subsea pods are only passive components — passive relays for information received from the surface or another pod — API's use of the word "transmission" necessarily envisions an active role for the subsea pods in transmitting signals to other components in the BOP control system.

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[7] *See* Exhibit 5157 at 17.

[8] Zatarain Report at 40-41.

[9] *Id.* at 40-41.

For these reasons, a reading of API 16D's reference to "signal transmission capacity" that is more consistent with the actual function of deadman systems in subsea BOPs envisions a deadman system which monitors for the loss of signals generated within and exchanged between the subsea pods. Subsea MUX control pods are not just passive relays forwarding pre-processed commands sent from the surface computers, but are themselves the "brains" of a subsea BOP; they process control signals received via MUX cables from surface operator terminals and issue commands to operate the various BOP functions.[10] Consequently, the capacity of a deadman system to sense whether the four SEMs are receiving commands from the surface is less critical than its capacity to sense whether these SEMs have the ability to process and execute commands they receive from the surface.

In Cameron BOPs with electric AMF systems, a "heartbeat" pulse generated and transmitted continuously by each SEM is an indication of that SEM's ability to perform its assigned function as one of the subsea brains of the BOP. The absence of this heartbeat signal means that a SEM's processing capability has been degraded or that it has lost power from the surface — error conditions which render that SEM useless to operate BOP functions in an emergency.[11] When all four SEMs (i.e., both pods) fail to generate and transmit their heartbeat signal the BOP cannot process and execute commands from the surface.

Cameron's AMF system design clearly satisfies this more natural reading of the API deadman provision's language. The SEM heartbeat *is* a signal generated by and transmitted between the subsea pods. When all four SEMs fail to generate and transmit their heartbeats, "signal transmission capacity in both subsea pods" has been lost as described by API 16D.

II. The Zatarain Report's Discussion of the Fault Tolerance of the Deepwater Horizon's Control System is Based on an Incomplete Understanding of the Meaning and Application of Fault Tolerance Concepts

Overview of the Zatarain Report Discussion of Fault Tolerance

Citing ISA 84, the Zatarain Report defines "fault tolerance" as "the built-in capability of a system to provide continued correct execution of its assigned function in the presence of a limited number of hardware and software faults."[12] Noting that API 16D requires BOP control systems to incorporate redundant subsea pods, the Zatarain Report claims that API mandates the application of the ISA 84 fault tolerance concept to subsea BOP control systems.[13]

Although the Zatarain Report concedes that Cameron's control system design is adequately fault-tolerant to satisfy any demands imposed by API 16D,[14] it concludes that this degree of fault tolerance was not enough: the Cameron Mk 2 control system was not adequately fault-tolerant

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[10] *See* Exhibit 3600 at 56-65.

[11] *See* CAM_CIV_0053663.

[12] Zatarain Report at 29.

[13] *Id.* at 30.

[14] *Id.* at 45.

with respect to the simultaneous AMF equipment failures it alleges were present on the day of the blowout—specifically, a depleted 27V battery pack on the Blue Pod and a reverse-wired V-103 on the Yellow Pod.[15]

Problems with the Zatarain Report Discussion of Fault Tolerance

The Zatarain Report's treatment of fault-tolerance in the context of the Mk 2 control system used on the Deepwater Horizon suffers from a number of serious deficiencies that risk creating a flawed understanding of the meaning and application of fault tolerance in designing subsea BOP control systems. Among the most significant errors are the following:

- The Zatarain Report mischaracterizes API 16D's redundancy requirements as explicit requirements for the incorporation of fault tolerance in subsea BOP design. The Zatarain Report claims that API 16D's requirements for redundant subsea BOP control system equipment require subsea BOP control systems to be fault tolerant to the loss of one subsea control pod.[16]

  However, the term "fault tolerance" appears nowhere in API 16D; whatever API 16D's requirements for redundant subsea BOP control systems, only the Zatarain Report confuses these requirements with the concept of fault tolerance. Additionally, because redundancy is only one of many strategies a systems engineer can employ in designing a system to be fault-tolerant,[17] the Zatarain Report's equation of redundancy with "fault tolerance" risks confusing the reader into wrongly thinking that API 16D requires *other* means of making a system more fault-tolerant.

- Fault tolerance is only one of several approaches taken by Cameron system engineers in improving the reliability of the Mk 2 control system used on Deepwater Horizon. Although the Zatarain Report is correct that fault tolerance can be an important concept in designing a BOP's control system to operate dependably in the face of equipment failures, it is not—as the Zatarain Report makes it out to be— the *only* approach taken by systems engineers to increase system dependability. The National Institutes of Standards and Technology (NIST) identifies fault tolerance as one of four general approaches to achieving dependability:

  - *Fault avoidance*-most relevant in the design phase of an engineered system, it consists of designing the control system—selecting its physical components, programming its software—to avoid identifiable faults threatening system dependability.

  - *Fault removal*-most relevant in the pre-commissioning phase of an engineered system, it consists of constructing and testing the actual system to identify and eliminate unanticipated faults threatening system dependability.

  - *Fault tolerance*-most relevant in the post-commissioning phase of an engineered system.

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[15] *Id.* at 46.

[16] *Id.* at 30.

[17] National Institute of Standards and Technology (NIST), A CONCEPTUAL FRAMEWORK OF FAULT TOLERANCE § 4 (2004).

- *Fault evasion*-most relevant in the post-commissioning phase of an engineered system, it consists of the incorporation of system features and procedures to identify and correct faults (expected or unexpected) before they threaten system dependability.[18]

Because systems engineers designing control systems do not have infinite resources to employ each of these approaches, they must strike a balance among all of them based on the resources anticipated at each phase in the system's life, as well as the design constraints imposed by the end user.[19]

In designing the Mk 2 control system, the precise balance Cameron struck between these approaches was driven by the design constraints — physical space, delivery schedule, development costs, desired reliability, etc.—imposed by a particularly sophisticated customer base. Cameron designed its Mk 2 control system to meet the needs of established drilling contractors, many of whom—including the Deepwater Horizon's customer—already had significant experience using alternative MUX control systems, or who had already procured the Mk 2 control system for use on their other rigs.[20] Additionally, the Deepwater Horizon's rig operator did not simply purchase its Mk 2 control system off-the-shelf; rather, throughout the design and commissioning process, the rig operator purchasing the Deepwater Horizon (as well as its own clients) was an active participant in tailoring the configuration of Deepwater Horizon's Mk 2 control system to satisfy its needs and the needs of its own clients.

- Fault tolerance does not refer only to the ability of physical components within a control system to improve system dependability, but also embraces other elements neglected by the Zatarain Report. The Zatarain Report's application of the fault tolerance concept to the Deepwater Horizon's Mk 2 control system discusses only the contributions of control system hardware and software toward ensuring system reliability in the face of component failure. Although the Zatarain Report acknowledges that the failure of rig personnel to perform proper maintenance on the Deepwater Horizon's AMF system components ultimately caused its failure, it devotes significant discussion to alternative components that (it claims) could have improved the fault tolerance of the Deepwater Horizon's AMF system.[21]

  However, this treatment of fault tolerance as if the term referred only to the selection of physical components to overcome component failure is incomplete; the fault tolerance of a system also refers to the procedures and practices operators employ in using the system

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[18] *Id.* at § 2.2.

[19] *Id.* at § 5. For example, a systems engineer designing an airline passenger jet could make his design more fault-tolerant by adding an extra engine; however, if the extra weight of the additional engine and its fuel would reduce the number of passengers the plane could carry, the designer working with the customer might instead decide to emphasize fault evasion techniques that rely on the training of the pilots and ground maintenance staff to identify and correct problems before they result in component failure.

[20] The customer for the Deepwater Horizon (RB Falcon) had already purchased a Mark 2 BOP control system for use on another rig (Nautilus) when it ordered the BOP stack and control system for Horizon. *See* CAM_CIV_0227061.

[21] Zatarain Report at 45-65.

despite the failure of one or more system components.[22] With this in mind, fault tolerance involves its own balancing act between procedures and equipment driven once again by the constraints imposed by the customer.

For their part, Cameron systems engineers designed the Deepwater Horizon's Mk 2 control system expecting that the sophisticated customer would maintain and operate the system in a manner consistent with this balance.

- The choice between fault-tolerant physical components involves its own complex balancing that the Zatarain Report completely neglects. The Zatarain Report's discussion of the fault tolerance concept identifies a number of alternative physical components that it claims would have allowed the AMF system to function despite the specific equipment failures it claims were present in the Mk 2 control system on the day of the blowout.[23]

  Unfortunately, the Zatarain Report's mention of these various alternative or additional physical components neglects any serious discussion of the feasibility or trade-offs arising from incorporating them into the Deepwater Horizon's Mk 2 control system. Although on paper it seems a great idea to incorporate physical components affording an infinite degree of fault tolerance into a design, the reality is that a system can only incorporate as many and of the type permitted by the design constraints specified by the customer.[24]

  Consequently, system engineers selecting physical components to provide fault tolerance for their designs must balance the advantages against the costs from incorporating an alternative or additional component. For example, the addition of redundant safety equipment to a battery-powered emergency system might improve fault tolerance with respect to the specific failure scenario the new safety device was intended to address, but reduce fault tolerance system-wide by reducing battery life or by diverting scarce maintenance resources from other safety equipment.

III. Alternative Technologies

Overview

The discussion above is important to keep in mind when reviewing the suggestions in the other expert reports that the Deepwater Horizon's Mk 2 control system should have incorporated one or another alternative technologies.

In general, all the expert reports give short shrift to the complexity of designing a subsea BOP control system. They propose alternative technologies without any evaluation whether their

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[22] NIST FAULT TOLERANCE CONCEPTUAL FRAMEWORK at § 4. For example, an extra engine gives a passenger jet a degree of fault tolerance against engine failure, but operations manuals instructing pilots of responsive actions they can take in the event of engine failure might be a far more efficient means of providing adequate fault tolerance against this particular malfunction.

[23] Zatarain Report at 45-65.

[24] For example, physical space and weight in particular are at a premium in the context of subsea BOP stack control systems like the Mk 2 used on Deepwater Horizon. The larger and heavier the subsea pods, the more difficult it is to shuttle them or the rest of the LMRP back and forth over the 5000+ feet between the rig and the sea floor.

design proposal is even possible given customer-imposed constraints (physical dimensions, planned purpose and method of operation, development costs, desired reliability, development time, etc.) involved in designing or modifying a BOP control system. Additionally, the other expert reports propose each of these alternative technologies to cure only a single alleged failure in Deepwater Horizon's control system; they make no attempt to weigh the advantages captured against the inevitable trade-offs arising from incorporating these alternatives.

These reports' omission of any discussion of the trade-offs involved in incorporating their pet technologies tells one nothing about whether the design alternatives offered are *appropriate* for the needs of the sophisticated customers who own and operate Cameron BOP stacks like that on Deepwater Horizon. Cameron does not sell the BOP stacks to novices, but rather to drilling contractors experienced in using Cameron control systems for deepwater drilling applications. Additionally, Cameron's customers do not simply purchase Cameron BOP stacks and their control system off the rack; rather, they specify many of the features of these BOPs including the control system. Lastly, even after delivery, Cameron customers may make modifications when existing control system components no longer meet their needs and alternative components—with their associated development costs, development delays, and risk, etc.—are desirable.

With these considerations in mind, the other expert reports' claims of the abstract superiority of their proposed technologies is irrelevant; different control system components are not so much *superior* to another as they may be more or less *appropriate* for the purposes identified by an end user. In the following section, this report will explore how the trade-offs involved in the alternative control system technologies identified in the other reports could make them inappropriate for some customers—and might not have made any difference in avoiding the Deepwater Horizon disaster.

A. <u>Rechargeable AMF Batteries with Real-Time Remote Monitoring Capability</u>

A number of expert reports identify rechargeable AMF system batteries with real-time monitoring capability as a desirable improvement on the non-rechargeable batteries used in Deepwater Horizon's Mk 2 control system.[25] These reports disagree on whether this design improvement should have been incorporated into the Deepwater Horizon's control system by either retrofitting a rechargeable battery system onto its Mk 2 control system, or by the wholesale replacement of its Mk 2 subsea pod with a Cameron Mk 3 subsea pod.[26]

However, the decision to use a rechargeable battery system with real-time monitoring on a subsea BOP is necessarily a far more complicated decision than these expert reports admit; this system may not be as appropriate for some Cameron customers as the Mk 2 in its current configuration.

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[25] Expert Report of Rory Davis at 10-11; Expert Report of Gregg Perkin at 20; Expert Report of Glen Stevick 29-30; Zatarain Report at 6.

[26] Note that those expert reports (Davis and Stevick) recommending wholesale replacement of Mk 2 control pods with Mk 3 control pods do not evaluate the Mk 3 pods in their entirety; rather, they recommend Mk 3 pods on the basis of specific components in the Mk 3 pods. With this in mind, this report will address the specific components of interest to these expert reports, rather than discuss the pros and cons of Cameron's Mk 3 pods generally.

- The other expert reports exaggerate the quality of information provided by a rechargeable battery pack with real-time battery monitoring system. Although a real-time battery monitoring system displaying battery parameters indicative of the present condition of a rechargeable battery can be useful for identifying whether a rechargeable battery can *initiate* an AMF sequence, it is of comparatively little use in identifying whether a rechargeable battery can *complete* an AMF sequence. As a rechargeable battery is drained and then subsequently recharged, it becomes less and less capable of sustaining the chemical reactions providing power. Although after each charge a rechargeable battery's parameters will look as if the battery were factory-fresh, once a load is placed on a rechargeable battery it will run out of power more quickly each time it is used. At the end of a rechargeable battery's useful life, an inattentive operator might think after reviewing battery parameters displayed by a real-time monitoring system that his rechargeable battery was in good shape, only to see it die before his eyes as soon he placed a load on it.

  With this in mind, rig personnel must carefully monitor the parameters displayed by the real-time monitoring system and have sufficient training in trend analysis to be able to identify when a rechargeable battery is approaching the end of its useful life. If rig personnel are not sufficiently well trained or are inattentive to rechargeable battery parameters throughout the entire time a rechargeable battery is being used, a principal benefit of real-time battery monitoring of rechargeable batteries might prove illusory. Consequently, rechargeable batteries with a real-time monitoring circuit would likely be inappropriate for rig operators lacking confidence in their personnel's ability to track and interpret battery parameters over the course of each rechargeable battery's lifetime.

- Re-engineering the Mk 2 control system to accommodate a rechargeable battery system with real-time monitoring capability would require almost as much work as designing a new system from scratch. Replacing the non-rechargeable batteries in the Mk 2 BOP control system used on Deepwater Horizon with rechargeable batteries with real-time monitoring capability is not an easy one-for-one swap.

  A rechargeable battery system with real-time monitoring suitable for subsea control system use was unavailable when the Mk 2 control system was originally designed in the mid-1990s, as well as when the Deepwater Horizon was built in the late 1990s.[27] The retrofitting of these additional systems within subsea pods in which there is simply no available physical space could require either the wholesale reconfiguration of the components within the pod or the enlargement of the pod itself to accommodate the additional systems and their associated components (communications lines, power conduits, etc.). Creating the additional electrical connections to integrate these new components into the AMF circuit would involve even greater engineering challenges. For example, the proposed battery remote monitoring circuit would require additional input cards to monitor battery parameters—yet the Mk 2 SEM in its current configuration lacks the space to accommodate any additional input cards.[28] Even if there were space to accommodate the hardware needed for these additional systems, compatible hardware is becoming increasingly hard to find; the dwindling number of vendors

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[27] *See* Masaki Yoshio, R. J. Brodd & Akiya Kozawa, LITHIUM-ION BATTERIES: SCIENCE AND TECHNOLOGIES 1-5 (2009).

[28] *See* Exhibit 5157 at 17-22; CAM_CIV_0001283.

manufacturing Mk 2 SEM-compatible hardware was the primary motivation behind Cameron's development of the Mk 3 control system.[29] Lastly, once all these hardware changes had been made, Cameron engineers would have to expend considerable effort in developing software to control the newly-redesigned Mk 2 control system.

Largely because of the magnitude of these engineering challenges, Cameron customers like Transocean have passed on opportunities to formally encourage Cameron to devote the resources necessary to develop a rechargeable battery retrofit for Mk 2 control systems.[30]

- The redesign of the Mk 2 system to accommodate a rechargeable battery system with real-time monitoring capability introduces new failure scenarios as the complexity of the system increases. Even if Cameron engineers could overcome the engineering challenges highlighted above there is no guarantee that the resulting system would meet the needs of Cameron customers for whom control system reliability is paramount.

  One of the most attractive features of the Mk 2 control system for many of its customers is its familiarity; many rig operators and their personnel have nearly two decades' experience operating the Mk 2 in its current configuration, and have preferred to retain these systems to adopting subsequent Cameron control systems designs—in particular the Mk 3—equipped with rechargeable batteries with real-time battery monitoring circuits.[31] For these customers, an extensive redesign of the Mk 2 system would not only be very expensive, but would also risk sacrificing the proven, familiar system design that makes the Mk 2 control system the most appropriate for their needs. All the lessons learned and best practices over nearly two decades' of these customers' operation of the Mk 2 system could go out the window as the system is redesigned; new maintenance and operating procedures would have to be developed and implemented. Moreover, the increased complexity arising from revised software and the squeezing of additional systems into the Mk 2 system inevitably creates new potential failure modes that would be nearly impossible to identify until the redesign was already in progress. Furthermore, these customers would have to overcome the inevitable unforeseen difficulties as the newly-redesigned Mk 2 system moves from the drawing board to the field.

  Simply stated, customers—including Transocean specifically—believe that the Mk 2 control system without rechargeable batteries or real-time battery monitoring capability is and has been a "quality system" that they continue to use post-Macondo.[32]

- Rechargeable batteries are not required for use in subsea BOP deadman systems by any other countries. Perhaps in recognition of the fact that a rechargeable battery circuit equipped with a remote monitoring system is not a silver bullet to ensure that AMF batteries are functional, those countries with far more rigorous regulatory requirements than the United States (e.g.,

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[29] *See* CAM_CIV_0073954.

[30] Exhibit 5155.

[31] Cameron designed its Mk 3 Model control pod to be compatible with BOP stacks originally designed to accommodate Mk 1 and Mk 2 control systems. Cameron offered these Mk 3 pods to its customers—including Transocean—in the years preceding the Macondo blowout. *See* CAM_CIV_0042676.

[32] *See* Deposition of Geoff Boughton (Transocean Subject Matter Expert for Subsea Equipment, including BOPs) at 491-94.

Norway) for subsea BOP design express no preference between rechargeable and non-rechargeable batteries in subsea BOP deadman systems.

B. Real-Time Monitoring for Non-Rechargeable AMF Batteries

Several of the expert reports submitted by other parties have suggested that the Mk 2 control system on the Deepwater Horizon should have had real-time monitoring capability for its non-rechargeable batteries.[33]

These reports' discussions of the ability of the Mk 2 system to support real-time battery monitoring for its non-rechargeable batteries could mislead one into thinking that real-time battery monitoring is a silver bullet for ensuring adequate AMF battery capacity. For the reasons explained below, real-time monitoring of Mk 2 batteries may not be appropriate for every customer. Also, a real-time battery monitoring circuit might not have made any difference in ensuring that Deepwater Horizon's AMF batteries had adequate capacity on the day of the blowout.

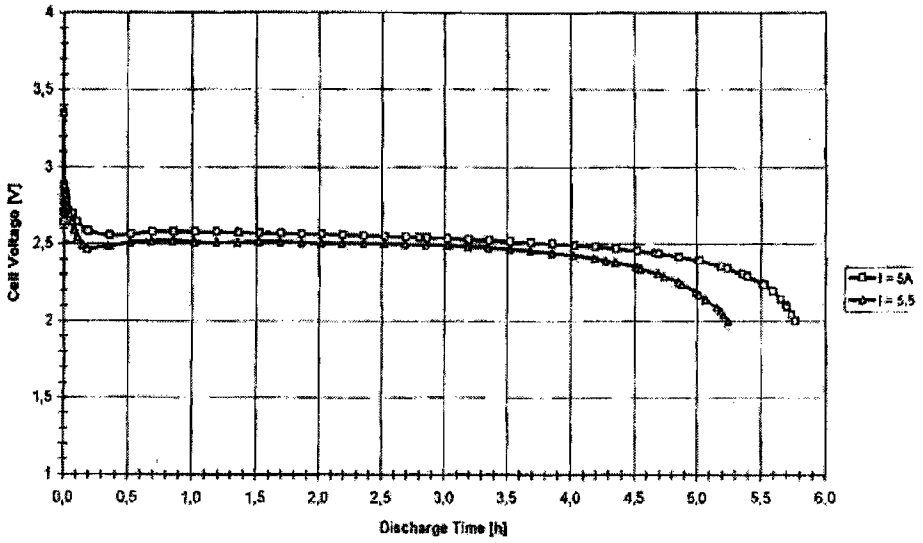
- Real-time battery monitoring reduces the number of AMF activations available in the batteries. Monitoring of non-rechargeable $LiMnO_2$ batteries used in Mk 2 control systems will not yield meaningful results unless the batteries are under loads similar to those the batteries would see in an actual AMF sequence.[34] However, placing the AMF batteries under these loads will necessarily exhaust available battery capacity more quickly as there is one less AMF sequence left in the batteries after each test.

- The other expert reports exaggerate the quality of information provided by any real-time battery monitoring system for the Mk 2 non-rechargeable batteries. The non-rechargeable $LiMnO_2$ batteries used in the Mk 2 control system found on Deepwater Horizon are characterized by a relatively flat discharge characteristics curve until immediately before battery failure:

[33] Davis Report at 11; Perkin Report at 19-20; Stevick Report at 29-30; Zatarain Report at 17-18.

[34] *See* Exhibit 5153 at 26, 29.

Figure 1: Discharge Curve for Cameron Mk 2 Control System AMF Battery Cell[35]



Because there is little or no warning of non-rechargeable battery failure until immediately before these batteries have failed, monitoring parameters like voltage in real-time for signs of imminent battery failure is a largely pointless exercise; operators with a real-time monitoring system for non-rechargeable batteries would be able to do little more than watch batteries whose voltage seemed perfectly fine before an AMF sequence fail during the sequence. Moreover, the tendency on the part of these batteries' voltages to rebound to near-nominal levels as soon as a load has been removed means that the indications provided by a real-time battery voltage monitoring system for non-rechargeable batteries are useless for indicating remaining battery capacity between AMF sequences.[36]

Rig personnel who are unaware of these inherent limitations in a real-time battery monitoring circuit for non-rechargeable batteries could develop a false sense of confidence in the ability of these batteries to support additional AMF sequences. Consequently, non-rechargeable batteries might not be replaced pursuant to Cameron's battery replacement recommendations.

With these considerations in mind, real-time monitoring of non-rechargeable AMF batteries might not be appropriate for all rig operators. Additionally, in light of the potentially confusing indications of remaining battery capacity yielded by real-time monitoring of non-rechargeable batteries, there is no guarantee that real-time battery monitoring would have ensured adequate capacity in Deepwater Horizon's AMF batteries on the day of the blowout.

- Real-time monitoring of non-rechargeable AMF batteries will not generally yield meaningful information when the BOP stack is subsea. Real-time monitoring of non-rechargeable AMF batteries will not generally yield meaningful information except during a manually or automatically initiated AMF sequence.[37] However, this real-time monitoring requires

[35] *Id.* at 29.

[36] *See id.* at 7-20.

[37] *See id.* at 26.

communications between the rig and the control pods—which will generally be unavailable whenever an AMF sequence has been initiated subsea.[38] Consequently, rig personnel will generally only be able to obtain meaningful information from real-time monitoring of non-rechargeable AMF batteries in those relatively rare occasions when manually initiating AMF sequences during deck testing.

- The significant re-engineering of the Mk 2 control system needed to accommodate a real-time battery monitoring circuit necessarily will create novel failure scenarios. Although some of the expert reports correctly point out that the Mk 2 control system used on Deepwater Horizon has an attachment point at the SEM pie connector to accommodate real-time AMF battery voltage testing when the pod is on the surface,[39] the utility of this attachment point is rather limited; it only facilitates measurement of a single parameter (voltage), and it is only available when the pod is on the surface for deck testing.

  Modifying the Mk 2 pod to accommodate the real-time monitoring of additional parameters (e.g., current, etc.) when the pod is subsea would entail significant re-engineering of the Mk 2 control pod. At a minimum, Cameron engineers would have to design entirely new battery parameter monitoring hardware and software as well as modify existing Mk 2 SEM circuit boards to accommodate the required additional electrical connections to relay information from the battery parameter monitoring system to the surface.[40]

  More importantly (as explained earlier) these changes to the Mk 2 pod's current configuration would not only be inherently difficult, costly, and time-consuming, but also could introduce new failure modes that would be nearly impossible to identify or list until the redesign was already in progress, thus eliminating one of the principal reasons—proven reliability—that many of Cameron's customers prefer the Mk 2 control system to alternative control systems.

- Real-time battery monitoring circuits for non-rechargeable batteries are not required for use in subsea BOP deadman systems by any other countries. Perhaps in recognition of the fact that a real-time battery monitoring circuit is not a silver bullet to ensure that non-rechargeable AMF batteries remain functional, those countries with far more rigorous regulatory requirements (e.g., Norway) for subsea BOP design than the United States express no preference for these systems.

C. Dedicated 27V Battery Pack for Each SEM

An expert report submitted by another party in the litigation has suggested that the Mk 2 control system on the Deepwater Horizon should have had a dedicated 27V battery pack for each of its SEMs.[41]

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[38] *See* CAM_CIV_0053663 at 665.

[39] Zatarain Report at 17-18.

[40] *See* Exhibit 5157 at 17-22; CAM_CIV_0001283.

[41] Zatarain Report at 6.

Because the decision to incorporate an additional 27V battery pack into each SEM is far more complicated than this expert report admits, this modification may not be as appropriate for many Cameron customers as the Mk 2 in its current configuration.

- An additional 27V battery pack would not add an appreciable degree of certainty that a BOP's AMF batteries would have adequate capacity to complete an AMF sequence. Because the 9V battery packs and not the 27V battery packs are the most limiting factor in the ability of the AMF batteries to complete an AMF sequence,[42] an additional 27V battery pack is unnecessary—a 27V battery pack replaced on the schedule prescribed in Cameron's battery replacement recommendations should *always* have enough power to complete an AMF sequence from one or both SEMs. Alternatively, in those cases in which rig personnel fail to adhere to Cameron's battery replacement recommendations, an additional 27V battery pack would not guarantee the ability to complete an AMF sequence; rather, it could simply be one more failed battery.

- The significant re-engineering of the Mk 2 control system needed to accommodate an additional 27V battery necessarily will create novel failure scenarios. As explained earlier, physical space and electrical connections within the Mk 2 subsea pod are already in scarce supply. Moreover, if the engineering difficulties involved in the relocation of the much smaller 9V battery packs within the Mk 2 control pod ca. 2005 are any indication,[43] the addition of another, large 27V battery pack within each pod will likely entail even more significant re-engineering of systems within the pod.

  More importantly (as explained earlier) these changes to the Mk 2's current configuration would not only be inherently difficult, costly, and time-consuming, but could also introduce new failure modes that would be nearly impossible to identify or list until the redesign was already in progress. This could eliminate one of the principal reasons—proven reliability—that many of Cameron's customers prefer the Mk 2 control system to alternative control systems.

D. Single-Coil Solenoid Valves

Several of the expert reports submitted by other parties have suggested that the Mk 2 control system on the Deepwater Horizon should have been equipped with single-coil solenoid valves similar to those used in the Mk 3 pod.[44]

Although a single-coil solenoid might avoid the particular failure scenario alleged to have existed on Deepwater Horizon, this design alternative involves its own trade-offs which may make it a less appropriate choice for customers for whom control system reliability is paramount. The most significant reason that these customers might prefer the P/N 223290-63 dual-coil solenoid used in Cameron Mk 2 control systems to a single-coil solenoid valve is because *a single-coil solenoid valve has no redundancy in its electrical components*. Unlike the Mk 2 control system's dual-coil solenoid in which the loss of a single coil will not compromise the

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[42] *See* CAM_CIV_0317810 at 813.

[43] *See* CAM_CIV_0371449.

[44] Davis Report at 11; Stevick Report at 29-30; Zatarain Report at 61.

ability of the valve to operate,[45] the loss *for any reason* of the lone coil in a single coil-solenoid valve *always* results in the failure of that valve.

This loss of a layer of design redundancy in a critical component may make a single-coil solenoid valve an inappropriate choice for Cameron customers who are either comfortable with the dual-coil solenoid valve design proven in the Mk 2 control system, or who lack confidence in their organization's maintenance practices with respect to solenoid valves.

E. AC-Coil Solenoid Valves

One expert report submitted by another party in the litigation has suggested that any adverse consequences arising from a reverse-wired coil in V-103Y could have been eliminated by substituting AC-powered solenoid coils for the DC-powered solenoid coils used in Deepwater Horizon's Mk 2 control system.[46]

Although an AC solenoid coil might be able to avoid the specific failure scenario of interest in this other report, the trade-offs involved in using this type of solenoid may make it less appropriate for many Cameron customers than the DC-solenoid valve design currently used in Cameron Mk 2 control systems.

- The greater power needed to create AC power for the solenoid valves will deplete AMF batteries faster. Because batteries produce DC power, the substitution of AC-powered solenoids for DC-powered solenoids requires specialized components—specifically, an inverter—that place *additional* loads on the AMF batteries, resulting in shorter useful battery lives.

- The substitution of AC-solenoid coils could require significant re-engineering of the Mk 2 control system and will necessarily create novel failure scenarios. As explained earlier, physical space and electrical connections within the Mk 2 subsea pod are already in scarce supply; the incorporation of the additional equipment—in particular, inverters—associated with AC solenoid coils will require significant re-engineering of subsea control pods. Specifically, the current configuration of the Mk 2 SEM control output will not support the delivery of AC power to the solenoid valves via a single inverter; rather, each solenoid valve coil would have to have its own dedicated inverter—*nearly 200 additional components per pod* in the case of the Deepwater Horizon.[47]

  More importantly, this change to the Mk 2's current configuration would not only be inherently difficult and costly, but also could introduce new failure modes for the AMF system that would be nearly impossible to identify or list until the redesign was already in progress. With this in mind, the substitution of AC solenoid coils could eliminate one of the principal reasons—proven reliability—that many of Cameron's customers prefer the Mk 2 control system to alternative control systems.

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[45] CAM_CIV_0027344 at 458-459.

[46] Zatarain Report at 59-60.

[47] *See* Exhibit 5157 at 4-17.

F. Alternative AMF and EDS Sequences and BOP Stack Configuration

Several of the expert reports submitted on behalf of the other parties have suggested that Deepwater Horizon's control system should have had an alternative AMF or EDS sequence, or even that the Deepwater Horizon BOP stack have an entirely different configuration.[48]

For its part, Cameron did not and does not recommend a particular AMF sequence, EDS sequence, or BOP stack configuration to its customers. As noted earlier, Cameron's customers are seasoned drilling contractors who have developed sufficient expertise in deepwater drilling operations to develop their own philosophies to guide them in identifying the appropriate AMF, EDS, or BOP stack configuration for their needs.[49]

In the construction of Deepwater Horizon's BOP specifically, Vastar and RB Falcon specified the stack configuration as well as the AMF and EDS sequences programmed into the Deepwater Horizon's Mk 2 control system. Vastar and RB Falcon employees deliberated internally regarding the appropriate stack configuration and AMF/EDS sequence and then forwarded their decisions to Cameron.[50] Although Cameron personnel did on occasion provide Vastar and RB Falcon feedback regarding the feasibility of a particular stack configuration or AMF/EDS sequences in light of the capabilities of the Deepwater Horizon's control system, Cameron only performed this task on request, and then only with respect to the alternatives identified by its customers.

I understand that the customer's role in dictating the particular configuration of the Deepwater Horizon's BOP stack is discussed at greater length in the expert report submitted by David O'Donnell on behalf of Cameron.[51]

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[48] Davis Report at 11-16; Perkin Report at 17-20; Stevick Report at 16-22, 26-31.

[49] *See* Exhibit 4114; Exhibit 5094.

[50] *See* Exhibit 4115.

[51] Expert Report of David O'Donnell at 14-15.

Appendix 1

Curriculum Vitae

RICHARD J. CORONADO, JR.

Education

University of Houston
Bachelor of Science in Electrical Engineering

Skills

Proficient in Programmable Logic Controller (PLC) programming and have used Siemens STEP7, Isagraf, Toshiba PDS PLC development tools
Experience with Kontron (formerly PEP) controllers, Siemens S7-300 PLCs and Toshiba PLCs
Familiar with electrical controls and power distribution (low to medium voltage)
Proficient in Microsoft Excel (as needed for project reporting, calculation, and data storage)
Strong verbal and written communication skills
Analytically and technologically oriented

Languages

English and Spanish

Work Experience

11/2006 to Present

Cameron Drilling Systems
Engineering Manager
Duties: Manage a team of engineers that are responsible for the software installed on drilling controls systems.

09/2004 to 11/2006

Cameron Drilling Systems
Advanced Product Design Engineer
Duties: Implemented new PLC hardware for new generation mux system. Assisted with testing of new generation mux equipment.

02/2001 to 09/2004

Cameron Drilling Controls
Senior Product Design Engineer
Duties: Responsible for maintaining hardware and software of existing drilling control systems. Required to interface with customer during implementation of upgrades or modifications.

09/2000 to 02/2001 **Cameron Controls**
Senior Product Design Engineer
Duties: Managed a team of engineers responsible for the umbilical product group associated with production control systems.

07/1998 to 09/2000 **Cameron Controls**
Senior Product Design Engineer
Duties: Design and test systems BOP and Production Control Systems for major drilling contractors and oil companies. Detail design included the following: programming PLC's, power calculations, layout of equipment and bill of materials.
In addition to above responsibilities, meet with vendors and customers during initial stages of projects to discuss details of deliverable equipment. I have had the opportunity to lead projects from the initial stages to commissioning as well as assist the field service department, aftermarket engineering, marketing department and the manufacturing departments with electrical hardware or software related issues.

06/1996 to 07/1998 **Industrial Control Services, Inc.**
Test Engineer
Duties: Design, program and test Emergency Shutdown Systems (ESD) for major engineering and petrochemical corporations. Additional responsibilities: power and heat calculations, layout of equipment, and bill of materials. I had the opportunity to lead (4) projects from the initial stages to completion.

01/1996 to 06/1996 **Engineering Management Professional Services**
Test Engineer
Contract to Industrial Control Services, Inc.
(Contract Position led to permanent employment)
Duties: Testing and quality control of electrical control systems, tagging electrical circuits, and noting discrepancies of software used for testing final product.

06/1994 to 01/1996 **HydroChem Industrial Services, Inc.**
Buyer
Duties: The handling of nuclear, chemical and telecommunication purchases and services for the corporation (local and national offices), and other procurement transactions related to the acquisition of these services and products. Responsible for monthly/quarterly financial reports, and special projects requiring travel.

10/1993 to 06/1994 **Bergaila & Associates**
Lab Technician
(Contract position to ARCO Chemical Company)

Duties: Compliance analysis to include EPA mandated standards, product analysis to include ARCO Chemical Company mandated standards, quality assurance, and quality control of products (i.e. styrene, propylene oxide, polyols, etc...).

06/1989 to 10/1993 **Southwestern Laboratories, Inc.**
Environmental Analyst
Duties: Maintenance of intricate environmental testing equipment (upkeep, and order of replacement parts and supplies), responsible for conducting various testing methods on water and soil samples, quality assurance and quality control of the data produced from such tests, and occasional field site sampling.

Awards

Industrial Control Services, Inc. Employee of the Month - Feb 1996
Cameron Controls Employee of the Month – Sep 2002

Appendix 2

Richard Coronado – Consideration Materials

Deposition Exhibit No.	Document Description	Bates Range
1	Deepwater Horizon Accident Investigation Report – dated September 8, 2010	
2	BP Accident Investigation Report Appendices – Case No: 21035	
71	Report of Survey, Deepwater Horizon	MODUSI 01 0 000380 - MODUSI 01 0 000470
257	Rig Condition Assessment	TRN-MDL00038591 - TRN-MDL00038677
275	Deepwater Horizon Follow Up Rig Audit, Marine Assurance Audit and Out of Service Period September 2009	BP-HZN-IIT-0008871 - BPHZN-IIT-0008930
599	Daily Report Sheet - Date 5/MAY/2010	BP-HZN-IIT-0006192 - BPHZN-IIT-0006199 BP-HZN-MBI00133146 - BPHZN-MBI00133153
1159	Event Log (20-Apr-10)	TRN-USCG-MMS-00038807 - TRN USCG MMS 00038854 TRN-MDL-00038789 - TRNMDL-00038836
1164	DNV - Final Report for UNITED STATES DEPARTMENT OF THE INTERIOR, Volume I (20 March 2011)	
1165	DNV - Final Report for UNITED STATES DEPARTMENT OF THE INTERIOR, Volume II (20 March 2011)	
1172	DEEPWATER HORIZON - BOP major component refurbishment and major maintenance completed.	TRN-MDL-01506544
1192	Transocean - Deepwater Horizon Rig Assessment (Oct 17 to Oct 31, 2005)	TRN-HCEC-00063579 - TRNHCEC-00063574
1195	Transocean - DAR Consolidation Report (Printed: 02-Jun-2010)	BP-HZN-2179MDL00331805 - BP-HZN-2179MDL00332030
1353	MACONDO: THE GULF OIL DISASTER - Chief Counsel's Report 2011	
1356	DRILLING CONTRACT - RBS-8D SEMISUBMERSIBLE DRILLING UNIT, VASTAR RESOURCES, INC. AND R&B DRILLING CO.	BP-HZN-2179MDL00259139- BP-HZN-2179MDL00259159
1648	Deepwater Horizon Accident Investigation Report - dated September 8, 2010: Executive Summary	BP-HZN-2179MDL00963938 - BP-HZN-2179MDL0096393843
1878	Analysis 5D. The Blowout Preventer Did Not Seal The Well	BP-HZN-BLY00000141 - BPHZN- BLY00000760
1880	Solenoid 103 - Did it really fail?	BP-HZN-BLY00296547 - BPHZN- BLY00296547

Deposition Exhibit No.	Document Description	Bates Range
3124	Det Norske Veritas Addendum to Final Report for United States Department of the Interior, Forensic Examination of Deepwater Horizon Blowout Preventer, April 30, 2011; 30 pages	
3130	Laboratory Notebook	16862- 16902
3131	Deepwater Horizon Forensic Investigation Component Identification Matrix - Mark II Blue Pod	DNV-SUPPL-000182 - 00187
3132	Deepwater Horizon Forensic Investigation Component Identification Matrix - Mark II Yellow Pod	DNV-SUPPL-000188
3133	R&B Falcon, Deepwater Horizon, P.O.# 08700101, Assembly Drawing Driller Control Panel	
3134	Det Norske Veritas Deepwater Horizon Design Risk Assessment, Prepared For Transocean SEDCO FOREX, Final Report January 2012, marked as Confidential Treatment Requested by Transocean Holdings LLC	TRN-HCEC-00061611 - TRN-HCEC-00061736
3135	Image of Yellow Control Pod Filters; one page	
3136	R.Doc.1757, DNV-Solenoid 103 Replacement Wiring Connections, marked as Privileged and Confidential-Client Attorney Work Product; two pages	
3137	R.Doc.1757, DNV-Solenoid 103 B Wiring Connections, marked as Privileged and Confidential - Client Attorney Work Product; two pages	
3138	R.Doc.1757, DNV-Solenoid 3A Wiring Connections, marked as Privileged and Confidential-Client Attorney Work Product; two pages	
3139	R.Doc.1757, DNV-Solenoid 103 Original Wiring Connections, marked as Privileged and Confidential-Client Attorney Work Product; two pages	
3140	R.Doc.1757, NASA-TPS BOP-015-1 PETU Solenoid Driver Characterization, marked as Confidential and Privileged Attorney Client Communication; seven pages	
3141	R.Doc.1757, NASA-TPS BOP-015-2 PETU Solenoid Driver Characterization, marked as Confidential and Privileged Attorney Client Communication; 24 pages	
3142	R.Doc.1757, NASA - TPS BOP-015-3 PETU Solenoid Driver Characterization, marked as Confidential and Privileged Attorney Client Communication; 23 pages	
3143	MDL 2179:R.Doc.1757, NASAAttachment #1 Checkme Download Comparison: Yellow POD SEM-A vs Yellow POD SEMB, marked as Confidential and Privileged Attorney Client Communication; 61 pages	
3144	Test Preparation Sheet, TPS Number: BOP-027 dated 6/16/11; six pages	
3145	R.Doc.1757, DNV-Disassembly of Solenoid 3A (yellow pod) dated 6-17-11, marked as Confidential and Privileged Attorney Client Communication; four pages	

Deposition Exhibit No.	Document Description	Bates Range
3146	Test Preparation Sheet, TPS Number: BOP-033 dated 6/19/11; 35 pages	
3147	R.Doc.1757, DNV-Disassembly of Solenoid 103 Original (yellow pod) dated 6-20-11, marked as Confidential and Privileged Attorney Client Communication; four pages	
3148	Test Preparation Sheet, TPS Number: BOP-022-1 dated 6/15/11; three pages	
3154	DNV Deepwater Horizon HAZID Report for Transocean Offshore Deepwater Drilling, Inc., Project no EP026665 Rev C, 2nd August 2010	DNV-SUPPL-000189 - 00208
3155	02 August 2010 Deepwater Horizon HAZID (Rev C) Transocean Offshore Deepwater Drilling, Inc., Pages 18 through and including 39	DNV-SUPPL-000209 - DNV-SUPPL-000230
3156	02 August 2010 Deepwater Horizon HAZID (Rev C) Transocean Offshore Deepwater Drilling, Inc., Pages 40 through and including 52	DNV-SUPPL-000231 - DNV-SUPPL-000244
3157	DNV Deepwater Horizon HAZID Report Transocean Offshore Deepwater Drilling, Inc., Report No: EP026474-1, Rev. 0, 10 November 2010	DNV-SUPPL-000245 - DNV-SUPPL-000269
3158	DNV Deepwater Horizon HAZID Report Transocean Offshore Deepwater Drilling, Inc	DNV-SUPPL-000270 - DNV-SUPPL-000287
3159	DNV Deepwater Horizon HAZID Report Transocean Offshore Deepwater Drilling, Inc	DNV-SUPPL-000288 - DNV-SUPPL-000300
3160	DNV Deepwater Horizon HAZID Report Transocean Offshore Deepwater Drilling, Inc	DNV-SUPPL-000301 - DNV-SUPPL-000315
3169	Cameron Controls RBS 8DMultiplex BOP Control System, marked as Confidential Treatment Requested by Transocean Holdings LLC	TRN-MDL-00043799 - TRN-MDL-00043958
3170	Drawing, marked as Confidential Cooper Cameron Battery	CAM_CIV_0022982
3171	Photo of SAFT Lithium MnO2 Battery Label; one page	
3172	February 12-16, 2010 E-mail string among Michael Fry, DWH SubSeaSup, Wallace Jarrett, others, Subject: Transocean Horizon SEM	TRN-MDL-00310787 - TRN-MDL-00310789
3176	Operational MUX Systems, marked as Highly Confidential	CAM_CIV_0033729 - CAM_CIV_0033730
3177	Page 18 and 19 of Basic Operation Manual, Subsea Multiplex BOP Control System, marked as Confidential	CAM_CIV_0265089 - CAM_CIV_0265090
3179	Cameron Controls dated 5/May/2010 Daily Report Sheet, marked as Confidential	CAM_CIV_0031897 - CAM_CIV_0031917
3180	May 7, 2010 E-mail from Jason Van Lue to William Stringfellow, Robert White and others, Subject: Deadman test on yellow POD, marked as Confidential	CAM_CIV_0077711
3182	Blowout Preventer and Control System Operating Procedures for Ultra Deepwater; Hugh L. Elkins; Sept 8, 1998, marked as Confidential	CAM_CIV_0121003 - CAM_CIV_0121007

Deposition Exhibit No.	Document Description	Bates Range
3259	Transocean Recommended Practices Subsea - Family 400 Subsea Maintenance Facility	TRN-MDL-01120767 - TRN-MDL-01120777
3299	Horizon BOPP 002 HistoryrptEquipmentHistory.rpt.pdf	TRN-INV00034227 - TRN-INV-00034306
3318	Email from DWH, SubSeaSup to Kent, James re Batteries	TRN-MDL00310821
3343	DEEPWATER HORIZON TL BOP Stack Operation and Maintenance Manual	TRN-HCEC-00007822 - TRN-HCEC-00008055
3400	Deepwater Horizon Technical Rig Audit - January 2005	TRN-MDL00519065 - TRN-MDL00519127
3409	Email from J. Kent to B. Trahan re "RE: RAPS review"	TRN-MDL00890391 - TRN-MDL00890393
3419	Email from J. Kent to J. Kent, DWH SupSeaSup and DWH MaintSup re: "RE: Tracking"	TRN-MDL00303083 - TRN-MDL00303084
3422	BWA 000486 DAR Consolidation SUBSEA.pdf	TRN-MDL00302302 - TRN-MDL00302527
3433	Email from DWH MaintSup to J. Kent re: "Battery Spreadsheet" with Horizon Batteries Spreadsheet Attachment	TRN-MDL00977501 - TRN-MDL00977504
3434	Email From Van Lue, Jason to Stringfellow, William re RE: AMF battery EB	CAM-CIV0029311 - CAM-CIV-0029312
3435	Hydraulic Function Data Spreadsheet	
3437	Email from J. Kent to DWH SubSeaSup re: "RE: SS Workbook"	TRN-MDL00989506
3440	2911 Subsea Equipment Status in Preparation for 2011 OSS Meeting Agenda/Notes	TRN-MDL00401409 - TRN-MDL00401412
3600	Basic Operations Manual Book	CAM_CIV_0000244 - CAM_CIV_0000423
3601	E-mail from Carter Erwin Sent 2/22/2010 5:11 p.m. to Lori Johnson, William LeNormand - Subject: RE: Control System Upgrade for HORIZON	CAM_CIV_0098247 - CAM_CIV_0098249
3602	Cameron Controls Daily Report Sheet Dated 5/MAY/2010; Project Title: SUBSEA POD Intervention	CAM_CIV_0046703 - CAM_CIV_0046721
3603	Emergency, Back-Up and Deepwater Safety Systems Automated Disconnect Systems for Shutting in Wells	CAM_CIV_0019820 - CAM_CIV_0019825
3605	Engineering Bulletin EB 891 D, Dated September 8, 2004; AMF/Deadman Battery Replacement	CAM_CIV_0003275 - CAM_CIV_0003276
3609	Controls Engineering EB 865C Dated 12-06-99; Deadman/AMF System Surface Testing	CAM_CIV_0003233
3611	Cameron Controls Daily Report Sheet Dated 9/11/2001; Project Title - DEEPWATER HORIZON	CAM_CIV_0046820 - CAM_CIV_ 0046823
3612	Cameron Controls Daily Report Sheet Dated 9/17/2001; Project Title: DEEPWATER HORIZON	CAM_CIV_0046824 - CAM_CIV_0046827
3614	E-Mail from Carter Erwin Dated 2/22/2010 at 4:41 p.m.; Subject: FW: Control System Upgrade for Horizon; Attachment: CAMERON Drig and Production Sys Quote # 20554964	CAM_CIV_0150775 - CAM_CIV_0150778

Deposition Exhibit No.	Document Description	Bates Range
3615	Color photograph of PETU with yellow rectangle below Insulation Monitorings	
3616	Color photograph of older PETU used during the top kill procedure	
3617	Cameron Desk Test Procedure for Mark-II Control Pod, Cameron P/N 2020708-21 DEEPWATER HORIZON; Dated May 10, 2010	CAM_CIV_0018112 - CAM_CIV_0018140
3618	Macondo Top Kill Procedures Manual for MC252-1 Re-Run & Function Test Yellow Pod	TDR018-002087 - TDR018-002123
3619	Cameron Controls Daily Report Sheet Dated 28/June/2010; Project Title: SUBSEA Blue POD Intervention	CAM_CIV_0151756 - CAM_CIV_0151762
3620	Factory Acceptance Test Procedure for Subsea Electronic Module (Horizon AMF/Deadman In Current Situation - Test Procedure); Dated May 11, 2010	CAM_CIV_0151942 -51953
3621	Deck Test Procedure for Mark-II Control Pod Cameron P/N 2020708-21 "DEEPWATER HORIZON	CAM_CIV_0151954 - CAM_CIV_0151975
3627	Email from William LeNormand, W to Wallace Jarrett; Date: 9/21/2009 4:58 p.m.; Subject: FW: Pictures of Pie Connector	CAM_CIV_0150654
3630	Email from Michael Fry to William LeNormand; Date: 2/19/2010 12:26 p.m.; Subject: FW: Event Logger readings	CAM_CIV_0150773- CAM_CIV_0150774
3634	Email from William LeNormand to Jason Van Lue Dated 5/15/2010 at 11:03 a.m.; Subject: RE: Distribution between Conduit/Pod/Solenoid Package	CAM_CIV_0151517 - CAM_CIV_0151523
3635	Email from William Stringfellow to Carter Erwin, et al Dated 5/29/2010 at 4:49 a.m.; Subject: PETU Question	CAM_CIV_0028727
3636	Email from Merrick M. Kelley to Geoff Boughton, et al Dated 6/24/2010 at 2:47 p.m.; Subject: REQUEST: Attend Blue Pod Recover Procedure Review at bp office	CAM_CIV_0151579 - CAM_CIV_0151594
3637	Email from William LeNormand to Merrick Kelley Dated 7/11/2010 at 7:31 p.m.; Subject: RE: NEXT STEP - BLUE POD Operations	CAM_CIV_0150536 - CAM_CIV_0150537
3782	Email from DWH, SubSeaSup to M. Fry re: Transocean Horizon SEM	TRN-MDL00311104 - TRN-MDL00311106
3783	Email from W. Jarrett to M. Fry and G. Boughton re: Transocean Horizon Yellow SEM attaching image	TRN-MDL01537029
3792	E-mail between Owen McWhorter and James Kent; February 24, 2010; Subject: Batteries	TRN-MDL-00310821
3795	Email from B. Ambrose to G. Boughton, et al re: Weekly Report from Michoud	TRN-INV01523282 - TRN-INV-01523284
3797	E-mail string among Geoff Boughton and Ronald Guidry, et al.; 5/9/2010; Subject: RE: Issue on the Horizon with pie connectors	TRN-INV-01798503 - TRN-INV-01798507
3798	Transocean Technical Information Bulletin OPT-TIB-435-01, Instructions for Rebuilding Cameron Controls Solenoid Valve	TRN-MDL-01547899 - TRN-MDL-01547905

Deposition Exhibit No.	Document Description	Bates Range
3948	Executive Summary (Accident Event Sheet)	
3969	Meeting Minutes, Progress Meeting	CAM_CIV_0106657 - CAM_CIV_0106659
3978	Cameron Mark II MUX System Diagnostics	BP-HZNBLY00366758 - BP-HZNBLY00366759
3987	DWH Rig Move Subsea Electrical Checklist	RN-MDL00303315 - RN-MDL-00303318
4112	Drilling Contract, RBS-8D Semisubmersible Drilling Unit Vastar Resources, Inc. and R&B Falcon Drilling Co.	BP-HZN-MBI00021460 - BP-HZN-MBI00021999
4248	Macondo Well Incident Transocean Investigation Report Volume 1 Dated June 2011; 206 pages	
4272	Vastar Resources NC. Deepwater Horizon Technical Position Paper	TRN-HCEC00026736 - TRN-HCEC00027083
4275	RISK ASSESSMENT OF THE DEEPWATER HORIZON BLOWOUT PREVENTER (BOP) CONTROL SYSTEM- April 2000- Final Report	TRN-HCEC00056391 - TRN-HCEC00056860
4300	2-16-11 Fry e-mail to DWH Re: Battery replacement	TRN-MDL00303352 - TRN-MDL00303359
4304	Macondo Well Incident -Transocean Investigation Report Volume II	
4305	Deepwater Horizon WCS BOPP (BOP Control Pods) charts	
4306	5-17-10 Gary Leach e-mail to Geoff Boughton; Subject: FW: MUX Batteries	TRN-INV-01747000
4307	1-29-10 Geoff Boughton e-mail to Ronald Guidry, Michael Fry; Subject: RE: Horizon Flowmeter	TRN-MDL-01075634
4412	E-mail String, Primary E-mail from Mark Hafle Dated August 18, 2009	BP-HZN-2179MDL00208114 - BP-HZN-2179MDL00208115
4423	E-mail Michael Byrd to Curtis Jackson and others, dated November 14, 2001	BP-HZN-2179MDL03106206 - BP-HZN-2179MDL03106207
4435	E-mail from Deepwater Horizon Foremen to driller@dwh.rig.deepwater.com and others, dated January 10, 2005; Subject: FW: Test Rams MOC tasks.doc	TRN-MDL-0019247 - TRNMDL-0019248; TRN-MDL-0019251 - TRN-MDL-0019252
4617	Cameron MultiPlex BOP Control Sys HPU-POD Cable Reels, Vol4 C-008.pdf	TRN-INV00034309 - TRN-INV-00034379
4697	May 26, 2010 E-mail from Bryan Ritchie to Kate Baker and others, Subject: DRAFT: MC252 Subsurface Technical Memo v1 with Attachments, marked as Confidential	BP-HZN-2179MDL00335101 - BP-HZN-2179MDL00335139
4903	E-Mail Dated February 9, 2010, to Bill Sannan from Paul Johnson	TRN-MDL-01856808
4935	Test Preparation Sheet, dated "2/28/12"	DNV007-000187 and 88
4936	Test Preparation Sheet, dated "3/1/12"	DNV007-000196 and 97
4937	E-mail from Mr. Tolleson to Mr. Farr, et al., dated March 09, 2011	TDR091-000249 and 50
4938	SEM Testing at WEST DEC, dated November 3, 2010	TRN-INV-02500717 - 25

Deposition Exhibit No.	Document Description	Bates Range
4939	Investigations-Cameron Control Software, dated 3/1/2011	TRN-INV-01029555
4940	Investigations-What testing of the AMF was Completed on, dated 1/14/2011	TRN-INV-01028927
4950	Deepwater Horizon Operations Manual, dated December 2004	BP-HZN-2179MDL00142400, 421, 422
5094	Sept 1, 2000 BOP Stack Design, Technical Position Paper, marked as CONFIDENTIAL	TRN-INV-01864068 - 64076
5097	Refurbishment Procedure for Cameron Solenoid Valves, Part No. 223290-15 and Part No. 223290-63, marked as CONFIDENTIAL	CAMCG 00004025 - 04038
5150	May 10 and 11, 2010 E-mail string among Kim DeRouen, Edward Gaude, Herbert Read, Subject: Shelf life of deadman batteries, marked as CONFIDENTIAL	CAM_CIV_0371789 - 71791
5151	May 29 and 30, 2010 E-mail string among Mac Kennedy, Mel Whitby, Don Coonrod, John Mangan and others, Subject: New Gov'mt regs....comment on Recommendation #6 - Privileged, marked as HIGHLY CONFIDENTIAL	CAM_CIV_0364040 - 64043
5152	May 27, 2010 E-mail string among Ray Jahn, Jason Van Lue, Thomas Ronchetto and others, Subject: Testing AMF Sub Sea.[, marked as CONFIDENTIAL	CAM_CIV_0322469 - 22472
5153	Test Procedure for Deadman Battery Pack Longevity Test, marked as HIGHLY CONFIDENTIAL	CAM_CIV_0370628 - 70656
5154	Jan 12 and 13, 2006 E-mail string among Ray Jahn, Carter Erwin, Edward Gaude, Jody Ballard, Subject: PNA 332: New Deadman Battery Life Expectancy JB-CER-00274, marked as CONFIDENTIAL	CAM_CIV_0083914 - 83916
5155	E-mail string among Edward Gaude, Ray Jahn, Brian Williams and others, Subject: AMF batteries, marked as CONFIDENTIAL	CAM_CIV_0371709 - 71717
5157	Subsea Electronic Module Wiring Diagrams, marked as CONFIDENTIAL	TRN-MDL-00304715 - 04761
5158	Photo of AMF card from DEEPWATER HORIZON, DEADMAN Version 1.6 Cameron; one page	
5159	Schematic, marked as CONFIDENTIAL	CAM_CIV_0370225
5160	Schematic of AMF BOARD; one page	
5161	Circuit Diagram Multiplex Modular Control Pod, marked as CONFIDENTIAL	TRN-INV-01302552 - TRN-INV-01302581
5162	Factory Acceptance Test Procedure for Subsea Electronic Module (Horizon AMF/Deadman in Current Situation - Test Procedure), marked as HIGHLY CONFIDENTIAL	CAM_CIV_0151942 - 51975
5164	June 18, 2003 E-mail string between Don Algama and Richard Coronado, Subject: RBS 8M, marked as CONFIDENTIAL	CAM_CIV_0317158
5165	Sept 15, 2010 Document from Brandy N. Jones, marked as HIGHLY CONFIDENTIAL	CAM_CIV_0374340 - 74349

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5166	ExproSoft Memo, Subject: Reliability of Acoustic BOP Controls, Preliminary work, marked as CONFIDENTIAL	CAM_CIV_0406933 - 06945
5169	Deck Test Procedure for Mark-II Control Pod Cameron P/N 2020708-21 "Deepwater Horizon" marked as CONFIDENTIAL ACCESS RESTRICTED	CAM_CIV_0002990 - 03013
5172	R.DOC 1757, NASA/DNV - Summary Preparation Sheet BPO-009 Test Solenoid at Deep Sea Temperature, marked as CONFIDENTIAL AND PRIVILEGED ATTORNEY CLIENT COMMUNICATION; 23 pages	
5173	Emergency Disconnect Sequences, MUX BOP Control System for "Deepwater Horizon" marked as HIGHLY CONFIDENTIAL	CAM_CIV_0105569 - 05576
5174	AMF/Deadman Battery Replacement, marked as CONFIDENTIAL	CAM_CIV_0105520 - 05521
5175	May 30, 2008 E-mail from Brad Johnson to Edward Gaude and others, Subject: MUX Presentation to Transocean, with Attachments, marked as CONFIDENTIAL; 64 pages	CAM_CIV_0317791 - 17792
5409	Nov 3, 2010 E-mail string between Dan Farr and Steve Myers and others, Subject: DWH - BOP follow up, with Attachments, marked as CONFIDENTIAL	TRN-INV-01834164 - TRNINV-01834165
5489	BOP - Justify it Functioned as Design, dated 10/26/2010	TRN-INV-02500740
5490	E-mail from Mr. Boughton to Mr. Childs, et al., dated December 16, 2010	TRN-INV-02500667
5491	E-mail chain, top e-mail from Mr. Garza to Mr. Watson, et al., dated June 14, 2010	TRN-INV-02453505 - TRN-INV-02453509
5492	E-mail chain, top e-mail from Mr. Childs to Mr. Ambrose, et al., dated July 15, 2010	TRN-INV-01142774 - TRN-INV-01142775
5493	Chronology of Deepwater Horizon Incident, dated June 2, 2010	TRN-MDL-02815267 - TRN-MDL-02815321
5494	E-mail from Mr. McIntosh to Mr. Florence, dated October 26, 2010	TRN-MDL-02785585 - TRN-MDL-02785586
5495	E-mail chain, top e-mail from Mr. Florence to Mr. Farr, et al., dated February 09, 2011	TRN-INV-02853658 - TRN-MDL-02853668
5496	E-mail chain, top e-mail from Mr. Walsh to Mr. Tiano, et al., dated June 14, 2011	TRN-INV-03293628
5497	Handwritten note	TRN-INV-03500581
5498	Horizon SEM Information	TRN-INV-01870820
5499	E-mail chain, top e-mail from Mr. Fry to Mr. Boughton, dated May 11, 2010	TRN-INV-01268788 - TRN-INV-01268796
5654	E-mail chain, top e-mail from Mr. Watson to Mr. Florence, dated June 03, 2010	TRN-INV-02504686 - TRN-INV-02504690
5655	E-mail chain, top e-mail from DWH, SubSeaSup, to Mr. Florence, dated December 18, 2010	TRN-MDL-02785016 - TRN-MDL-02785018

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5657	E-mail chain, top e-mail from Mr. Florence to Mr. Tolleson, dated September 17 2010	TRN-INV-02806212 - TRN-INV-02806213
5658	Re-test the AMF Card with the Standard SEM test, November 3, 2010	TRN-INV-02546928 - TRN-INV-02546929
5659	E-mail chain, top e-mail from Mr. Florence to Mr. Murray, et al., dated October 27, 2010	TRN-MDL-02805023 - TRN-MDL-02805031
5661	AMF Sequence Test for SEM A & B	TRN-INV-02509564 - TRN-INV-02509567
5662	E-mail chain, top e-mail from Mr. Tolleson to Mr. Florence, dated November 03, 2010	TRN-MDL-02785488 - TRN-MDL-02785494
5663	Deepwater Horizon Incident Investigation, dated September 22, 2010	BP-HZN-2179MDL 01308125 - BP-HZN-2179MDL01308133
5664	DWH Investigation, BOP Modifications	TRN-INV-01206565 - TRN-INV-01206568
5665	MOC issues associated with installation of test rams	TRN-MDL-01527522
5666	Did the AMF/Blind Shear Ram Performance prevent sealing of the Well	TRN-INV-01030970
5667	E-mail chain, top e-mail from Mr. Watson to Mr. Florence, dated May 29, 2010	TRN-MDL-02800177 - TRN-MDL-02800179
7007	Cameron Controls Daily Report Sheet, dated July 13, 2007, two pages	BP-HZN-BLY00111439 and BP-HZN-BLY00111440
7013	Deepwater Horizon Forensic Investigation of the Blowout Preventer, four pages	
7014	Email from R. Fleming to D. Guillot, et al. re: AMF test Procedure signed copy	BP-HZNBLY00090633 - BP-HZNBLY00090646
7020	Photocopy of printout of e-mail sent 5/11/10 from Sergio Mendez to Carter Erwin, Subject: Seacon new connector option instead of Pie connector, marked Confidential	CAM_CIV_0075606
7028	Photocopy of Cameron MK III Model 80 Multiplex BOP Control Pod Transocean Offshore Deepwater Budgetary Quotation No. 20506009, marked CONFIDENTIAL	CAM_CIV_0042929 - CAM_CIV_0042933
7029	Photocopy of Cameron "Performance," marked Highly Confidential	CAM_CIV_0043027 - CAM_CIV_0043082
7110	Well Control Manual Issue 3 Rev 00	TRN-MDL-00871333
7120	Transocean Preparation and Prevention Sheet	TRN-MDL-00868026 - TRN-MDL-00868029
	Subsea Logbook Entry	TRN-MDL-01650183
	Horizon BOP Intervention, Diagnostic Pumping	BPD122-4684.exl
	Deepwater Horizon Incident Investigation - CF3-NTF20 card electrical characteristics test results Sep 13 2010	BP-HZN-2179MDL02386138 - BP-HZN-2179MDL02386180
	Critical Factor: 5D The Blowout Preventer Did Not Seal The Well; Topic: AMF Card electrical charteristic test result; Dated: September 13 2010	BP-HZN-2179MDL02386138- BP-HZN-2179MDL02386180
	CF3-NTF31 AMF batteries condition testing	BP-HZN2179MDL02386181
	CF3-NTF19 Solenoid valve energisation test result -with hydraulic pressure - BP	BP-HZN2179MDL0238632 - BP-HZN2179MDL02386137

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	CF3-NTF20 AMF card electrical characteristics test results - BP	BP-HZN2179MDL0238638 - BP-HZN2179MDL02386180
	CF3-NTF1_kv3113	BP-HZN2179MDL023878 11
	CF3-NTF14 -Blue Pod function test results post accident inspection - Cameron	BP-HZN2179MDL02387812 - BP-HZN2179MDL02387849
	Critical Factor: 5D The Blowout Preventer Did Not Seal The Well; Topic: Solenoid valve energisation test result - in air -BOP; Dated: September 9 2010	BP-HZN-2179MDL02388955-BP-HZN-2179MDL02389001
	CF3-NTF15 -Blue pod PETU screen shot first power up post accident inspection - Cameron	BP-HZN2179MDL02388960 - BP-HZN2179MDL02388965
	CF3-NTF16 Blue pod AMF function test post accident inspection - Cameron	BP-HZN2179MDL02388966 - BP-HZN2179MDL02388993
	Deepwater Horizon Incident Investigation - CF3 NTF18 Solenoid Valve energization test Sep 9 2010	BP-HZN-2179MDL02388995 - BP-HZN-2179MDL02389001
	Multiplex BOP Control System Manual/Certification (Volume Two) Sections 5-10 Contains Factory Acceptance Tests, Drawings and Documentation (Data Book)	BP-HZN-BLY00049914 - BP-HZN-BLY00050312
	Multiplex BOP Control System Manual/Certification (Volume Three) Sections 12 Blue, Yellow & Spare Control Pod Contains Factory & Acceptance Tests, Drawings and Documentation (Data Book)	BP-HZN-BLY00050313 - BP-HZN-BLY00050902
	Multiplex BOP Control System Manual/Certification (Volume Four) Sections 13-18 Contains Factory Acceptance Tests, Drawings and Documentation (Data Book)	BP-HZN-BLY00050903 - BP-HZN-BLY00051413
	Multiplex BOP Control System Manual/Certification (Volume Five) Sections 19-29 Contains Factory Acceptance Tests, Drawings and Documentation (Data Book)	BP-HZN-BLY00051414 - BP-HZN-BLY00051880
	Multiplex BOP Control System Manual/Certification (Volume I) (Data Book)	BP-HZN-BLY00054088-BP-HZN-BLY00054648
	EMPAC Work Orders	BP-HZN-BLY00055866
	Transocean Deepwater Horizon BOP Maintenance prior to commencing operations on MC on the IADC and DIMS Reports	BP-HZN-BLY00055870
	References in CF 3 Summary Report	BP-HZNBLY00078438
	Email From Pagram, Browyn to Parker, John re RE Notes_kv1672	BP-HZNBLY00089613 - BP-HZNBLY00089614
	NTF Register	BP-HZNBLY00102740
	NTF Register	BP-HZNBLY00138865
	INCIDENT INVESTIGATION DOCUMENT EDITING CHECKLIST	BP-HZNBLY00140763
	Working Copy_TO Horizon Report Draft Preparation Working Doc 1 - CF-3	BP-HZNBLY00163321 - BP-HZNBLY00163382
	TO Horizon Report Draft Preparation Working Doc 1 - CF3	BP-HZNBLY00166039 - BP-HZNBLY00166098

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	July Master Schedule bfp	BP-HZNBLY00166707
	July Master Schedule bfp	BP-HZNBLY00167969
	July Master Schedule bfp	BP-HZNBLY00167981
	NTF Register	BP-HZNBLY00196716
	RMS II Condensed Summary	BP-HZN-BLY00215830
	References in CF 3 Summary Report	BP-HZNBLY00297955
	References in CF 3 Summary Report	BP-HZNBLY00299241
	RE NTF S_kv1746	BP-HZNBLY00300139 - BP-HZNBLY00300140
	CF3-NTF15 -Blue pod PETU screen shot first power up post accident inspection - Cameron	BP-HZNBLY00313144 - BP-HZNBLY00313150
	References in CF 3 Summary Report	BP-HZNBLY00313569
	July Master Schedule	BP-HZNBLY00314004
	CF3-NTF09 MUX lines not being protected against explosion or fire	BP-HZNBLY00314117 - BP-HZNBLY00314118
	CF3-NTF20 AMF card electrical characteristics test results - BP	BP-HZNBLY00314123 - BP-HZNBLY00314166
	CF3-NTF03 BOP TESTING	BP-HZNBLY00314167 - BP-HZNBLY00314182
	CF3-NTF13 -Yellow pod AMF function test post accident inspection - Cameron	BP-HZNBLY00314212 - BP-HZNBLY00314223
	Interlinks Systems Cameron Automatic Mode Function Battery Performance	BP-HZN-BLY00314327 - BP-HZN-BLY00314357
	CF3-NTF08 -Summary of yellow and blue pod defects post accident inspection - BP	BP-HZNBLY00315341 - BP-HZNBLY00315344
	CF3-NTF12 -Yellow pod PETU screen shot on start up post accident inspection - Cameron	BP-HZNBLY00329472 - BP-HZNBLY00329478
	CF3-NTF05 -BOP diagnostic capability - BP	BP-HZNBLY00330063 - BP-HZNBLY00330069
	CF3-NTF38 BOP Pod Maintenance Timeline	BP-HZNBLY00331043
	CF3-NTF19 Solenoid valve energisation test result -with hydraulic pressure - BP	BP-HZNBLY00332173 - BP-HZNBLY00332178
	CF3-NTF18 Solenoid valve energisation test result -in air BP	BP-HZNBLY00332658 - BP-HZNBLY00332665
	CF3-NTF31 AMF batteries condition testing	BP-HZNBLY00332736
	CF3-NTF14 -Blue Pod function test results post accident inspection - Cameron	BP-HZNBLY00334932 - BP-HZNBLY00334943
	CF3-NTF11 -Yellow Pod function tests post accident inspection - Cameron	BP-HZNBLY00337675 - BP-HZNBLY00337711
	TO Horizon Report Draft Preparation Working Doc -CF-2	BP-HZNBLY00340002 - BP-HZNBLY00340020
	CF3-NTF30 Certification of Drilling Systems by ABS	BP-HZNBLY00343984
	CF3-NTF16 Blue pod AMF function test post accident inspection - Cameron	BP-HZNBLY00344152 - BP-HZNBLY00344154
	BOP Maintenance	BP-HZN-BLY00345923 - BP-HZN-BLY00345927

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	BOP Maintenance Review Nov 2009 to April 2010, RMS II Maintenance	BP-HZN-BLY00346590
	CF3-NTF27 -BOP Control Panel Display	BP-HZNBLY00347637 - BP-HZNBLY00347639
	Between Well BOP Activities	BP-HZN-BLY00348260
	CF3-NTF17 -Stress Engineering - AMF pressure sensor testing - BP	BP-HZNBLY00350160 - BP-HZNBLY00350162
	CF3-NTF2 BOP Maintenance	BP-HZNBLY00360083 - BP-HZNBLY00360090
	CF3-NTF9 MUX lines not being protected against explosion or fire	BP-HZNBLY00361850
	References in CF 3 Summary Report	BP-HZNBLY00366035
	Email from Carpenter, Loma to Wong, Norman re Appendix XYZ	BP-HZNBLY00366472 - BP-HZNBLY00366476
	Email From Wong, Norman to Carpenter, Loma re RE Maint_kv1724	BP-HZNBLY00367494 - BP-HZNBLY00367497
	Email From Wong, Norman to Carpenter, Loma re RE Appen_kv1733	BP-HZNBLY00368814 - BP-HZNBLY00368816
	INCIDENT INVESTIGATION DOCUMENT EDITING CHECKLIST.	BP-HZNBLY00383272 - BP-HZNBLY00383291
	INCIDENT INVESTIGATION DOCUMENT EDITING CHECKLIST.	BP-HZNBLY00383421 - BP-HZNBLY00383441
	INCIDENT INVESTIGATION DOCUMENT EDITING CHECKLIST.	BP-HZNBLY00383742 - BP-HZNBLY00383751
	CF3-NTF15 -Blue pod PETU screen shot first power up post accident inspection - Cameron (3)	BP-HZNBLY00389312 - BP-HZNBLY00389317
	CF3-NTF20 AMF card electrical characteristics test results - BP (2)	BP-HZNBLY00389318 - BP-HZNBLY00389357
	Email From Abbassian, Fereidoun to Daneker, Michael re RE BOP B_kv2757	BP-HZNBLY00392636 - BP-HZNBLY00392637
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00394203
	CF3-NTF2_kv1900	BP-HZNBLY00394599
	CF3 -NOTES TO FILE SPREADSHEET - BOP INVESTIGATION TEAM.	BP-HZNBLY00395042
	CF3 -NOTES TO FILE & DOCUMENT REFERENCES IN SUMMARY REPORT & CLC SPREADSHEET.	BP-HZNBLY00395534
	CF3 -NOTES TO FILE & DOCUMENT REFERENCES IN SUMMARY REPORT & CLC SPREADSHEET.	BP-HZNBLY00395538 - BP-HZNBLY00395539
	DEEPWATER HORIZON INCIDENT INVESTIGATION PRELIMINARY FACTUAL 'NOTE TO FILE' FORM.	BP-HZNBLY00395790 - BP-HZNBLY00395800
	DEEPWATER HORIZON INCIDENT INVESTIGATION PRELIMINARY FACTUAL 'NOTE TO FILE' FORM.	BP-HZNBLY00395808 - BP-HZNBLY00395816
	CF3 -NOTES TO FILE SPREADSHEET - BOP INVESTIGATION TEAM.	BP-HZNBLY00396377 - BP-HZNBLY00396378

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	CF3 -NOTES TO FILE SPREADSHEET - BOP INVESTIGATION TEAM.	BP-HZNBLY00396379
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00396708
	References in CF 3 Summary Report	BP-HZNBLY00397145
	NTF-BOP Investigation Team Summary Report 09032010 (3)	BP-HZNBLY00397165
	Notes to_kv2701	BP-HZNBLY00397335
	NTF-BOP Investigation Team Summary Report 09032010 (3)	BP-HZNBLY00397631
	References in CF 3 Summary Report 09012010	BP-HZNBLY00397642
	20100902 References in CF 3 Summary Report	BP-HZNBLY00398541
	Email from Politis, Nikolaos to Garnett, Andrew re RE NTF s_kv2738	BP-HZNBLY00398725
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00400450
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00400983
	Email from Fleming, Ray to Emmerson, Tony; Abbassian, Fereidoun re RE NTF S_kv3011	BP-HZNBLY00402589 - BP-HZNBLY00402591
	CF3-NTF19 Solenoid valve energisation test result -with hydraulic pressure - BP	BP-HZNBLY00402630 - BP-HZNBLY00402635
	CF3-NTF20 AMF card electrical characteristics test results - BP	BP-HZNBLY00402636 - BP-HZNBLY00402678
	CF3-NTF31 AMF batteries condition testing	BP-HZNBLY00402679
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00402705
	Email from Abbassian, Fereidoun to Fleming, Ray re RE NTF S_kv3022	BP-HZNBLY00403837 - BP-HZNBLY00403839
	NTF-BOP Investigation Team Summary Report 09032010 (3)	BP-HZNBLY00403942
	CF3-NTF1_kv3113	BP-HZNBLY00403995
	CF3-NTF14 -Blue Pod function test results post accident inspection - Cameron	BP-HZNBLY00403996 - BP-HZNBLY00404033
	Copy of References in CF 3 Summary Report 09012010	BP-HZNBLY00404291 - BP-HZNBLY00404291
	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00404469 - BP-HZNBLY00404469
	Critical Factor: 5D The Blowout Preventer Did Not Seal The Well; Topic: Blue pod PETU screen shot taken on start up of Blue pod; Dated: September 2, 2010	BP-HZN-BLY00404955 - BP-HZN-BLY00404960
	CF3-NTF15 -Blue pod PETU screen shot first power up post accident inspection - Cameron	BP-HZNBLY00404955 - BP-HZNBLY00404960
	CF3-NTF16 Blue pod AMF function test post accident inspection - Cameron	BP-HZNBLY00404961 - BP-HZNBLY00404988
	CF3-NTF18 Solenoid valve energisation test result -in air BP	BP-HZNBLY00404990 - BP-HZNBLY00404996

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	NTF-BOP Investigation Team Summary Report 09032010	BP-HZNBLY00405491 -BP-HZNBLY00405491
	Factory Acceptance Test Procedure for Subsea Electronic Module (Horizon AMF/Deadman In Current Situation - Test Procedure); Yellow Pod May 12, 2010	BP-HZN-BLY0060853 - BP-HZN-BLY0060863
	BOP Controls Backup System	BP-HZN-MBI00133127
	7-24-2001 Transocean letter re: Deepwater Horizon Contract Amendment - Additional Personnel	BP-HZN-MBI00179361 - BP-HZN-MBI00179363
	11-5-2001 Transocean letter to BP re: Late Delivery Charge & Change Order Summary	BP-HZN-MBI00179364- BP-HZN-MBI00179366
	Subsea Multiplex BOP Control System Basic Operation Manual for Standard Systems - 3rd Generation	CAM_CIV_0000244 - CAM_CIV_0000423
	Assembly Drawing Solenoid Valve 3/2 Way	CAM_CIV_0000558
	Deepwater Horizon Mk 2 Control Pod Stack Flow Diagram	CAM_CIV_0001283- CAM_CIV_0001285
	Deck Test Procedure for Mark-II Control POD / Cameron P/N 2020708-21	CAM_CIV_0002990 - CAM_CIV_0003013
	Factory Acceptance Test Procedure / System Integration R&B Falcon / Deepwater Horizon RBS8D / X-200114-21-01	CAM_CIV_0008495 - CAM_CIV_0008537
	Factory Acceptance Test Procedure for Subsea Electronic Module (Extended Version) / Rev A02 / Doc No. X-065449-02	CAM_CIV_0009509 - CAM_CIV_0009538
	William LeNormand Cameron Controls Daily Report Sheet Dated 5/MAY/2010; Project Title: SUBSEA POD Intervention	CAM_CIV_0012191 - CAM_CIV_0012206
	Factory Acceptance Test Procedure for Subsea Electronic Module / Cameron Part #2020722-21 / Revision 01 / Document No. X-200751-21-03	CAM_CIV_0014469 - CAM_CIV_0014511
	Repair Quote Document Number: 5000/H51/20537194 Date Issued: May 05 2009	CAM_CIV_0014911 - CAM_CIV_0014913
	Factory Acceptance Test Procedure for Subsea Electronic Module (Extended Version) / Revision A04 / Doc. No. X65449-02	CAM_CIV_0016371 - CAM_CIV_0016400
	Factory Acceptance Test Procedure for Subsea Electronic Module (Extended Version) / Revision A04 / Doc. No. X065449-02	CAM_CIV_0016442 - CAM_CIV_0016462
	Ex. A to Declaration.pdf	CAM_CIV_0017555 - CAM_CIV_0017573
	Project: Redesign, File-Name: control.c November 22 1999	CAM_CIV_0017876 - CAM_CIV_0017886
	Project: Redesign, File-Name: crc.c	CAM_CIV_0017887 - CAM_CIV_0017888
	Project: Redesign, File-Name: crc.h	CAM_CIV_0017889
	Dateiname: curses.c, curses_port.h	CAM_CIV_0017890 - CAM_CIV_0017892

Deposition Exhibit No.	Document Description	Bates Range
	Project: Redesign, File-Name:deadman.c	CAM_CIV_0017893 - CAM_CIV_0017905
	Project: Redesign, File-Name: flow_scm.h	CAM_CIV_0017906 - CAM_CIV_0017907
	Project: Redesign, File-Name:funcMoni.c	CAM_CIV_0017908 - CAM_CIV_0017913
	Project: Redesign, File-Name: funcMoni.h	CAM_CIV_0017914
	Project: Redesign, File-Name: funcSolv.c	CAM_CIV_0017915 - CAM_CIV_0017919
	Project: Redesign, File-Name: funcSolv.h	CAM_CIV_0017920
	Project: Redesign, File-Name:gdefs.h	CAM_CIV_0017921 - CAM_CIV_0017931
	Project: Redesign, File-Name: genMoni.h	CAM_CIV_0017932 - CAM_CIV_0017933
	Project: Redesign, File-Name: ihsysf.c	CAM_CIV_0017934 - CAM_CIV_0017937
	Project: SCM-Flow Counter, File-Name: ih_scm.c	CAM_CIV_0017938 - CAM_CIV_0017946
	Project: Redesign, File-Name: isNEW.c	CAM_CIV_0017947 - CAM_CIV_0017961
	Project: Redesign, File-Name: isr.h	CAM_CIV_0017962
	Project: Redesign, File-Name: pbadc3.c	CAM_CIV_0017963
	Headerfile: pbd8.h	CAM_CIV_0017974
	Project: Redesign, File-Name: pbDefs.h	CAM_CIV_0017975 - CAM_CIV_0017976
	Project: Redesign, File-Name: rcbtel.c	CAM_CIV_0017977 - CAM_CIV_0017988
	Project: Redesign, File-Name: rs485tel.c	CAM_CIV_0017989 - CAM_CIV_0017999
	Project: Redesign, File-Name: scmMoni.c	CAM_CIV_0018000 - CAM_CIV_0018012
	Project: Redesign, File-Name: scmMoni.h	CAM_CIV_0018013 - CAM_CIV_0018014
	Project: Redesign, File-Name: Solve.c	CAM_CIV_0018015- CAM_CIV_0018025
	Project: Redesign, File-Name: submain.c	CAM_CIV_0018026 - CAM_CIV_0018035
	Project: Redesign, File-Name: subpb1.c	CAM_CIV_0018036 - CAM_CIV_0018046
	Project: Redesign, File-Name: subpb2.c	CAM_CIV_0018047 - CAM_CIV_0018063
	Project: Redesign, File-Name: subtel.c	CAM_CIV_0018064 - CAM_CIV_0018083
	Project: Redesign, File-Name: tele.c	CAM_CIV_0018084 - CAM_CIV_0018088
	Project: Redesign, File-Name: tele.h	CAM_CIV_0018089 - CAM_CIV_0018090

Deposition Exhibit No.	Document Description	Bates Range
	Project: Redesign, File-Name: vicisdefs.h	CAM_CIV_0018091 - CAM_CIV_0018095
	Multiples BOP Control System Budgetary Proposal For Reading & Bates "Vastar Project" Quotation No. WS-1218/98 Date: January 6, 1999	CAM_CIV_0018541 - CAM_CIV_0018584
	Emergency, Back-up and Deepwater Safety Systems /Automated Disconnect Systems for Shutting in Wells	CAM_CIV_0019820 - CAM_CIV_0019825
	Drilling Controls Training	CAM_CIV_0020346 - CAM_CIV_0020674
	Email From Coronado, Richard J to Walters, David re DMS Sequence for Deepwater Horizon	CAM_CIV_0021049
	Email From Perez, Paul R;Cooper Cameron Corp to Williams, Bolie C;Cooper Cameron Corp re Re: DMS Sequence(s)	CAM_CIV_0021124 - CAM_CIV_0021125
	Assembly, Stack Hose Diagram Deepwater Horizon / Drawing Number: SK-122100-21	CAM_CIV_0022591 - CAM_CIV_0022594
	Battery Pack, 9VDC, 41A/HR Lithium 12 Cells in Series/Parallel W/Molex Conn. & PTC's Drawing SK-154449-01	CAM_CIV_0022982
	Assembly and Test Procedure for Cameron Solenoid Valves, X-065393-05, Revision 07 Dated June 20, 2009	CAM_CIV_0023928 - CAM_CIV_0023946
	Factory Acceptance Test Procedure for Portable Electronic Test Unit Doc No. X-065396-38 Rev A 02 dated 02/04/1998	CAM_CIV_0023962 - CAM_CIV_0023976
	Upgrade Procedure for Cameron Solenoid Valve / Doc.No. X-200106-01 / Revision 01	CAM_CIV_0024629 - CAM_CIV_0024637
	Design Requirements for AMF/Deadman Battery Pack 9VDC, 36.5Amp/Hr / Document No. X-234265-02 / Revision 03	CAM_CIV_0025410 - CAM_CIV_0025411
	Handling procedure for SEM Pie Connectors and Solenoid Cable Connectors Jan 23 2002	CAM_CIV_0026119 - CAM_CIV_0026127
	Interconnection Diagram, PBOF Hoses with Devices / Drawing Number: SK-122366-05	CAM_CIV_0026538 - CAM_CIV_0026566
	Cameron Drilling Controls System Training Presentation for Transocean: Control Signal	CAM_CIV_0027344- CAM_CIV_0027381
	Drilling Control System Training, Module 2, Cameron Documentation	CAM_CIV_0027896 - CAM_CIV_0027897
	Factory Acceptance Test Procedure for Subsea Electronic Module (Horizon AMF/Deadman In Current Situation - Test Procedure); Dated May 10, 2010	CAM_CIV_0028380 - CAM_CIV_0028390
	Email from M. Whitby re: BP Crisis Center Actions	CAM_CIV_0028607- CAM_CIV_0028608
	Factory Acceptance Test Procedure for Subsea Electronic Module (Horizon AMF/Deadman In Current Situation- Test Procedure) Yellow Pod	CAM_CIV_0031388- CAM_CIV_0031398
	Assembly Drawing Solenoid Valve 3/2 Way	CAM_CIV_0037650

Deposition Exhibit No.	Document Description	Bates Range
	Drawing SK-122366-21: SEM Interconnection Drawing	CAM_CIV_0037995
	Cameron -Houston, Texas Product Engineering Part/Document Audit Report / Entry Number: 202072221	CAM_CIV_0043135 - CAM_CIV_0043144
	Functional Design Specification / AMF Controller Card / P.N.: 2197095-05 / Document Number: X-065413-86 / Revision C01	CAM_CIV_0043160 - CAM_CIV_0043168
	Cameron Controls, Daily Report Sheet, Subsea Pod Intervention, Horizon, BP, May 26, 2010	CAM_CIV_0046703 - 46721
	Cameron Outstandings List	CAM_CIV_0048007
	Circuit Diagram Riser Control Box Instrumentation System - Yellow / Dwg. No. SK-122122-08-06	CAM_CIV_0048606 - CAM_CIV_0048607
	Deadman System written description by Paul R. Perez Date: August 15, 1999	CAM_CIV_0053663 - CAM_CIV_0053667
	Factory Acceptance Test Procedure, BOP Stack, P/N 2163740-01 and Blue & Yellow Bop MUX Pods 2@P/N 2020708-21 for R & B Falcon "Deepwater Horizon" / Revision A02 / Document No. X-201209-21	CAM_CIV_0054380 - CAM_CIV_0054396
	2003 Letter to Cameron Customers re: Mk2 End of Life Issues	CAM_CIV_0073954- CAM_CIV_0073956
	Email From: Fry, Michael Sent Nov 19 2007 8:50 AM Subject: FW: Connectors for DWH pod repair	CAM_CIV_0073998
	Email From Fry, Michael to Erwin, Carter re FW: Yellow Pod Horizon	CAM_CIV_0075733 - CAM_CIV_0075734
	Email from Van Lue, Jason to Dilley Richard re RE: DSR DWHorizon 20080420-21	CAM_CIV_0076140 - CAM_CIV_0076142
	Email From Williams, Dean to Erwin, Carter re FW: Transducers & EPROMs	CAM_CIV_0078199 - CAM_CIV_0078201
	Sem software Update required	CAM_CIV_0078206
	Email from ENR-Rigmanager to Winpenny, Gary re Sedco Energy - AMF Problems	CAM_CIV_0078207
	REA_Request_Energy BOP	CAM_CIV_0078224
	Email from Williams, Brian to Erwin, Carter re RE: Transocean Leader - BOP Control Software Issues	CAM_CIV_0078526
	Email from Williams, Brian to Erwin, Carter re RE: DOC041610 (3).pdf - Leader	CAM_CIV_0078552
	Acoustic Proposal	CAM_CIV_0078553
	Email from Williams, Brian to Erwin, Carter, et al. re RE: DOC041610 (3).pdf - Leader	CAM_CIV_0078560 - CAM_CIV_0078564
	Original Equipment Manufacturer/Technical Bulletin Approval Form, Document Ref: CIS-01-C05 RevA01	CAM_CIV_0078580 - CAM_CIV_0078587
	Email from Erwin, Carter to Lien, Ole re RE: Cameron Mux Solenoid	CAM_CIV_0079407 - CAM_CIV_0079409
	Email from Jahn, Ray to Erwin, Carter; Brown, Steve re Nautilus RCB/SEM Modifications	CAM_CIV_0083884

Deposition Exhibit No.	Document Description	Bates Range
	Email From Watson, Neil Sent: Nov 28 2009 3:56 PM Subject Solenoid Kits for the Sovex Attachments: Original Equipment Manufacturer/ Technical Bulletin Approval Form, Document Ref: CIS-01-C05RevA01.pdf	CAM_CIV_0097485 - CAM_CIV_009743
	Functional Design Specification for Multiplex Drilling Control System / P/N 2020700-21 / Revision A01 / X-201300-21	CAM_CIV_0105577 - CAM_CIV_0105598
	Power Dissipation Inside the SEM for "Deepwater Horizon"	CAM_CIV_0106246 - CAM_CIV_0106249
	Primary Lithium Batteries / Selector Guide	CAM_CIV_0106994 - CAM_CIV_0107008
	Installation Procedure / Retrofit Protection Kit for Riser Control Box Deepwater Horizon (RBS-8D) / Revision A01 / Document No. X-234274-21	CAM_CIV_0120983 - CAM_CIV_0120990
	Wiring Diagram, Subsea Electrical J-Box Yellow Cable / Drawing Number: SK-122220-01	CAM_CIV_0121958
	Test Procedure for Deadman Battery Pack Longevity Test / Revision A02 / Document No. X-234265-01	CAM_CIV_0123089 - CAM_CIV_0123117
	Assembly Drawing Solenoid Valve 3/2 Way	CAM_CIV_0124406 - CAM_CIV_0124407
	Battery Pack Drawing	CAM_CIV_0124836
	Upgrade procedure for Cameron Solenoid Valve, Part No. 223290-15 and Part No. 223290-63, marked as CONFIDENTIAL	CAM_CIV_0126524 - CAM_CIV_0126532
	Design Requirements for AMF/Deadman Battery Pack 9VDC, 36.5Amp/Hr / Document No. X-234265-02 / Revision 03	CAM_CIV_0127454 - CAM_CIV_0127455
	List of products	CAM_CIV_0129546 - CAM_CIV_0129548
	Assembly / Dis-Assembly Procedure for Sub Plate Mounted Solenoid Valve Cameron Part No: 223290-15	CAM_CIV_0134332 - CAM_CIV_0134342
	Test Procedure for Deadman Battery pack Longevity Test Rev 1, marked as HIGHLY CONFIDENTIAL	CAM_CIV_0145282 - CAM_CIV_0145310
	Daily Service Report blue pod	CAM_CIV_0151756 - CAM_CIV_00151762
	Transocean Sedcoforex, Inc. RFI Number: RFI031olm problems	CAM_CIV_0161484 - CAM_CIV_0161487
	Email from Algama, Don to Cody, Brad re RE: Express Class Rig - BOP V-ICIS VDC	CAM_CIV_0161491 - CAM_CIV_0161493
	Email from Martin, Jim to Cody, Brad; Gaude, Edward re Horizon/Nautilus Deadman sequence timing	CAM_CIV_0161563
	TSF Horizon -Pod (P/N 2020708-21), Non-conformance report dispositions	CAM_CIV_0161587 - CAM_CIV_0161588
	Email from Villamarin, Eduardo to Gaude, Edward re Horizon Pod Repair	CAM_CIV_0161623
	Installation Procedure / Retrofit Protection Kit for Riser Control Box Revision A01 / Document No. X-234274-01	CAM_CIV_0161783 - CAM_CIV_0161789

Deposition Exhibit No.	Document Description	Bates Range
	Email from Jamison, Thomas to Erwin, Carter re Pod Flowmeters Problem on Horizon (RBS8D)	CAM_CIV_0161797 - CAM_CIV_0161799
	File log 2003.04.07/08:00:00	CAM_CIV_0161800 - CAM_CIV_0161822
	SK-122178-21-04-003.DWG	CAM_CIV_0162021
	Email from Coronado, Richard to Hensley, John re RE: FW: AMF - Express	CAM_CIV_0162074 - CAM_CIV_0162080
	Transocean Sedco Forex Cameron Summit Meeting Action Item Report Interim and Progress Report on Reliability Issues Related to Cameron BOP Control Systems 10/9/01	CAM_CIV_0162139 - CAM_CIV_0162151
	Email From Jahn, Ray sent August 26 2010 Subject: Questions Received on August 19, 21 & 23, 2010 from James McAdams	CAM_CIV_0169398 - CAM_CIV_0169400
	Email from Erwin, Carter to Yeo, Ken re FW: Horizon Panel Program (rbsdp66.pia) & EventLogger ini file	CAM_CIV_0172396
	Project name: RB Falcon Rbs8d	CAM_CIV_0172397 - CAM_CIV_0172403
	DOC121508	CAM_CIV_0172407 - CAM_CIV_0172414
	List of BOP Drawings	CAM_CIV_0173427
	Margaret, RBSactions_June10	CAM_CIV_0191021 - CAM_CIV_0191022
	Changing the Deadman Sequence	CAM_CIV_0191226
	dmpg2	CAM_CIV_0191227
	dmpg3	CAM_CIV_0191228
	File: shutdown.asc version 1.0	CAM_CIV_0191229
	Email from Van Lue, Jason to Kelley, Merrick re RE: REQUEST : Please confirm multiple use of deadman	CAM_CIV_0198904 - CAM_CIV_0198905
	Email from King, Don to Whitby re Re: DWH Update, Sunday June 6th, 2010	CAM_CIV_0203616 - CAM_CIV_0203618
	Email from Van Lue to Chiasson, Glenn Re: DWH Update, Sunday June 6th, 2010	CAM_CIV_0205665 - CAM_CIV_0205669
	sk-122178-21-04.tif	CAM_CIV_0216094 - CAM_CIV_0216096
	Cameron Technical Publications Rig Book Request Form	CAM_CIV_0216097
	Email From Kelley, Merrick to Van Lue, Jason re RE: AMF/Deadman test Horizon	CAM_CIV_0217341
	May 2010 Email from M. Whitby to P. Berthaud re: relationship between Nautilus and Horizon	CAM_CIV_0227061- CAM_CIV_0227062
	Cameron Controls X-200114-21-01 Rev. B02 Dead Man Sequence May 25, 2000	CAM_CIV_0256367 - CAM_CIV_0256376
	Assy Portable Electronic Test Unit Drawing SK-066180-38	CAM_CIV_0256572
	Recommended Upgrade & Verification Document for Mark I & II Sem / Document No. X-262098-01	CAM_CIV_0259546 - CAM_CIV_0259554

Deposition Exhibit No.	Document Description	Bates Range
	Installation Procedure for Mark II Power Supply Kit / Document Number: X-076704-10	CAM_CIV_0275305 - CAM_CIV_0275329
	Deadman System	CAM_CIV_0277329 - CAM_CIV_0277333
	Email From Cooper, Nathan to Gaude; Edward C.re FW: Odebrecht Extra Testing	CAM_CIV_0316453 - CAM_CIV_0316457
	Email From Jahn, Ray to Amiraux, Philippe re RE: FW: Li-Ion Battery Mtg 5/7/10	CAM_CIV_0316950 - CAM_CIV_0316956
	GD data sheet FB07144X release2	CAM_CIV_0316964 - CAM_CIV_0316965
	Cameron AMF Battery Monitor software	CAM_CIV_0317005 - CAM_CIV_0317020
	Rigs with Cameron Control Systems	CAM_CIV_0317094 - CAM_CIV_0317095
	TO Cameron Controls Pod and J box Upgrade status	CAM_CIV_0317132 - CAM_CIV_0317133
	Gilmore Pilot Operated Check Valve 1-1/2", 5000 psi WP	CAM_CIV_0317148 - CAM_CIV_0317151
	Email from Algama, Don to Thomison, James re SOS300052644 - Addition of AMF card to RBS8M	CAM_CIV_0317165
	Email from Cody, Brad to Gaude, Edward re RE: DWH Deadman System	CAM_CIV_0317166 - CAM_CIV_0317167
	Email from Jahn, Ray to Erwin, Carter; Brown, Steve re Nautilus RCB/SEM Modifications	CAM_CIV_0317168
	RBS8M_SEM_BA_18Sep03	CAM_CIV_0317170 - CAM_CIV_0317179
	Factory Acceptance Test Procedure for Subsea Electronic Module, Doc No. X-065449-05 B02	CAM_CIV_0317180 - CAM_CIV_0317188
	Email From Gaude, Ed to Sweeney, John re RE: Downtime	CAM_CIV_0317358 - CAM_CIV_0317359
	Email from Gaude, Ed to Leong, Hiam re FW: RE: Eventlogger upgrade ESR 000214691 Leader Event logger upgrade	CAM_CIV_0317377 - CAM_CIV_0317379
	FText.ini	CAM_CIV_0317380
	GText.ini, Annular Preventer	CAM_CIV_0317381
	OText.ini, Active SEM	CAM_CIV_0317382
	PText.ini, Write Protocol	CAM_CIV_0317383
	RText.ini	CAM_CIV_0317384
	SAP0Text.ini	CAM_CIV_0317385
	SAP10Text.ini	CAM_CIV_0317386 - CAM_CIV_0317387
	SAP11Text.ini	CAM_CIV_0317388 - CAM_CIV_0317389
	SAP12Text.ini	CAM_CIV_0317390 -
	SAP13Text.ini	CAM_CIV_0317391
	SAP1Text.ini	CAM_CIV_0317392 -

Deposition Exhibit No.	Document Description	Bates Range
	SAP2Text.ini	CAM_CIV_0317393 - CAM_CIV_0317394
	SAP3Text.ini	CAM_CIV_0317395
	SAP4Text.ini	CAM_CIV_0317396
	SAP5Text.ini	CAM_CIV_0317397
	SAP6Text.ini	CAM_CIV_0317398
	SAP7Text.ini	CAM_CIV_0317399
	SAP8Text.ini	CAM_CIV_0317400 - CAM_CIV_0317401
	SAP9Text.ini	CAM_CIV_0317402 - CAM_CIV_0317403
	Operational and Maintenance Advisory, Number S30C-108042815020	CAM_CIV_0317476 - CAM_CIV_0317482
	Vans PBOF CABLES.xls	CAM_CIV_0317506
	Issues & Actions Meetings Minutes 10/16/01	CAM_CIV_0317542 - CAM_CIV_0317543
	Cameron Summit Meeting Action Item Report	CAM_CIV_031757
	Transocean Sedcoforex, Inc. RFI Number: RFI001EDS	CAM_CIV_0317577 - CAM_CIV_0317579
	Cameron Reliability Issues Meeting	CAM_CIV_0317593
	Cameron Rig Specific Issues	CAM_CIV_0317594
	POD Mounted Flowmeters for the Horizon	CAM_CIV_0317596 - CAM_CIV_0317597
	Transocean Upgrade Verification Table	CAM_CIV_0317640 - CAM_CIV_0317641
	Control reliability issues.xls	CAM_CIV_0317658
	Email from John, Ray to Williams, Brian re Transocean Dwgs f/Horizon, Nautilus, Enterprise	CAM_CIV_0317674
	sk-066058-10-04	CAM_CIV_0317676 - CAM_CIV_0317721
	sk-122178-05-04	CAM_CIV_0317722 - CAM_CIV_0317727
	Product Engineering Part/ Document Audit report Entry Number: 2185759-05	CAM_CIV_0317728
	SK-122366-21	CAM_CIV_0317740
	SK-066376-53-04.tif	CAM_CIV_0317750 - CAM_CIV_0317752
	SK-066376-53.tif	CAM_CIV_0317753
	SK-122100-21-04.tif	CAM_CIV_0317754 - CAM_CIV_0317757
	SK-066376-42-04.tif	CAM_CIV_0317768 - CAM_CIV_0317770
	SK-066376-42.tif	CAM_CIV_0317771
	SK-122100-14-04.tif	CAM_CIV_0317772
	SK-122366-14.tif	CAM_CIV_0317773
	SK-1222366-14.tif	CAM_CIV_0317774

Deposition Exhibit No.	Document Description	Bates Range
	Email from Johnson, Brad to Gaude, Gilbert; Erwin, Carter re FW: Bad Pie Connector	CAM_CIV_0317776 - CAM_CIV_0317778
	Factory Acceptance Test , AWQ-4/24-s-BC-DO-HP	CAM_CIV_0317779 - CAM_CIV_0317788
	CAR-Transocean RMA 8727	CAM_CIV_0317789 - CAM_CIV_0317790
	MK1-2 vs MK3 053008.ppt	CAM_CIV_0317792
	Email From Larimore, Stephen to gaude, Edward C. re Mark I Training & Flash	CAM_CIV_0317795
	COMMS.html	CAM_CIV_0317796
	COMMS.swf	CAM_CIV_0317797
	HPU_MarkI.html	CAM_CIV_0317798
	HPU_MarkI.swf	CAM_CIV_0317799
	MUX_POD_Mark1.html	CAM_CIV_0317800
	MUX_POD_Mark1.swf	CAM_CIV_0317801
	STACK_Pride.html	CAM_CIV_0317802
	STACK_Pride.swf	CAM_CIV_0317803
	Token_Ring_PLC_Star.html	CAM_CIV_0317804
	Token_Ring_PLC_Star.swf	CAM_CIV_0317805
	For Ed Gaude MK I training	CAM_CIV_0317806
	image001.gif	CAM_CIV_0317807
	image002.jpg	CAM_CIV_0317808
	Cameron DF 055061-01 Design File for Calculation of Lithium MnO2 Battery Life Hours and Recommended Battery Replacement May 8, 2000	CAM_CIV_0317810 - CAM_CIV_0317816
	Email from Coronado, Richard to Gaude, Edward re FW: Scanned from MFP-06958807 05/06/2010 11:39	CAM_CIV_0317830
	DOC050610.pdf	CAM_CIV_0317831 - CAM_CIV_0317833
	Email From Hoang, Loc to Mcwhorter, David re Re: Accumulator	CAM_CIV_0317844 - CAM_CIV_0317846
	Horizon AMF-Deadman battery	CAM_CIV_0317857 - CAM_CIV_0317859
	SK-122220-01-001 Model (1)	CAM_CIV_0332785
	Drilling Products School for Transocean Agenda for Cameron Controls	CAM_CIV_0333502 -
	E13 SKs	CAM_CIV_0337648 - CAM_CIV_0337678
	E13 Riser Instrumentation MANUAL.ppt	CAM_CIV_0339861
	Email from Thies to McAdams, James re Re: [Fwd: Deadman Advisory]	CAM_CIV_0347602 - CAM_CIV_0347603
	Cameron Deadman System Schematic June 10 1997	CAM_CIV_0347609 - CAM_CIV_0347610
	Email from Holkenbrink, Wolfgang to McAdams, James re Re: Deadman Problem - Urgent	CAM_CIV_0347640 - CAM_CIV_0347642
	Email from Holkenbrink, Wolfgang to McAdams, James re Re: Deadman Problem - Urgent	CAM_CIV_0347643 - CAM_CIV_0347644

Deposition Exhibit No.	Document Description	Bates Range
	Email From: May, Roger Sent: Mon Apr 26 2004 4:11 PM Subject RE: Telecon Attaching Saft Battery Testing Data	CAM_CIV_0349772 - CAM_CIV_0349774
	Saft Techincal Data Sheet Lithium Manganese Dioxide LM 33600 Series May 2001	CAM_CIV_0349900
	Saft Typical Electrical Performance Sheet	CAM_CIV_0349901
	Engineering Report Abstract 3862, May 27, 2010 Subject: A re-validation Testing on SEACON's AWQ 4/24 Connector	CAM_CIV_0357316 - CAM_CIV_0357335
	Email From: Amiraux, Philippe, Sent: Fri July 23 2010 12:50 PM Subject: Lithium primary battery, shelf-life and remaining capacity	CAM_CIV_0357648
	Saft's Responses to Questions Received from Cameron on July 22, 2010	CAM_CIV_0357649
	MK I & II AMF/Deadman Power-Up Sequence	CAM_CIV_0357650
	Email From McAdams, James to Jahn, Ray re Re: AMF/Deadman Circuit f/DrillMax 1 (Old Style)	CAM_CIV_0357671 - CAM_CIV_0357673
	Cameron Product Advisory XXXXX Additional Testing of the Deadman Batty Pack PN 2021604-01	CAM_CIV_0357772 - CAM_CIV_0357773
	LT1083/LT1084/LT1085 Fixed / 3A, 5A, 7.5A Low Dropout Positive Fixed Regulators	CAM_CIV_0357933 - CAM_CIV_0357944
	Interlink Systems Report Cameron AMF Battery Technical Description	CAM_CIV_0358103 - CAM_CIV_0358125
	Diagram of AWQ - 4/24-BC-SP & Assy	CAM_CIV_0365731
	Functional Design Specification for Solenoid Coil P/N 2231484-01	CAM_CIV_0365850
	Email From: Gaude, Ed Sent: May 8 2010 10:17 PM Subject: RE: E-connector for pie connector	CAM_CIV_0368774 - CAM_CIV_0368775
	Email from Thies, Reinhard to Holkenbrink, Wolfgange; Jahn, Ray re RE: AMF card f/Drilling Systems	CAM_CIV_0370223 - CAM_CIV_0370224
	deadm16	CAM_CIV_0370225
	Email from Thies Reinhard to Jahn, Ray re RE: AMF card f/Drilling Systems	CAM_CIV_0370226 - CAM_CIV_0370228
	Email from Gaude, Edward to Cody, Brad re RE: AMF boards	CAM_CIV_0370229 - CAM_CIV_0370233
	2197017-03-01_preliminary	CAM_CIV_0370492 - CAM_CIV_0370496
	Email from Jahn, Ray to McAdams, James re RE: AMF/Deadman Battery	CAM_CIV_0371050 - CAM_CIV_0371051
	3S4P Battery Configuration SAFT P/N 39336001200 Nov 11 2004	CAM_CIV_0371207 - CAM_CIV_0371215
	Battery CAD Drawing 39336001200-P4	CAM_CIV_0371254
	Battery Pack Drawing SK-154449-01	CAM_CIV_0371302
	Email from E. Gaude to Ian Coull re: LM 33600 retrofit kit	CAM_CIV_0371449- CAM_CIV_0371455
	Interlink Systems Report Mark II AMF Battery and Charger Functional Specification	CAM_CIV_0372599 - CAM_CIV_0372612

Deposition Exhibit No.	Document Description	Bates Range
	Cameron Solenoid Test Report 226123_31175	CAM_CIV_0374340 - CAM_CIV_0374349
	Field Performance Reports -FPR Number 226314	CAM_CIV_0374422 - CAM_CIV_0374425
	Final Acceptance Test AWQ-4 24	CAM_CIV_0389856 - CAM_CIV_0389858
	Email From: Jahn, Ray Sent: May 11 2010 6:29 PM Subject: FW: Manganese Dioxide battery packs	CAM_CIV_0390693 - CAM_CIV_0390694
	Document Transmittal Form	CAM_CIV_0400895
	Cameron Engineering Report 2768 Deadman Battery Pack Longevity Test 11/09/00	CAM_CIV_0400898 - CAM_CIV_0400915
	Cameron Engineering Report 2768 Deadman Battery Pack Longevity Test Appendix 11/09/00	CAM_CIV_0400916 - CAM_CIV_0400918
	VIUC/VSBC -4 / Intelligent Universal Controller Modules for Stand-Alone and VMEbus / Manual Order No. 3368 / User's Manual Issue 1.0.2	CAM_CIV_0405298 - CAM_CIV_0405388
	PB-DAC3 / Opto-Isolated 4-Channel Digital to Analog Piggyback for VMOD-2 and IMOD / Order No. 5230-35-x / User's Manual / Publication No. 5230-UM-0101 / Issue 2	CAM_CIV_0405532 - CAM_CIV_0405581
	PB-ADC3 / Optoisolated Analog to Digital Piggyback for VMOD-2 and IMOD / Manual Order Nr. 14279 / User's Manual / Issue 3	CAM_CIV_0405643 - CAM_CIV_0405699
	VBP2 / VMEbus Backplanes for the VMEbus / Order No. 541-0 / Users / Designers Manual / Document No. 541UM-0001 / Issue 1	CAM_CIV_0405701 - CAM_CIV_0405750
	Controls Maintenance for Mechanical Technicals	CAM_CIV_0406152 - CAM_CIV_0406193
	ExproSoft Memo, Reliability of Acoustic BOP Controls, Preliminary Work	CAM_CIV_0406933 - CAM_CIV_0406945
	Email From: Mac Kennedy Sent: May 15 2002 9:19 PM Subject: RE: TSF Express AMF EDF Quotation and Repair	CAM_CIV_0407604 - CAM_CIV_0407609
	Email from Kennedy, Mac to Cody, Brad, er al., re RE: TSF Express AMF EDF Quotation and Repair	CAM_CIV_0407604 - CAM_CIV_0407609
	April 12, 2010 Daily Report Sheet from Global Explorer	CAM_CIV_0407611 - CAM_CIV_0407615
	Email from David Parker of SeaCon to Ed Gaude	CAM_CIV_0407616
	Email From: Moore, James Sent: Jul 1, 2010 9:00 PM Subject: RE:Transocean Customer Provided Parts	CAM_CIV_0407617
	Email From: McWhorter, David Sent: July 1 2010 9:16 PM Subject: RE: Transocean Customer Provided Parts	CAM_CIV_0407618
	Email From Gaude, Edward Sent: May 8, 2010 4:11 PM Subject: RE: Solenoid Valve E connector	CAM_CIV_0407619
	Email From: Van Lue, Jason Sent May 27 2010 9:09 AM Subject: FW: Faulty Solenoid Valves	CAM_CIV_0407620 - CAM_CIV_0407621

Deposition Exhibit No.	Document Description	Bates Range
	Faulty Solenoid Valves-These were pulled due to Coil Breaks or Leaks	CAM_CIV_0407623
	Tech-16 Cameron Solenoid Valve 223290-63 Assembly and Test.pdf	CAM_CIV_0407626 - CAM_CIV_0407661
	Email From: Muffler, Ron, Sent: May 14, 2008 5:11 PM Subject: RE: Solenoid Assembly Procedure	CAM_CIV_0407663
	Solenoid Valve Assembly 223290-63	CAM_CIV_0407669 - CAM_CIV_0407701
	Cameron Engineering Department Engineering Transmittal Meeting April 21, 2001	CAM_CIV_0407703
	Email From: Jahn, Ray Sent: Jan 1, 2005 3:55 PM Subject: RE: Control System AMF Batteries	CAM_CIV_0407704 - CAM_CIV_0407708
	Email From: Jahn, Ray Sent: Mar 2 2005 2:24 PM Subject: RE: Cameron AMF Battery Upgrade	CAM_CIV_0407712 - CAM_CIV_0407717
	Email From: Williams, Brian Sent: Mar 8 2005 9:27 AM Subject: RE: BOP AMF Battery Upgrade	CAM_CIV_0407718 - CAM_CIV_0407722
	Email From: Jahn, Ray Sent: Oct 18 2004 10:23 AM Subject: Transocean Meeting 10/18/04	CAM_CIV_0407723
	Windows Executable, Technical File Information, ISSETT_SE	CAM_CIV_0407878 - CAM_CIV_0407879
	Windows Executable, Technical File Information, _DELIS	CAM_CIV_0407885 - CAM_CIV_0407886
	Email from Leong, Hian to Gonzalez, Manuel re Horizon Panel Program (rbsdp66.pia) & EventLogger ini file	CAM_CIV_0407895
	Project Name RB Falcon RBS8D	CAM_CIV_0407897 - CAM_CIV_0407904
	Email From Jahn, Ray to Erwin, Carter re FW: PDF'S	CAM_CIV_0407906 - CAM_CIV_0407907
	Product Engineering Part/ Document Audit Report Entry Number: 2020722-21	CAM_CIV_0407908 - CAM_CIV_0407909
	Product Engineering Part/ Document Audit Report Entry Number: 2020722-21	CAM_CIV_0407910 - CAM_CIV_0407918
	SK-122366-21	CAM_CIV_0407919
	SK-122104-21-07	CAM_CIV_0407920 -
	SK-122178-21-04	CAM_CIV_0407921 - CAM_CIV_0407923
	SK-122178-21-061	CAM_CIV_0407924
	SK-122178-21-061	CAM_CIV_0407925 - CAM_CIV_0407971
	SK-066300-97-04	CAM_CIV_0407972
	SK-066300-97-04	CAM_CIV_0407973 - CAM_CIV_0408002
	SK-122178-21-061	CAM_CIV_0408022 - CAM_CIV_0408068
	SK-066300-97-04	CAM_CIV_0408070 - CAM_CIV_0408099

Deposition Exhibit No.	Document Description	Bates Range
	NASeBOP	CAM_CIV_0408111 - CAM_CIV_0408112
	Email From JAHNR to Gaude, Edward re FW: LiMnO2 Battery question from BP	CAM_CIV_0408190 - CAM_CIV_0408192
	Terwin 2000 Series -small	CAM_CIV_0408219 - CAM_CIV_0408222
	AMF systems with upgraded batteries (ref EB 891 D)	CAM_CIV_0408225
	Email from Kennedy, Mac to Erwin, Carter; LeNormand, William re RE: DSR noon report May 15th, 2010	CAM_CIV_0408312 - CAM_CIV_0408313
	POD2 Model (1)	CAM_CIV_0408356
	Cameron Multiplex BOP Control System Basic Operations Manual Book Maintenance Valves and Regulators RBS 8D Volume 1	CAMCG 00000236 - CAMCG 00000645
	Cameron Controls, Flow Diagram Mark 2 Control Pod, SK-1221-8-21-05	CAMCG 00000331
	Cameron Multiplex BOP Control System Patco Cable Reel Blue & Yellow RBS 8D Volume 2	CAMCG 00000646 - CAMCG 00000919
	Cameron Multiplex BOP Control System Patco Hose Reel Hot Line RBS 8D Volume 3	CAMCG 00000920 - CAMCG 00001123
	Cameron Multiplex BOP Control System Driller's Control Panel ToolPusher's Control Panel BOM Assembly and Electrical Schematic Drawings RBS 8D Volume 5	CAMCG 00001428 - CAMCG 00001620
	Cameron Multiplex BOP Control System J-Box - Riser Inst. Cables PETU Accumulator Racks BOM Drawings RBS 8D Volume 6	CAMCG 00001621 - CAMCG 00001761
	Cameron Multiplex BOP Control System RBS 8D Volume 7	CAMCG 00001762 - CAMCG 00002174
	Cameron Multiplex BOP Control System Electronics PEP RBS 8D Volume 8	CAMCG 00002175 - CAMCG 00002842
	Cameron Multiplex BOP Control System HPU-Pod Cable Reels Cable Sheave BOM Drawings RBS 8D Volume 4	CAMCG00001124 - CAMCG00001427
	TRANSOCEAN MARK lII MODEL 80	CAM-CIV0097590 - CAM-CIV-0097594
	MUX Control Pod Hyperbaric Functional Test (Blue Pod)	CAM-DOI 000014529 - CAM-DOI 000014540
	MUX Control Pod Hyperbaric Functional Test (Yellow Pod)	CAM-DOI 000014546 - CAM-DOI 000014558
	Instructions for using Checkme	CAM-DOJ-CIV-00031609 - CAM-DOJ-CIV-00031611
	(BOP-015-1_Summary PETU Solenoid Drive Characterization)	DNC2011060642
	(BOP-015-2_Summary PETU Solenoid Drive Characterization)	DNC2011060643
	(BOP-015-3_Summary PETU Solenoid Drive Characterization)	DNC2011060743

Deposition Exhibit No.	Document Description	Bates Range
	Removal of Batteries from Yellow SEM DNV 2011061602 -BOP-028	DNV 2011061602
	DNV Test Preparation Sheet BOP-015 PETU Solenoid Drive Characterization	DNV00001056
	TPS-BOP-018 Download SEM Software Summary	DNV00001280
	BOP-029 Full Load Battery Test	DNV00001392
	BOP-030 Full Load Battery Test	DNV00001393
	DNV2011061716 - Bat-1	DNV00001407
	DNV2011061719 - Bat 2	DNV00001410
	DNV2011061722 - Bat 3	DNV00001413
	DNV2011061804 - Bat 4	DNV00001422
	DNV2011061807 - Bat 5	DNV00001425
	DNV2011061810 - Bat 6	DNV00001428
	DNV2011061813 - Bat 6a	DNV00001431
	DNV2011061816 - Bat 7	DNV00001434
	DNV2011061819 - Bat 10	DNV00001437
	DNV2011061822 - Bat 11	DNV00001440
	BOP-030 Full Load Battery Test with SEM Batteries	DNV00001453
	DNV2011061906 - Bat 11a	DNV00001456
	DNV2011061909 - Bat 12	DNV00001459
	DNV2011061912 - Bat 13	DNV00001462
	DNV2011061915 - Bat 14	DNV00001465
	DNV2011061918 - Bat 15	DNV00001468
	DNV2011061921 - Bat 16	DNV00001471
	DNV2011061924 - Bat 17	DNV00001474
	DNV Phase I Test Data; Dugal-Whitehead, N., Test Preparation Sheet – BOP Solenoid Drop Out and Pick Voltage Test of Yellow Pod 3A Solenoid, February 28, 2011	DNV007-DNV000191
	TS BOP-10 Summary Test Solenoid at Deep Sea Temperature w Hydraulic Pressure	DNV2011051801
	Det Norske Veritas, Solenoid 103 Original Wiring Connections	DNV2011052708
	TPS-BOP-018 Download SEM Software Summary; 4 pages	DNV2011060922
	Yellow POD SEM-A vs Yellow Pod SEM-B; 61 pages	DNV2011060923
	DNV Phase I Test Data; Dugal-Whitehead, N., Test Preparation Sheet – Test of Blue SEM Batteries, June 15, 2011	DNV2011061502
	DNV Phase I Test Data; Dugal-Whitehead, N., Test Preparation Sheet – Test of Yellow SEM Batteries, June 16, 2011	DNV2011061601
	BOP-029 Full load Battery Test.pdf (KPMG/DNV BOP Testing Data)	DNV2011061701
	BOP-030 Full Load Battery Test.pdf (KPMG/DNV BOP Testing Data)	DNV2011061702

Deposition Exhibit No.	Document Description	Bates Range
	3A Solenoid Disassembly.pdf (KPMG/DNV BOP Testing Data)	DNV2011061703
	BOP&LMRP Log 6_17_11.xls (KPMG/DNV BOP Testing Data)	DNV2011061704
	BOP-bP-O12.xls (KPMG/DNV BOP Testing Data)	DNV2011061708
	BOP-bP-O12_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061709
	BOP-bP-O12_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061710
	LMRP-yP-O1.xls (KPMG/DNV BOP Testing Data)	DNV2011061711
	LMRP-yP-O1_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061712
	LMRP-yP-O2.xls (KPMG/DNV BOP Testing Data)	DNV2011061713
	LMRP-yP-O2_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061714
	BatLog06_17_11.xls (KPMG/DNV BOP Testing Data)	DNV2011061715
	Bat-1.xls (KPMG/DNV BOP Testing Data)	DNV2011061716
	Bat-1_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061717
	Bat-1_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061718
	Bat 2.xls (KPMG/DNV BOP Testing Data)	DNV2011061719
	Bat 2_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061720
	Bat 2_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061721
	Bat 3.xls (KPMG/DNV BOP Testing Data)	DNV2011061722
	Bat 3_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061723
	Bat 3_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061724
	103-Y Original Solenoid Disassembly.pdf (KPMG/DNV BOP Testing Data)	DNV2011061801
	BOP-032 Full Load Battery Test at Low Temperature.pdf (KPMG/DNV BOP Testing Data)	DNV2011061802
	Bat Log 6-18-11.xls (KPMG/DNV BOP Testing Data)	DNV2011061803
	Bat 4.xls (KPMG/DNV BOP Testing Data)	DNV2011061804
	Bat 4_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061805
	Bat 4_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061806
	Bat 5.xls (KPMG/DNV BOP Testing Data)	DNV2011061807
	Bat 5_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061808
	Bat 5_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061809
	Bat 6.xls (KPMG/DNV BOP Testing Data)	DNV2011061810
	Bat 6_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061811
	Bat 6_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061812
	Bat 6a.xls (KPMG/DNV BOP Testing Data)	DNV2011061813
	Bat 6a_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061814
	Bat 6a_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061815
	Bat 7.xls (KPMG/DNV BOP Testing Data)	DNV2011061816
	Bat 7_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061817
	Bat 7_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061818
	Bat 10.xls (KPMG/DNV BOP Testing Data)	DNV2011061819
	Bat 10_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061820

Deposition Exhibit No.	Document Description	Bates Range
	Bat 10_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061821
	Bat 11.xls (KPMG/DNV BOP Testing Data)	DNV2011061822
	Bat 11_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061823
	Bat 11_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061824
	LMRP Log 6-18-11.xls (KPMG/DNV BOP Testing Data)	DNV2011061825
	LMRP-bP-O&C3.xls (KPMG/DNV BOP Testing Data)	DNV2011061826
	LMRP-bP-O&C3_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061827
	LMRP-bP-O&C4.xls (KPMG/DNV BOP Testing Data)	DNV2011061828
	LMRP-bP-O&C4_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061829
	LMRP-bP-O&C5.xls (KPMG/DNV BOP Testing Data)	DNV2011061830
	LMRP-bP-O&C5_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061831
	3A Solenoid Additional Disassembly.pdf (KPMG/DNV BOP Testing Data)	DNV2011061901
	R.Doc.1757, DNV-Disassembly of Solenoid 103 Replacement (Yellow Pod) dated 6-19-11, marked as Confidential and Privileged Attorney Client Communication; four pages	DNV2011061902
	BOP-033 Removal of the AMF-Deadman cards and tracing circuitry.pdf (KPMG/DNV BOP Testing Data)	DNV2011061904
	Bat Log6-19-11.xls (KPMG/DNV BOP Testing Data)	DNV2011061905
	Bat 11a.xls (KPMG/DNV BOP Testing Data)	DNV2011061906
	Bat 11a_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061907
	Bat 11a_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061908
	Bat 12.xls (KPMG/DNV BOP Testing Data)	DNV2011061909
	Bat 12_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061910
	Bat 12_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061911
	Bat 13.xls (KPMG/DNV BOP Testing Data)	DNV2011061912
	Bat 13_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061913
	Bat 13_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061914
	Bat 14.xls (KPMG/DNV BOP Testing Data)	DNV2011061915
	Bat 14_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061916
	Bat 14_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061917
	Bat 15.xls (KPMG/DNV BOP Testing Data)	DNV2011061918
	Bat 15_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061919
	Bat 15_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061920
	Bat 16.xls (KPMG/DNV BOP Testing Data)	DNV2011061921
	Bat 16_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061922
	Bat 16_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061923
	Bat 17.xls (KPMG/DNV BOP Testing Data)	DNV2011061924
	Bat 17_con-1.jpg (KPMG/DNV BOP Testing Data)	DNV2011061925
	Bat 17_con-2.jpg (KPMG/DNV BOP Testing Data)	DNV2011061926
	Solenoid Disassembly Measurements (KPMG/DNV BOP Testing Data)	DNV2011062001

Deposition Exhibit No.	Document Description	Bates Range
	BOP-035 Measure Resistance Across 5V Buses (KPMG/DNV BOP Testing Data)	DNV2011062002
	103Y Original Solenoid Disassembly (KPMG/DNV BOP Testing Data)	DNV2011062003
	BOP-036 Evaluation of Conformal Coating of Fuse Cards (KPMG/DNV BOP Testing Data)	DNV2011062004
	BOP-034 SEM Observations and Comparison (KPMG/DNV BOP Testing Data)	DNV2011062005
	STM2-YP-1_con-1 (KPMG/DNV BOP Testing Data)	DNV2011062105
	BOP-038 Capture of SEM Executables (KPMG/DNV BOP Testing Data)	DNV2011062110
	Battery Testing Summary (KPMG/DNV BOP Testing Data)	DNV2011062203
	Solenoid Testing Summary (KPMG/DNV BOP Testing Data)	DNV2011062204
	2011-07-14 Cameron Response Solenoid Measurements (KPMG/DNV BOP Testing Data)	DNV2011071401
	R. DOC. 1757 Comparison of 103-Y Original and Replacement Solenoid and 3A Solenoid	DNV201142101
	Laboratory Notebook No. 401	DNV-SUPPL000001 - DNV-SUPPL000107
	Laboratory Notebook No. 413	DNV-SUPPL000108 - DNV-SUPPL000181
	DEEPWATER HORIZON FORENSIC INVESTIGATION, COMPONENT IDENTIFICATION MATRIX - MARK II BLUE POD	DNV-SUPPL000182 - DNV-SUPPL000187
	Deepwater Horizon Forensic Investigation Component Identification Matrix – MARK II Yellow Pod	DNV-SUPPL-000188
	Test Preparation Sheet BOP- 003 BOP Solenoid drop out and pick voltage test	DNV-SUPPL-000316 - DNV-SUPPL-000326
	DEEPWATER HORIZON FORENSIC INVESTIGATION, COMPONENT IDENTIFICATION MATRIX - MARK II YELLOW POD	DNV-SUPPL000327 - DNV-SUPPL000332
	Nais relay dk1a1bl212v.pdf	http://datasheet. octopart.com/DK 1A1B-12V-Naisdatasheet-28923.pdf
	Moto PICC16C74 microcontroller.pdf	http://robertdick. org/eecs203/labs /30390e.pdf
	tech_1 System Overview.pdf	http://www.icdia. co.uk
	tech_2 Kernel.pdf	http://www.icdia. co.uk
	tech_3 Input Output System.pdf	http://www.icdia. co.uk
	tech_4 Interprocess Communications.pdf	http://www.icdia. co.uk
	tech_6 Math Module.pdf	http://www.icdia. co.uk
	tech_7 OS 9 File System.pdf	http://www.icdia. co.uk
	tech_a Example code.pdf	http://www.icdia. co.uk
	tech_a Sample Code.pdf	http://www.icdia. co.uk
	User Trap Handlers.pdf	http://www.icdia. co.uk

Deposition Exhibit No.	Document Description	Bates Range
	LM2671 -SIMPLE SWITCHER Power Converter High Efficiency 500mA Step-Down Voltage Regulator with Features.pdf	http://www.natio nal.com/pf/LM/L M2671.html
	RMS II Planned Maintenance by System Rig: Deepwater Horizon	MODUSI 01 0 033331 - MODUSI 01 0 035330
	Blue BOP MUX Control Pod (3/16/09 - 3/16/10)	MSU 03 0 001141 - MSU 03 0 001168
	Blue BOP MUX Cable (3/16/09 - 3/16/10)	MSU 03 0 001184 - MSU 03 0 001193
	Blue BOP MUX Cable Reel (3/16/09 - 3/16/10)	MSU 03 0 002823 - MSU 03 0 002832
	BOP Documents List	OSE591-002580
	Factory Acceptance Test Procedure for Subsea Electronic Module Doc No. X-065449-05	TRN-HCEC00001665 - TRN-HCEC00001671
	TO Holdings LLC, Graph	TRN-HCEC00001672 - TRN-HCEC00001674
	TO Holdings LLC, Graph	TRN-HCEC00001675 - TRN-HCEC00001677
	TO Holdings LLC, Graph	TRN-HCEC00001678
	TO Holdings LLC, Graph	TRN-HCEC00001679
	Factory Acceptance Test Procedure for Subsea Electronic Module Doc No. X-065449-05	TRN-HCEC00001770 - TRN-HCEC00001778
	RBS 8D -Multiplex BOP Controls System	TRN-HCEC00002062 - TRN-HCEC00002265
	RBS 8D -Multiplex BOP Controls System	TRN-HCEC00002266 - TRN-HCEC00002457
	Rig Book drawings of Driller panel	TRN-HCEC-00002288-89
	Rig Book drawings of Transoceanolpusher panel	TRN-HCEC-00002366-68
	RBS 8D -Multiplex BOP Controls System	TRN-HCEC00004365 - TRN-HCEC00004638
	Transocean Operations Policies and Procedures Manual Nov 1 2004	TRN-HCEC-00004639 - TRN-HCEC-00004726
	Cameron 087 Horizon 139 Volume 4	TRN-HCEC00007060 - TRN-HCEC00007367
	RBS 8D -Multiplex BOP Controls System	TRN-HCEC00007368 - TRN-HCEC00007782
	6087 Deepwater Horizon C-002 Maintenance Manual	TRN-HCEC00007821 - TRN-HCEC00008055
	Solenoid Valve Images	TRN-HCEC-00017701-02
	Equipment History & RMS - RMS II	TRN-HCEC-0003
	Daily Operation Report I	TRN-HCEC-00031874-32092
	RMS II Equipment list	TRN-HCEC-00034580 - 34588
	EMPAC Entries	TRN-HCEC-00049004; TRN-INV-00034258 - TRN-INV-00034259 ; TRN-INV-00034284; TRN-HCJ-00045618; TRN-INV-00034369; TRN-MDL-01506544

Deposition Exhibit No.	Document Description	Bates Range
	Empac Work Order No: 8706-001242-000 Pie Connectors 2/27/2006	TRN-HCEC-00053162
	Transocean's Letter Agreement for Conversion of VBR to a Test Ram - October 11, 2004	TRN-HCEC-00064131 - TRN-HCEC-00064132
	Transocean BOPP Entry	TRN-HCJ-00097790
	Transocean BOPP Entry	TRN-HCJ-00098008
	Transocean BOPP Entry	TRN-HCJ-00098078
	Comments Additional BOP Testing- 23 Mar 2011	TRN-INV- 03278903 - TRN-INV-03278904
	Cameron_Formal_Test_Procedure_Request_Draft9	TRN-INV- 2844223
	1. Final Interview Memo	TRN-INV00004601 - TRN-INV-00004613
	MultBOPCntrlSysJ-BoxVol6.pdf	TRN-INV00008117 - TRN-INV-00008235
	(Duplicate) PA-006024 Fuses in Subsea Architecture-RCB, RMJB, And SEM.pdf	TRN-INV00032076 - TRN-INV-00032110
	RMS Entries	TRN-INV-00034303; TRN-HCJ-00051837; TRN-MDL-00013666; TRN-MDL-00013670
	RMS II - Equipment History, Equipment: BOP Control POD, Tag: WCS BOPP 003, dated January 20, 2001 through May 20, 2010	TRN-INV-00034309 - TRN-INV-00034380
	RMS II - Equipment History, Equipment: WCS, dated January 01, 2005 through December 31, 2005	TRN-INV-00117273 - TRN-INV-00118144
	RMS II - Equipment History, Equipment: WCS, dated January 01, 2007 through December 31, 2007	TRN-INV-00118498 - TRN-INV-00119286
	TSF -Horizon SEM and Solenoid Valves Repair Quote 82604HOR.r1doc.doc	TRN-INV00580082 - TRN-INV-00580084
	Notes for Cameron Test Procedure.docx	TRN-INV00761768
	Notes for Sol Valve Test Procedure.docx	TRN-INV00792432
	TO III BOP Control Investigation Outline	TRN-INV00807645 - TRN-INV-00807652
	files.html	TRN-INV00835711
	structdp_slave__t.html	TRN-INV00835730
	structdp_slave__wt__t.html	TRN-INV00835731
	structglobal__t.html	TRN-INV00835732
	structglobal__tele__info__t.html	TRN-INV00835734
	structmem_board__t.html	TRN-INV00835735
	structmenuepkt__.html	TRN-INV00835736
	structpb__analog__t.html	TRN-INV00835738
	structpb__data__t.html	TRN-INV00835739
	structpb__diagnostic__t.html	TRN-INV00835740
	structpb__err__t.html	TRN-INV00835741
	structpb__valve__tab__t.html	TRN-INV00835742
	structrcv_strg__t.html	TRN-INV00835743
	structring_buffer__t.html	TRN-INV00835744

Deposition Exhibit No.	Document Description	Bates Range
	structsap11to14__rd__t.html	TRN-INV00835746
	structsap11to14__wt__t.html	TRN-INV00835747
	structsap15to18__rd__t.html	TRN-INV00835748
	structsap15to18__wt__t.html	TRN-INV00835749
	structsap19__wt__t.html	TRN-INV00835750
	structsap4__rd__t.html	TRN-INV00835751
	structsap4__wt__t.html	TRN-INV00835752
	structsap5__rd__t.html	TRN-INV00835756
	structsap5__wt__t.html	TRN-INV00835757
	structsap7to10__rd__t.html	TRN-INV00835758
	structsap7to10__wt__t.html	TRN-INV00835759
	structsubsea_task__t.html	TRN-INV00835760
	structta__analog__t.html	TRN-INV00835762
	structtele__err__t.html	TRN-INV00835763
	structtimeout__t.html	TRN-INV00835764
	structt__exit__to__os__t.html	TRN-INV00835765
	structt__valve__ana__t.html	TRN-INV00835766
	structt__valve__t.html	TRN-INV00835767
	structt__valve__tab__t.html	TRN-INV00835768
	structvicis_d_m__t.html	TRN-INV00835769
	struct_c_c___d_m.html	TRN-INV00835770
	struct_p_b_d8___b_o_a_r_d.html	TRN-INV00835771
	struct_p_b_d8___p_o_r_t.html	TRN-INV00835772
	struct_p_i_t68230.html	TRN-INV00835773
	struct_s_u_b_d_m_o_u_t.html	TRN-INV00835774
	struct_s_u_b_s_e_a___t_e_l_e.html	TRN-INV00835775
	struct_task_info__t.html	TRN-INV00835776
	struct_task__t.html	TRN-INV00835777
	struct_tele_head__t.html	TRN-INV00835778
	struct_tele__t.html	TRN-INV00835779
	tree.html	TRN-INV00835780
	union_tele_data__u.html	TRN-INV00835781
	_c_a_m___t_r_a_n_s__0000056__rcbtel_8c_source.html	TRN-INV00836008 - TRN-INV-00836018
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	_c_a_m___t_r_a_n_s__0000061__submain_8c_source.html	TRN-INV00836110 - TRN-INV-00836112
	_c_a_m___t_r_a_n_s__0000062__subpb1_8c_source.html	TRN-INV00836117 - TRN-INV-00836119

Deposition Exhibit No.	Document Description	Bates Range
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	_c_a_m___t_r_a_n_s__0000064__subtel_8c_source.html	TRN-INV00836132 - TRN-INV-00836134
	_c_a_m___t_r_a_n_s__0000065__tele_8c_source.html	TRN-INV00836142 - TRN-INV-00836144
	_c_a_m___t_r_a_n_s__0000066__tele_8h_source.html	TRN-INV00836145
	_c_a_m___t_r_a_n_s__0000067__vicis_defs_8h_source.html	TRN-INV00836150 - TRN-INV-00836152
	RMS II - Equipment History, Equipment: WCS, dated February 01, 2009 through May 01, 2010	TRN-INV-00837647 - TRN-INV-00838087
	Cameron BOP SEM Software Listing.doc	TRN-INV00882566 - TRN-INV-00882820
	TOI-DWH-9N9L27N-PS-01 with test conditions.doc	TRN-INV00892700 - TRN-INV-00892704
	RMS II - Equipment History, Equipment: WCS, dated January 01, 2008 through December 31, 2008	TRN-INV-00966889 - TRN-INV-00967354
	RMS II - Equipment History, Equipment: WCS, dated January 01, 2006 through December 31, 2006	TRN-INV-00967748 - TRN-INV-00969030
	Version No.25.pdf (What Testing of the AMF was completed on board the DWH?)	TRN-INV01028932
	Version No.25.pdf	TRN-INV01130032 - TRN-INV-01130041
	Updated SEM Schematics, 2010.pdf	TRN-INV01302552
	Email from Leach, Gary to Boughton, Geoff re FW: MUX Batteries	TRN-INV01747000 - TRN-INV-01747001
	26_BOP Controls Databook Vol 3.pdf	TRN-INV01806645 - TRN-INV-01807180
	DWH Proj 3936 DR #36.doc	TRN-INV01849271 - TRN-INV-01849282
	West Engg Solenoid Test Report	TRN-INV01849303 - TRN-INV-01849305
	AMF Card Price Quote	TRN-INV01850583 - TRN-INV-01850586
	Assembly and Test Procedure for Cameron Solenoid Valves, March 24, 2011	TRN-INV-01877450 - 1877478
	TOI-DWH-9N9L27N-PS-01.doc	TRN-INV02509564 - TRN-INV-02509567
	TOI-DWH-9N9N27L-PS-01.doc	TRN-INV02509570 - TRN-INV-02509573
	TOI-DWH-9N9N27N-BATT-01.doc	TRN-INV02509574 - TRN-INV-02509577
	SEM Test Report.03Nov10 -Test 4.doc	TRN-INV02546928 - TRN-INV-02546929
	Cameron BOP SEM Software Listing - Transocean Deepwater Horizon Investigation Team	TRN-INV-02551064 - TRN-INV-02551318
	Cameron_Formal_Test_Procedure_Request_Draft9	TRN-INV-02844222

Deposition Exhibit No.	Document Description	Bates Range
	Email from Walsh, Bob to Florence, Ewen re FW: E-0326-02 BOP Known Leaks Investigation Ticket Final.docx	TRN-INV-02846375
	Email from Maynard, Chance to Childs, Greg re RE: DWH Accumulator sizing	TRN-INV02848149 - TRN-INV-02848154
	AMF (Ryan McIntosh)2.docx	TRN-INV02855720 - TRN-INV-02855723
	AMF (Ryan McIntosh)2.docx	TRN-INV02855725 - TRN-INV-02855729
	Cameron Controls, Contents of the Manual, R&B Falcon Deepwater Horizon	TRN-INV02912451 - TRN-INV-02913105
	DNV Phase I Test Data; Dugal-Whitehead, N., Test Preparation Sheet – BOP Solenoid Drop Out and Pick Voltage Test, February 25, 2011	TRN-INV-03489816 – 3489826
	RMS II – Equipment History	TRN-MDL-00013581 - TRN-MDL-00014228
	BOP Control System Manual Vol. 1	TRN-MDL00049105 - TRN-MDL00049519
	Transocean Deepwater Nautilus and Horizon Training Manual	TRN-MDL00058902 - TRN-MDL00059199
	Cameron Controls, Subsea Electronic Module, Mark II Control Pod, SK-122178-14	TRN-MDL-00059516 - TRN-MDL-00059517
	Technical Position Paper	TRN-MDL00068473 - TRN-MDL00068820
	BOP Subsea Test	TRN-MDL00106420 - TRN-MDL00106431
	Well Control Handbook (Revision Date: March 31, 2009)	TRN-MDL-00286767 - TRN-MDL-00287162
	DAR Entry	TRN-MDL-00302458
	Email from Diaz to DWH re Solenoid repair	TRN-MDL-00304315
	Email from Guidry to Boughton, et al. re Subsea Daily Report, RGuidry, DW Horizon, 02-022-2010	TRN-MDL-00304461
	TO Subsea Support Team - Daily Report	TRN-MDL-00304462
	RCB Diagrams	TRN-MDL00304577 - TRN-MDL00304582
	Cameron Controls Diagrams	TRN-MDL00304715 - TRN-MDL00304761
	Email from DWH, SubSeaSup to DWH, Materials re Quote for Job # 106270	TRN-MDL-00304845
	Letter from Diaz to Hay re Solenoid Valves	TRN-MDL-00304846 - TRN-MDL-00304847
	Original Equipment Manufacturer/Technical Bulletin Approval Form Doc. Ref: Pa # 006024, Rev1	TRN-MDL00304902 - TRN-MDL00304936
	RCB Diagrams	TRN-MDL00308532 - TRN-MDL00308534
	Email from Fry to DWH, SubSeaSup re Transocean Horizon SEM	TRN-MDL-00310787 - TRN-MDL-00310789

Deposition Exhibit No.	Document Description	Bates Range
	Batteries	TRN-MDL00310821
	Event Logger readings	TRN-MDL00310861
	BOP Work History	TRN-MDL00322301
	Daily Report -Horizon -POD INTERVENTION rev 2.docx	TRN-MDL00494706 - TRN-MDL00494726
	Engineering/Technical Bulletin Approval Form	TRN-MDL00499091 - TRN-MDL00499109
	Email FW: Deck Test Procedure	TRN-MDL-00618951
	Cameron Controls Deck Test Procedure for Mark-II Control pods, Cameron P/N 2020708-21 Deepwater Horizon with handwritten notes dated May 4 2010	TRN-MDL-00618952 - TRN-MDL-00618973
	Cameron Controls pg. 6 of 22 re Cameron Deck Test procedure, handwritten notes	TRN-MDL-00618974
	Cameron Controls pg. 10 of 22 re Cameron Deck Test procedure, handwritten notes	TRN-MDL-00618975
	Single Unit Test Certificate for PBOF Cable Part 2185879-22-05	TRN-MDL-00618976
	Transocean Drilling Practices Course	TRN-MDL-00871267 - TRN-MDL-00871332
	RMS II – Equipment History	TRN-MDL-01134537 - TRN-MDL-01135583
	TO Instructions Solenoid Rebuilt	TRN-MDL01547899 - TRN-MDL01547905
	Response_to_USCG_Draft_Report[1].pdf	TRN-MDL01924241 - TRN-MDL01924244
	Status of the Single Line Drawing	TRN-MDL02788598
	Single_Line_Drawing.pdf	TRN-MDL02788599
	Single_line_Hydraulic_Flow_Drawing_Blind_Shear_Ram.p df	TRN-MDL02788950
	RE: Last time the AMF battery was changed?	TRN-MDL02789135
	subsea work book.xls	TRN-MDL02789136 - TRN-MDL02789305
	Last time the AMF battery was changed?	TRN-MDL02789431
	E-0326-02 BOP Known Leaks Investigation Ticket Final.docx	TRN-MDL02790260 - TRN-MDL02790265
	AMF_Single_lineC.PDF	TRN-MDL02790992
	TESTING PROCEDURE FOR SETTING AMF FUNCTION.doc	TRN-MDL02791346 - TRN-MDL02791349
	Proposed_BOP_Control_System_Testing_ctolleson.doc	TRN-MDL02792301 - TRN-MDL02792305
	Theory of operation for the DWH BOP Controls AMF.doc	TRN-MDL02793000 - TRN-MDL02793002
	Software_Changes_Documentation_ctolleson.xls	TRN-MDL02793004 - TRN-MDL02793006
	Email from Watson, Neil to Florence, Ewen re RE: AMF Deadman	TRN-MDL02799561 - TRN-MDL02799565

Deposition Exhibit No.	Document Description	Bates Range
	Email from Watson, Neil to Florence, Ewen re RE: AMF Deadman	TRN-MDL02799923 - TRN-MDL02799925
	Ron Guidry conversation 06 01 10.doc	TRN-MDL02799932 - TRN-MDL02799933
	Email from Watson, Neil to Florence, Ewen re RE: AMF Deadman	TRN-MDL02800172 - TRN-MDL02800173
	SK-122178-21-001 Model (1).pdf	TRN-MDL02800174
	SK-122178-21-06.pdf	TRN-MDL02800175
	SK-122220-01-001 Model (1).pdf	TRN-MDL02800176
	Email from Watson, Neil to Florence, Ewen re RE: AMF Deadman	TRN-MDL02800177 - TRN-MDL02800179
	Declaration of Robert Ewen Florence	TRN-MDL02800180 - TRN-MDL02800182
	Transocean DWH Investigation AMF Testing Guidance.doc	TRN-MDL02804902 - TRN-MDL02804903
	TOI-DWH-9N9L27N-PS-01 (2).doc	TRN-MDL02804904 - TRN-MDL02804907
	Email from Florence, Ewen to McIntosh, Ryan; Tolleson, Chris re FW: SEM Testing	TRN-MDL02804963 - TRN-MDL02804964
	SEM Test -03Nov10.doc	TRN-MDL02804965 - TRN-MDL02804974
	Email from Florence, Ewen to Tolleson, Chris re RE: RE: Fedex info	TRN-MDL02804982 - TRN-MDL02804987
	Email from Florence, Ewen to Murray, Ally; Tolleson, Chris re RE: Cameron system	TRN-MDL02805523 - TRN-MDL02805530
	BOP Control System and AMF Testing.pdf	TRN-MDL02805531 - TRN-MDL02805534
	Simulation DWH control on DWN equipment.docx	TRN-MDL02805566 - TRN-MDL02805567
	Email from Florence, Ewen to Childs, Greg re RE: BOP Leaks report	TRN-MDL02806089 - TRN-MDL02806090
	E-0326-R05_BOP Leaks (3B).docx	TRN-MDL02806091 - TRN-MDL02806097
	EDS Emergency Disconnect Activation General Considerations	TRN-UCSG_MMS 00013684
	EDS Well Control	TRN-UCSG_MMS 00013690
	EDS Well Testing	TRN-UCSG_MMS 00013700
	EDS Activation Report	TRN-UCSG_MMS 00013701
	EDS Procedure General	TRN-UCSG_MMS-00013690
	EDS Sequences	TRN-UCSG_MMS-00013695
	Transocean's Logs of Response	TRN-UCSG_MMS-00038807-TRN-UCSG_MMS-00038854
	Transocean's Amended Response to June 25, 2010 Subpoena	TRN-UCSG_MMS-00039812 - TRN-UCSG_MMS-00039813
	Cameron Controls, Stack Flow Diagram SK-122124-21-05	TRN-UCSG_MMS-00042585 - TRN-UCSG_MMS-00042590
	Power One LM3026 Power converter mac_6.pdf	www.powerone.com

Deposition Exhibit No.	Document Description	Bates Range
	Microwave OS-9 overview.pdf	www.radisys.com
	OS-9 Tech Manual V4.9.pdf	www.radisys.com
	Saft Lithium-manganese dioxide (Li-MnO2).pdf	www.saftbatteries.com
	Saft LM33550.pdf	www.saftbatteries.com
	Saft Selector Guide.pdf	www.saftbatteries.com
	API 16D_E2 2005 Control Sys Drill Well Equip.pdf	www.techstreet.com
	(KPMG22825) 06202011 AMF cards pics.docx (KPMG/DNV BOP Testing Data)	
	(KPMG22827) 06202011 Fuse Boards pics.docx (KPMG/DNV BOP Testing Data)	
	2011-08-26 Expert Report and Appendices of Gregg S. Perkin (PSC).PDF	
	2011-08-26 Expert Report of Dr. Rory R. Davis, PE (United States).PDF	
	2011-08-26 R. Davis Expert Report Supporting Materials	
	2011-09-23 Expert Report of Calvin Barnhill (Transocean).pdf	
	2011-09-23 Expert Report of Greg Childs (Transocean).pdf	
	2011-09-23 Expert Report of Jeff L. Wolfe (Transocean).pdf	
	2011-09-23 Expert Report of Robert M. Scates and John S. Robert - Rimkus Consulting Group (Transocean).pdf	
	20320.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20322.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20324.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20327.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20328.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20331.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20332.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	20357.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	20359.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21226.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21243.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	

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	21255.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21259.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21261.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21264.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21270.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21273.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21276.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21280.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21282.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21288.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21533.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21561.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21566.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21569.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21572.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21576.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21580.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21581.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21585.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	21590.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21593.JPG (KPMG SEM Disassembly Photos 2011-06-1415 - Batteries)	
	21630.JPG (KPMG SEM Disassembly Photos 2011-06-1415)	
	AMF Battery Pack photo	

Deposition Exhibit No.	Document Description	Bates Range
	ANSI/ISA - 84.00.01 - 2004 Part 1 (IEC 61511-1 Mod) Functional Safety: Safety Instrumented Systems for the process Industry Sector - Part 1: Framework, Definitions, System, Hardware and Software Requirements	
	ANSI/ISA - 84.00.01 - 2004 Part 2 (IEC 61511-2 Mod) Functional Safety: Safety Instrumented Systems for the process Industry Sector - Part 2: Guidelines for the Application of ANSI/ISA 84.00.01 - 2004 Part 1 (IEC 61511-1 Mod)	
	BOP 032 DNV Phase II Full Load Battery Test at Low Temperature	
	Cameron Circuit Diagram for the PETU with A+B Wiring	
	Cameron Drilling and Production Systems Performance through leadership Power Point Multiplex Electro-Hydraulic (MUK) BOP Drilling Control Systems	
	Cameron Field Performance Reports (FPR) List from Cameron website	
	Complete Horizon SEM Wiring Diagram with AMF-Relevant Portions Highlighted	
	Condition of AMF photo	
	Data Analysis Technologies Sample Analysis Certificate	
	Deepwater Horizon AMF Schematics and Wiring Diagrams	
	Deepwater Horizon Subsea Electronic Module Schematics and Wiring Diagrams	
	Deposition of Florence, Ewen dated Oct 5 2011	
	Deposition of Kent, James	
	Deposition of Thompson, Neil dated Jul 5 2011	
	Deposition transcript Kenney, Gary dated Jul 6 2011	
	Deposition transcript of Farr, Daniel dated Aug 24 2011	
	Deposition transcript of Farr, Daniel dated Aug 25 2011	
	Deposition transcript of Gaude, Ed dated Sep 19 2011	
	Deposition transcript of LeNormand, William dated Jun 20 2011	
	Deposition transcript of LeNormand, William dated Jun 21 2011	
	DNV data & photos (KPMG/DNV BOP Testing Data)	
	DNV Flow and Force Calculations-Odmund	
	DNV Image 23117	
	DNV Image 7837	
	DNV Image 7853	
	DNV Image 7919	
	DNV Phase I Data	
	DNV Phase II Data	

Deposition Exhibit No.	Document Description	Bates Range
	DNV Phase II Files (KPMG/DNV BOP Testing Data)	
	DNV replacement solenoid	
	DNV Report Volume 1	
	DNV2011061705 -BOP-bP-O11.xls (KPMG/DNV BOP Testing Data)	
	DNV2011061706 -BOP-bP-O11_con-1.jpg (KPMG/DNV BOP Testing Data)	
	DNV2011061707 -BOP-bP-O11_con-2.jpg (KPMG/DNV BOP Testing Data)	
	DNV2011061903 -BOP-030 Full Load Battery Test with SEM batteries.pdf (KPMG/DNV BOP Testing Data)	
	Executed Protective Order -Art Zatarain	
	Exhibit 3103 (Lab Notebook)	
	Exhibits and Deposition Transcripts of Erwin, Carter	
	Exhibits and Deposition Transcripts of Ambrose, Billy	
	Exhibits and Deposition Transcripts of Boughton, Geoff	
	Exhibits and Deposition Transcripts of Hay, Mark David	
	Exhibits and Deposition Transcripts of Kenney, Gary	
	Exhibits and Deposition Transcripts of McWhorter, David	
	Exhibits and Deposition Transcripts of McWhorter, Jim	
	Exhibits and Deposition Transcripts of Pleasant, Chris	
	Exhibits and Deposition Transcripts of Stringfellow, William	
	Exhibits and Deposition Transcripts of Whitby, Melvin	
	Expert Report of David O'Donnell Oct 17 2011	
	Expert Report of Knighthawk Engineering Oct 17 2011	
	Expert Report of Arthur Zatarain Oct 17 2011	
	Expert Report of Paul Dias Oct 17 2011	
	Expert Report of Stevick Oct 17 2011	
	Flow and Force Calculations (excel)	
	Horizon AMF and SEM Selected Wiring Diagrams	
	Horizon AMF Wiring Diagram with Important Components Highlighted	
	Hydraulic Analysis of Macondo #252 Well Prior to Incident of April 20, 2010 Rev. 1 SES Document No.:1101190-ST-RP-0002 Apr 27 2011 pg. 131 of Stress Engineering Report	
	IMG_0444.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0445.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0446.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0447.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0448.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0449.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0450.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0451.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0452.JPG (KPMG/DNV BOP Testing Data)	

Deposition Exhibit No.	Document Description	Bates Range
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	IMG_0454.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0455.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0456.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0457.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0458.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0459.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0460.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0461.JPG (KPMG/DNV BOP Testing Data)	
	IMG_0462.JPG (KPMG/DNV BOP Testing Data)	
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	IMG_1551.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1552.JPG (KPMG/DNV BOP Testing Data)	
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	IMG_1557.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1558.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1559.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1560.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1561.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1562.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1563.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1564.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1565.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1566.JPG (KPMG/DNV BOP Testing Data)	
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	IMG_1568.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1569.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1570.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1571.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1572.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1573.JPG (KPMG/DNV BOP Testing Data)	
	IMG_1574.JPG (KPMG/DNV BOP Testing Data)	
	Joint United States Coast Guard/Bureau of Ocean Energy Management Testimony	
	Joint United States Coast Guard/Bureau of Ocean Energy Management USCG-MMS Investigation Report Vol I	
	Joint United States Coast Guard/Bureau of Ocean Energy Management USCG-MMS Investigation Report Vol II	
	Key Dates of the Saft Group Internet Page	
	KPMG SEM Disassembly Photos 2011-06-14-15	
	Lab Notebook	
	Lab Notebook 06172011.pdf (KPMG/DNV BOP Testing Data)	
	Lab Notebook 06182011.pdf (KPMG/DNV BOP Testing Data)	
	Lab Notebook 06192011.pdf (KPMG/DNV BOP Testing Data)	
	Lab Notebook 06202011 (KPMG/DNV BOP Testing Data)	
	Lab Notebook 06212011 (KPMG/DNV BOP Testing Data)	
	Lab Notebook 06222011 (KPMG/DNV BOP Testing Data)	
	March 25, 2010 Order: Access to BOP	
	Materials Notebook 06172011.pdf (KPMG/DNV BOP Testing Data)	
	Perkin Rpt Matls, File Folder of Appendix M and End notes	

Deposition Exhibit No.	Document Description	Bates Range
	Pride Quality Management Manual dated Oct 1 2009; page 29 of 36, Cameron Solenoid Valve, 223290-63, Assembly and Test	
	Product Engineering Part Report	
	Questions from James McAdams	
	Saft LM 33600 Data Sheet	
	SEM Notebook 06172011.pdf (KPMG/DNV BOP Testing Data)	
	SEM Notebook 06182011.pdf (KPMG/DNV BOP Testing Data)	
	SEM Notebook 06192011.pdf (KPMG/DNV BOP Testing Data)	
	SEM Notebook 06202011 (KPMG/DNV BOP Testing Data)	
	SEM Notebook 06212011 (KPMG/DNV BOP Testing Data)	
	SEM Notebook 06222011 (KPMG/DNV BOP Testing Data)	
	SEM Pie Plug	
	Testing Notes from Transocean Internal Investigation, August 4-6, 2011	
	Thermal Expansion Calculations	
	Transcript of Testimony of The Joint United States Coast Guard/Bureau of Ocean Energy Management 4/4/11	
	Transcript of Testimony of The Joint United States Coast Guard/Bureau of Ocean Energy Management 4/8/11	
	Transcript of the Testimony of the Joint United States Coast Guard/Bureau of Ocean Energy Management Investigation Excerpt 5-28-10 Chris Pleasant	
	Transcript of the Testimony of the Joint United States Coast Guard/Bureau of Ocean Energy Management Investigation Excerpt 8-25-10 Billy Dean Stringfellow	
	Transcript of the Testimony of the Joint United States Coast Guard/Bureau of Ocean Energy Management Investigation Excerpt 8-25-10 Mark David Hay	
	Transocean Report Supporting Materials	