DET NORSKE VERITAS

Final Report
for
UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF OCEAN ENERGY MANAGEMENT,
REGULATION, AND ENFORCEMENT
WASHINGTON, DC 20240

FORENSIC EXAMINATION OF DEEPWATER HORIZON BLOWOUT PREVENTER

CONTRACT AWARD NO. M10PX00335

VOLUME II APPENDICES

Report No. EP030842
20 March 2011

TABLE OF CONTENTS – VOLUME I

TABLE OF CONTENTS – VOLUME II

APPENDIX A

FORENSIC TESTING PLAN
[OCTOBER 22, 2010]

PROTOCOL FOR METALLURGICAL EXAMINATION AND TESTING OF DRILL PIPE
[February 3, 2011]

TEST PROCEDURE - FRACTURED/SHEARED RECOVERED DRILL PIPE ENDS VISUAL EXAMINATION OF BLOWOUT PREVENTER RAM BLOCKS
[February 16, 2011]

DET NORSKE VERITAS

Forensic Testing Plan

for the

Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package

Ref – M10PS00234

Joint Investigation Team of the
United States Department of the Interior
and the
United States Department of Homeland Security

Bureau of Ocean Energy Management, Regulation and Enforcement

DNV Reg. No.: ANEUS815NTHO (1-2SC2OV)

PRIVILEGED & CONFIDENTIAL
CLIENT - ATTORNEY WORK PRODUCT

October 22, 2010

Title: Proposed Forensic Investigation Test Plan of the Blowout Preventer and the Lower Marine Riser Package		DNV COLUMBUS, INC. Materials & Corrosion Technology Center 5777 Frantz Road Dublin, OH 43017-1386 United States Tel: (614) 761-1214 Fax: (614) 761-1633 http://www.dnv.com http://www.dnvcolumbus.com
Customer:	United States Department of Interior – Bureau of Ocean Energy Management, Regulation and Enforcement	
Customer Address:	381 Elden Street Herndon, VA 20170-4879	
Customer Reference:	1-2SC2OV	
Contact Person:	Olivia Adrian and Warren Williamson	
DNV Reference:	ANEUS815NTHO	
Date of Issue:		
Terms and Conditions:		
Prepared by/Contact Person: Gary Kenney, Ph.D.	*Position:* Lead Investigator	*Signature:*
Reviewed by: Phillip Nidd	*Position:* Deputy Project Manager	*Signature:*
Approved by: Neil Thompson, Ph.D.	*Position:* Project Manager	*Signature:*

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 General Site Preparations

Following recovery from the Macondo Well, and initial preservation efforts undertaken on the barge Q-4000, the Blowout Preventer (BOP) and Lower Marine Riser Package (LMRP) were transported by barge to NASA's Michoud Assembly Facility in New Orleans, LA. The two assemblies arrived at the Michoud facility on September 11, 2010 and were secured aboard a transport barge tied to the Michoud Assembly's West Dock.

Infrastructure necessary to secure the BOP and LMRP at the Michoud Assembly facility's West Dock was completed and the two packages were moved from the barge and placed on two separate test stands on the West Dock on October 3, 2010. The current plans are to construct an enclosure to shelter them from the elements. The schedule for erecting the enclosure will be integrated into the schedule for the forensic investigations.

The proposed Forensic Testing Plan integrates with a number of other activities and or plans under development. These include:

- A Safety and Health Plan to assure the safety and health of individuals performing the actual tests as well as any personnel or visitors within the proximity of the test site.
- A Spill Containment Plan to protect the surrounding environment from any unintentional releases of fluids or materials into the environment that might result from any of the actual investigations or tests that are planned.
- A Hurricane Plan to secure and prevent the two Units from being damaged in the event of a hurricane.
- A Lifting Plan or plans to cover the major lifts that might be required as part of the investigations and tests.

These plans will be appended to the Forensic Testing Plan as they become available.

1.2 Proposed Forensic Testing Plan

As part of its forensic investigations, DNV is required to provide to the Joint Investigation Team (JIT) a proposed Forensic Testing Plan for completing various tests as part of identifying potential contributing factors that might have prevented the BOP Stack as a whole (i.e. both the BOP and the LMRP) from functioning as expected when the incident (blowout associated with the Deepwater Horizon drilling rig failure) occurred. This document is that proposed plan.

2 OBJECTIVES

The Joint Investigation Team's Request for Proposal (JIT-RFP) stated the following objectives for the testing and analysis of the BOP system:

The objectives of the proposed investigation are to determine the performance of the BOP system during the well control event, any failures that may have occurred, the sequence of events leading to failure(s) of the BOP and the effects, if any, of a series of modifications to the BOP Stack that BP and Transocean officials implemented. As part of the foregoing task, the examination is to determine:

- *If the leaks on the BOP were critical to the non-performance during the blowout and during the ROV intervention attempts.*
- *If any modification(s) made to the control logic and stack inhibited the performance.*
- *If any other relevant factor, including but not limited to manufacturing defects, deferral of necessary repairs affecting functionality, and maintenance history contributed to the BOP's failure to operate as intended.*

In support of those objectives the proposed Forensic Testing Plan will:

- Outline the process for establishing and documenting the condition of the various components and, to the extent possible, identify the state of those components pre- and post-incident.
    - To identify the serial number(s), part numbers or other identification markings and the functionality of various components fitted to the BOP Stack.
    - To identify and establish, to the extent possible, the functionality of various components fitted to the BOP Stack.
    - To identify and characterize degradation, damage, and anomalies of the BOP Stack components.
- Outline the process for establishing the basic functionality of the BOP Stack and whether, at the time of the incident, the BOP Stack functioned in accordance with its intended design.
    - To the extent possible, establish the functionality of the BOP Stack pre and post the actual incident.
    - Where it does not function in accordance with its design, identify the physical cause(s) and contributory factors that led to any failures.
- Evaluate the functionality of the control systems for the BOP Stack. This includes, to the extent possible, the control systems that would have been located on the Deepwater Horizon semi-submersible and those on the BOP Stack itself and interconnections between the two.
- Characterize the state of the wellbores of the BOP and LMRP and to protect and characterize the condition of any drill pipe, materials or 'fish' found within the central cavity of the BOP and LMRP.

- Include in the testing plan, necessary items to establish the effect that other relevant factors may have contributed to the BOP not operating as intended, including;
  - Design.
  - Manufacturing defects.
  - Deferral of necessary repairs.
  - Maintenance history.
  - Ejection of cement.
  - Formation fluids.
  - Drilling solids or fluids.
  - Other material from the well through the BOP during the blowout.

3 CONSTRAINTS AND PRECONDITIONS

There are several constraints and pre-conditions that complicate or establish limits on achieving the overall goals of this forensic investigation. These are discussed below.

Immediately following the incident, various interventions were undertaken using Remote Operated Vehicles (ROVs) to try and function various components on the overall assembly; most notably, to try and function the Blind Shear Ram located on the BOP. It is understood that various control components located on the two control pods to the BOP Stack were replaced as part of those interventions and are stored within the Michoud facility. In addition, it is understood that not all of the original control components have been recovered. Therefore, it may not be possible to recreate the exact controls that were in place prior to the incident.

The control system located on the Deepwater Horizon itself and key documents and drawings including as built drawings and management of change (MOC) documents that describe modifications made from time of initial commissioning in year 2001 were lost following the explosions, fires and eventual sinking of the semi-submersible unit. As a result a substitute control system will have to be used when testing or functioning various components as well as the stack as a whole. This required approach confounds the ability to recreate the exact situation that existed pre-incident and prevents any contribution to the functioning (or non-functioning) of the BOP Stack related to these control systems to be determined. Not having a complete set of as-built drawings complicates the process of recreating the BOP Stack to the condition that existed pre-incident. DNV understands that some, if not all, of the required documentation of the pre-incident design of the DWH-BOP may exist and will request this from appropriate parties.

Pre-incident conditions can be arrived at by two methods: (1) a process of working backwards from the current condition through all interventions in order to recreate the pre-incident condition and (2) development of as-built drawings recreated as based upon a review of original design drawings, available records relating to modifications and maintenance, and pre-incident and initial ROV footage prior to intervention. In this case, integrating the two approaches should enhance the ability to derive the pre-incident condition.

Following the incident various components of the BOP Stack were subjected to the flow of the well fluids escaping from the well until a 'top kill' of the well was completed. DNV understands these flows may have impacted certain parts of the overall BOP Stack. However, at the time of the writing of this plan, DNV has not had the opportunity to verify or assess the extent of such possible damage. As a result it may be necessary to replace certain components on the BOP Stack in order to complete the functional testing of the full BOP Stack. This required replacement of components could be viewed as another factor that must be considered when undertaking the assessment of the state or functionality of the various components, pre-incident versus post-incident.

On recovery of the BOP Stack certain agreed upon actions were taken after the Stack was brought to the surface to preserve and protect various components from degrading on being exposed to air, sun, temperatures and other environmental factors. As a result the condition of various components especially certain components on the BOP section of the Stack may not be reflective of their state pre or even post intervention.

Prior to and continuing concurrent with the Forensic Testing Plan of the BOP, a detailed log is being prepared of all actions undertaken with respect to the BOP during post-incident intervention, top kill efforts, recovery and repair of the BOP control systems, and recovery and preservation of the BOP itself. This log will be used to help determine the pre-incident, post-incident, and as-recovered status of the BOP components.

DNV is aware that the wellbores or central cavities of both the BOP and the LMRP may contain materials or drill pipe that could prove key to the overall investigation into this incident. It is possible that functioning of certain parts of the BOP and LMRP might cause that material to be damaged. Therefore, the sequencing of certain inspections, investigations, and tests will be driven by the priority to retrieve those materials prior to continuing with the function testing. Further, the efforts to recover this evidence could require parts of the BOP and LMRP to undergo some level of disassembly before any function testing is actually undertaken or as the function testing progresses.

As noted above, preservation procedures were planned upon recovery of the BOP Stack to the surface. Not all those planned procedures were completed on the Q-4000 recovery vessel. [1] Since arrival at the Michoud facility, the essential elements of those procedures, notably the flushing of the Yellow and Blue Control Pods that are fitted to the LMRP were performed.

Another constraint and precondition is the fact that debris fell out of the BOP Stack when it was released from the wellhead and pulled to surface. The inability to know what this debris was and where it was located in the BOP prior to falling downhole or to the seafloor is a factor that must be considered when assessing the state or functionality of the BOP Stack pre or post-incident.

[1] DNV, Blowout Preventer Preservation Effort Event Log and Observations, BOEMRE, Sept. 26,2010.

DNV recognizes that these preconditions must be considered as it conducts its investigations. To the extent possible, DNV will make all reasonable effort to factor them into both the testing program as well as into any findings or conclusions that will derive out of its investigations.

4 SCOPE

The scope of this proposed Forensic Testing Plan includes the following:

- Perform and manage the investigations and tests of the BOP Stack and its components as provided in the Forensic Testing Plan.
- Document and record those investigations and tests and all related and supporting steps and procedures, including the video recording of the examination in its entirety.
- Conform to the protocols established by the JIT for the proper custody and documentation of chain of custody of the BOP Stack and its components.
- Conform to the protocols established by the JIT for the proper protection and preservation of the evidence and, to avoid destructive testing without approval from the JIT unless otherwise provided in the approved Forensic Testing Plan.

5 TEST PROTOCOL

The BOP and LMRP can be viewed as being comprised of three major systems or assemblies:

- An electronic and electrical control system that sends and receives commands to the BOP Stack to initiate or undertake various actions.
- A hydraulic system that ‘translates’ these electronic signals into a form of mechanical energy as part of executing those commands.
- A series of mechanical components such as the ram blocks, ram and annular elastomeric elements, and their related actuators completing the execution of a certain action(s) or command(s).

To meet the above objectives established for this forensic investigation, the condition of each of the above systems will be investigated. The summarized plan below and the detailed plan provided in the remainder of this document outline the planned test activities. In addition, DNV will consult with the members of the Technical Working Group on a regular basis to develop individual testing procedures, as necessary, for specific activities as the forensic investigation work progresses. The following summarizes the overall approach of the Forensic Testing Plan.

1. Adhere to all safety health, and environmental (SHE) practices and procedures as established by DNV Safety Manual and for work conducted on the Michoud NASA Facility.
2. Maintain security and limit site access during investigation.
3. At each stage in the investigation perform the following.

   a. Video record all testing and provide photographic evidence where appropriate.
   b. Examine the condition of each component and characterize any damage, anomalies, or deterioration.
   c. Collect any evidence that could possibly impact present or future examinations.
4. A visual examination of the exterior and the interior well bores of the BOP Stack, the LMRP and the two Control Pods.
5. Prior to function testing the lower section BOP rams or the LMRP annulars, secure and remove the drill pipe and any other materials or 'fish' that are currently trapped or are contained within the wellbores to prevent them from being damaged.
6. As part of securing and removing the trapped materials (including drill pipe) from the well bores determine the state of the ram blocks and annulars. Any ram blocks and the annulars in the closed or partially closed position will be retracted during visual examination of the wellbore and removal of the trapped material.
7. Perform a static pressure-leak integrity test of the hydraulic circuits (hoses, piping, valves, actuators) of the BOP Stack, LMRP and ROV Panels.
8. Function test the lower section of the BOP Stack containing the rams.
   a. Hydraulic supply will be connected via the Control Pod Stinger Receptacle for the BOP Stack using an interface tool to function the open or retract cycle of each of the five rams. The tests would start with the Upper Blind Shear Rams (the top most rams), then the Casing Shear Rams and on 'down' the BOP finishing with the Test Rams at the bottom of the BOP.
   b. As each set of rams is opened or retracted, visually examine and record their condition.
   c. It is possible that one or more sets of rams will not function when hydraulic pressure is applied. Where this happens some level of disassembly of that set of rams may be required in order to retract or open them as well as to identify the factors that prevented the ram(s) from opening.
   d. Reassemble the rams where necessary and in a manner that reflects their pre-incident condition, to the extent possible.
   e. Provision will have to be made to restrain, capture and recover any drill pipe(s) or other materials that remain within the well bore of the BOP or are wedged within any of the rams.
   f. The process will be reversed and function to close will be executed for all five sets of rams.
   g. The functionality of the open and close shuttle valves on the BOP Stack (i.e. the next level of control in the ram assemblies) will be tested and their performance recorded.
9. Apply the same general approach to the functioning of the upper and lower annulars on the LMRP.
   a. Hydraulic supply will be connected via the Control Pod Stinger Receptacle for the LMRP using an interface tool to open or retract the annulars starting with the upper annular.
   b. Make provision to capture any materials that reside or are trapped in the well bore of the LMRP.

c. Where necessary reassemble the annulars to reflect their pre-incident condition.
d. Reverse the process and function test to close both annulars.
e. The functionality of the open and close shuttle valves on the annulars (i.e. the next level of control in the annular assemblies) will be tested and their performance recorded.

10. Inspect the condition of ram and annular components.
11. Examine the condition of the stack mounted accumulators including determining existing pre-charges and the accumulators ability to hold proper nitrogen and hydraulic charges. (Note numbers, positions, and function use of all Stack accumulators).
12. Examine the state of the two Control Pods (e.g. check for shorts in the electrical systems, condition of connections, identify any and all changes made to the two Control Pods during the ROV Interventions, etc.).
13. Test the functioning of the components of the Control Pods in their as retrieved state.
14. To the extent possible reinstate the components on the two Control Pods to their pre-incident condition.
15. To the extent possible, recreate the surface control assembly as existed on the Deepwater Horizon pre-incident.
16. To the extent possible, reassemble the BOP and the LMRP and function the various components in the pre-incident condition.

5.1 Safety, Health, and Environmental

This protocol for BOP Stack investigation will be conducted in accordance with all relevant health, safety and environmental practices as required by NASA and by the DNV Columbus Health, Safety, and Environmental Manual. The goal of the Safety Manual is to prevent accidents and personal injury by promoting safety awareness and providing reference and instructions whereby personnel may acquire and adhere to safe work practices in the office, laboratory, and in field operations at a client's jobsite. The Safety Manual addresses requirements that are outlined in the Occupational Safety and Health Act (OSHA) of 1970 that pertains to both general and construction industry standards as given in the Code of Federal Regulations (CFR) Parts 1910 and 1926, respectively.

In addition to the standard policy manuals, site specific plans for safety, spill containment and hurricane emergency are provided. A site specific Safety and Health Plan to assure the safety and health of individuals performing the actual tests as well as any personnel or visitors within the proximity of the test site will be developed and may be made available as needed. A Spill Containment Plan to protect the surrounding environment from any unintentional releases of fluids or materials into the environment that might result from any of the actual investigations or tests that are planned will be developed and may be made available as needed. An emergency plan for the threat of a hurricane will be developed and may be made available as needed.

A cornerstone on the SHE plans will be the daily Tailgate Safety Meeting that involves the following activities.

1. Each morning (daily) prior to entering the test site, all personnel that will be working on-site will meet for a discussion of the day's activities and a review of all safety, health, and environmental issues; especially addressing any hazards that are present or that may develop. Job responsibilities and emergency procedures will be discussed.
2. This meeting will be conducted by the DNV on-site Team Lead.
3. A check list will be developed and everyone will sign-off indicating their participation. Any personnel who missed the day's Tailgate Safety Meeting must first go through a review of the meeting and sign-off that they understand the activities being performed and understand any special SHE concerns prior to entering the test site.

5.2 Evidence Collection and Control

Evidence can be in the form of items removed from the wellbore of the BOP and LMRP, components removed from the BOP and LMRP during the investigation, or samples collected in the form of scrapings, particles, scale, coating samples, liquids, etc. All evidence will be handled in accordance with the following ASTM Standard procedures.

- ASTM E860 - 07 Standard Practice for Examining And Preparing Items That Are Or May Become Involved In Criminal or Civil Litigation.
- ASTM E1188 - 05 Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator.
- ASTM E1459 - 92(2005) Standard Guide for Physical Evidence Labeling and Related Documentation.
- ASTM E1492 - 05 Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory.

US Coast Guard personnel will take possession of the evidence for secure storage and are the Primary Evidence Controller. The USCG will work closely with the DNV Project Team personnel (Primary Investigation Lead) who will direct the investigation and make decisions on the samples and other evidence to be collected. The Deepwater Horizon Criminal Investigation Team (DHCIT) agents and FBI Evidence Response Team (ERT) (Secondary Evidence Controller) will record and document all evidence, tests, and investigations.

The DHCIT and the EPA National Environmental Investigations Center (NEIC) will provide the primary support for all fluid samples collected during the Investigation. The US Coast Guard personnel will take initial custody of the fluid samples and they will be handled in a similar manner as all other evidence. The custody of the fluid samples will be transferred from the Coast Guard control to the EPA NEIC for analysis. In this manner all fluid samples will be analyzed in a similar manner for the entire project.

The following procedures provide an outline of the working relationships among the principals; detailed practices for evidence collection and control will be in accordance with ERT standard practice.

4. Samples collected or other evidence gathered under the supervision of DNV Project Team personnel (Primary Investigation Lead) will be provided directly to the US Coast Guard (Primary Evidence Controller) or representative for evidence logging and Chain of Custody documentation. The FBI ERT will document or log all evidence retrieved. The samples or other evidence will be transferred from the Coast Guard personnel (Primary Evidence Controller) and transported from the field location to the evidence designated storage facility. The samples and other evidence shall remain in storage until further examination, preservation, or transfer of the evidence is undertaken. The evidence shall be kept under the secure control of the Coast Guard during the storage period.
   a. Label the samples at the scene with the following:
      i. Incident ID.
      ii. Date & time of collection.
      iii. Location and orientation where evidence was removed.
      iv. Name of the investigator.
      v. Evidence tracking number.
   b. The sample tracking number should be unique to that individual sample.
   c. All sample information above should be written in the field notebook and later entered into the electronic database.
5. The Primary Evidence Controller shall complete a CHAIN OF CUSTODY FORM; the purpose of which is to describe the evidence and exercise signature control over the transfer and custody of evidence to other facilities or Secondary Evidence Controllers during the evidence testing process. The CHAIN OF CUSTODY FORM is to be completed for each subsequent custody transfer of evidence. No evidence will be destroyed or disposed of without the written consent of the JIT.
6. When transferring evidence and evidence ownership to outside parties, the Primary Evidence Controller will complete the appropriate portion of the approved CHAIN OF CUSTODY FORM. The purpose of which is to describe the evidence under transfer, the name of the outside party and the date of evidence release to the outside party. The Primary or Secondary Evidence Controller shall obtain digital photographs of the evidence prior to release to an outside party. Whenever evidence is being transferred from one location to another, or between Evidence Controllers, all samples or other physical evidence will be photographed in “as is” condition going into shipping containers and once evidence arrives at its new location it will be photographed in “as received” condition. No evidence will be packaged and shipped or received without a complete CHAIN OF CUSTODY FORM that is completely and properly filled out.
7. Upon receipt of the evidence, the outside party will complete and return to the Primary or Secondary Evidence Controller the appropriate portion of the approved CHAIN OF CUSTODY FORM, the purpose of which is to provide a detailed summary of evidence received and signatory confirmation of evidence receipt. At completion of outside party testing, the appropriate portion of the approved CHAIN OF CUSTODY FORM will be completed by the outside party and returned to the attention of the Primary or Secondary Evidence Controller.

5.3 Video and Photo Documentation

The forensic investigation as described in this document will be video and photo documented. This documentation will be performed from multiple angles and will include close-up documentation where details of specific activities or of specific component conditions dictate the need. The overall responsibility for video and photo documentation and the decisions to provide detail documentation of any specific investigation activity will be the responsibility of the DNV Project Team personnel.

Video documentation will be accomplished through two groups: (1) J.A.M. Video Productions and (2) FBI ERT video team.

J.A.M will be using Sony A390 Digital Single Lens Reflex cameras with an aspect ratio of 3:2 and a density of 14 Megapixels per photograph. Each picture will be recorded in a compressed jpg format in addition to a 'raw' uncompressed format.

A variety of video cameras will be used. A Sony DSR 570 will be used with an aspect ratio of 16:9 and recording in High Aspect Definition. Other cameras of various sizes will be required and used for examination and recording of information in areas such as the well-bore. The need for lighting and enhancement of the lighting conditions will be assessed and the lighting adjusted accordingly as each activity progresses.

8. During the morning toolbox meeting, the testing schedule will be reviewed and the video and photo documentation plan for the day will established for the two video teams. In addition to the video teams, individual investigators on the DNV Project Team may provide photo documentation of activities on which they are working.
9. All video and photo documentation will be logged on a daily basis. Any photo documentation collected outside of the two teams listed above will be stored and secured in the DNV site office.

5.4 Site Access and Information Control

Site security and access to the BOP Stack Forensic Test Site will be controlled on a multi-level basis. The Cost Guard representative will approve the final security levels. The following is a draft of the Security Levels. Level 1 includes the primary security area that is controlled by a fence and entry is through a security gate. All persons entering the site must enter through Level 1. Persons entering Level 1 must be on an approved entry list. Persons not on that list are allowed on an escorted basis only and then only by approved escorts. Everyone enters into Level 1, but only certain persons will have access to Levels 2 and 3. Level 1 is primarily for deliveries, workers not involved in the actual testing but require site access, etc.

Level 2 is a designated area for observers for the forensic testing. This will permit observers to witness the testing at a distance and from a restricted area only.

Level 3 is the primary test area and limited to necessary personnel only. The necessary personnel will include the following.

- DNV Project Team personnel.
- ERT FBI Primary Evidence Control Team.
- ERT FBI Video Documentation Team
- EPA Fluid Collection Team.
- Coast Guard Secondary Evidence Control Team.
- JIT representatives.
- Interested Parties Technical Working Group.

Personnel in the above list have been defined elsewhere except for the Interested Parties Technical Working Group (TWG). The Interested Parties Working Group will be made up of technical representatives from interested parties. The group will consist of a representative from Transocean, BP, Cameron, and two additional technical representatives from the remaining interested parties. This working group will be allowed free access to the primary test area, but are limited to observing and technical discussions with the DNV Project Team personnel. The Technical Working Group is a fixed group of members and the individual representatives are not to be rotated on a regular basis. One alternate representative for each position can be designated, but only one representative is allowed into the primary test area on any given day and that representative must be available at the morning Tailgate meeting. Technical Working Group members will be permitted to substitute individuals for the purpose of providing individuals with the specific expertise required depending on the work being performed. For example, the pressure containment and electrical control systems have different areas of competence required.

5.5 Investigative Process

The investigative process is an iterative process that integrates the BOP and LMRP function testing, evidences collection, preservation of evidence (especially the drill pipe (fish) contained in the wellbores of the BOP and LMRP), materials examination and damage assessment, and video and photo documentation. In addition, as the process proceeds, the findings may dictate the sequence of steps required to balance the processes listed above. Therefore, these protocols are meant to provide a basis for the overall forensic investigation for examining the BOP Stack components. These protocols are not meant to be a step-by-step procedure, but provide more of a roadmap with multiple paths to meeting the objectives. Any procedures that are outside of the expected paths outlined in these protocols will be submitted for approval to the JIT prior to proceeding.

It is expected that more detailed procedures may be required on certain elements (Steps) of the protocols described herein. These detailed procedures for any Protocol Step will be developed in conjunction with the DNV Project Team and the Working Group. In addition, detailed procedures to accomplish each Protocol Step will be documented through notes, photography, and videography.

5.6 Visual Examination of the BOP and LMRP

5.6.1 General

A visual examination will be performed of the external and internal surfaces of both the BOP and the LMRP as they were received at the Michoud facility in New Orleans, LA. These examinations will be both photo and video documented.

The purpose of these examinations will be to:

- Identify and record any visible damage to the major elements and various components that comprise the two packages.
- Identify and record any variations between the design of the BOP and LMRP as received at the Michoud facility and the original design of the two packages as per various Cameron drawings.
- Record all externally visible serial / identification numbers on all external components of the BOP and LMRP.
- Identify and record the contents or materials that are located within the wellbore or central cavities of the BOP and the LMRP.
- Extract the materials (including drill pipe) located within the wellbore or central cavities of the BOP and the LMRP.
- Assist with planning the sequence of some of the subsequent inspections or tests that will be completed as part of its forensic investigations.

5.6.2 Visual Examination of the External Surfaces

5.6.2.1 Preparation of the External Surfaces for visual examinations

BP issued a series of Recovery Procedures for the retrieval of the BOP and LMRP from the seafloor for which Transocean provided the BOP preservation procedures.[2] Standard decontamination and initial preservation procedures that included washing the exterior surfaces of the two packages after they were landed on the Q-4000 were completed. From an initial review of the two packages following their arrival at the Michoud facility there does not appear to be a need to undertake further washing of the exterior surfaces to undertake the visual examinations described in this part of the proposed test plan.

On September 28 and 29 the Yellow and Blue Control Pods were removed and flushed. The procedure followed was the agreed preservation procedures for the Q4000 and fluids were collected as per the preservation procedure. All work was in accordance with NASA-Michoud Safety and Environmental requirements.

[2] Contingency: Recover BOPs with DP Inside; Macondo Plug and Abandonment Project for MC252-1 dated 31-Aug-10.

5.6.2.2 Visual Examination of the External Surfaces

10. Copy the following pages from the Cameron Operation and Maintenance Manual [3] containing Cameron drawings of the BOP and LMRP packages and the control systems.
    a. CAMCG 0000012 – 0000021.
    b. CAMCG 0000024 – 0000031.
11. Copy the following pages from the Cameron RBS-8D Multiplex BOP Control System Operations Manual, containing drawings of the control pods. [4]
    a. CAMCG 00000329 – 00000337.
    Note – The drawings referred to above are of a general nature. At the time of the writing of this proposed procedure DNV was in the process of trying to source original detailed design drawings of the Deepwater Horizon BOP, LMRP and the two Control Pods. Those drawings should be substituted for the above referenced material once received.
12. Using the drawings and taking into consideration possible access constraints, plan an approach to visually examining each of the four sides, top, and bottom of the two packages.
    [*Note: Make arrangements with NASA's Michoud Assembly staff for any man-lifts, scaffolding, or other means of access to the full height of each of the two components when separated (i.e. approximately 30 feet in height).*]
13. Use of personnel protective equipment including gloves, hardhats, and safety shoes is mandatory. As many of the components contain hydraulic fluids safety glasses with side shields or wrap around safety glasses is also mandatory. When working above four-feet all regulatory requirements for working at heights must also be followed.
14. Collect and assemble measuring tapes, calipers, depth gauges, etc. required to assist with characterizing any anomalies or variations to the state and condition of the two packages versus their original design.
15. Make provisions with the videographer for recording the visual examinations as well as taking of any still photographs.

As the Control Pods will be removed from the LMRP and placed in specially fabricated storage vats, it is proposed to complete the visual examinations of those two Pods prior to being placed in the vats. The component (BOP, LMRP, Pods) order of visual inspection is not critical and can be adjusted based on convenience and timing. Provisions will be made to assure that the electronics are not subject to electrostatic discharge (ESD) during the inspection and testing of the electronics systems.

16. Identify, characterize the condition where applicable, and record the following on the Yellow Control Pod.
    a. The components as mounted on the Yellow Control Pod and verify those components against the appropriate Cameron drawing(s). Note any discrepancies between what is fitted and the drawings.

[3] R&B Falcon Deepwater Horizon TL BOP Stack Operation and Maintenance Manual, Rev A, September 2000
[4] Basic Operations Manual RBS 8D Volume 1, R&B Falcon, Deepwater Horizon, June 2000

b. The serial number part number or other identification markings of the various components mounted on the Yellow Control Pod along with any damage, anomalies corrosion products, marine growth, etc. Characterize any damage or anomalies using terms such as gouge, scrape, pit, etc. and measure the extent of the damage or anomaly, record, and photo document.
c. Check all fittings for tightness using gloved hands (no hand tools to be used) and for any damage or anomalies such as cross-threading, gaps, pits, possible leak points or paths, etc., record, and photo document.
d. Check connecting hoses, tubing, etc. for damage or anomalies such as kinks, dents, gouges, and the condition of their fittings to control components or other terminations.
e. Identify the condition of all hoses, umbilicals or control cables. Note the state of cuts or tears and measure the length, if possible where a component has been cut or otherwise separated to where it terminates on the LMRP. Quantify orientation and location of all cuts and anomalies (relative to some reference point).
f. Check all fittings used for connecting hoses, control cables, etc. for signs of damage or anomalies (e.g. gouges, signs of excessive wear or force used to make a connection and characterize the damage found if any).
g. Examine the condition of Pod mounted accumulator bottles (i.e. pilot or supply, surface or subsea function).

17. Repeat steps 15 (a) to (g) with the Blue Control Pod.
18. Continue the visual examinations of the LMRP.

a. The serial number, part number or other identification markings of the various components mounted on the LMRP along with any damage, anomalies, corrosion products, marine growth, etc. will be recorded. Characterize any deformations using terms such as gouge, scrape, pit, etc. and where possible measure the extent of the damage or anomaly.
b. Note numbers, positions and condition of all accumulator bottles. If and where possible identify and record any identification markings.
c. Note the condition of all fittings and tubing or hoses between the accumulator bottles and their connections to the LMRP functions.
d. Check all fittings for tightness using gloved hands (no hand tools to be used) and for any damage or anomalies such as cross-threading, gaps, pits, possible leak points or paths, etc.
e. Examine the exterior of all major components located on the LMRP. Note the general condition and any damage or anomalies and measure the extent of the damage or anomaly.
f. Note the condition of any vents, plugs or other connections to the main components of the LMRP.
   i. Choke and kill hoses and all fittings and connections.
   ii. The exterior surfaces of the annular housings.
   iii. Whether any bolts or other fasteners are missing and the general condition or state of the bolts, fasteners, etc.

g. Check and record the alignment of the 'bull's eye" tilt indicators on the LMRP.

On completion of the visual examinations of the external surfaces of the LMRP, initiate the visual examinations of the external surfaces of the BOP. The same preparations and precautions as taken for the visual examinations of the LMRP shall be applied to the visual examinations of the external surfaces of the BOP.

19. Identify, characterize the condition where applicable, and record the following on the BOP.
    a. The serial number, part number or other identification markings of the various components mounted on the BOP along with any damage, anomalies, corrosion products, marine growth, etc. Characterize any deformations using terms such as gouge, scrape, pit, etc. and where possible measure the extent of the damage or anomaly.
    b. Note numbers, positions and condition of all accumulator bottles. If and where possible identify and record any identification markings.
    c. Note the condition of all fittings, isolation valves, and tubing or hoses between the accumulator bottles and their connections to the BOP components or functions.
    d. Check all fittings for tightness using gloved hands (no hand tools to be used) and for any damage or anomalies such as cross-threading, gaps, pits, possible leak points or paths, etc.
    e. Check connecting hoses, tubing, etc. for damage or anomalies such as kinks, dents, gouges, and the state of their fittings to control components or other terminations.
    f. Identify the state of all hoses, umbilicals or control cables. Note the state of cuts or tears and measure the length, if possible where a component has been cut or other wise separate to where it terminates on the BOP. Quantify orientation and location of all cuts and anomalies (relative to some reference point).
    g. Check all fittings on connecting hoses, cables, etc. for signs of damage or anomalies (e.g. gouges, signs of excessive wear or force used to make a connection and characterize the damage found if any).
    h. Examine the exterior of all major components located on the BOP. Note the general condition and any damage or anomalies and measure the extent of the damage or anomaly.
    i. Note the condition of any vents, plugs, weep holes, or other connections to the main components of the BOP.
        i. Choke and kill hoses and all fittings and connections,
        ii. The exterior surfaces of the ram housings, bonnets, etc.
        iii. Whether any bolts or other fasteners are missing and the general condition or state of the bolts, fasteners, etc.

5.6.3 Visual Examination of the Internal Wellbores of the LMRP and BOP

5.6.3.1 General Considerations

The primary goals of visual examination of the internal wellbore are:

- To visually examine the wellbore surfaces.
- To examine the location and condition of the drill pipe and other materials remaining in the wellbore.
- To extract the drill pipe and other materials remaining in the wellbore.

To accomplish these goals functioning of some of the rams (BOP) and annulars (LMRP) in order to retract those rams/annulars that are in the closed or partial closed position may be required. Once retracted the drill pipe and other materials can be removed and the well bore examined. Procedures for ram functioning as included in Section 5.8.2 Function Testing the BOP Rams and LMRP Elements will be followed.

The following information is available concerning the condition of the wellbore.

- The ROV surveillance and interventions, found that the well cavities of the BOP Stack contain drill pipe and other materials. This was confirmed when the BOP Stack was recovered and raised to the deck of the Q-4000.
- The wellbore cavities of both the BOP and the LMRP were filled with stack guard as part of the initial decontamination of the BOP Stack and short-term preservation procedures that were performed on the Q-4000. The wellbores were visually inspected and the fact that various materials, drill-pipe or 'fish' were located within the well bore cavities was confirmed and documented. Following these initial inspections, certain preservation measures were not performed in order to try and prevent well bore and drill pipe material from being damaged (e.g. function testing of certain rams and annulars and flushing the control pods).
- Following the Q4000 Preservation procedures, the positions of the ram assemblies of the lower section of the BOP were reported as follows:
  - Blind Shear Rams (the topmost rams): Upper blade [closed] and Lower blade [open].
  - Casing Shear Rams: Both ram blades [open].
  - Upper Variable Bore Rams: Blocks are closed on the wellbore drill pipe.
  - Middle Variable Bore Rams: Ram positions unknown.
  - Test Rams: Ram positions unknown.
- The positions of the annulars in the LMRP were reported as follows:
  - Upper annular: Closed with drill pipe 'wedged' in the annular.
  - Lower annular: Unknown.

Inspection of the internal cavities cannot be undertaken until the cavities are drained of the preservation fluid and possibly washed to remove any residues left behind. In order to gain access to the full height (depth - approximately 27' deep) of the wellbores, it will be necessary to function any rams or annulars that are in the closed or partially closed position. Further, there may be a need to undertake some degree of disassembly of these components if they do not respond to the pressure applied to retract them. For example, if the Blind Shear Ram will not retract a process of progressive disassembly will be undertaken to identify and if possible, correct the fault. If necessary, the ram will be mechanically retracted or removed.

Provisions will be made to capture or retrieve the drill pipe and other materials trapped inside the wellbores to prevent them from being damaged as a result of the wellbore inspection and function testing. Once extracted, these materials will be preserved for future examination.

The visual inspection procedures that follow will be integrated with activities undertaken to assess the functionality of the BOP Stack (Section 5.8.2) and to recover drill pipe and other materials within the wellbore. Therefore, this investigation will need to provide for a high level of flexibility in the sequence that various activities are undertaken to permit visual examination, to maintain the integrity of the drill pipe and other materials within the wellbore, and to allow the function testing of the rams and annulars.

The initial access to the wellbores is from the tops of the BOP and the LMRP. The wellbore cavities are 18-3/4" in diameter. As a result the "visual" inspections will be carried out using remotely operated cameras and borescopes that are lowered into the wellbore cavities. A 3-D Laser scanner (profilometer) may also be used to assist with dimensioning various features, damage, and anomalies found as part of the visual inspections of the internal wellbores.

5.6.3.2 Visual Examination of the Internal Wellbores

20. The visual examinations of the internals will start with the wellbore of the BOP. The wellbore will be drained of preservative fluid and cleaned of any residues.
21. Inspection of the wellbore internal surfaces, drill pipe or other materials in the wellbore, and ram surfaces will be by a remotely operated camera lowered into the wellbore and the use of a borescope where appropriate. More detailed characterization may be performed by using the 3-D Laser Profilometer.
22. The position of the rams and the materials trapped in the rams will be noted and logged. The trapped materials will be examined for identification marks, if any and these marks recorded. The state of the wellbore cavity to the first set of rams (the Upper Blind Shear Rams) will be examined for signs of wear as a result of drilling activities, possible damage from prior maintenance or repairs and erosion due to the well fluids escaping subsequent to the incident. The extent of this damage will be characterized and recorded. [*Note: Complete characterization of any damage may require waiting until the wellbore is cleared of drill pipe and other materials, if any present.*]
23. The condition of the surfaces of the Upper Blind Shear Rams, if visible, will be examined for wear, damage or deformations on the faces of the rams and their upper and lower surfaces. Damage or anomalies will be characterized and recorded.

24. The following Steps demonstrate the iterative nature that is required between the visual examinations and the function testing of the rams. To examine the wellbores spaces between the rams it will be necessary to retract them.
    a. One blade or side of the blind shear rams remains closed. Attempts on the Q-4000 to retract the blade were unsuccessful. The examination of the wellbore below the level of the rams may be very difficult even with the use of remote operated cameras.
    b. Also, it will be necessary to function or possibly remove the ram in order to retrieve the materials that currently reside within the wellbore and maybe trapped by the closed rams. As the visual examination progresses, visual examination will be performed for those surfaces that can be accessed until ram retraction is required.
25. Prior to any Ram intervention, the plug off the ST Lock "open" end caps will be pulled in order to measure the depth of the ST Wedge Piston to verify if the ST Lock position is locked or unlocked [exclude Casing Shear Ram (no ST Lock)].
26. The general approach is as follows:
    a. Examine and characterize the state of the wellbore cavities down to the Upper Blind Shear Rams. Examine, to the extent possible the blind shear ram faces.
    b. Retract the blind shear rams (See Section 5.8.2.2 Function Testing of the BOP Rams for further details). If the Blind Shear Rams will not retract, undertake a process of progressive disassembly to try and identify and if possible, correct the fault. If necessary, completely open or physically remove the Upper Blind Shear Rams. De-energize all systems to the blind shear rams. Examine blind shear rams and characterize any damage and anomalies.
    c. Visually examine and characterize the condition of the wellbore cavity or recesses between the Upper Blind Shear Rams and the Casing Shear Rams for signs of wear as a result of drilling activities, prior maintenance or repairs and erosion due to the well fluids escaping.
    d. Examine the state of the Casing Shear Rams as found (reported as open following Q4000 Preservation procedures). Make provision to capture the materials trapped in the wellbore cavities. Leave the Casing Shear Rams in their retracted position.
    e. Continue the provisions to restrain or capture the drill pipe trapped in the lower BOP wellbore.
    f. Retract the Upper Variable Bore Rams. Examine the faces of the UVBR’s as they open. Examine the state of the wellbore cavity below the UVBR’s and the Middle Variable Bore Rams. If the MVBR’s and Test Rams are not holding the drill pipe remove it.
    g. Continue an iterative process of wellbore cavity examinations between the rams and retracting the Upper Variable Bore Rams, the Middle Variable Bore Rams and the Test Rams. As each set of rams are retracted the rams will be stopped at a point to provide an opportunity to examine their faces before they are fully retracted.
    h. Complete the examination and characterization of the wellbore cavities below the Test Rams.

27. A detailed visual examination and characterization of all external surfaces of the rams (their faces and upper lower surfaces) will be undertaken for any ram blocks that are removed from the body of the BOP.
28. As noted above, drill pipe and other materials likely extend below the Casing Shear Rams and that it may not be possible to continue the visual examinations of the wellbore cavities below the Casing Shear Rams until they are cleared from the bore.
29. When these materials are recovered, they will be examined for identification marks, and any damage or anomalies (e.g. pitting, gouging, striations, etc.) will be measured.

On completion of the visual examination of the wellbore of the BOP, the wellbore of the LMRP will be examined. The same concerns discussed for the BOP (the presence of drill pipe and other materials within the wellbore of the LMRP) are a concern for the LMRP. The order of visual examination of the wellbores is driven by the order of function testing and can be changed depending on the needs of the function testing.

30. The same general procedure for visually examining the internal wellbore of the BOP will be applied to the visual inspections of the LMRP. The internal wellbore of the LMRP will be drained of preservation fluids and washed of any residue.
    a. Examine and characterize the state of the wellbore cavities and any trapped drill pipe. Make provision to secure the drill pipe trapped in the upper annular.
    b. Examine and characterize, to the extent possible the condition of the upper element, the elastomeric body and metal inserts. Characterize to the extent possible the drill pipe trapped within the metal inserts or 'fingers' of the element. Open, retract or if required mechanically retract the element and recover materials that remain in the wellbore.
    c. Undertake initial visual examinations of the drill pipe and other materials and prepare and preserve the drill pipe and other materials for further examinations and possible testing. If drill pipe remains captured by lower annular element, then secure the drill pipe from vertical movement and proceed with visual examination
    d. Examine and characterize the accessible faces of the element bore. Completely retract, or if necessary remove, the upper element and de-energize all systems to the upper annular.
    e. Visually examine and characterize the condition of the wellbore cavity between the upper element and the lower element for signs of wear as a result of drilling activities, prior maintenance or repairs or erosion due to the well fluids escaping.
    f. Examine the state of the lower element. Characterize to the extent possible any drill pipe trapped or that remains within the metal inserts or 'fingers' of the lower element. Make provision to capture the materials trapped in the fingers of the lower element. Retract or if required mechanically remove the lower element and recover materials that remain in the wellbore.
    g. Recover the drill pipe, undertake initial visual examinations and then prepare and preserve the drill pipe for future examinations and possible testing.

h. Visually examine the surfaces of the lower element, the elastomeric body and the metal inserts. Examine and characterize the condition of the lower element bore and the wellbore below the lower element to the lower connecting collar.

5.7 Hydraulic Circuit Static Pressure Test

The static pressure-test will evaluate the integrity of the hydraulic circuits (hoses, piping, valves, and actuators) of the BOP Stack, LMRP and ROV Panels. The integrity test will cover the complete hydraulic circuit from the opening pressure port in the Control Pod Stinger Receptacle or ROV Panel through hoses, tubing and valves into the operator assembly (internal porting and piston assemblies), back to the closing pressure port in the Stinger Receptacle. A special set of tools will be utilized which connects and seals in the opening port and seals and blanks off the closing port to form a static circuit which can be pressurized without causing ram or annular functions.

Installation of additional valves needs to be minimized to protect the integrity of the static tests. The intention is not to pressure up accumulator units. Necessary means will be taken to isolate accumulator units from the static testing. These means will be determined on a case by case basis.

5.7.1 General Preparations

31. The hydraulic circuit will be dead-headed so that there is no fluid flow, and hence, no ram function. As maximum closing pressure can be damaging to rams the Technical Working Group will be consulted with to establish recommended pressures for conducting these tests.
32. Obtain a compatible hydraulic pressure unit (HPU). Prior to starting the tests, all gauges (pressure, flow, volume, electrical, etc.) will be calibrated and certified to appropriate standards or in accordance with manufacturers' specifications (including pressure, volume, and flow monitoring data recording).
33. Obtain and have available quantities of all fluids as recommended by the manufacturer. [*Note: Spill response measures are separate but integral to this work and will comply with all NASA, Michoud requirements.*
34. Personal protective equipment and all safety procedures as described in the Visual Examination section of this Plan will be followed during the function testing. In addition as this work will involve the use of high pressures, procedures for working around high-pressure equipment and especially high-pressure hydraulic hoses will apply.
35. Collect and assemble all hand tools, any pneumatic or power actuated tools, measuring tapes, etc. that might be required to complete these tests.
36. Make provisions with the videographer for recording these tests as well as the taking of any still photographs.
37. Make provisions for containment of any fluid which might leak from the hydraulic circuit during testing.

5.7.2 BOP Stack Circuits

38. The static test will start on the BOP Stack in the following sequence:
    a. Upper Blind Shear Ram
    b. Casing Shear
    c. Upper Pipe Ram
    d. Middle Pipe Ram
    e. Lower Pipe Ram
    f. Wellhead Connector
    g. Choke and Kill Valves
    h. Stack Mounted Regulators
    i. ST-lock system
    j. High-pressure blind shear ram close (Note that pressuring this circuit will not close the rams. This is a through-pod-receptacle function which activates the high-pressure blind shear control valve panel on the lower BOP. It is very important to verify there are no leaks in this circuit, because it is part of both the EDS and the autoshear.)
    k. High-pressure casing shear close
    l. Autoshear arm/disarm
    m. Stack accumulators charge/discharge
39. Hydraulic pressure is to be applied to the opening or unlatching side port in the BOP Stack Stinger Receptacle. Install the special hydraulic supply tool into the appropriate opening or unlatching port. Install the special blanking tool into the appropriate return or closing port in the Stinger Receptacle. Trace the line from the outside of the receptacle down to the component and back to the receptacle to ensure proper circuit. [*Note: Circuits on both pod receptacles will be tested.*]
40. Apply pressure slowly increasing from zero. Monitor the hydraulic connections for any leaks and de-pressure immediately if leaks are found. Take corrective actions.
41. Continue increasing pressure until the maximum working pressure recommended by Cameron for the specific function is reached. Hold at maximum pressure for 15 minutes after pressure stabilizes while continuing to monitor for any leaks. Document any leaks including the minimum pressure at which the leak initiated. If necessary, de-pressure and re-pressure to validate leak initiation pressures.
42. After a 15 minute pressure hold at rated working pressure is achieved without visible leakage, de-pressure the circuit.
43. Continue static pressure testing (steps 35 through 38) until all hydraulic circuits have been completed in the BOP Stack.

5.7.3 LMRP Circuits

44. Static testing will then continue on the LMRP in the following sequence:
    a. Upper Annular
    b. Lower Annular
    c. Mud Boost Valve
    d. Choke Isolation Valve
    e. LMRP Connector

f. Choke & Kill Connectors
g. Regulators

45. Follow the same procedure as the BOP Stack static test applying hydraulic pressure to the opening or unlatching side port in the LMRP Stinger Receptacle. Install the special hydraulic supply tool into the appropriate opening or unlatching port. Install the special blanking tool into the appropriate return or closing port in the Stinger Receptacle. Trace the line from the outside of the receptacle down to the component and back to the receptacle to ensure proper circuit.
46. Apply pressure slowly increasing from zero. Monitor the hydraulic connections for any leaks and de-pressure immediately if leaks are found. Take corrective actions.
47. Continue increasing pressure until the maximum working pressure recommended by Cameron for the specific function is reached. Hold at maximum pressure for 15 minutes after pressure stabilizes while continuing to monitor for any leaks. Document any leaks including the minimum pressure at which the leak initiated. If necessary, de-pressure and re-pressure to validate leak initiation pressures.
48. After a 15 minute pressure hold (following pressure stabilization) at rated working pressure is achieved without visible leakage, de-pressure the circuit.
49. Continue static pressure testing (steps 41 through 44) until all hydraulic circuits have been completed in the LMRP.

5.7.4 ROV Panel Circuits

50. Static testing will then continue on the ROV Panels located in the BOP Stack and LMRP in the following sequence:
    a. LMRP Connector Unlatch
    b. Choke & Kill Connector Unlatch
    c. Shear Ram Close
    d. Pipe Ram Close
    e. Wellhead Connector Unlatch
51. Hydraulic pressure is to be applied via the ROV panel interface. An ROV hot stab will be connected to the hydraulic supply line to provide the necessary function pressure. Manually install and ensure the ROV stab is locked in the ROV panel before applying pressure. Install the special blanking tool into the appropriate return or closing port in the Stinger Receptacle. Trace the line from the ROV panel to the component and back to the receptacle to ensure proper circuit.
52. Apply pressure slowly increasing from zero. Monitor the hydraulic connections for any leaks and de-pressure immediately if leaks are found. Take corrective actions.
53. Continue increasing pressure until the maximum working pressure recommended by Cameron for the specific function is reached. Hold at maximum pressure for 15 minutes after pressure stabilizes while continuing to monitor for any leaks. Document any leaks including the minimum pressure at which the leak initiated. If necessary, de-pressure and re-pressure to validate leak initiation pressures.
54. After a 15 minute pressure hold at rated working pressure is achieved without visible leakage, de-pressure the circuit.

55. Continue static pressure testing (steps 47 through 50) until all ROV hydraulic circuits have been completed on both the BOP Stack and the LMRP.

5.8 BOP Function Testing

5.8.1 General

The function testing will evaluate the functionality of the various components of the BOP and the LMRP, including the following.

- Each of the five sets of rams that comprise the BOP and the systems that drive or actuate those rams.
- The two annulars that comprise the LMRP and the systems that drive or actuate the elements.
- The systems that control the functioning of these components.

Where a component or sub-assembly does not function in accordance with its design, the physical cause(s) and contributory factors that led to the malfunction will be identified. To the extent possible, those factors that existed pre-incident versus those that were likely caused following the incident will be established.

Two general approaches can be adopted for testing the functioning of the BOP and LMRP as a whole and their individual components.

- One is to start holistically with the BOP Stack assembled (i.e. the BOP and LMRP together) and the control systems as close to their pre-incident state as possible. Then engage or energize each of the various systems and components and note whether they operate as designed. This could be viewed as a top-down approach to the function testing.
- The second approach is to start at the individual component level. Test that component, note its response, then move 'outward' from that component to the next level of the assembly. Re-energize those two components, note their response, and continue until the various components in that sub-system or sub-assembly is completed. In simple terms, a bottom-up approach.

Each approach has advantages and disadvantages. Taking into consideration a number of factors that are discussed within the proposed test plan it was decided to take a 'bottom-up' approach i.e. one that starts at the individual component level and works outward and upward through the various levels of actuation and control.

Function testing of the BOP Stack will begin with testing the operation of the BOP rams. Once the tests of the BOP rams are complete, function testing will move to the annulars of the LMRP.

5.8.2 Function testing the BOP Rams and LMRP Elements

5.8.2.1 General Preparations

Procedures in 5.8.2 will be followed with the understanding that any rams / annulars that had been in the closed or partially closed position will have been retracted in Section 5.6. During the function testing, rams/annulars will be functioned at the least pressure required to cause the rams to function and never greater than the manufacturer's maximum recommended pressure. In addition, the rams will not be allowed to close all the way with out an exemplar pipe in the well bore to minimize damage to the surfaces of the rams/annulars. The plan is to function rams such that the movement is sufficient to suggest complete mobility, but not to close completely so not to damage the ram/annular elements.

56. In addition to a compatible hydraulic pressure unit (HPU), obtain a Portable Electronic Test Unit (PETU) from Cameron (the manufacturer of the BOP and its controls). Prior to starting the tests, all gauges (pressure, flow, volume, electrical, etc.) will be calibrated and certified to appropriate standards or in accordance with manufacturers' specifications. Monitor and record dynamic pressure and flow throughout all tests.
57. Obtain and have available quantities of all fluids as recommended by the manufacturer. Note – spill response measures are separate but integral to this work and will comply with all NASA, Michoud requirements.
58. Personal protective equipment and all safety procedures as described in the Visual Examination section of this Plan will be followed during the function testing. In addition as this work will involve the use of high pressures, procedures for working around high-pressure equipment and especially high-pressure hydraulic hoses will apply.
59. Collect and assemble all hand tools, any pneumatic or power actuated tools, measuring tapes, etc. that might be required to complete these tests.
60. Make provisions with the videographer for recording these tests as well as the taking of any still photographs.
61. Install a containment or fluid capture system to the return or vent side of the BOP and LMRP prior to the function testing of the units.
    a. As each set of rams or annulars is functioned, make provision to capture any vented hydraulic fluids.

5.8.2.2 Testing the BOP Rams

62. Monitor the position of each ram block prior to any function testing (even for those that have undergone functioning during the ROV interventions and Q4000 preservation).
63. First function test the opening or retract function of the BOP rams. In instances where specific rams have already been cycled fully open during offshore preservation procedures or prior offshore operations, the procedure will be to validate visually and through applied pressure that the rams are fully retracted.
64. Function testing of the rams will start with the Blind Shear Rams of the BOP.
65. Hydraulic pressure is to be applied to the opening side port in the BOP Stack Stinger Receptacle. Install the special hydraulic supply tool into the appropriate opening port.

Install the special hydraulic return tool into the appropriate return or closing port in the Stinger Receptacle and connect to fluid capture system. Trace the line from the outside of the receptacle down to the component and back to the receptacle to ensure proper circuit.

66. Position the video camera and observers at the top of the BOP to observe the wellbore and the function of the UBSRs.
67. Apply pressure increasing from zero. Monitor the hydraulic connections for any leaks and de-pressure immediately if leaks are found. Take corrective actions. If no leaks are found record minimum pressures required to action rams. Continue applying pressure until the rams are fully retracted from the wellbore. Stop applying pressure at the maximum pressure recommended by Cameron for actuating the UBSRs. Record the final pressures and volume counts required to completely retract the rams. Monitor and record dynamic pressure and flow throughout tests.
    a. As noted in the visual examination section, the opening of the rams will be staged to examine the faces of the rams prior to being completely retracted.
    b. Record the applied pressure versus displacement of the ram blocks.
    c. If there is no ram block movement at maximum recommended pressures, the next step will be to start disassembling the shear ram sub-assembly to discern the cause of the problem. The possibility exists that a progressive level of disassembly will be required. A minimum level of intrusive effort or disassembly will be taken to identify the cause of a fault or problem having to retract the ram using mechanical or outside means. It is recognized that there could be various reasons for the ram(s) not functioning. For example, rather than being an issue of a 'stuck ram' due to friction of some nature, it may be faults in the pistons or other parts of the actuating system. As part of this work, it will be examined whether the cause of problem or fault was likely due to a condition that existed pre-incident or the effect of events subsequent to the incident.
    d. Prior to any ram sub-assembly intervention, pull the plug off the ST Lock "open" end caps and measure the depth of the ST Wedge Piston to verify the ST Lock position is locked or unlocked [exclude Casing Shear Ram (no ST Lock)].
68. De-energize the system. Label any vented fluids collected during the opening of the rams and install a new collection bottle.
69. Inspect the wellbore and document the condition of and position of the Casing Shear Rams. Remove and document any loose drill pipe from the wellbore. [*Note: During the Q4000 Preservation, the short fish of drillpipe below the Upper Shear Rams was removed. The Casing Shear Rams were then opened.*]
70. Make provision, if required, to capture or restrain any drill pipe or fittings wedged in the Casing Shear Rams from falling further into the wellbore when opening the Casing Shear Rams.
71. Following and using the same steps for retracting the upper blind shear rams make the same provisions for opening the Casing Shear Rams. Install the special hydraulic supply tool into the appropriate opening port. Install the special hydraulic return tool into the appropriate return or closing port in the Stinger Receptacle and connect to fluid capture

system. Trace the line from the outside of the receptacle down to the component and back to the receptacle to ensure proper circuit.

72. Position the video camera and observers at the top of the BOP to observe the wellbore and the function of the CSR's.
73. Apply pressure and record the minimum pressures required to action the CSR's. Continue applying pressure until the rams are fully retracted from the wellbore. Stop applying pressure at the maximum pressure recommended by Cameron for actuating the CSRs. Record the final pressures and volume counts required to completely retract the rams. Monitor and record dynamic pressure and flow throughout tests.
74. De-energize the system. Label any vented fluids collected during the opening of the rams and install a new collection bottle.
75. Once the Casing Shear Rams have moved and the drill pipe, fittings or other material within the wellbore is free, remove any material, visually examine, characterize any damage to this material, and prepare it for proper storage and possible future examination.
    a. Undertake any visual examinations to the wellbore cavities and the faces and surfaces of the Casing Shear Rams that were not previously completed.
76. Document the position and condition of the visible surfaces of the Upper Variable Bore Rams (UVBR) (Upper Pipe Rams).
77. Repeat the above steps for functioning of the:
    a. Upper Variable Bore Rams (UVBRs)
    b. Middle Variable Bore Rams (MVBRs)(Middle Pipe Rams), and the
    c. Test Ram (TR).

    Note: Ensure the special hydraulic supply and return tools are located in the appropriate ports for rams being functioned. Trace the line from the outside of the receptacle down to the component and back to the receptacle to ensure proper circuit.
78. Once all five sets of rams on the BOP have been opened or retracted and all material removed from the wellbore, the function testing will be reversed. Record the minimum pressure to close the rams and observe the ram to ram interface. For the blind shear and casing shear rams, allow the ram blocks to completely close against each other. Terminate the function immediately if interfacing appears to be causing mechanical damage. For the variable bore and test rams, terminate the close function prior to ram to ram contact. There will be no pipe in the wellbore and functioning close could result in damage to the ram elements. If at any time any of the rams do not move with 500 psi or less, terminate the function and proceed to forensic investigation of this fault. Monitor and record dynamic pressure and flow throughout tests.
79. Disconnect the ROV and Control Pod shuttle valves from the BOP body and disconnect the Control Pod and (where applicable) ROV supply lines.
80. For Control Pod only (Blue and Yellow Pod shuttle) connect hydraulic supply to the Blue Pod port, connect vent line to the Yellow Pod port and connect the return line to the BOP body side of the shuttle valve.
81. Pressure the shuttle valve and record the minimum pressure at which the valve shifts. Do not pressure the valves beyond Cameron specified limits. Note and record any fluid from

the vented Yellow Pod port indicating a leak. [*Note: If the shuttle is already shifted then the procedure will be reversed to begin with the opposite inlet (Yellow Pod port) first as indicated in the following step and the Blue Pod port last*.]

82. Reverse the Yellow and Blue Pod connections and repeat and record the minimum pressure to shift.
83. For shuttle valves associated with ROV intervention, repeat the minimum pressure shift test with hydraulic supply to the ROV panel side.
84. Where a shuttle valve does not function, the next step will be to start disassembling the shuttle valve to discern the cause of the problem. Where a shuttle valve functions reconnect the shuttle valves to the BOP Stack.
85. Undertake this same procedure with each of the shuttle valves on the BOP Stack.
86. The Yellow and Blue Control Pods that attach to the LMRP were removed from the LMRP as part of a short-term preservation procedure. It is intended to hold with doing any further testing at the individual component level of the BOP Stack at a point prior to having to refit the Control Pods. Testing of the Control Pods will be undertaken with the function testing of the control systems.

5.8.2.3 Testing the LMRP Annulars

The approach to the function testing of the upper and lower annulars will follow the same approach as with the rams on the BOP. However, it has been noted that the elastomeric element of the upper annular has been heavily damaged. It is believed that it is possible to test the functionality of the components that actuate the element without first having to fit a new element.

87. First function test the opening or retract function of the annulars. In instances where the specific annular has already been cycled fully open during offshore preservation procedures or prior offshore operations, the procedure will be to validate visually and through applied pressure that the annular piston is fully retracted. Even though the piston is fully retracted, the annular element may not open up fully to clear the wellbore.
88. Start its tests with the Upper Annular of the LMRP.
89. Hydraulic pressure is to be applied to the opening side port in the LMRP Stinger Receptacle. Install the special hydraulic supply tool into the appropriate opening port. Install the special hydraulic return tool into the appropriate return or closing port in the LMRP Stinger Receptacle and connect to fluid capture system. Trace the line from the outside of the receptacle to the component and back to the receptacle to ensure proper circuit.
90. Position the video camera and observers at the top of the LMRP to observe the wellbore and the function of the upper annular.
91. Apply pressure increasing from zero. Monitor the hydraulic connections for any leaks and de-pressure immediately if leaks are found. Take corrective actions. If no leaks are found record minimum pressures required to action the element. Continue applying pressure until the annular piston is fully retracted. Even thought the piston fully retracts, the element may not open up fully and clear the wellbore. Stop applying pressure at the

maximum pressure recommended by Cameron for actuating the annular piston. Record the final pressures and volume counts required to completely retract the piston. Monitor and record dynamic pressure and flow throughout tests.

a. As noted in the visual examination section, the opening of the element will be staged to examine the faces of the element prior to being completely retracted.

92. If there is no movement of the element at the maximum recommended Cameron pressures the next steps will be to start disassembling the annular sub-assembly to discern the cause of the problem. The possibility exists that a progressive level of disassembly will be required. The minimum level of intrusive effort or disassembly will be taken to identify the cause of a fault or problem having to retract the element using mechanical or outside means.
93. De-energize the system. Label any vented fluids collected during the opening of the annular and install a new collection bottle.
94. Inspect the wellbore and document the condition of and position of the Lower Annular. Remove and document any loose drill pipe from the wellbore.
95. Make provision, if required, to capture or restrain any drill pipe or fittings wedged in the lower annular from falling further into the wellbore when opening the lower element.
96. Following and using the same steps for retracting the upper element make the same provisions for opening the lower element. Ensure the special hydraulic supply and return tools are installed in the appropriate ports in the LMRP Stinger Receptacle and connected to a fluid capture system. Trace the line from the outside of the receptacle to the component and back to the receptacle to ensure proper circuit.
97. Position the video camera and observers at the top of the BOP to observe the wellbore and the function of the lower packer.
98. Apply pressure and record the minimum pressures required to action the lower element. Stop applying pressure at the maximum pressure recommended by Cameron for actuating the element.

    a. If there is no movement at the maximum recommended pressure, the next steps will be to start disassembling the lower annular sub-assembly to discern the cause of the problem. The possibility exists that a progressive level of disassembly will be required. The minimum level of intrusive effort or disassembly will be taken to identify the cause of a fault or problem having to retract the element using mechanical or outside means.

99. De-energize the system. Label any vented fluids collected during the opening of the lower annular.
100. Once the drill pipe, fittings or other material within the wellbore is free; remove any material, visually examine, characterize any damage to this material, and prepare it for proper storage and possible future examination.

    a. Undertake any visual examinations to the wellbore cavities and the faces and surfaces of the element that were not previously completed.

101. Disconnect the Control Pod shuttle valves from the annulars and disconnect the Control Pod supply lines.

102. Connect hydraulic supply to the Blue Pod port, connect vent line to the Yellow Pod port and connect the return line to the annular body side of the shuttle valve.
103. Pressure the shuttle valve and record the minimum pressure at which the valve shifts. Do not pressure the valves beyond Cameron specified limits. Note and record any fluid from the vented Yellow Pod port indicating a leak. [Note: If the shuttle is already shifted then the procedure will be reversed to begin with the opposite inlet (Yellow Pod port) first as indicated in the following step and the Blue Pod port last.]
104. Reverse the Yellow and Blue Pod connections and repeat and record the minimum pressure to shift.
105. Where a shuttle valve does not function, the next step will be to start disassembling the shuttle valve to discern the cause of the problem. Where a shuttle valve functions reconnect the shuttle valves to the LMRP.
106. Undertake this same procedure with each of the shuttle valves on the LMRP.

5.8.2.4 Inspection of Ram and Annular Components

Once all function testing is complete, all ram/annular components will be disassembled for inspection.

107. Open ram bonnets and remove the ram blocks from the cavities and inspect the rams for damage and anomalies as described in 5.13.
108. Inspect the ram cavities measuring damage and anomalies.
109. Remove and inspect the annular elements for damage and anomalies as described in 5.13.
110. Inspect the annular cavities measuring damage and anomalies.

5.9 Testing of the Accumulators

There are both piston-type and bladder-type accumulators mounted to the BOP Stack, LMRP, and the Control Pods. Function testing will consist of first measuring and recording the Nitrogen pre-charge on the accumulators and where necessary reinstating the recommended pre-charge. The intent is to test accumulator bottles as a system (bank) and test individually only if anomalous performance occurs; can alter testing to identify individual bottle performance as need arises.

Note: the pre-charge will be adjusted for surface conditions (ambient pressure) to match the subsea condition. Subsea accumulator pre-charged N_2 gas pressures (adjusted from surface to subsea hydrostatic pressure and temp) will be roughly 2,500 psi above surface operating (the exact calculation should be made for stack depth, using a N_2 volume table method). This pressure, added to normal surface operation for various accumulators, is the pre-charge to expect at initial inspection. While this pre-charge was necessary for proper subsea operation, all accumulators will require bleed off to surface operation pressure values for proper operation and function tests during examination.

111. Note numbers, positions, and function use of all Stack accumulators.

112. Install fluid capture, pressure and volume measurement on the hydraulic side of the accumulator before opening and discharging or draining any resident fluid.
113. Collect samples of the pre-charge gases for examination and analysis of composition and moisture content.
114. Install pressure measurement on the pre-charge side of the accumulator.
115. Fully discharge the hydraulic side of the accumulator. Verify full discharge from both the hydraulic and pre-charge pressure gauges.
116. Measure any remaining pre-charge in the accumulator after hydraulic discharge.
    a. After draining hydraulic fluid from each accumulator, allow sufficient time for pre-charge gas temperature to come to ambient equilibrium (by monitoring pressure until it stops increasing). Record ambient temperature for "Remaining pre-charge" datum on each bottle.
117. Where necessary reinstate pre-charge to recommended level.
118. Monitor pre-charge for 5 minutes and document any leak off. If leak off occurs, the next steps will be to start disassembling the accumulator assembly to discern the cause of the problem and repair as needed before proceeding to hydraulic pressurization.
119. Slowly pressure up the hydraulic side of the accumulator until maximum manufacturer recommended pressure adjusted for surface conditions is achieved. Verify the pressure from both the hydraulic and pre-charge sides of the accumulator (matching pressures).
120. Hold for a minimum of 5 minutes or until pressure stabilizes within 5 psi, or 30 minutes, whichever is less and record results..
121. Fully discharge the hydraulic side of the accumulator recording the total discharge volume and pressure curve; recording until pressure stabilizes within 5 psi, or 30 minutes, whichever is less.
122. If the accumulator fails to discharge the calculated volume, the next steps will be to start disassembling the accumulator assembly to discern the cause of the problem and repair as needed before proceeding. *[Note: Full accumulator capacity is not required for operation of the BOP on surface thus repair of accumulators (if any) may not be required.]*
123. Slowly pressure up the hydraulic side of the accumulator until maximum recommended pressure is achieved. Verify the pressure from both the hydraulic and pre-charge sides of the accumulator (matching pressures) and leave charged for the next tests.
124. Repeat the test protocol (steps 102 through 112) for all accumulators mounted on the BOP Stack and LMRP.

5.10 Testing of the Control System

The control system for the BOP consists of the following main units.

- The Hydraulic Power Unit (HPU)
- Diverter Control Unit (DCU)

- Offshore Installation Manager's Control Panel[5]
- Drillers Control Panel
- Toolpusher Control Panel
- Cable Reels for connecting the controls from the Subsea Control Pods to the surface.
- Subsea Multiplex Modular Pod (i.e. the Yellow and Blue Pods fitted to the LMRP)

All of the above controls were lost with the sinking of the Deepwater Horizon semisubmersible, except for the subsea control pods (the Yellow and Blue Pods). In order to recreate the control systems that were in place prior to the incident it would be necessary to source similar control panels from Cameron. The value of undertaking such an effort is questioned; as any control units that Cameron are likely to be able to supply will be fitted with electronic systems that are of a 2010 'generation' versus the systems that were being used in 1999/2000 when the Deepwater Horizon BOP Stack and its various controls were designed and fabricated. Any test using such systems will not be representative of the state of the control systems in existence on April 20, 2010.

The approach to examine the two control pods will be to start with undertaking some basic measurements on the electronics or electrical systems including the following. Provisions will be made to assure that the electronics are not subject to electrostatic discharge during the inspection and testing of the electronics systems. Depending on the results of the following tests, in consultation with the Technical Working Group, solenoids and possibly even programmable logic controllers may be removed and subjected to further bench tests.

125. Examine the wiring or circuit layouts in the control pods (video and photo document) and compare those to the original electrical line drawings.
    a. Test for electrical faults at each accessible connection.
    b. Examine and record any programmable logic controllers (PLC's) and other electrical components and compare their stated capacity against original design documentation,
126. Document the condition of electrical connections and circuits using photography and stereomicroscopy if or where necessary.
127. Test the charge on the batteries that are built into the control pods.
    a. The batteries will be charged and monitored over a period of time to assess potential current drain. The drain from any shorts or to ground that are identified will be assessed to determine the potential effect on the batteries over a period of time.
128. The Subsea Electronic Modules (SEM's) will be removed from the Control Pods and inspected for signs of water ingress or other factors that might cause them to malfunction. Their electronic functions and operations will also be tested. Take water

[5] This is also called the Toolpushers Control Panel and is located on bridge (on the DWH) and Drillers Control Panel is on the Drill Floor. The DWH had a CCU (main - Central Control Unit).

samples where appropriate for future analysis and use field kit for testing pH and chlorides at site.

129. Test for any shorts that might exist in the electrical and electronic systems of the control pods.
    a. Various electrical lines to or on the control pods were cut or severed as part of the ROV interventions. The potential exists that any shorts identified may result from such activities versus having existed pre-incident.
    b. Specific test procedures will be developed and discussed with the Technical Working Group prior to carrying out these tests.
130. Examine the state of the various electrical connections for damage or excessive wear and tear.
131. The AMF system in each of the two control pods will be examined for electrical shorts or faults and the function tested.
    a. Test various trigger modes (loss of pressure, MX signal combinations).
    b. Test when conditions to initiate the AMF have been met and not re-set by cycling power to the Pod (will the system continue to repeat the cycle?).
    c. Test the AMF/deadman sequence functionality. Verify that the deadman sequence can be armed and that there is proper feedback to the PETU through the SEM.
    d. Explore whether battery state of charge affects AMF/deadman sequence functionality by using alternate batteries at appropriate states of charge.
132. Where it is possible to identify a certain condition or potential failure mode occurred and was a result of the conditions following the incident, that fault will be corrected. Again the principal of ‘minimal intrusiveness’ will be applied. Where it is not possible to identify whether a fault was in existence pre vs. post incident, the fault will not be addressed or corrected. An assessment of all damaged cables and electrical lines will be undertaken as part of the fault investigations.
133. The solenoid valves currently mounted to the control panels were functioned and flushed as part of the short-term preservation process of flushing the two control pods. Further as noted earlier a number of the valves and components to the two control pods were replaced during the ROV interventions or during topside maintenance as part of the interventions. All components that were removed will be identified and cataloged. They will be visually examined and function tested to evaluate their overall state or condition.
134. The original (pre-incident) components, will then be refitted where possible, following re-inspection, to the Control Pods. The overall configuration of the control pods being as close to the pre-incident condition will be checked against documentary evidence and the relevant tapes of the ROV interventions.
135. The Control Pods will be connected to a Cameron supplied Portable Electronic Test Unit. The Pods will be pressurized and energized. The various components will then be functioned and the results recorded.

5.11 Testing of the Wellhead and Collet Connectors

In addition to the Annular and Ram BOP Functions, investigation and function testing of the Wellhead Connector on the BOP and the BOP Stack connector on the LMRP, as well as the Choke and Kill Connectors on the LMRP will be tested. All unlatch and release functions are accessible from the ROV panels and hydraulic interface will first be conducted via the ROV panels in the same manner as the BOP and Annular function testing. It is recognized that these functions were not a part of the initial incident function demand, but rather required when the stack was disconnected and retrieved from the sea floor. Visual examination will be conducted and documented of all connector latches and their corresponding mating surfaces for any signs of damage. Distance of stroke will be measured and recorded as well as minimum pressure to unlatch collets or release gaskets. Hydraulic tracing will proceed in the same step by step fashion back to the control interface for determination of any component faults.

5.12 Function Testing of the Complete BOP Stack in the Pre-Incident Condition

As discussed above, the ability to establish the pre-incident operation condition of the BOP Stack and Control System will be difficult due to the following.

- Intervention process including maintenance overhaul of the Control Pods and attempted functioning of the rams above recommended maximum operation pressures.
- Wear / erosion due to the oil and gas flow prior to capping.
- Control systems located on the Deepwater Horizon were lost following sinking of the semi-submersible unit.
- Key documents and drawings including certain as built drawings and management of change (MOC) documents that describe modifications made from time of initial commissioning may not be available.

The assumptions made in trying to configure the BOP Stack back to its pre-incident operating condition will be documented. Because certain as-built drawings may have been lost, the primary process will be to establish the as-retrieved condition of the BOP Stack and work backwards to the pre-incident condition by reviewing all video, logbooks, and maintenance during the intervention period (post-incident). To further estimate pre-incident condition, design drawings will be used along with the review of pre-incident maintenance, modifications, repairs, and parts replaced. In addition, previous wells history for proper or problem functional issues will be reviewed where available. Establishing the pre-incident condition of the BOP Stack will require the following to be performed first.

- Visual examination.
- BOP function testing.
- Testing of the Control System and, to the extent possible, establish the pre-incident functionality.

- Document review of all intervention procedures.
- Document review of all performance histories, maintenance, repairs, and modifications.

To recreate the surface control system as it existed pre-incident is not expected to be possible. The goal will be to establish its pre-incident functionality, to the extent possible. This will be a combined effort of Cameron, BP, Transocean, and DNV. Part of this effort will be to determine the limitations of the effort in reproducing the functionality and logic of the control system as it existed pre-incident.

In addition, establishing pre-incident operation may require replacing certain parts that were worn or damaged due to post-incident intervention or fluid flow. Those parts damaged or worn due to normal operation pre-incident will be re-used in the construction of the pre-incident BOP Stack. If the pre-incident condition of the BOP Stack cannot be conclusively established, the BOP Stack will be tested under possible alternate pre-incident scenarios that are consistent with the available information.

Once the pre-incident condition(s) of the BOP Stack is established the following will be performed.

136. Compile all data to establish the pre-incident condition of the BOP Stack.
    a. Determine the control system to best simulate pre-incident functioning of the BOP Stack.
137. Refit components of the BOP Stack to the pre-incident condition and re-attach Control Pods to the LMRP.
    a. For example, re-establish the hydraulic hoses or connections, electrical connections, battery charge, etc. to pre-incident conditions.
138. Re-attach the LMRP to the BOP.
139. Verify all accumulators are fully charged to surface operation N_2 pressures.
140. The AMF system will be re-established. The BOP stack will be configured with the rams, annulars and the Control Pods in various configurations. The system will then be sequentially triggered and the cause and effects recorded.
141. Fit an exemplar pipe into the wellbore to permit full function testing of the BOP Stack.
142. Perform function testing on most likely scenarios for pre-incident BOP Stack configuration. As part of the scenarios, determine credible sequences regarding the pressure(s) applied to the rams; record the pressures, movement and time to close.
143. Perform function testing on certain fault conditions that may have been present pre-incident.

The specific function tests of the entire stack and the order in which the tests will be performed will be determined after an incident timeline has been established. The intent of fully assembled function tests are to validate root cause findings, component faults and their impact on the overall functionality. To the extent possible, fault conditions will be recreated prior to function tests. Both well control critical functions and BOP Stack/LMRP release functions will be considered in full function testing. Certain functions may not be possible with the PETU; for example full function of emergency systems is not possible using the PETU.

5.13 Materials Testing and Damage Evaluation

Materials evaluation may include various aspects of the BOP Stack design, damage, or general condition. One aspect will be to determine, using non-destructive methods, the materials of construction of the BOP and components for comparison to design specifications. Another aspect of materials evaluation will be inspection for manufacturing defects, post-manufacture shop and/or field repair defects, and damage assessment. Depending on the findings and type and extent of damage, metallurgical analysis and mechanical testing may be required to provide specific materials properties to enhance the analysis.

Damage to the BOP Stack could have occurred during several possible activities: previous well(s) operation, pre-run maintenance, installation, well blow out, rig failure and riser collapse, intervention and capping, flow of oil and gas through the stack, and removal and transport to the Michoud Assembly facility. An assessment of any such damage will be part of the visual examinations that may be undertaken. Where damage is identified, note of the damage will be taken into consideration when reviewing the ROV video-tapes to try and determine when the damage was first apparent and whether it was the result of intervention activities, fluid flow, normal usage, etc.

In addition to components of the BOP, materials recovered from the wellbore (including drill pipe) will be examined to determine their impact on the BOP functionality. For example, the various pieces of drill pipe will be carefully examined to establish how they sheared and in what sequence and the reasons for their locations in the BOP Stack.

144. Damage and anomalies of a dimensional nature (length, width, depth) will be characterized relatively simply with rulers, calipers, micrometers, pit depth gauges, etc. In addition, the orientation and location of all damage and anomalies will be quantified (relative to some reference point).
145. Crack defects and anomalies are more difficult to characterize. NDE methods such as magnetic particle inspection or dye penetrant testing may be applicable. In addition, simple grinding away of the crack to measure depth can be effective. The method used will depend on the cracks observed and the component configuration where cracks are identified. An NDE certified inspector (certified with the specific tools that will be used) will be used if cracks are identified.
146. NDE testing will be performed wherever possible to minimize the need for disassembly or destructive testing. Until the condition of the BOP is examined, it is not possible to define the requirements or details of the NDE testing.
    a. Due to the thickness of the BOP walls, standard NDE thickness measurements are not likely to provide reliable measurements.

b. A method of damage assessment internal to the wellbore that will be used is a laser scanning 3-D camera. This can provide a high resolution surface topography for dimensioning damage (depth, length, width). The camera is lowered into the wellbore to the desired depth and the camera is rotated to permit the surface of interest to be scanned.

147. The materials testing and damage evaluation will be an integrated part of the above described testing plans (Visual Examination and BOP Function Testing). Many of the procedures listed require condition assessments.

148. Components, parts, and other evidence collected or otherwise removed during the BOP Stack forensic testing (including drill pipe) will be dimensionally measured and the material identified if no part serial number is visible.
   a. Metallic materials can be further characterized metallurgically or through mechanical testing. The decision to perform these analyses will be made on a piece by piece basis.
   b. Elastomeric materials will be examined for dimensional stability (requires the original dimensional specifications) and hardness. The decision to perform these analyses will be made on a piece by piece basis.

5.14 Cataloging and Examination of Recovered Evidence

Significant evidence was recovered during the preservation procedures performed on the Q-4000. This evidence is stored on the Michoud facility in either the "evidence yard" and in other secured storage. In the case of the Q-4000 evidence, the evidence has not been carefully reviewed and preventive measures taken to preserve the evidence. Other evidence from the BOP Stack was recovered during intervention following the incident. All evidence recovered form the BOP Stack will be examined as part of this work. The following procedures will be performed.

149. Carefully photograph and unpack all evidence bags and containers, inspect the evidence, and determine preservation requirements. The following applies to non-fluid samples.
   a. All evidence will be photographed prior to and following inspection, cleaning, measuring, and drying.
      i. The evidence will be photographed in the bag to document the as-received condition. The photograph identification and the evidence identification will be recorded in DNV Lab Notebook 401.
      ii. The evidence will be removed from the as-received packaging and placed on top of the packaging.
      iii. The bag and evidence will be photographed to document the condition of the evidence after removing it from the bag. The photograph identification and the evidence identification will be recorded in DNV Lab Notebook 401.
   b. Visually inspect for damage or anomalies and the extent of damage or anomalies will be measured.
   c. Inspect and make a decision on whether to collect any loose particles, scale, etc.

d. Clean metallic evidence using an inert solvent (e.g. acetone or ethyl alcohol) and a soft bristle brush to remove any scales or deposits on the surface of the evidence.
e. Clean non-metallic evidence with a soft bristle brush without using a solvent (i.e. the solvent may degrade the evidence).
f. Carefully dry samples as part of performing items a. - d. above.
g. The evidence will be photographed after cleaning to document the result of the cleaning process. The photograph identification and the evidence identification will be recorded in DNV Lab Notebook 401.
h. All measurements made on the evidence inspected will be recorded in a dedicated log book for cataloging recovered evidence.
i. Re-packaged samples on an individual basis to provide a dry environment as necessary to preserve the as-retrieved condition and labeled with the exact same evidence number and label as the original package.
j. Samples will be inspected to determine if there are any critical surfaces that should have extra protection against corrosion. These surfaces can be protected by putting a layer of petroleum jelly on the surface.
k. The evidence will then be placed in secure storage either at the USCG evidence yard or DNV's evidence trailer. A logbook detailing the evidence stored in the DNV evidence trailer will be kept inside the evidence trailer at all times. Any removal of evidence from the trailer and addition of evidence to the trailer will require entry in the logbook.

150. All fluid samples will be turned over to the EPA NEIC to provide consistent handling, sample collection (especially from bulk fluid samples), and subsequent testing of the fluids. Detailed procedures and fluid sample handling and testing will be provided by EPA NEIC and appended to this Forensic Testing Plan.
151. All functioning components (e.g. solenoid valves) will be examined for their functionality.

Appendix A

Safety and Health Plan for the BOP Stack Investigation Conducted on the East Dock at the NASA Michoud Facility

(To Be Provided At A Later Date)

<u>Appendix B</u>

Spill Containment Plan for the BOP Stack Investigation Conducted on the East Dock at the NASA Michoud Facility

(To Be Provided At A Later Date)

Appendix C

Hurricane Plan for the BOP Stack Investigation Conducted on the East Dock at the NASA Michoud Facility

(To Be Provided At A Later Date)

DNV Energy

DNV Energy is a leading professional service provider in safeguarding and improving business performance, assisting energy companies along the entire value chain from concept selection through exploration, production, transportation, refining, and distribution. Our broad expertise covers Asset Risk & Operations Management, Enterprise Risk Management; IT Risk Management; Offshore Classification; Safety, Health and Environmental Risk Management; Technology Qualification; and Verification.

DNV Energy Regional Offices:

Asia and Middle East
Det Norske Veritas Sdn Bhd
24th Floor, Menara Weld
Jalan Raja Chulan
50200 Kuala Lumpur
Phone: +603 2050 2888

North America
Det Norske Veritas (USA), Inc.
1400 Ravello Drive
Katy, TX 77449
United States of America
Phone: +281-396-1000

Europe and North Africa
Det Norske Veritas Ltd
Palace House
3 Cathedral Street
London SE1 9DE
United Kingdom
Phone: +44 20 7357 6080

Offshore Class and Inspection
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

Cleaner Energy & Utilities
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

South America and West Africa
Det Norske Veritas Ltda
Rua Sete de Setembro
111/12 Floor
20050006 Rio de Janeiro Brazil
Phone: +55 21 2517 7232

Nordic and Eurasia
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

DET NORSKE VERITAS

Protocol for Metallurgical Examination and Testing of Drill Pipe

[Modification 4 of Contract M10PX00335]

Joint Investigation Team of the
United States Department of the Interior
and the
United States Department of Homeland Security

Bureau of Ocean Energy
Management, Regulation and Enforcement

DNV Reg. No.: ANEUS815NTHO (1-2SC2OV)

PRIVILEGED & CONFIDENTIAL
CLIENT - ATTORNEY WORK PRODUCT

February 3, 2011

Title: Protocol for Metallurgical Examination and Testing of Drill Pipe [Modification 4 of Contract M10PX00335]		DNV COLUMBUS, INC. Materials & Corrosion Technology Center 5777 Frantz Road Dublin, OH 43017-1386 United States Tel: (614) 761-1214 Fax: (614) 761-1633 http://www.dnv.com http://www.dnvcolumbus.com
Customer:	United States Department of Interior – Bureau of Ocean Energy Management, Regulation and Enforcement	
Customer Address:	381 Elden Street Herndon, VA 20170-4879	
Customer Reference:	1-2SC2OV	
Contact Person:	Olivia Adrian and Warren Williamson	
DNV Reference:	ANEUS815NTHO	
Date of Issue:	February 3, 2011	
Terms and Conditions:		
Prepared by/Contact Person: Neil Thompson, Ph.D.	*Position:* Project Manager	*Signature:*
Reviewed by: Gary Kenney, Ph.D.	*Position:* Lead Investigator	*Signature:*
Approved by: Phillip Nidd	*Position:* Deputy Project Manager	*Signature:*

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

This is a modification to the Forensic Testing Plan to address the scope changes to include removal and analysis of the drill pipe contained within the Riser and the drill pipe removed from the Blow Out Preventer (BOP) Stack (BOP and Lower Marine Riser Package (LMRP)) as requested in the "Revised SOW 14Dec2010 - M10PX00335, Modification 4". This protocol provides an outline of the examination and test protocols recommended for the metallurgical examination and testing work.

The investigative process is an iterative process that integrates evidence collection, materials examination and damage assessment, video and photo documentation, metallurgical examination and other physical testing. In addition, as the process proceeds, the findings may dictate the sequence of steps required to balance the processes. Therefore, these protocols are meant to provide a basis for the overall forensic investigation for examining the drill pipe removed from the BOP Stack components and riser. These protocols are not meant to be a step-by-step procedure, but provide more of a roadmap with multiple paths to meeting the objectives. Any procedures that are outside of the expected paths outlined in these protocols will be submitted for approval to the Joint Investigation Team (JIT) prior to proceeding.

2 OBJECTIVES

This investigation will perform a physical examination and metallurgical analysis of the recovered broken and cut pieces of work string (drill pipe) from the BOP Stack and the Riser. The objectives of this investigation are:

- To determine how the recovered drill pipe were originally connected together and their position within the BOP Stack.
- To determine the metallurgical, mechanical, and chemical properties of the drill pipe and how these properties may have affected the functioning of the BOP Stack.
- To examine the sheared and cut ends of the drill pipe and other anomalies along the length of the drill pipe in order to help in establishing the sequence of events directly following the well blow out and subsequent intervention.

Examination of the recovered sections of the work string is expected to provide valuable information to support the primary investigation efforts already underway (see Contract M10PX00335). Specific focus will be put towards determining the original assembly of the work string and identifying if and how the presence of the work string in the BOP Stack and Riser and / or its metallurgical characteristics, may have contributed to the failure of the BOP Stack. All examinations will be performed with a focus on a review and understanding of the original assembly of the work string and the corresponding sequence of events that occurred in the order that the various sections were located as found in the BOP Stack and Riser.

3 SCOPE

The scope of the physical examination and metallurgical analysis of the work string includes the following:

- Photo and video-documentation of the status and assembly of the work string sections as presently trapped within the BOP Stack and Riser.
- Manage the recovery and removal of the work string sections within the BOP Stack and Riser to ensure protection and control of evidence, including photo and video-documentation of activities as necessary.
- Perform evidence collection and control protocols for each section of work string recovered or any sample (liquids or scrapings) recovered during the operations.
- Examine work string and photograph and video document the general condition, dimensional measurements and orientation to confirm detailed positioning with respect to the BOP Stack and Riser.
- After removal of the work string sections from the BOP Stack and Riser, visually examine sections, including photo and video-documentation as necessary. Examination will include measurements of section dimensions and documentation of features observed.
- To the extent possible, reassemble the work string sections to reflect the original configuration of the work string and perform detailed photo and video documentation of all work string fracture points, deformation and / or other forms of damage.
- Inspect any work string fractures, cuts, and sheared surfaces by means of optical magnification; perform macro-photographic documentation of these surfaces.
- Perform microscopic examination of sections of work string recovered, including photo and video documentation as necessary. Where necessary to the forensic investigation, fractographic examinations will be performed on fracture surfaces identified during visual examination.
- Perform hardness measurements on the drill pipe sections in the laboratory.
- Select and remove samples from the work string sections for metallurgical analysis at the DNV Materials and Corrosion Technology Center in Dublin, Ohio. Perform evidence collection and transfer protocols as necessary for transportation of the samples to Dublin, Ohio.
- Perform tensile testing to establish mechanical properties of the materials.

- Perform Charpy V-notch impact testing to establish fracture behavior.
- Perform chemical testing to establish the material composition.
- Where necessary to the forensic investigation, perform microscopic examination of surfaces and/or deposits or scale from samples.
- Compare metallurgical, mechanical, and chemical properties of the drill pipe to applicable standards and specifications.

4 TEST PROTOCOL

4.1 Safety, Health, and Environmental

This protocol will be conducted in accordance with all relevant health, safety and environmental practices as outlined in "5.1 Safety, Health, and Environmental" of **Forensic Testing Plan for the Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package Ref – M10PS00234** dated October 22, 2010.

4.2 Evidence Control

All evidence control procedures will be followed as outlined in "5.2 Evidence Collection and Control" of **Forensic Testing Plan for the Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package Ref – M10PS00234** dated October 22, 2010.

The referenced sections of drill pipe to be subjected to metallurgical examination and testing are as follows:

Table 1 – Drill pipes descriptions.

Item No.	Length (inch)	Description of Sections of Drill Pipe
39	137.25	Recovered from LMRP at the Michoud Facility with top end protruding ~6-inches above upper annular
83	111.60	Recovered from LMRP on the Q4000 inside the flex joint with bottom end resting on upper annular
84	7.50	Recovered from LMRP on the Q4000 on top of the upper annular
94	42.00	Recovered from BOP at the Michoud Facility between the blind shear ram and casing shear ram
148	142.25	Recovered from BOP on the Q4000 between the casing shear ram and lower variable bore ram
1-B-1	111.72	Short section of pipe in Riser from the kink downstream (includes tool joint) recovered from the USCG evidence yard.
1-B-2	30.48	Short section of pipe in Riser from the kink upstream to intervention cut, recovered from the USCG evidence yard..
1-A-1	551.16	Long section of pipe from riser recovered from the USCG evidence yard..

Removal of select samples from the Michoud Facility and transportation to the DNV Materials & Corrosion Technology Center in Dublin, Ohio will be necessary for the laboratory metallurgical analysis. The protocols in place for transfer of evidence control on the site will be extended to allow for transfer off the site. Chains-of-Custody documentation will be completed to release evidence control from the Coast Guard personnel on site to DNV personnel. Samples will be taken to Dublin, Ohio using secure transportation. Chains-of-Custody documentation will be completed as necessary to ensure evidence control from the Michoud Facility to the DNV Technology Center. Upon arrival at the DNV Technology Center, samples will be accepted by an authorized DNV investigator and catalogued within the DNV Quality Assurance (QA) System.

4.3 Video and Photo Documentation

All video and photo documentation procedures will be followed as outlined in “5.3 Video and Photo Documentation” of **Forensic Testing Plan for the Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package Ref – M10PS00234** dated October 22, 2010.

4.4 Recovery and Removal of Sections of the Work String in the Blowout Preventer and Riser

As part of the **Forensic Testing Plan for the Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package Ref – M10PS00234** dated October 22, 2010, recovery of the sections of work string in the blowout preventer were performed.

There also is drill pipe in the Riser which was connected directly above the BOP Stack. The Riser will be cut open and the drill pipe retrieved. Detailed procedures for the removal of drill pipe from the riser are given in Appendix A.

4.5 Materials Damage Evaluation

The following procedures were developed specifically for the drill pipe and based on sections “5.13 Materials Testing and Damage Evaluation and 5.14 Cataloging and Examination of Recovered Evidence” of **Forensic Testing Plan for the Forensic Investigation and Testing of the Blowout Preventer & Lower Marine Riser Package Ref – M10PS00234** dated October 22, 2010.

4.5.1 Visual and Non-Destructive Testing

1. All evidence will be photographed at each step of the evaluation process; prior to and following collection of surface samples, cleaning, and inspection.
2. Photograph the evidence in the as-received condition.
3. Inspect and make a decision on whether to collect any loose particles, scale, deposits, etc.
4. Collect samples of any loose particles, scale, deposits using a scalpel with an uncontaminated blade and each sample shall be placed in a separate, clean, self-

sealing sample bag. All samples shall be entered into evidence. A map of the sample locations shall be produced and supported by high resolution photographs.

5. Clean pipe surfaces using water, detergent and a soft bristle brush.
6. The evidence will be photographed after cleaning.
7. Samples will be inspected to determine if there are any critical surfaces that should have extra protection against corrosion. These surfaces can be protected by putting a layer of petroleum jelly or light oil on the surface.
8. The length of each section of evidence and locations of any identifying marks, welds, etc. shall be measured and recorded. The diameter, wall thickness and circumference of each evidence section shall be measured at several locations along the length of the evidence.
    a. Mark a longitudinal line on the sample external surface.
    b. Mark parallel circumferential lines 12-inches apart on the external surface normal to the longitudinal datum.
    c. Measure the pipe circumference at each of the 12-inch positions.
    d. Measure the distances of the fracture surfaces from the nearest circumferential line.
    e. All recordings shall be mapped in accordance with each sample measurement and the corresponding location on each pipe section; all data shall be recorded by written record with supporting high resolution photographs.
9. Characterize damage and anomalies of a dimensional nature (length, width, depth) by tape, ruler, calipers, micrometer gauge or pit depth gauge, as appropriate. Locate and orient features relative to a reference location on the section (that is from a specified end, joint, or other significant feature).
10. Characterize crack defects and anomalies away from sheared surfaces and those associated with sheared surfaces.
    a. For those crack defects away from sheared surfaces; Non-Destructive Examination (NDE) methods such as magnetic particle inspection or dye penetrant testing may be applicable. In addition, simple grinding away of the crack to measure depth can be effective. The method used will depend on the cracks observed and the component configuration where cracks are identified. An NDE certified inspector (certified with the specific tools that will be used) will be used if cracks are identified.
    b. For those cracks associated with sheared surfaces, characterize length and width of crack and crack location with respect to sheared surface (laser profilometer is one such method).
11. NDE testing will be performed wherever possible to minimize the need for disassembly or destructive testing.
12. Characterize the inside of the drill pipe using a borescope.

13. Based on information collected, lay out the drill pipe sections in their relative positions with respect to where they were collected in order to establish the overall pattern of damage. Fracture, sheared, cut surfaces MUST NOT be placed into contact with each other. All data shall be recorded by written record with supporting high resolution photographs. A drawing of the pieces should be made showing the orientation and location of the individual pieces.
14. Inspect all fracture surfaces and adjacent material using hand-held magnifying lenses and, where possible, a stereoscopic microscope at up to X50 magnification.
15. Map the fracture morphology (laser scanning profilometer can be used). The fracture surfaces can be cleaned with a soft bristle brush and water with a non-abrasive detergent to see any details on the fracture surface.
16. Field-microscopic examination can be performed on various surfaces of sections of work string recovered from the BOP Stack and Riser as needed. The surfaces selected for detailed examination will be based largely on damage identified during the visual examination. These examinations will be photo-documented. In addition to a field stereo microscope, laser scanning profilometer will be used to characterize sheared surfaces from each end of the pipe sections.

4.5.2 Destructive Analysis of Work String Samples

A detailed metallurgical analysis of the sections of work string recovered from the BOP Stack and Riser requires that destructive analysis techniques be used. Destructive analyses are necessary to verify the microstructural morphology of the work string materials and to accurately measure mechanical and chemical properties of the work string materials. Given that materials can vary in strength from sample to sample, it is important to the overall investigation to establish the specific material properties of each of the drill string's components.

In order for the destructive analysis to be performed, it is essential that all necessary non-destructive analysis be complete before any samples are removed. For this phase of the work, samples will be transported to the DNV Materials & Corrosion Technology Center in Dublin, Ohio. Evidence tracking protocols will be followed as necessary, as described above.

4.5.2.1 Hardness Measurements

Work string components removed for metallurgical testing will be subjected to material hardness tests.

4.5.2.2 Metallographic Analysis

Representative coupons from the drill pipe recovered from the BOP Stack and Riser will be examined for metallographic analysis. The metallurgical ring samples will consist of a 3-inch full circumference cut-out of each drill pipe section. In general, the metallurgical ring samples will be cut from the center of the drill pipe sections away from the sheared surfaces and other damage noted on the drill pipe sections (See Appendices B and C). In addition, borescope viewing of the internal surfaces of the drill pipe sections will be performed to make sure that removing the test coupons does not compromise any areas of internal damage that may be of interest to the investigation.

17. Metallographic ring samples will be taken from areas of each drill pipe section from a central location away from the sheared or cut ends and away from any significant damage.
    a. Drill pipe Item Nos. 39, 83, 94, 148, 1-B-2, and 1-A-1 will have metallurgical coupons removed for analysis. No metallurgical ring sample of Item 84 will be tested due to the short length of Item 84 and due to the fact that its attachment to Item 83 can be well established. See Appendix B for locations of 3-inch metallurgical ring samples and Appendix C for location of the one-inch metallurgical ring sample for Item No. 1-B-1.
    b. Cut full circumferential metallurgical ring samples from each of the drill pipe sections.
        i. Use a portable band saw, circular saw with cut-off blade for steel, or an abrasive cut-off blade.
        ii. Make cuts slow to minimize over heating.
    c. Enter the metallurgical ring samples into the evidence log
    d. Ship metallurgical ring samples to DNV Columbus' Technology Center laboratory in Dublin Ohio for Metallurgical Testing.
18. From each 3-inch ring sample, cut ¾-inch metallurgical coupon full circumferential ring from end of 3-inch ring for transverse-section metallurgical analysis.
    a. Use fluid cooled band saw to make cut.
    b. Mount metallurgical coupons to analyze fresh cut surface.
19. From the remaining material from each 3-inch ring sample, cut a longitudinal section approximately ¾-inch wide for longitudinal-section metallurgical analysis.
    a. Use fluid cooled band saw to make cut.
20. Mount metallurgical coupons (transverse-section and longitudinal sections) in epoxy, grind, and polish the mounted sections with successively finer grits to a final polish of 1 micron diamond paste.
21. View the metallurgical sections in the as-polished condition using an optical microscope and document the appearance as needed with digital photo-micrographs.
22. Document the extent of wall loss and/or other visible anomalies, if any, of the metallurgical sections.
23. Etch the polished metallurgical section coupons using an appropriate etching agent (for example Nital for carbon steel). View the coupons in the as-etched condition using an optical microscope and document the microstructural appearance with digital photomicrographs.

24. Record micro-hardness profiles at appropriate locations and orientations. Knoop micro-hardness (ASTM E384) traverses of the base metal will be recorded from the metallographic cross-section coupons, by taking measurements perpendicular to the ID/OD surface.
25. Data collected will be placed in the laboratory notebook. This data will later be entered into the electronic database.
26. Compare metallurgical property data to applicable standards and specifications for drill pipe.

4.5.2.3 Mechanical Analysis

Tensile test samples will be machined from selected sections of drill pipe recovered. The mechanical test coupon for mechanical analyses (tensile and impact tests) will consist an 18-inch long full circumference cut-out of the drill pipe sections. The mechanical test coupon will be cut from the center of the drill pipe sections away from the sheared surfaces and other damage noted on the drill pipe sections. In addition, borescope viewing of the internal surfaces of the drill pipe sections will be performed to make sure that removing the test coupons does not compromise any areas of internal damage that may be of interest to the investigation. Mechanical test coupons are not expected to be taken from each drill pipe section. The drill pipe sections to be tested for mechanical properties will be selected following removal and initial inspection of all of the drill pipe sections. Appendix B details the locations from which mechanical test coupons will be removed.

27. Mechanical test coupons will be taken from areas of selected drill pipe sections from a central location away from the sheared or cut ends and away from any significant damage (see Appendix B).
    a. Two or three drill pipe sections will be selected to remove coupons for mechanical property testing.
    b. Cut full circumferential ring coupons, 18-inch in length from each of the selected drill pipe sections.
        i. Utilize a circular saw with cut-off blade for steel or an abrasive cut-off blade.
        ii. Make cuts slow to minimize over heating.
    c. Enter the ring coupons into the evidence log
    d. Ship ring coupon to DNV Columbus' Technology Center laboratory in Dublin Ohio for Metallurgical Testing.
28. From each 18-inch ring sample, appropriate mechanical test specimens will be machined.
29. Tensile testing to be conducted according to ASTM A370.
    a. Dog-bone shaped tensile test specimens will be prepared from the axial direction of the pipe.

   b. Stress-strain curves will be determined and the yield strength and ultimate tensile strength, and elongation will be determined.
30. Charpy V-notch testing to be conducted according to ASTM E23.
   a. Sub-sized Charpy – V notch (CVN) impact specimens will be machined from the drill pipe samples.
   b. Full CVN curves (approximately 6 notched bar specimens per curve) will be determined.
   c. Notch orientation for CVN specimens.
      i. Axially direction specimens – through wall notch (crack propagation in transverse direction)
   d. Data collected will be placed in the laboratory notebook. This data will later be entered into the electronic database.
31. Compare mechanical property data to applicable standards and specifications for drill pipe.

4.5.2.4 Chemical Analysis of Drill Pipe

32. Chemical composition coupons will be taken from remaining metal for each 3-inch ring coupon.
33. Photo-documentation will be done to show where samples were taken from the 3-inch ring coupon.
34. Bulk chemical composition will be measured using optical emission spectroscopy (OES) analysis per ASTM E415.
35. Data collected will be placed in the laboratory notebook. This data will later be entered into the electronic database.
36. Compare chemical property data to applicable standards and specifications for drill pipe.

4.5.2.5 Chemical Analysis of Deposits

37. Samples of loose particles, scale, surface deposits, etc. can be analyzed to establish their chemical composition by the following methods:
   a. SEM using x-ray Energy Dispersive Spectroscopy (EDS) techniques can be performed in order to establish the elemental composition.
   b. X-ray diffraction (XRD) can be performed to determine the structure of any crystalline compounds.
   c. MIC indicator kits can be inoculated to determine the likelihood for microbiological activity.

4.5.2.6 Analysis of Fracture / Sheared Pipe Ends

38. Samples from four of the pipe section ends selected for analysis of their fracture / sheared surfaces (see Appendix D). Analyses will include:

a. SEM to examine surface features.
b. EDS to examine semi-quantitative surface chemistries.

4.5.2.7 Scanning Electron Microscopy (SEM)

39. Samples selected from metallographic coupons, deposit/scale samples, and samples of debris will be considered for examination using SEM and EDS. Samples will be prepared on a case-by-case basis depending on type of sample to be tested.

5 SHIPPING AND RECEIVING OF EVIDENCE

5.1 Shipping of Evidence

40. Samples are to be packed in well-marked containers of sufficient strength to protect the specimens from damage during shipment.
41. Containers are to be filled with foam particles or other approved insulating and protective material to limit movement of the evidence samples within the container and to provide maximum protection in case of shipping incidents.
42. A completed CHAIN OF CUSTODY FORM is to be placed inside each shipping container and the contents of each container is to be photo-documented prior to secure sealing of the container for shipping.
43. Shipping is to be managed and facilitated by Site personnel. The Evidence Controller will provide completed CHAIN OF CUSTODY FORM(S) along with the Master Shipping List summary of all evidence samples.
44. Photo-document the CHAIN OF CUSTODY FORM(S).
45. In the event that a CHAIN OF CUSTODY FORM is unavailable, a form should be made that includes:
    a. Originating Location. Identify the person that is responsible for the logistics for getting the material transported.
    b. Authorization for Transmittal. Similar to originating location item, but may also be directed by management and/or counsel.
    c. Itemized Description. List each sample provided. Provide a picture of the materials prior to transport, if possible.
    d. Transporter. Identify the transporter.
    e. Destination Location. Identify the contact person receiving the items.
    f. Signatures. The form should be signed by the person responsible for transporting the samples and the person responsible for receiving the samples.

5.2 Receipt of Evidence Samples

46. Evidence samples are to be received in accordance with the following.
    a. The Recipient shall complete a thorough review of the commercial shipping invoice, documentation and packing list and account for all item

package containers defined in the shipping documentation when accepting delivery.

b. The Recipient shall perform an itemized inventory of all samples against the Master Shipping List to verify the sample identification and physical condition after shipping.
c. Photo-documentation should be done by the recipient of all samples received while they are still in their containers. Video-documentation should also be done if possible.
d. The Recipient shall complete and sign the attached CHAIN OF CUSTODY FORMs, validating the accurate inventory of all evidence samples received.
e. The Recipient shall forward copies of the completed CHAIN OF CUSTODY FORM for receipt of samples to Sender. Completed CHAIN OF CUSTODY FORMs validating the samples inventory are to be forwarded upon re-shipment of sample(s).
f. Samples shall be logged into the laboratory log sample book. Each sample will be given a laboratory reference identification number. This information will be entered into the electronic database.

APPENDIX A

REMOVAL OF DRILL PIPE FROM THE RISER

APPENDIX A: REMOVAL OF DRILL PIPE FROM THE RISER

Two sections of drill pipe are trapped within a section of the Riser that was connected to the Flex Joint located on top of the LMRP. A part of determining whether the BOP functioned or not will be to try and match the drill pipe recovered from the LMRP and BOP to each other as well as to the sections of pipe that are currently within the Riser.

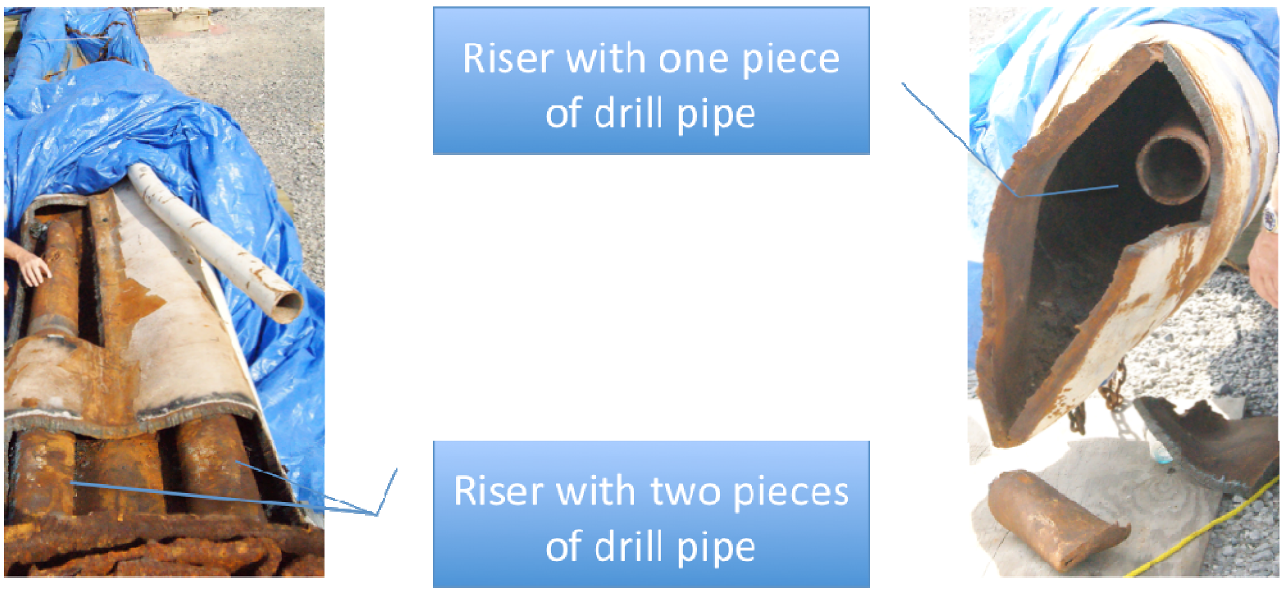


Figure 1 - Photograph of Riser showing two pieces of drill pipe at downstream end of riser and only one piece of drill pipe at upstream end of riser.

A ‘window’ has already been cut into the side of the Riser to expose the pipe trapped inside. To complete the investigations there is a need to remove the sections of pipe within the Riser and to examine the various failure surfaces on that drill pipe as a means to determine if they match to failure surfaces seen in the drill pipe removed from the LMRP and BOP.

The collapse of the riser along this approximately 30 foot section is almost complete trapping the pipe along its entire length. To retrieve the drill pipe from inside will likely require the Riser to be cut open.

1. The internal surfaces will be examined using a borescope to identify any internal features that may prevent performing the cutting operations as planned. Also to be sure that the planned cutting operations will produce minimal damage to the drill pipe.
2. Adjust cutting plan to account for borescope findings.

3. Clearly mark the riser as to the cuts to be made (see Figure 2, Figure 3, and Figure 4)
4. All cuts will be made with a plasma torch.
5. The first longitudinal cut will be down the middle on the riser top surface from the cut-out nearest the buckle end of the riser down to the flange (see Figure 3).
6. Eyelets will be welded to the top piece of the riser to permit attachment for lifting.
7. The second longitudinal cut will be down the edge of the riser the length of the drill pipe from the cut-out nearest the buckle end of the riser down to the flange (see Figure 2). This cut must be performed carefully to produce a vertical angle directing any metal splatter from the cutting operation to the far side of the internal riser surface and away from the drill pipe.
8. Cut the riser at the 90^{o} buckle and downstream to remove the top (as positioned in the evidence yard) of the riser (see Figure 4).
9. Remove the short piece of drill pipe from the buckle portion of the riser.
10. Remove the long piece of drill pipe from riser by carefully pulling the drill pipe out of the flanged (upstream) portion of the riser (portion not cut).

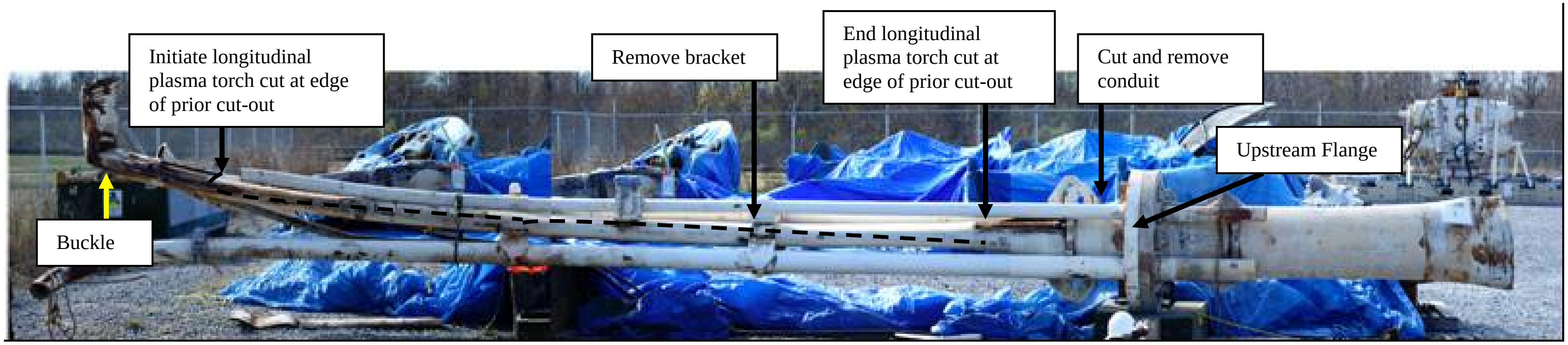


Figure 2 – Longitudinal cut on the edge of the riser.

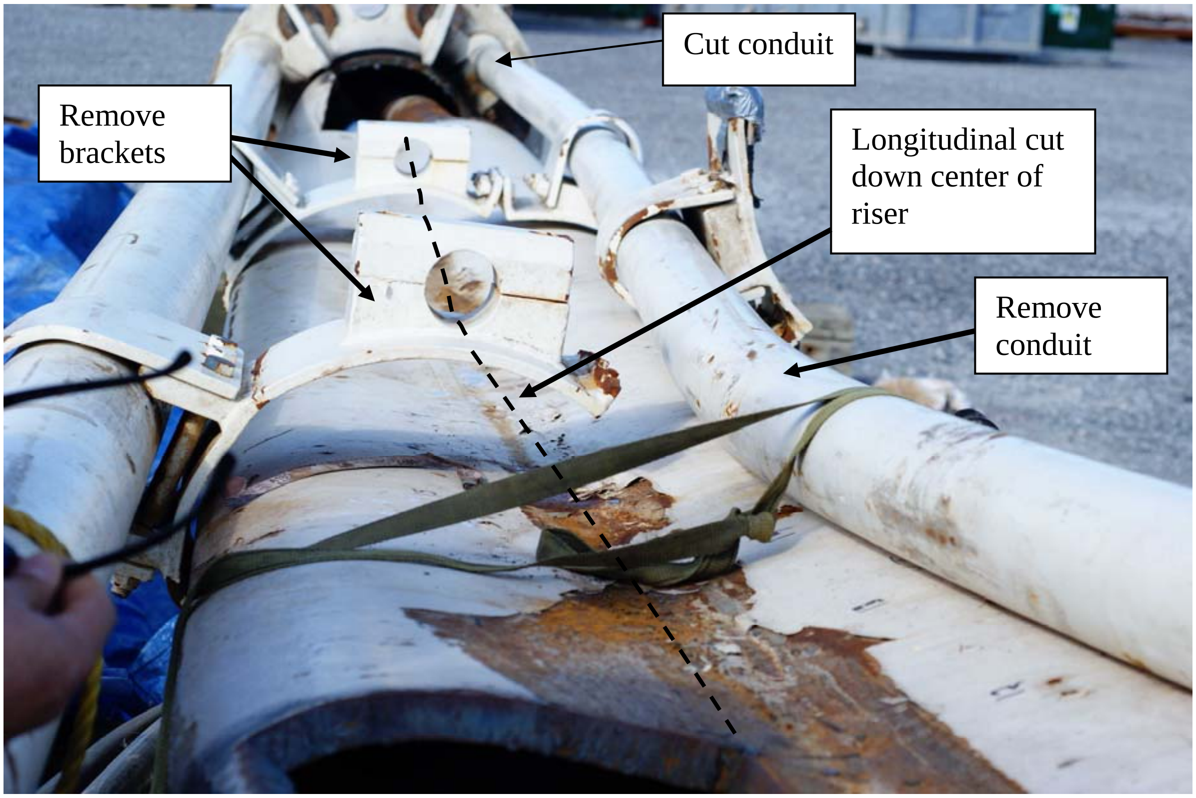


Figure 3 – Longitudinal cut down center of riser.

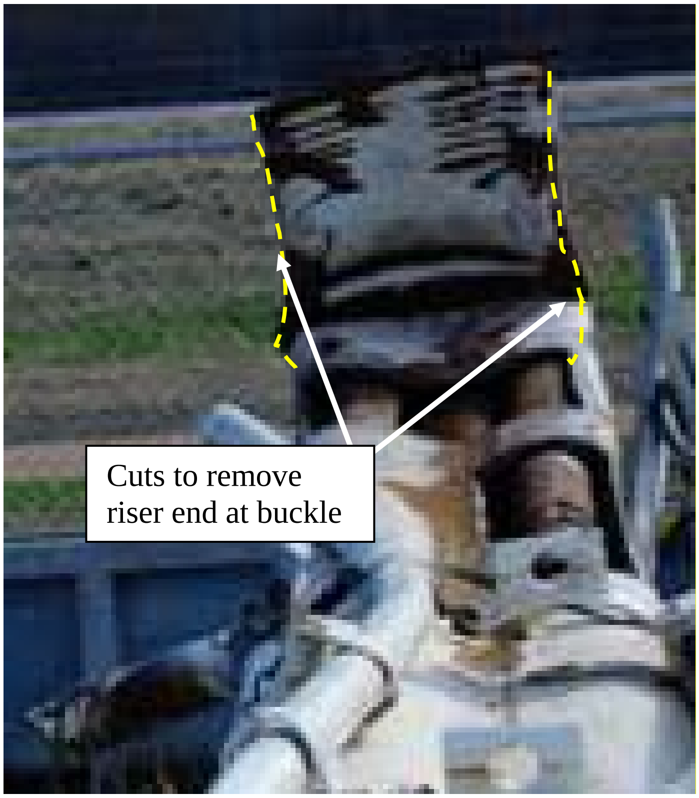


Figure 4 – Cuts to remove riser from ends of drill pipe at 90^o bend.

APPENDIX B

REMOVAL OF METALLURGICAL AND MECHANICAL SAMPLES FROM RECOVERED PIPE SECTIONS

APPENDIX B: REMOVAL OF METALLURGICAL AND MECHANICAL SAMPLES FROM RECOVERED PIPE SECTIONS

Metallurgical analysis will be conducted on select pipe sections recovered during the forensic analysis. In total, seven sections of drill pipe were recovered. Metallurgical ring samples will be cut from six of the recovered pipe section. Table 2 details the locations of the samples that will be removed from the various drill pipe sections. Metallurgical sample are in general removed from the center portion of the pipe unless noted in Table 2. Mechanical ring samples (18 inches in length) will be taken from Items No. 83 and 39 (dimensions included in Table 2).

Table 2 - Location and identification of the types of samples for metallurgical and Mechanical analyses.

Item Number	Length inches	Samples to be removed for metallurgical analyses(1)	Distance from the Downstream end of the pipe section (inches)
148 (2)	142.25	M,C	114.84 to 117.84
94	42.00	M,C	19.25 to 22.25
83	111.60	M, C, TC	41.75 to 63.75
1-B-2(3)	30.48	M,C	15.60 to 18.60
39	137.25	M, C, TC	59.19 to 81.19
1-A-1	551.26	M, C	341.28 to 344.28

(1) M = Metallurgical Samples, C = Chemistry Samples, TC = Tensile and Charpy Samples (Mechanicals)
(2) Sample will be taken toward the end, adjacent to debris to be recovered in the drill pipe.
(3) Sample will be removed toward the end to be away from undeformed end.

Transverse cuts at the locations identified in Table 2 will be completed to remove the necessary samples for metallurgical and mechanical examinations. The internal surfaces of the pipe sections have been examined with a borescope to confirm that the internal surfaces are devoid of any internal features. The parts to be cut have been clearly marked on the external surface of the pipe section. All cuts will be made with a portable band saw (dry cut) or circular saw.

APPENDIX C

REMOVAL OF METALLURGICAL SAMPLE FROM RECOVERED PIPE SECTION 1-B-1

APPENDIX C - REMOVAL OF METALLURGICAL SAMPLE FROM RECOVERED PIPE SECTION 1-B-1

Because of the constraints posed by the fracture / sheared surface and the corresponding friction weld at the pipe joint, a one-inch metallurgical ring sample (as opposed to typical 3-inch sample) will be selected for the downstream end of Item No. 1-B-1 (Table 3). Figure 5 shows the location on Item No. 1-B-1 from which the one-inch metallurgical sample will be removed.

Table 3 - Location and identification of the sample for metallurgical analyses for Item No. 1-B-1
.

Item Number	Length inches	Samples to be removed for metallurgical analyses(1)	Distance from the Downstream end of the pipe section (inches)
1-B-1	111.72	M, C	5.5 to 6.5

(1) M = Metallurgical Samples, C = Chemistry Samples, TC = Tensile and Charpy Samples (Mechanicals)

Transverse cuts at the locations identified in Table 3 will be completed to remove the one-inch sample for metallurgical examinations. The internal surfaces of the pipe sections have been examined to confirm that the internal surfaces are devoid of any internal features. The parts to be cut have been clearly marked on the external surface of the pipe section. Cuts will be made with a portable band saw (dry cut) or circular saw.

Figure 5 – Area to cut Item No. 1-B-1.

APPENDIX D

REMOVAL OF SHEARED DRILL PIPE ENDS FOR SECTIONS 83 AND 94.

APPENDIX D - REMOVAL OF SHEARED DRILL PIPE ENDS FOR SECTIONS 83 AND 94.

Four fracture / sheared surfaces will be cut from the ends of Item Nos. 94 (downstream end), 83 (upstream end), 1-B-1 (downstream end), and 39 (upstream end). See Table 4 for details. No new cuts are required for Item No. 1-B-1 because the metallurgical cut (see Appendix C) is near the fracture / sheared surface.

Table 4 - Location and identification of the sample for fracture / sheared surface analyses.

Item Number	Length inches	Samples to be removed for fracture surface examination	Distance from the end of the pipe section (inches)
94	41.76	Downstream End	4” from nearest fracture feature
83	111.60	Upstream End	4” from nearest fracture feature
39	137.25	Upstream End	4” from nearest fracture feature
1-B-1	111.72	Downstream End	Remaining section from metallurgical sample cut (Table 3)

Transverse cuts at the locations identified in Table 4 will be completed to remove the selected fracture / sheared ends of the pipes. The internal surfaces of the pipe sections have been examined to confirm that the internal surfaces are devoid of any internal features. The parts to be cut have been clearly marked on the external surface of the pipe section. Cuts will be made with a portable band saw (dry cut) or circular saw.

DNV Energy

DNV Energy is a leading professional service provider in safeguarding and improving business performance, assisting energy companies along the entire value chain from concept selection through exploration, production, transportation, refining, and distribution. Our broad expertise covers Asset Risk & Operations Management, Enterprise Risk Management; IT Risk Management; Offshore Classification; Safety, Health and Environmental Risk Management; Technology Qualification; and Verification.

DNV Energy Regional Offices:

Asia and Middle East
Det Norske Veritas Sdn Bhd
24th Floor, Menara Weld
Jalan Raja Chulan
50200 Kuala Lumpur
Phone: +603 2050 2888

North America
Det Norske Veritas (USA), Inc.
1400 Ravello Drive
Katy, TX 77449
United States of America
Phone: +281-396-1000

Europe and North Africa
Det Norske Veritas Ltd
Palace House
3 Cathedral Street
London SE1 9DE
United Kingdom
Phone: +44 20 7357 6080

Offshore Class and Inspection
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

Cleaner Energy & Utilities
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

South America and West Africa
Det Norske Veritas Ltda
Rua Sete de Setembro
111/12 Floor
20050006 Rio de Janeiro Brazil
Phone: +55 21 2517 7232

Nordic and Eurasia
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

TEST PROCEDURE

FRACTURED / SHEARED RECOVERED DRILL PIPE ENDS

OVERVIEW

Four fractured / sheared surfaces were cut from the ends of Item Nos. 94 (downstream end), 83 (upstream end), 1-B-1 (downstream end), and 39 (upstream end). See Table 1 for details. Items 94 (downstream end) and 83 (upstream end) are suspected to be mating surfaces as are Items 1-B-1 (downstream end), and 39 (upstream end).

Table 1 - Location and identification of the sample for fracture / sheared surface analyses.

Item Number	Length inches	Samples removed for fracture surface examination	Distance from the end of the pipe section (inches)
94	41.76	Downstream End	4" from nearest fracture feature
83	111.60	Upstream End	4" from nearest fracture feature
39	137.25	Upstream End	4" from nearest fracture feature
1-B-1	111.72	Downstream End	Remaining section from metallurgical sample cut

PURPOSE

The purpose of this testing is to establish the likelihood of the fractured / sheared surfaces being mating surfaces as suggested above.

TESTING

The examination of the fractured / sheared pipe ends will be performed following the procedures provided below. As the examination progresses, additional items for examination may be identified. These will be discussed with the parties participating in the investigation and approval from the JIT will be requested where appropriate.

1. Photograph Items 94, 83, 39, and 1-B-1 in detail to clearly describe the fractured or sheared surfaces. Attention will be given to the following:

    a. Ends and surfaces that are curled into the ID of the pipe.

    b. Wear / erosion markings.

2. Examine surfaces using a stereo microscope where appropriate.

3. Cut Item 83-Z to reveal the surfaces that are curled into the ID of the pipe (see Figure 1 and **Error! Not a valid bookmark self-reference.**).

4. Examine and photograph the cut surfaces from both sides of the pipe section Item 83-Z.

5. Cut fracture surface area from Item 1-B-1-Z (see Figure 3 and Figure 4).

6. Prepare cut pieces for insertion into the Scanning Electron Microscope (SEM). This applies to samples cut from both sides of the pipe section Item 83-Z and Item 1-B-1-Z.

    a. The height of the sample is critical for fitting into the SEM.

    b. A second cut for Item 83-Z will likely be required to maintain a maximum height of approximately 0.5-inches. This cut will be made following examination after the initial cuts on both sides of the pipe.

    c. It is expected that the total length of the cut sample will fit into the SEM, but this will be evaluated following the previous cuts.

7. Examine the surfaces in the SEM.

    a. General features of surfaces.

    b. Perform Energy Dispersive Spectroscopy (EDS) on surfaces of interest.

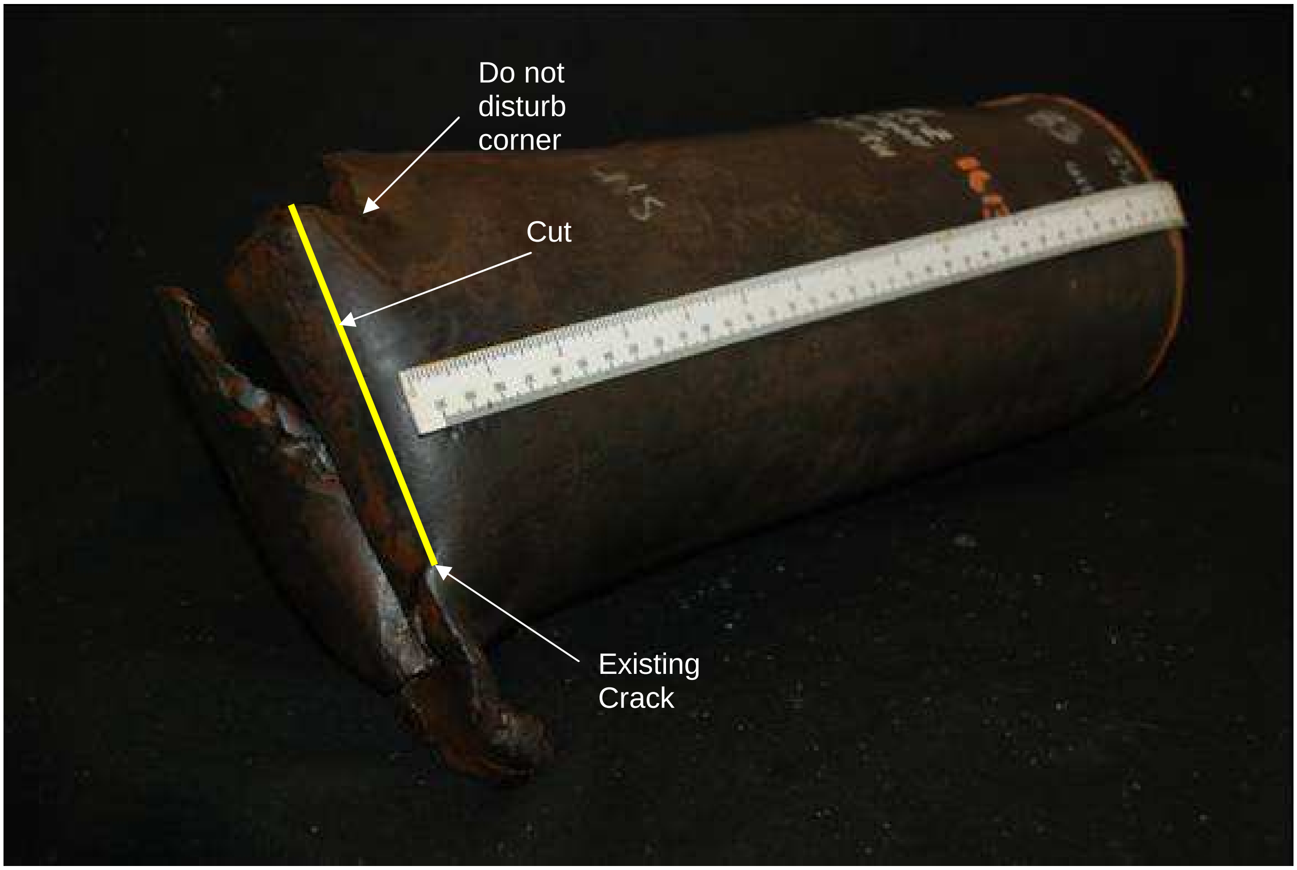


Figure 1 – Documentation of the proposed cut on Item 83 on the side without the "flat"

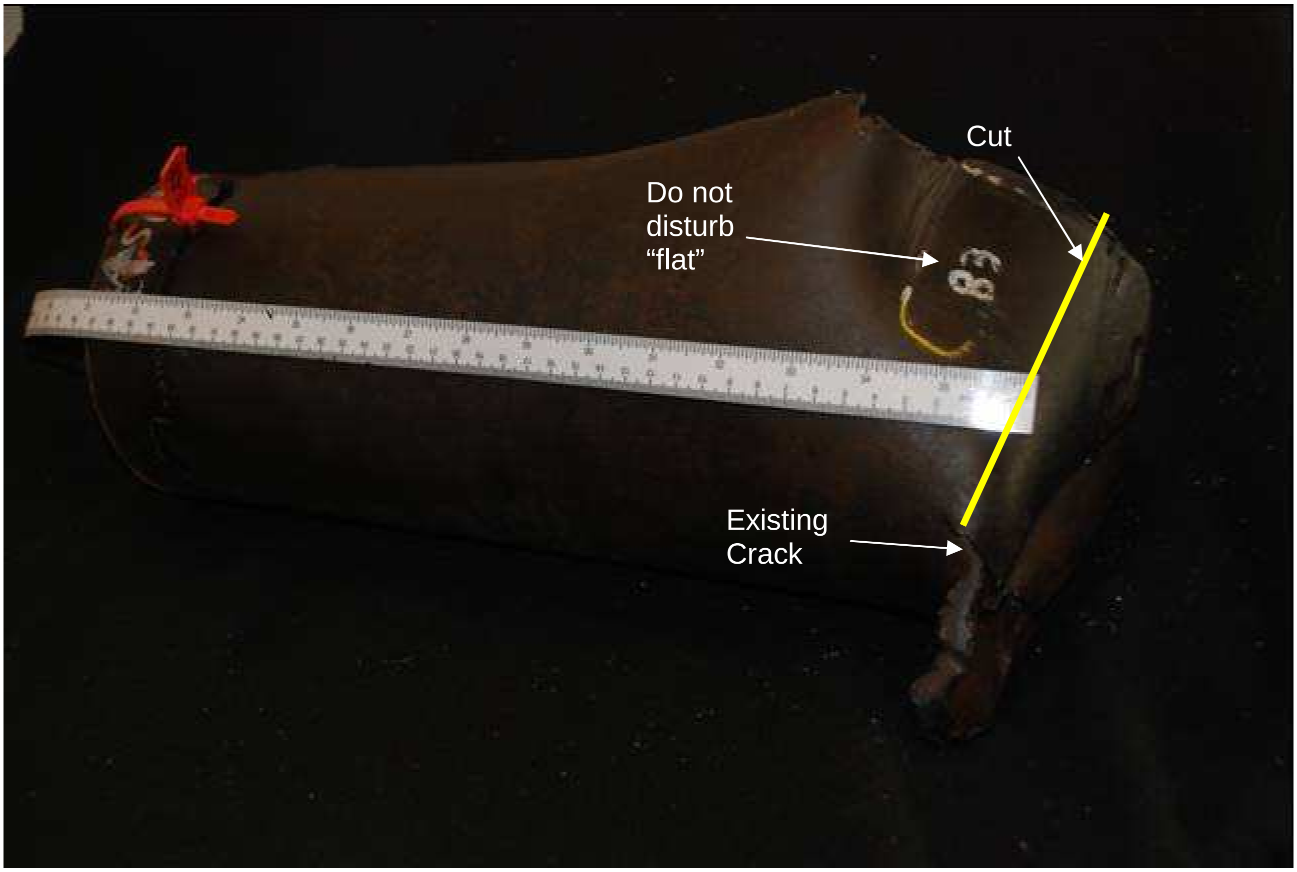


Figure 2 - Documentation of the proposed cut on Item 83 on the side with the “flat”

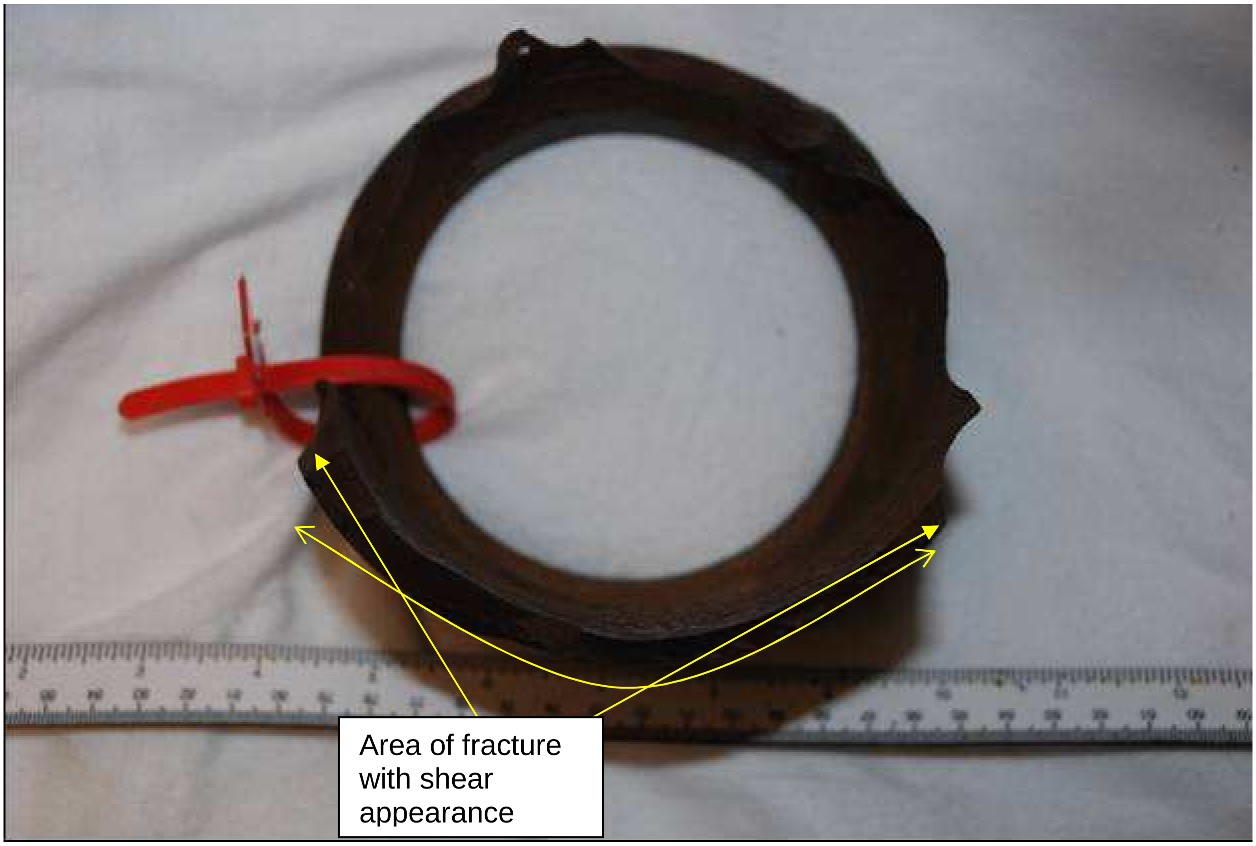


Figure 3 – Top view of Item 1-B-1-Z

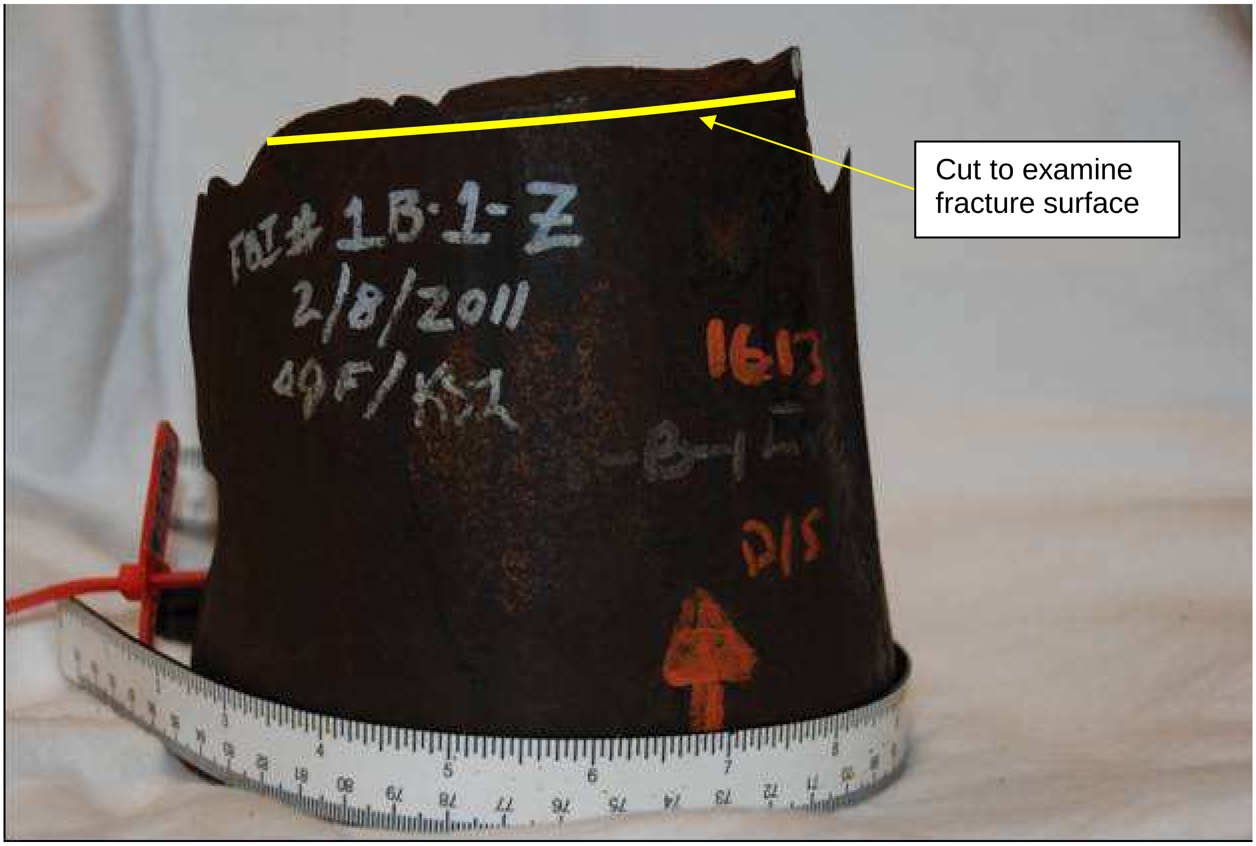
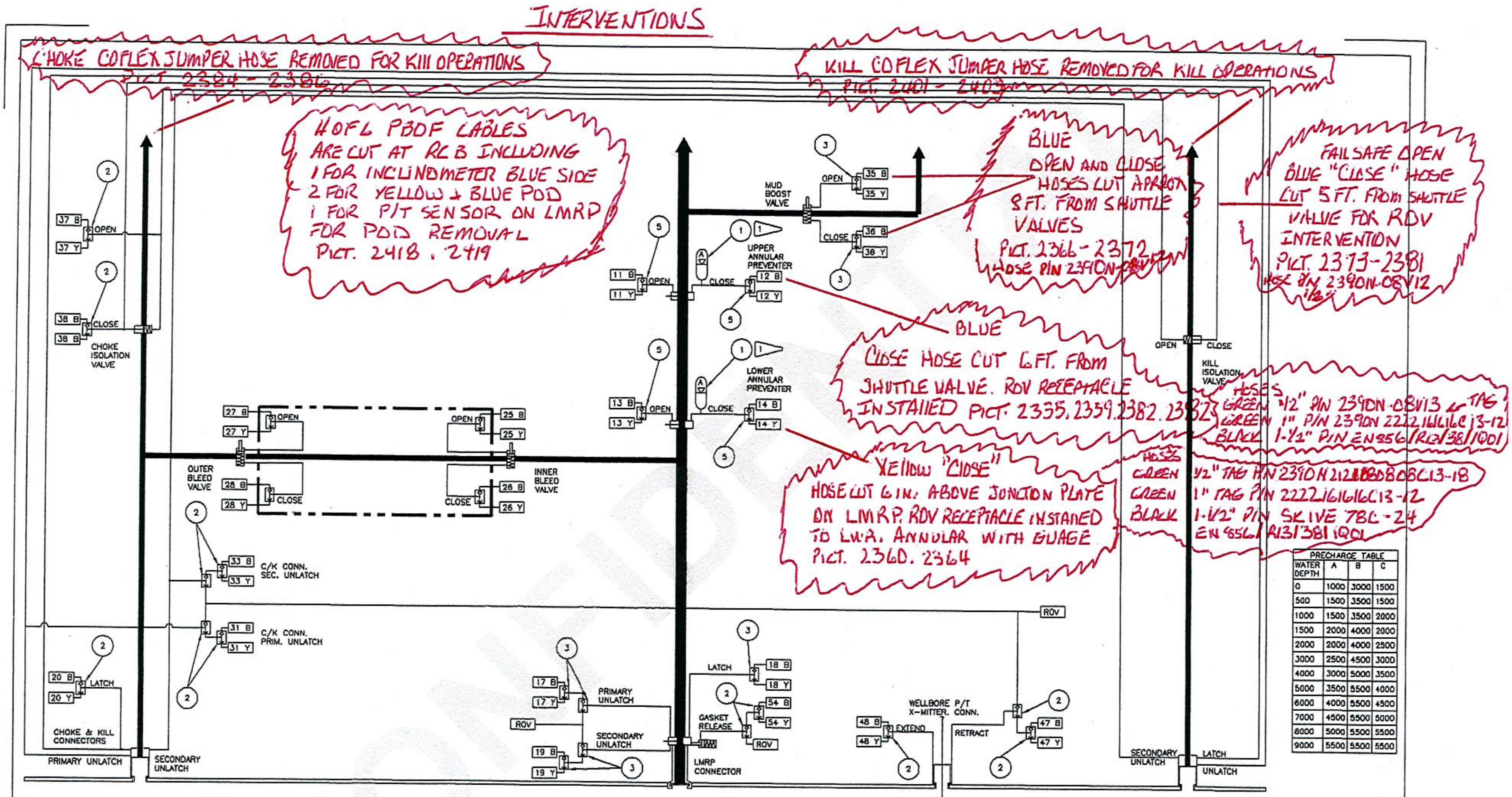


Figure 4 – Area to be cut from Item 1-B-1-Z.

APPENDIX B

SCANNED DRAWINGS



PRECHARGE TABLE			
WATER DEPTH	A	B	C
0	1000	3000	1500
500	1500	3500	1500
1000	1500	3500	2000
1500	2000	4000	2000
2000	2000	4000	2500
3000	2500	4500	3000
4000	3000	5000	3500
5000	3500	5500	4000
6000	4000	5500	4500
7000	4500	5500	5000
8000	5000	5500	5500
9000	5500	5500	5500

NOTES:

1. ACCUMULATOR ITEM NUMBERS ARE SHOWN ON BOM 2185069-21
2. SEE PRECHARGE TABLE FOR PRECHARGE INFO

R & B FALCON "DEEPWATER HORIZON"

REV. BY: M. Cloessens DATE: 09/13/04 REV: 04

CAMERON CONTROLS — COOPER CAMERON Corp., CAMERON Division, P.O. Box 1212, Houston, TX 77251-1212

STACK FLOW DIAGRAM

DO NOT SCALE

DRAWN: J. Williams DATE: 7/13/1999

CHECKED: L. Nitchell DATE: 6/13/2002

APPROVED: R. Arbor DATE: 6/13/2002

SURFACE TREATMENT

TOLERANCE UNLESS OTHERWISE SPECIFIED

MATERIAL AND HEAT TREATMENT

EST. WEIGHT:

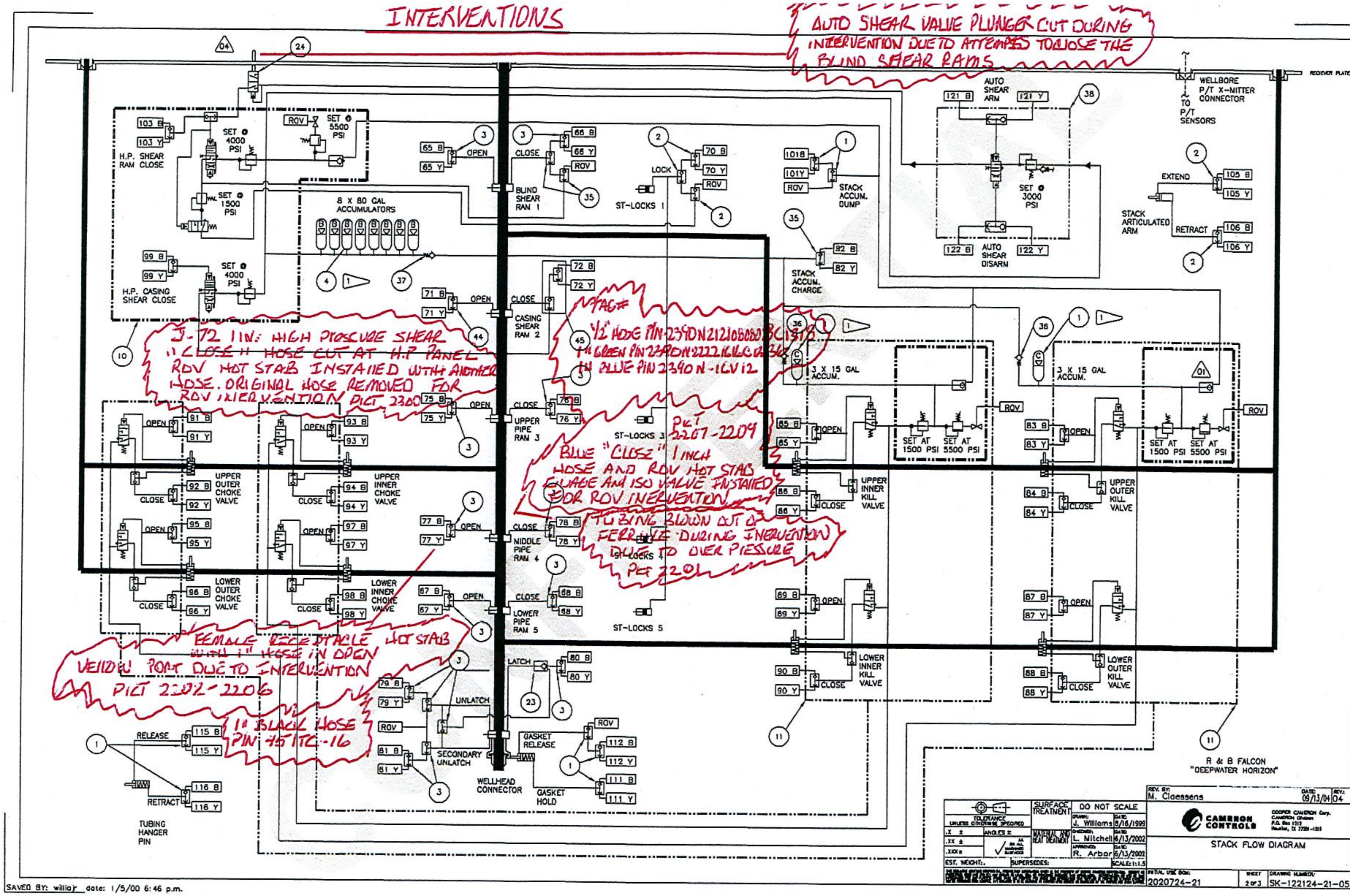
SUPERSEDES:

SCALE:

INITIAL USE BOM: 2020724-21

DRAWING NUMBER: SK-122124-21-05

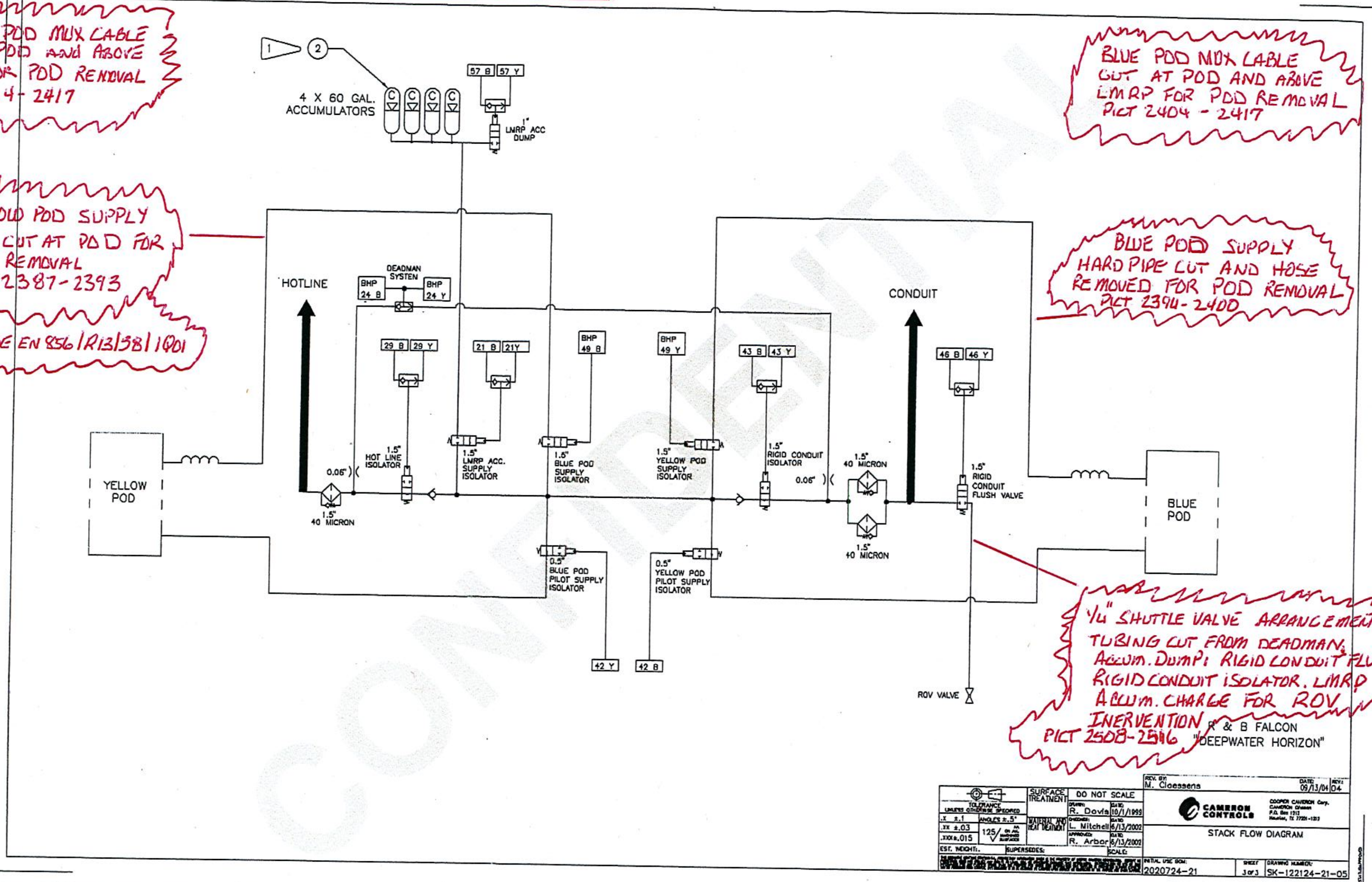
4/23/2010 1:45:52 PM SAP-CORONADOR SK-122124-21-05_001_000.00_CURRENT_CCP100.TIF



FOIA Exempt: Trade Secret and/or Confidential Business Information - Confidential Treatment Requested

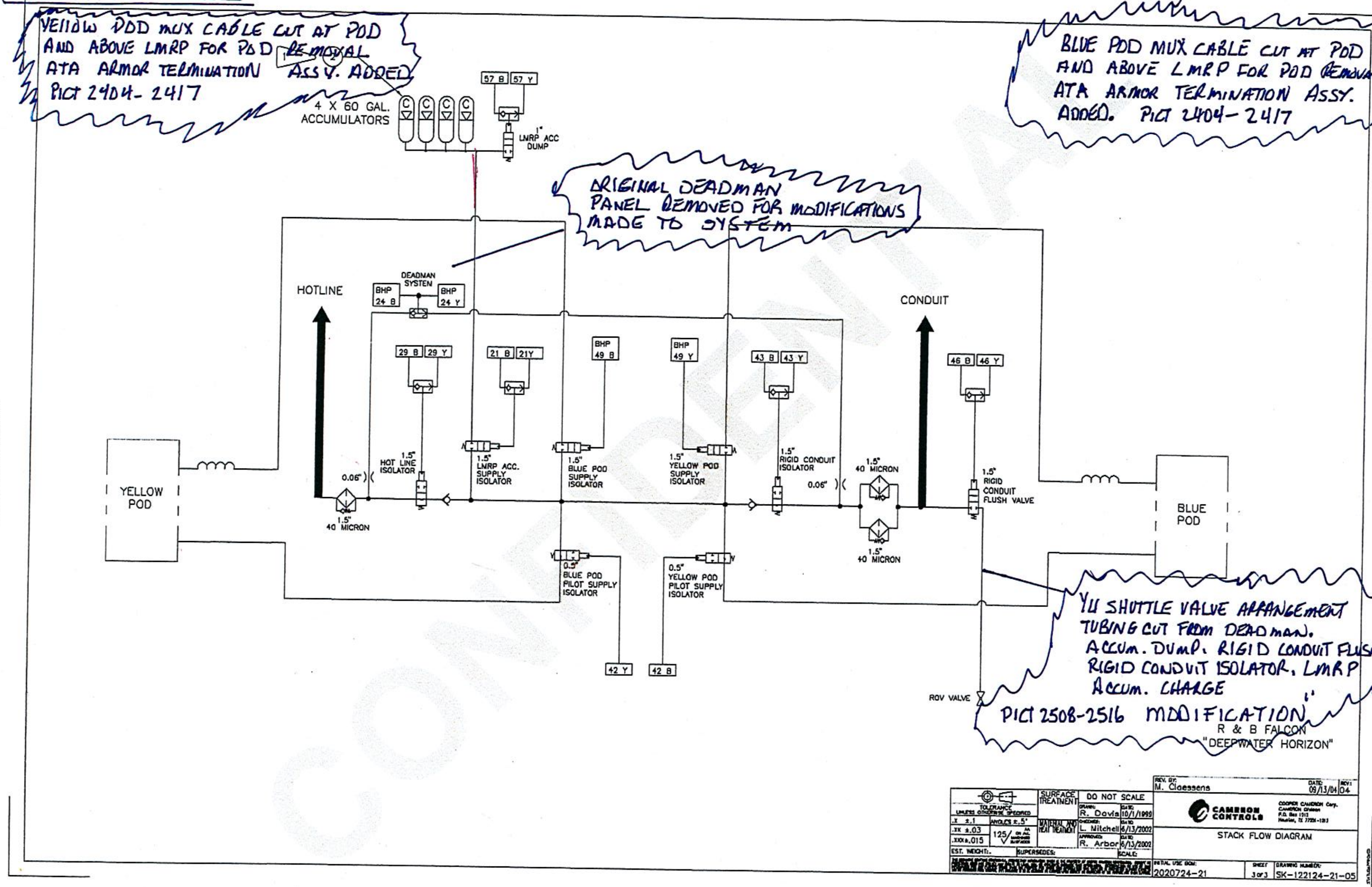
TRN-USCG_MMS-00042587

INTERVENTIONS

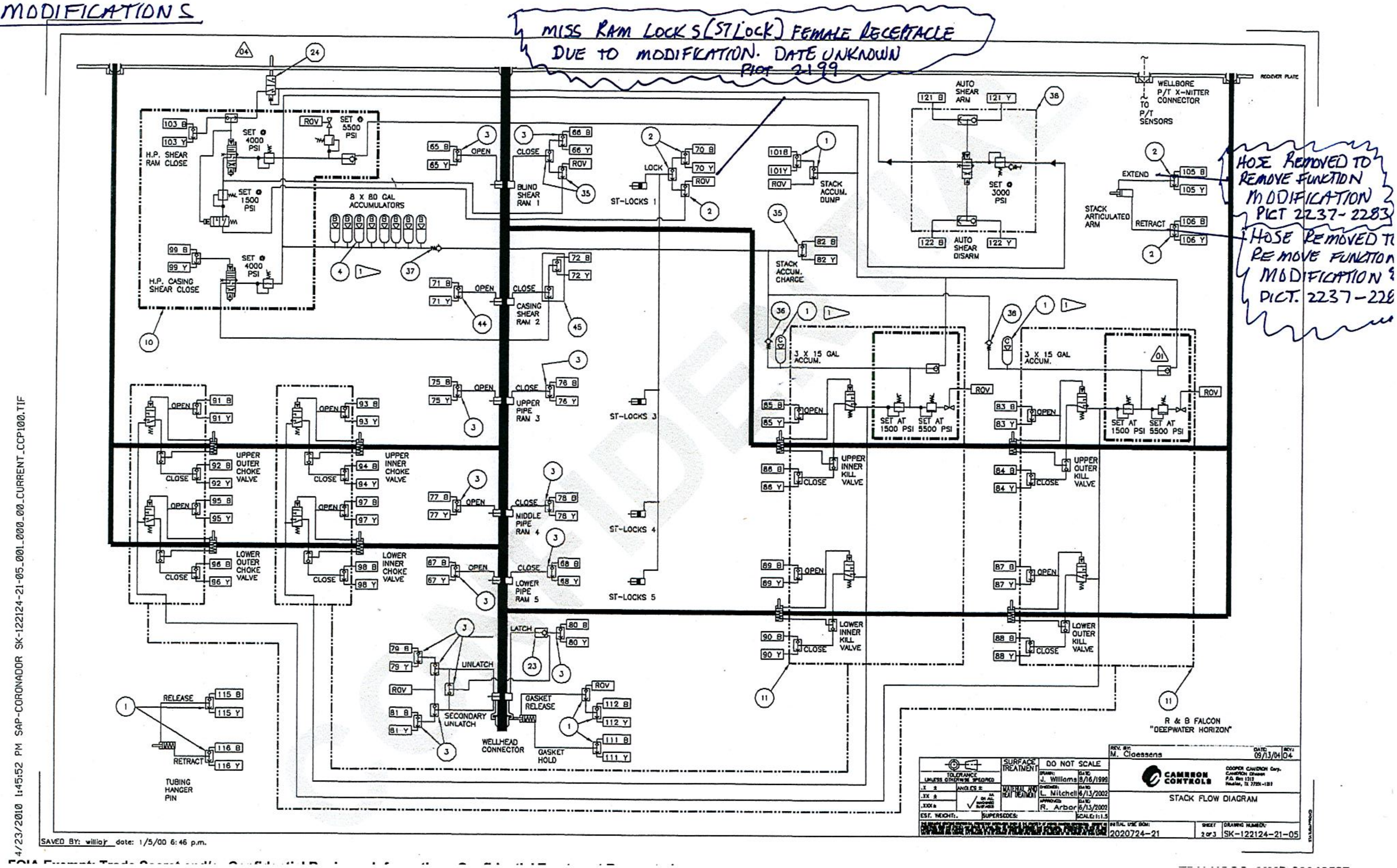


4/23/2010 1:45:52 PM SAP-CORONADOR SK-122124-21-05_001_000_00_CURRENT_CCP100.TIF

MODIFICATIONS



MODIFICATIONS



APPENDIX C

DOCUMENTS REVIEWED

DOCUMENTS REVIEWED

Document Reference Number	Document Title/ Description
1.	BOP Schematics – Flow Diagrams: Shear Ram Kit (TRN-USCG_MMS-00013703)
2.	BOP Schematics – Flow Diagrams: Stack Flow Diagram (TRN-USCG_MMS-00013704)
3.	BOP Schematics – Flow Diagrams: Stack Flow Diagram (TRN-USCG_MMS-00013705)
4.	BOP Schematics – Flow Diagrams: Stack Flow Diagram (TRN-USCG_MMS-00013706)
5.	BOP Schematics – Flow Diagrams: Final Assembly (TRN-USCG_MMS-00014355 - 00014358)
6.	Cameron Subpoena Files (Jul 6 2010): Engineering Report (CAMCG 00003071 – 00003086)
7.	Cameron Subpoena Files (Jul 6 2010): Product Advisory #1005 – Variable Bore Ram Assembly (CAMCG 00003087 – 00003176)
8.	Cameron Subpoena Files (Jul 6 2010): Engineering Errata Sheet: Stripping Recommendations (CAMCG 00003177 – 00003277)
9.	Cameron Subpoena Files (Jul 6 2010): Sequence Valve On Site Inspection Procedure (CAMCG 00003278 – 00003355)
10.	Cameron Subpoena Files (Jul 6 2010): Field Service Order (CAMCG 00003356 – 00003390)
11.	Cameron Subpoena Files: Deep Water Horizon TL BOP Stack Operation and Maintenance Manual (CAMCG 00000001 – 00000235)
12.	Cameron Subpoena Files: Multiplex BOP Control System Vol. I (CAMCG 00000236 – 00000645)
13.	Cameron Subpoena Files: Multiplex BOP Control System Vol. II (CAMCG 00000646 – 00000919)
14.	Cameron Subpoena Files: Multiplex BOP Control System Vol. III (CAMCG 00000920 – 00001123)
15.	Cameron Subpoena Files: Multiplex BOP Control System Vol. IV (CAMCG 00001124 – 00001427)
16.	Cameron Subpoena Files: Multiplex BOP Control System Vol. V (CAMCG 00001428 – 00001620)
17.	Cameron Subpoena Files: Multiplex BOP Control System Vol. VI (CAMCG 00001621 – 00001761)
18.	Cameron Subpoena Files: Multiplex BOP Control System Vol. VII (CAMCG 00001762 – 00002174)
19.	Cameron Subpoena Files: Multiplex BOP Control System Vol. VIII (CAMCG 00002175 – 00002842)
20.	Cameron Subpoena Files: R&B Falcon Drilling Co. PO: BOP Stack Test System (CAMCG 00002843 – 00002989)

Document Reference Number	Document Title/ Description
21.	Cameron Subpoena Files: Assembly Drawing Driller Control Panel (CAMCG 00003025 – 00003070)
22.	Cameron Subpoena Files: Beck, Redden & Secrest Letter (Cameron) – June 25, 2010
23.	Drawings – Schematics: BOP Detail Drawing
24.	Drawings – Schematics: BOP Subsea Stack drawing
25.	Drawings – Schematics: Horizon BOP Schematic
26.	Drawings – Schematics: BOP Detail Drawing Rev. 4
27.	Modifications: Amended Response to June 25, 2010 (TRN-USCG_MMS-0039812 – 0039813)
28.	Reference Documents: API RP 53: Recommended Practices for Blow Out Prevention Equipment Systems for Drilling Wells
29.	Reference Documents: API Spec 16D: Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment
30.	Regulations: 30 CFR § 250
31.	Secondary Control Info: Notice to Lessees & Operators – Accidental Disconnect of Marine Drilling Risers (June 1, 2009 – May 31, 2014)
32.	Secondary Control Info: Blowout Preventer Back-up Control Systems – Acoustic Systems
33.	Secondary Control Info: MMS Safety Alert – Marine Riser Failure (April 7, 2003)
34.	Slides – Presentation: General Stack Illustrations with Labels (2 copies in file)
35.	Transocean Files – EDS: Emergency Disconnect Activation General Considerations (TRN-USCG_MMS 00013684)
36.	Transocean Files – EDS: Cementing (Hanger Landed in Wellhead) (TRN-USCG_MMS 00013685)
37.	Transocean Files – EDS: Emergency Disconnect Activation Tripping (Drill Pipe in BOP) (TRN-USCG_MMS 00013687)
38.	Transocean Files – EDS: Emergency Disconnect Activation Logging with Wireline (TRN-USCG_MMS 00013689)
39.	Transocean Files – EDS: Emergency Disconnect Procedure General (TRN-USCG_MMS 00013690)
40.	Transocean Files – EDS: Emergency Disconnect Sequences (TRN-USCG_MMS 00013695)
41.	Transocean Files – EDS: Emergency Disconnect Activation Cementing (Setting Plugs) (TRN-USCG_MMS 00013696)
42.	Transocean Files – EDS: Emergency Disconnect Activation Well Control (TRN-USCG_MMS 00013698)
43.	Transocean Files – EDS: Emergency Disconnect Activation Well Testing (TRN-USCG_MMS 00013700)

Document Reference Number	Document Title/ Description
44.	Transocean Files – EDS: Emergency Disconnect Activation Drilling (TRN-USCG_MMS 00013701)
45.	Transocean Files – Equip. History & RMS – GMS Reports (TRN-HCEC-00031874 – TRN-HCEC-00032092)
46.	Transocean Files – Equip. History & RMS – RMS (TRN-HCEC-00034580 – TRN-HCEC-00035588 & TRN-USCG_MMS-00012251 – TRN-USCG_MMS-00014354)
47.	Transocean Files – Equip. History & RMS – RMS II Equipment History (1 Jan 2010 to 6 May 2010) (TRN-HCEC-00039351 – 00039408)
48.	Transocean Files – Prevention Maintenance and Repair History (TRN-HCEC-00036308 – TRN-HCEC-00036484)
49.	Transocean Files – Shear Ram Kit (TRN-USCG_MMS-00013703)
50.	Transocean Files – Stack Flow (TRN-USCG_MMS-00013704 – 00013706)
51.	Transocean Files: Final Assembly Schematic (TRN-USCG_MMS-00014355 – 00014358)
52.	Kirkland & Ellis, LLP (BP) Letter (4 Sept 2010) re: BOP Forensics Testing Plan
53.	Horizon Inspection 1-30-2002
54.	Horizon Inspection 3-29-2002
55.	Horizon Inspection 4-22-2002
56.	Horizon Inspection 5-16-2002
57.	Horizon Inspection 6-4-2002
58.	Horizon Inspection 6-5-2002
59.	Horizon Inspection 3-24-2003
60.	Horizon Inspection 4-21-2003
61.	Horizon Inspection 5-13-2003
62.	Horizon Inspection 6-16-2003
63.	Horizon Inspection 7-7-2003
64.	Horizon Inspection 7-19-2003
65.	Horizon Inspection 8-6-2003
66.	Horizon Inspection 8-8-2003

Document Reference Number	Document Title/ Description
67.	Horizon Inspection 8-18-2003
68.	Horizon Inspection 9-17-2003
69.	Horizon Inspection 10-20-2003
70.	Horizon Inspection 11-5-2003
71.	Horizon Inspection 12-11-2003
72.	Horizon Inspection 1-20-2004
73.	Horizon Inspection 2-20-2004
74.	Horizon Inspection 3-17-2004
75.	Horizon Inspection 6-21-2005
76.	Horizon Inspection 7-21-2005
77.	Horizon Inspection 8-17-2005
78.	Horizon Inspection 10-18-2005
79.	Horizon Inspection 11-22-2005
80.	Horizon Inspection 11-29-2005
81.	Horizon Inspection 1-3-2006
82.	Horizon Inspection 6-12-2006
83.	Horizon Inspection 7-18-2006
84.	Horizon Inspection 3-20-2007
85.	Horizon Inspection 4-6-2007
86.	Horizon Inspection 10-29-2007
87.	Horizon Inspection 11-9-2007
88.	Horizon Inspection 1-11-2008
89.	Horizon Inspection 2-8-2008
90.	Horizon Inspection 3-12-2008
91.	Horizon Inspection 8-15-2008

Document Reference Number	Document Title/ Description
92.	Horizon Inspection 10-28-2008
93.	Horizon Inspection 11-18-2008
94.	Horizon Inspection 9-28-2009
95.	Horizon Inspection 10-20-2009
96.	Horizon Inspection 11-12-2009
97.	Horizon Inspection 2-17-2010
98.	Horizon Inspection 3-3-2010
99.	Horizon Inspection 4-1-2010
100.	Incidents of Noncompliance 3-20-2007 and recind request
101.	Incidents of Noncompliance 8-6-2003
102.	Incidents of Noncompliance 5-16-2002
103.	Incidents of Noncompliance 9-5-2003
104.	TO Horizon Inspection Record and INC History
105.	Deepwater Horizon Follow Up Rig Audit, Marine Assurance Audit and Out of Service Period September 2009
106.	Deepwater Horizon Acceptance of Well Control Equipment for Transocean Job #1668 (TRN-HCEC-00007783 – TRN-HCEC-00007820)
107.	RB Falcon Deepwater Horizon BOP Assurance Analysis (TRN-HCEC-00016648 – TRN-HCEC-00016794)
108.	Deepwater Horizon Subsea Equipment Condition Audit for Transocean Job #001C (TRN-HCEC-00063449 – TRN-HCEC-00063578)
109.	Rig Condition Assessment Deepwater Horizon(TRN-USCG_MMS-00038609 – TRN-USCG-MMS-00038695)
110.	Horizon Blue POD photos & videos (DSCN0011 – DSCN0172)
111.	Blue Pod Recover Deck Test (.xcel)
112.	Cameron Deck Test Procedure for Mark-II Control Pod
113.	BP Daily Operations Report for 2/24/2010 (BP-HZN-MBI00013707 – BP-HZN-MBI00013713)
114.	BP Daily Operations Report for 3/13/2010 (BP-HZN-MBI00013777 – BP-HZN-MBI00013781)

Document Reference Number	Document Title/ Description
115.	Piping & Instrument Diagram Choke and Kill System – Rev. 3-2 (BP-HZN-MBI00020455)
116.	Choke / Kill Manifold Diagram (BP-HZN-MBI00020456)
117.	Piping & Instrument Diagram Choke and Kill System – Rev. 3-1 (BP-HZN-MBI00020457)
118.	Responder Logbook (Harry Thierens) (BP-HZN-MBI00137274 – BP-HZN-MBI00137304)
119.	BP Update Schematics 4-22 to 5-6-2010 (BP-HZN-CEC 018939 – BP-HZN-CEC 018950)
120.	BOP Updates Timeline (BP-HZN-MBI00133120 – BP-HZN-MBI00133126)
121.	Rig Worklist January 2010 (BP-HZN-MBI00010455; Xcel)
122.	Photos of BOP (BP-HZN-MBI00018251 – BP-HZN-MBI00018268)
123.	Computated Radiography (CR) on the Deepwater Horizon East Blind Shear Bonnet: Radiography-L – May 20, 2010 (BP-HZN-MBI000211525 – BP-HZN-MBI00021137)
124.	Tracerco Diagnostics FMI Field Report for Choke and Kill Line Density Measurement: May 12, 2010 (BP-HZN-MBI00021138 – BP-HZN-MBI00021145)
125.	Tracerco Diagnostics FMI Field Report for BOP Ram Closure: May 12, 2010 (BP-HZN-MBI00021146 – BP-HZN-MBI00021154)
126.	Tracerco Pipe on Pipe Tests (BP-HZN-MBI00021155 – BP-HZN-MBI00021157)
127.	Tracerco East Side-Locking Cylinder Scans (BP-HZN-MBI00021158 – BP-HZN-MBI00021160)
128.	Tracerco West Side-Locking Cylinder Scans 05 09 2010 (BP-HZN-MBI00021161 – BP-HZN-MBI00021164)
129.	Tracerco West Side Locking Cylinder Scans 05 12 2010 (BP-HZN-MBI00021165 – BP-HZN-MBI00021167)
130.	Tracerco Choke/Kill Line-Pipe Scan-May 12, 2010 (BP-HZN-MBI00021168 – BP-HZN-MBI00021170)
131.	Photo (jpeg) (BP-HZN-MBI00021171)
132.	Photo Dive No. 14 (BP-HZN-MBI00021172)
133.	Photo Dive No. 17 (BP-HZN-MBI00021175)
134.	Photo Dive No. 17 (BP-HZN-MBI00021176)
135.	Cameron BOP Stack Components (BP-HZN-MBI0002676)
136.	Untitled Schematic (BP-HZN-MBI00010426)

Document Reference Number	Document Title/ Description
137.	Stack Flow Diagram (BP-HZN-MIB00010427)
138.	Cameron TL, BOP Stack Control Equipment, Stack Mounted, 18-3/4", 15,000 psi WP Schematic (BP-HZN-MBI00010428)
139.	Cameron Schematic (BP-HZN-MBI00010438)
140.	Foundation of Hot Line Hose Reel (1/2) Schematic (BP-HZN-MBI00017194)
141.	Foundation of BOP Storage W/Test Stump (1/3) (BP-HZN-MBI00017216 – BP-HZN-MBI00017217)
142.	Foundation of BOP Storage W/Test Stump (2/3) (BP-HZN-MBI00017218 – BP-HZN-MBI00017219)
143.	Foundation of BOP Storage W/Test Stump (3/3) (BP-HZN-MBI00017220 – BP-HZN-MBI00017221)
144.	Foundation of Remote Control Stand for Blue Reel and Yellow Reel (BP-HZN-MBI00017230 – BP-HZN-MBI00017231)
145.	Arrangement of BOP Control Room (BP-HZN-MBI00017274 – BP-HZN-MBI00017275)
146.	Foundation of BOP Control Main HPU (BP-HZN-MBI00017278 – BP-HZN-MBI00017279)
147.	Foundation of BOP Accumulator Rack (BP-HZN-MBI00017284 – BP-HZN-MBI00017285)
148.	Foundation of BOP Bottle Rack (BP-HZN-MBI00017286 – BP-HZN-MBI00017287)
149.	Detail of Padeye For Maintenance (1/4) BOP Control Unit Room (BP-HZN-MBI00017346 – BP-HZN-MBI00017347)
150.	Machinery Arrangement on MUX Reel Platform (BP-HZN-MBI00017354 – BP-HZN-MBI00017355)
151.	Foundation of LMRP Storage W/Test Stump (1/2) (BP-HZN-MBI00017458 – BP-HZN-MBI00017459)
152.	Foundation of LMRP Storage W/Test Stump (2/2) (BP-HZN-MBI00017460 – BP-HZN-MBI00017461)
153.	Foundation of Hot Line & MUX Hose Turndown Sheaves (2/3) (BP-HZN-MBI00017622 – BP-HZN-MBI00017623)
154.	Foundation of LMRP Bulkhead Guide (2/4) (BP-HZN-MBI00017688 – BP-HZN-MBI00017689)
155.	Cameron TL, BOP Stack Control Equipment, Stack Mounted, 18-3/4" 15,000 psi WP (BP-HZN-MBI00018239 – BP-HZN-MBI00018248)
156.	Cameron TL, BOP Stack Control Equipment, Stack Mounted, 18-3/4" 15,000 psi WP (BP-HZN-MBI00018254 – BP-HZN-MBI00018263)
157.	Evaluation of Secondary Intervention Methods in Well Control (by West Eng. For MMS: March 2003) (BP-HZN-MBI00010469 – BP-HZN-MBI00010554)
158.	Subsea Pressure Test-Feb. 9-10, 2010 (BP-HZN-MBI00002458 – BP-HZN-MBI00002463)

Document Reference Number	**Document Title/ Description**
159.	Choke Manifold Pressure Test-Feb. 9-10, 2010 (BP-HZN-MBI00002454 – BP-HZN-MBI00002468)
160.	Subsea Pressure Test-Feb. 24, 2010 (BP-HZN-MBI00002469 – BP-HZN-MBI00002473)
161.	Choke Manifold Pressure Test-Feb. 24, 2010 (BP-HZN-MBI00002474 – BP-HZN-MBI00002478)
162.	Subsea Pressure Test-March 15, 2010 (BP-HZN-MBI00002479 – BP-HZN-MBI00002483)
163.	Choke Manifold Pressure Test-March 15, 2010 (BP-HZN-MBI00002484 – BP-HZN-MBI00002488)
164.	Subsea Pressure Test-March 26, 2010 (BP-HZN-MBI00002489 – BP-HZN-MBI00002493)
165.	Choke Manifold Pressure Test, March 26, 2010 (BP-HZN-MBI00002494 – BP-HZN-MBI00002498)
166.	Subsea Pressure Test-April 9, 2010 (BP-HZN-MBI00002499 – BP-HZN-MBI00002503)
167.	Choke Manifold Pressure Test-April 9, 2010 (BP-HZN-MBI00002504 – BP-HZN-MBI00002508)
168.	Cameron 18-3/4" 15M TL BOP Sheer Pressures (Xcel) (BP-HZN-MBI00010411)
169.	BP Xcel Workbook 1) From Cameron Rig Book; 2) Stump; 3) BOP Stack Test Space Out Measurements (BP-HZN-MBI00010453)
170.	Drilling Contract: RBS-8D Semisubmersible Drilling Unit Vastar Resources, Inc. and R&B Falcon Drilling Co. – December 9, 1998 (BP-HZN-MBI00021460 – BP-HZN-MBI00021999)
171.	Transocean's Logs of Response (TRN-USCG_MMS-00038807 – TRN-USCG_MMS-00038854)
172.	Transocean's Amended Response to June 25, 2010 Subpoena (TRN-USCG_MMS-0039812 – TRN-USCG_MMS-0039813)
173.	Transocean's Letter Agreement for Conversation of VBR to a Test Ram-October 11, 2004 (TRN-HCEC-00064131 – TRN-HCEC-00064132)
174.	Yellow POD Photo: 1.5 inch Pod Valve
175.	Yellow POD Photos: DSC02235
176.	Yellow POD Photos: DSC02236
177.	Yellow POD Photos: DSC02238
178.	Yellow POD Photos: Horizon Riser 062
179.	Yellow POD Photos: Horizon Riser 063
180.	Yellow POD Photos: Horizon Riser 064

MANAGING RISK

Document Reference Number	Document Title/ Description
181.	Yellow POD Photos: Horizon Riser 065
182.	Yellow POD Photos: Pod Extend & Retract Cylinder #1
183.	Yellow POD Photos: Pod Extend & Retract Cylinder #2
184.	Yellow POD Photos: Quarter inch Packer Seal
185.	Yellow POD Photos: Quarter Inch Pod Valve
186.	Yellow POD Function Test: June 25, 2010
187.	Drilling Contract RBS-8D Semisubmersible Drilling Unit Vastar Resources, Inc. and R&B Falcon Drilling Co. (BP-HZN-MBI00179081 – BP-HZN-MBI00179360)
188.	7-24-2001 Transocean letter re: Deepwater Horizon Contract Amendment – Additional Personnel (BP-HZN-MBI00179361 – BP-HZN-MBI00179363)
189.	11-5-2001 Transocean letter to BP re: Late Delivery Charge & Change Order Summary (BP-HZN-MBI00179364 – BP-HZN-MBI000179366)
190.	12-12-2001 Transocean letter to BP re: Letter of Agreement for Cost Escalation and Naming Convention Adjustments (BP-HZN-MBI00179367 – BP-HZN-MBI00179375)
191.	1-16-2002 Transocean letter to BP re: Riser Removal, Transportation & Storage TSF-5121-2002-001 (BP-HZN-MBI00179376 – BP-HZN-MBI-00179378)
192.	4-23-2002 Transocean letter to Vastar re: Additional Personnel for Mad Dog Project CONTRACTOR-5121-2002-005 (BP-HZN-MBI00179379 – BP-HZN-MBI00179381)
193.	6-3-2002 Transocean letter to BP re: Additional Personnel for Deepwater Horizon CONTRACTOR-5121-2002-006 (BP-HZN-MBI00179382 – BP-HZN-MBI00179384)
194.	8-26-2002 Transocean letter to BP re: Cost of re-drilling 60743#4 well as a result of recent “lost hole” incident (BP-HZN-MBI00179385 – BP-HZN-MBI00179387)
195.	10-14-2002 Transocean letter to BP re: Contract No. 980249 re-assigned to BP, successor-in-interest to Vastar (BP-HZN-MBI00179388 – BP-HZN-MBI00179389)
196.	11-1-2002 Transocean letter to BP re: Letter of Agreement for 6 5/8” Drill pipe Rental (BP-HZN-MBI00179390 – BP-HZN-MBI00179392)

Document Reference Number	Document Title/ Description
197.	1-6-2003 Transocean letter to BP re: Letter of Agreement for adding Offshore Safety Assistant (BP-HZN-MBI00179393 – BP-HZN-MBI00179395)
198.	1-7-2003 Transocean letter to BP re: Letter of Agreement for Recycling Program (BP-HZN-MBI00179396 – BP-HZN-MBI00179399)
199.	1-9-2003 Transocean letter to BP re: Insurance Cost Adjustments (BP-HZN-MBI00179400 – BP-HZN-MBI00179401)
200.	2-28-2003 Transocean letter to BP re: Letter of Agreement for Cost Escalation 2003 (BP-HZN-MBI00179402 – BP-HZN-MBI00179409)
201.	2-28-2003 Transocean letter to BP re: Letter of Agreement for Cost Escalation 2004 (BP-HZN-MBI00179410 – BP-HZN-MBI00179415)
202.	3-3-2003 Transocean letter to BP re: Letter of Agreement for Rental of 6 5/8" HWDP (BP-HZN-MBI00179416 – BP-HZN-MBI00179417)
203.	3-20-2003 Transocean letter to BP re: actual cost & daily rental rate of 6 5/8" drill pipe (BP-HZN-MBI0017918 – BP-HZN-MBI00179419)
204.	11-12-2003 Transocean letter to BP re: adding tool pusher in BP's office (BP-HZN-MBI00179420 – BP-HZN-MBI00179422)
205.	4-19-2004 Transocean letter to BP re: Contract Extension Agreement (BP-HZN-MBI00179423 – BP-HZN-MBI00179430)
206.	6-25-2004 Transocean letter to BP re: Cap Rock Communication Equipment (BP-HZN-MBI00179431 – BP-HZN-MBI00179433)
207.	10-11-2004 Transocean letter to BP re: Conversion of VBR to a Test Run (BP-HZN-MBI00179434 – BP-HZN-MBI00179436)
208.	1-7-2005 Transocean letter to BP re: Additional Personnel (Performance Engagement Coordinator) (BP-HZN-MBI00179437 – BP-HZN-MBI00179439)
209.	2-20-2005 Transocean letter to BP re: Adding Deck Pushers (BP-HZN-MBI00179440 – BP-HZN-MBI00179442)
210.	3-31-2005 Transocean letter to BP re: Cost Escalation 2005 (BP-HZN-MBI00179443 – BP-HZN-MBI00179445)
211.	Assignment Agreement between BP & BHP Billiton Petroleum (GOM) (BP-HZN-MBI00179446 – BP-HZN-MBI00179455)
212.	Amendment No. 26 to Drilling Contract to reflect amended day rates (BP-HZN-MBI00179456 – BP-HZN-MBI00179458)
213.	Basis for Cost Escalations; Adjusted Labor; Annual Premiums (BP-HZN-MBI-00179459 – BP-HZN-MBI00179463)
214.	Amendment No. 27 to Drilling Contract to reflect day rates (BP-HZN-MBI00179464 – BP-HZN-MBI00179474)

Document Reference Number	Document Title/ Description
215.	Amendment No. 28 to Drilling Contract to reflect six (6) pup joints (BP-HZN-MBI00179475 – BP-HZN-MBI00179476)
216.	Notice No. 29 to Drilling Contract to reflect operating rates (BP-HZN-MBI00179477 – BP-HZN-MBI00179480)
217.	Amendment No. 30 to Drilling Contract to reflect personnel labor rates: Article 3 (BP-HZN-MBI00179481 – BP-HZN-MBI00179486)
218.	Amendment No. 31 to Drilling Contract to reflect day rates (BP-HZN-MBI00179487 – BP-HZN-MBI00179489)
219.	Amendment No. 38 to Drilling Contract to reflect additional 3 years on contract (BP-HZN-MBI00179490 – BP-HZN-MBI00179611)
220.	Exhibit A: Day Rates for 3 & 5 year options (BP-HZN-MBI00179612 – BP-HZN-MBI00179613)
221.	10-11-2004 Transocean letter to Bp re: Conversion of VBR to Test Run (BP-HZN-MBI00179614 – BP-HZN-MBI00179616)
222.	6-12-2002 Transocean letter to BP re: Cameron Variable Bore Rams (BP-HZN-MBI00179617 – BP-HZN-MBI00179619)
223.	Drilling Contract (December 9, 1998) (BP-HZN-MBI00179620 – BP-HZN-MBI00180159)
224.	GoM Drilling, Completions and Interventions Riser Kink – Post-Recovery Survey Results (BP-HZN-MBI00192562 – BP-HZN-MBI00192626)
225.	Transocean Daily Operation Report I: Feb. 13 – 17, 2010 (TRN-HCEC-00031890 – TRN-HCEC-00031898)
226.	Transocean Morning Report: Feb. 24, 2010 (TRN-HCEC-00031934 – TRN-HCEC-00031937)
227.	Transocean Morning Report: March 18, 2010 (TRN-HCEC-00032011 – TRN-HCEC-00032013)
228.	Transocean Equipment History: Jan. 1, 2010 to May 6, 2010 (TRN-HCEC-00036061 – TRN-HCEC-00036069)
229.	Transocean Equipment History: Jan. 1, 2010 to May 6, 2010 (TRN-HCEC-00036070 – TRN-HCEC-00036071)
230.	Transocean Equipment History: Jan. 1, 2010 to May 6, 2010 (TRN-HCEC-00039351 – TRN-HCEC-00039408)
231.	Transocean Equipment History: Jan. 1, 2010 to May 6, 2010 (TRN-HCEC-00039811 – TRN-HCEC-00039930)
232.	Transocean Equipment History: Jan. 1, 2010 to May 5, 2010 (TRN-HCEC-00040041 – TRN-HCEC-00040160)
233.	Transocean Equipment History: Jan. 1, 2010 to May 5, 2010 (TRN-HCEC-00040161 – TRN-HCEC-00040217)
234.	Transocean Rig Hardware Assessment (TRN-USCG_MMS-00041066 – TRN-USCG_MMS-00041152)
235.	Transocean Change Proposal: 8/28/2004 to reduce components on BOP (hoses, valves, etc.) (TRN-USCG_MMS-00041973 – TRN-USCG_MMS-00041988)
236.	Transocean Change Proposal: 1/5/2004 to install new rigid conduit manifold and removal of RMJBs (TRN-USCG_MMS-

Document Reference Number	Document Title/ Description
	000419898 – TRN-USCG_MMS-00042012)
237.	Transocean Departmental Activity Report: May 20, 2004 (TRN-USCG_MMS-00042013 – TRN-USCG_MMS-00042042)
238.	Transocean Change Proposal: 3/5/2007 re: software changes to be made to correctly display EDS selection between panels, erroneous coil faults (TRN-USCG_MMS-00042043 – TRN-USCG_MMS-00042068)
239.	Transocean Change Proposal: 11/10/2002 re: install high shock flowmeters inside pods 3 each (TRN-USCG_MMS-00042069 – TRN-USCG_MMS-00042085)
240.	Transocean Change Proposal: 11/13/2002 re: go with non-retrievable pods to make system more reliable and reduce failure points (TRN-USCG_MMS-00042086 – TRN-USCG_MMS-00042087)
241.	Transocean Change Proposal: 11/21/2004 re: enhance rig with test ram capability (TRN-USCG_MMS-00042088 – TRN-USCG_MMS-00042098)
242.	Transocean Change Proposal: 3/9/2006 re: BP requests installation of 18-3/4" annular stripper packet (TRN-USCG_MMS-00042099 – TRN-USCG_MMS-00042108)
243.	Transocean Change Proposal: 8/27/2008 re: flex joint in LMRP in need of overhaul (TRN-USCG_MMS-00042109 – TRN-USCG_MMS-00042119)
244.	Transocean Change Proposal: 8/24/2009 re: Cameron OEM replacement valve (TRN-USCG_MMS-00042120 – TRN-USCG_MMS-00042141)
245.	Transocean Senior Subsea Supervisor Job Description (TRN-USCG_MMS-00042142 – TRN-USCG_MMS-00042150)
246.	BOP test dates and pressures reported to MMS on operator's well activity reports (Xcel)
247.	MMS inspections (Xcel)
248.	Cameron Daily Report Sheet: May 5, 2010 (BP-HZN-BLY00060675 – BP-HZN-BLY00060682)
249.	Blue Pod Recovery Log June 29, 2010 TO July 5, 2010 (BP-HZN-BLY00060946 – BP-HZN-BLY00061076)
250.	Operation Pulling the Blue Pod (BP-HZN-BLY00061116 (5 pgs.))
251.	Investigation of Well Control Incident on Transocean S711, Well 22/13a-8 (Bardolino) December 23, 2009
252.	Transocean investigation report re: February 18, 2010 Well Control Event
253.	BP-HZN-MBI00168122
254.	BP-HZN-MBI00167827

Document Reference Number	Document Title/ Description
255.	BP-HZN-MBI00167826 (BP-HZN-MBI00192753 through BP-HZN-MBI00192766)
256.	BP-HZN-MBI00002469
257.	BP-HZN-MBI00002474
258.	TRN-HCEC-00031934
259.	TRN-HCEC-00032011
260.	Horizon Drilling Inspection 3/3/2010
261.	Maconda BP Cementing 4/21/2010
262.	Maconda BP Pits 4/21/2010
263.	Maconda BP Time SDL 4/21/2010
264.	EmfView3
265.	Log Graph 2 BOEM comments
266.	Log Graph with BOEM comments
267.	Maconda BP 1 Pits Time RT
268.	Macondo BP1_SurfaceParameters_RT_4-22-10
269.	Macondo BP1_SurfaceParameters_Time_RT
270.	Macondo BP_Cementing_4-21-2010.txt
271.	Macondo BP_Cementing_4-21-2010.xls
272.	Macondo BP_Mudlog.emf
273.	Macondo BP_MWD BAT.emf
274.	Macondo BP_Pits_4-21-2010.xls
275.	Macondo BP_Pits_4-21-2010.txt
276.	Macondo BP_Time SDL_4-21-2010.txt
277.	Macondo BP_Time SDL_4-21-2010.xls
278.	STL_20100420.pdf

Document Reference Number	Document Title/ Description
279.	Surface_time_log_cementing.pdf
280.	BP-HZN-MBI00208965.pdf
281.	BP-HZN-MBI00208965.xls
282.	BP-HZN-MBI00208966.pdf
283.	BP-HZN-MBI00208972.pdf
284.	BP-HZN-MBI00208973.pdf
285.	BP-HZN-MBI00208975.pdf
286.	BP-HZN-MBI00208976.pdf
287.	BP-HZN-MBI00208978.pdf
288.	BP-HZN-MBI00208980.pdf
289.	BP-HZN-MBI00208982.pdf
290.	BP-HZN-MBI00208983.pdf
291.	BP-HZN-MBI00208985.pdf
292.	BP-HZN-MBI00208987.pdf
293.	BP-HZN-MBI00208988.pdf
294.	BP-HZN-MBI00208990.pdf
295.	BP-HZN-MBI00208991.pdf
296.	BP-HZN-MBI00208992.pdf
297.	BP-HZN-MBI00208994.pdf
298.	BP-HZN-MBI00208995.pdf
299.	BP-HZN-MBI00208997.pdf
300.	BP-HZN-MBI00208999.pdf
301.	BP-HZN-MBI00209000.pdf
302.	BP-HZN-MBI00209002.pdf
303.	BP-HZN-MBI00209003.pdf

Document Reference Number	Document Title/ Description
304.	BP-HZN-MBI00209005.pdf
305.	BP-HZN-MBI00209007.pdf
306.	BP-HZN-MBI00209009.pdf
307.	BP-HZN-MBI00209010.pdf
308.	BP-HZN-MBI00209012.pdf
309.	BP-HZN-MBI00209013.pdf
310.	BP-HZN-MBI00209015.pdf
311.	BP-HZN-MBI00209017.pdf
312.	BP-HZN-MBI00209019.pdf
313.	BP-HZN-MBI00209021.pdf
314.	BP-HZN-MBI00209023.pdf
315.	BP-HZN-MBI00209024.pdf
316.	BP-HZN-MBI00209025.pdf
317.	BP-HZN-MBI00209027.pdf
318.	BP-HZN-MBI00209030.pdf
319.	BP-HZN-MBI00209032.pdf
320.	BP-HZN-MBI00209034.pdf
321.	BP-HZN-MBI00209035.pdf
322.	BP-HZN-MBI00209037.pdf
323.	BP-HZN-MBI00209039.pdf
324.	BP-HZN-MBI00209041.pdf
325.	BP-HZN-MBI00209043.pdf
326.	BP-HZN-MBI00209044.pdf
327.	BP-HZN-MBI00209045.pdf
328.	BP-HZN-MBI00209047.pdf

Document Reference Number	Document Title/ Description
329.	BP-HZN-MBI00209049.pdf
330.	BP-HZN-MBI00209051.pdf
331.	BP-HZN-MBI00209053.pdf
332.	BP-HZN-MBI00209055.pdf
333.	BP-HZN-MBI00209058.pdf
334.	BP-HZN-MBI00209061.pdf
335.	BP-HZN-MBI00209062.pdf
336.	BP-HZN-MBI00209065.pdf
337.	BP-HZN-MBI00209068.pdf
338.	BP-HZN-MBI00209070.pdf
339.	BP-HZN-MBI00209071.pdf
340.	BP-HZN-MBI00209071.xls
341.	BP-HZN-MBI00209072.pdf
342.	BP-HZN-MBI00209072.xls
343.	BP-HZN-MBI00209073.pdf
344.	BP-HZN-MBI00209073.xls
345.	BP-HZN-MBI00209074.pdf
346.	BP-HZN-MBI00209074.xls
347.	BP-HZN-MBI00209075.pdf
348.	BP-HZN-MBI00209075.xls
349.	BP-HZN-MBI00209076.pdf
350.	BP-HZN-MBI00209076.xls
351.	BP-HZN-MBI00209077.pdf
352.	BP-HZN-MBI00209096.pdf
353.	BP-HZN-MBI00209096.xls

Document Reference Number	Document Title/ Description
354.	BP-HZN-MBI00209097.pdf
355.	BP-HZN-MBI00209097.xls
356.	BP-HZN-MBI00209098.pdf
357.	BP-HZN-MBI00209098.xls
358.	BP-HZN-MBI00209099.pdf
359.	BP-HZN-MBI00209099.xls
360.	BP-HZN-MBI00209100.pdf
361.	BP-HZN-MBI00209100.xls
362.	BP-HZN-MBI00209101.pdf
363.	BP-HZN-MBI00209101.xls
364.	BP-HZN-MBI00209102.pdf
365.	BP-HZN-MBI00209102.xls
366.	BP-HZN-MBI00209103.pdf
367.	BP-HZN-MBI00209103.xls
368.	BP-HZN-MBI00209104.pdf
369.	BP-HZN-MBI00209104.xls
370.	BP-HZN-MBI00209105.pdf
371.	BP-HZN-MBI00209105.xls
372.	BP-HZN-MBI00209106.pdf
373.	BP-HZN-MBI00209106.xls
374.	BP-HZN-MBI00209107.pdf
375.	BP-HZN-MBI00209134.pdf
376.	BP-HZN-MBI00209279.pdf
377.	BP-HZN-MBI00209421.pdf
378.	BP-HZN-MBI00209490.pdf

Document Reference Number	Document Title/ Description
379.	BP-HZN-MBI00209553.pdf
380.	BP-HZN-MBI00209648.pdf
381.	BP-HZN-MBI00209694.pdf
382.	BP-HZN-MBI00209765.pdf
383.	BP-HZN-MBI00209830.pdf
384.	BP-HZN-MBI00209900.pdf
385.	BP-HZN-MBI00210040.pdf
386.	BP-HZN-MBI00210132.pdf
387.	BP-HZN-MBI00210178.pdf
388.	BP-HZN-MBI00210305.pdf
389.	BP-HZN-MBI00210429.pdf
390.	BP-HZN-MBI00210553.pdf
391.	BP-HZN-MBI00210643.pdf
392.	BP-HZN-MBI00210733.pdf
393.	BP-HZN-MBI00210822.pdf
394.	BP-HZN-MBI00210915.pdf
395.	BP-HZN-MBI00211098.pdf
396.	BP-HZN-MBI00211128.pdf
397.	BP-HZN-MBI00211143.pdf
398.	BP-HZN-MBI00211160.pdf
399.	BP-HZN-MBI00211224.pdf
400.	BP-HZN-MBI00211242.pdf
401.	BP-HZN-MBI00211242.xls
402.	BP-HZN-MBI00211243.pdf
403.	BP-HZN-MBI00211243.xls

Document Reference Number	Document Title/ Description
404.	BP-HZN-MBI00211244.pdf
405.	BP-HZN-MBI00211244.xls
406.	BP-HZN-MBI00211245.pdf
407.	BP-HZN-MBI00211245.xls
408.	BP-HZN-MBI00211246.pdf
409.	BP-HZN-MBI00211274.pdf
410.	BP-HZN-MBI00211494.pdf
411.	BP-HZN-MBI00211831.pdf
412.	BP-HZN-MBI00211904.pdf
413.	BP-HZN-MBI00211981.pdf
414.	BP-HZN-MBI00212058.pdf
415.	BP-HZN-MBI00212128.pdf
416.	BP-HZN-MBI00212184.pdf
417.	BP-HZN-MBI00212498.pdf
418.	BP-HZN-MBI00212562.pdf
419.	BP-HZN-MBI00212562.xls
420.	BP-HZN-MBI00212563.pdf
421.	BP-HZN-MBI00212563.xls
422.	BP-HZN-MBI00212564.pdf
423.	BP-HZN-MBI00212564.xls
424.	MBI-300-00062.csv
425.	MBI-300-00063.csv
426.	MBI-300-00064.csv
427.	BP-HZN-MBI00021405.xls
428.	TRN-USCG_MMS-00059571.pdf

MANAGING RISK

Document Reference Number	Document Title/ Description
429.	CAMCG 00004225 - CAMCG 00004252.pdf
430.	CAMCG 00004253 - CAMCG 00004263.pdf
431.	CAMCG 00004264 - CAMCG 00004272.pdf
432.	CAMCG 00004273 - CAMCG 00004279.pdf
433.	CAMCG 00004280 - CAMCG 00004288.pdf
434.	CAMCG 00004289 - CAMCG 00004316.pdf
435.	CAMCG 00004317 - CAMCG 00004338.pdf
436.	CAMCG 00004339 - CAMCG 00004348.pdf
437.	CAMCG 00004349 - CAMCG 00004362.pdf
438.	CAMCG 00004363 - CAMCG 00004389.pdf
439.	CAMCG 00004390 - CAMCG 00004405.pdf
440.	CAMCG 00004406 - CAMCG 00004411.pdf
441.	CAMCG 00004412 - CAMCG 00004439.pdf
442.	CAMCG 00004440 - CAMCG 00004470.pdf
443.	CAMCG 00004471 - CAMCG 00004485.pdf
444.	CAMCG 00004486 - CAMCG 00004489.pdf
445.	CAMCG 00004490 - CAMCG 00004514.pdf
446.	CAMCG 00004515 - CAMCG 00004537.pdf
447.	CAMCG 00004538 - CAMCG 00004568.pdf
448.	CAMCG 00004569 - CAMCG 00004582.pdf
449.	CAMCG 00004583 - CAMCG 00004613.pdf
450.	CAMCG 00004614 - CAMCG 00004636.pdf
451.	CAMCG 00004637 - CAMCG 00004664.pdf
452.	CAMCG 00004665 - CAMCG 00004689.pdf
453.	CAMCG 00004690 - CAMCG 00004701.pdf

Document Reference Number	Document Title/ Description
454.	CAMCG 00004702 - CAMCG 00004709.pdf
455.	CAMCG 00004710 - CAMCG 00004732.pdf
456.	CAMCG 00004733 - CAMCG 00004738.pdf
457.	CAMCG 00004739 - CAMCG 00004742.pdf
458.	CAMCG 00004743 - CAMCG 00004750.pdf
459.	CAMCG 00004751 - CAMCG 00004757.pdf
460.	Ltr_to_Mathews_011911.pdf
461.	TRN-USCG_MMS-00044226.pdf
462.	TRN-USCG_MMS-00013703.pdf
463.	TRN-USCG_MMS-00013704.pdf
464.	TRN-USCG_MMS-00013705.pdf
465.	TRN-USCG_MMS-00013706.pdf
466.	TRN-USCG_MMS-00014355.pdf
467.	TRN-USCG_MMS-00042585.pdf
468.	Deepwater Horizon Preservation and Testing of Solenoid Valves Removed from BOP Control Pods: Parameters, Protocol & Procedures
469.	Deepwater Horizon Joint Investigation Hearing May 26
470.	Deepwater Horizon Joint Investigation Hearing May 27
471.	Deepwater Horizon Joint Investigation Hearing May 28
472.	Deepwater Horizon Joint Investigation Hearing May 29
473.	Deepwater Horizon Joint Investigation Hearing July 19
474.	Deepwater Horizon Joint Investigation Hearing July 20
475.	Deepwater Horizon Joint Investigation Hearing July 22
476.	Deepwater Horizon Joint Investigation Hearing July 23
477.	Deepwater Horizon Joint Investigation Hearing August 23

Document Reference Number	Document Title/ Description
478.	Deepwater Horizon Joint Investigation Hearing August 24
479.	Deepwater Horizon Joint Investigation Hearing August 25
480.	Deepwater Horizon Joint Investigation Hearing August 26
481.	Deepwater Horizon Joint Investigation Hearing August 27
482.	Deepwater Horizon Joint Investigation Hearing October 4
483.	Deepwater Horizon Joint Investigation Hearing October 5
484.	Deepwater Horizon Joint Investigation Hearing October 6
485.	Deepwater Horizon Joint Investigation Hearing October 7
486.	Deepwater Horizon Joint Investigation Hearing October 8
487.	Deepwater Horizon Joint Investigation Hearing December 8
488.	Deepwater Horizon Joint Investigation Hearing December 9
489.	Deepwater Horizon Accident Investigation Report, September 8, 2010
490.	Exhibit Macondo Well Schematic July 20
491.	Exhibit Production Casing Design Report April 15
492.	Exhibit Production Casing Design Report April 18
493.	Exhibit Photo of Deepwater Horizon Pipe **-** September 1, 2010
494.	Exhibit Cement Job on 7” Casing – Flow in vs Flow out – September 1, 2010
495.	Exhibit Cut Riser Exhibit – August 26
496.	Exhibit Safety and Fire Control Plan – July 23
497.	Exhibit BP Exploration Project String– July 23
498.	Exhibit April 20 Logging Data – July 23
499.	Exhibit 23 July Dr John Smith Displays – July 23
500.	Exhibit Production Casing Decision Tree – July 22
501.	Exhibit 20 Well Anomalies of Investigative Interest – July 22
502.	Exhibit Risk Based Decisions – July 22

Document Reference Number	Document Title/ Description
503.	Exhibit GOM Exploration & Appraisal Communication Plan Chart 1.pdf – October 7
504.	Exhibit GOM Exploration & Appraisal Communication Plan Chart 2.pdf – October 7
505.	Exhibit GOM Exploration & Appraisal Communication Plan Chart 3.pdf – October 7
506.	Exhibit GOM Exploration & Appraisal Communication Plan Chart 4.pdf – October 7
507.	Exhibit GOM Exploration & Appraisal Communication Plan Chart 5.pdf – October 7
508.	Exhibit Emergency Area Coverage.pdf - October 7
509.	Exhibit Transocean Subpoena Reply.pdf - October 7
510.	Exhibit AFE Summary for the Macondo Well.pdf - October 7
511.	Exhibit Allowable Level of Safety Chart 1.pdf - October 7
512.	Exhibit Letter to the Board – Republic of the Marshall Islands
513.	Exhibit Risk Matrix – September 1
514.	Exhibit Status Update for Deepwater Horizon Blowout Preventer System – October 13
515.	Exhibit BP Organizational Chart Exhibit – October 13
516.	Exhibit International Safety Management Code – December 3
517.	Exhibit Maritime “Safety Net” Layers and Potential System Failures – December 3
518.	Exhibit April 20 Drill Pipe Pressure Chart – December 8
519.	Exhibit April 20 Flow in / Flow out – December 8
520.	Exhibit April 20 Normal Flow / Abnormal Flow Chart - December 8
521.	Exhibit Handwritten Easel Exhibit – January 6
522.	Log Graph of Sperry Sun Data
523.	Macondo BP Surfact Parameters Time Data
524.	Macondo BP Mudlog Data
525.	Macondo BP Pits Data
526.	Macondo BP Time SDL 4-21-2010
527.	WEST Shear Ram Capabilities Study, September 2004

Document Reference Number	Document Title/ Description
528.	WEST Evaluation of Secondary Intervention Methods in Well Control, March 2033
529.	Report to the President: National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

APPENDIX D

LIST OF EVIDENCE

LIST OF EVIDENCE

Item #	Evidence	Location of Retrieval	Description	Find Date
1	Fluid Sample	BOP pod side, LMRP, after ROV pressure activation valve initiated by VFL	Pink fluid	9/28/2010
1	Riser	Riser	Riser	
2	Debris	LMRP, Blue Control Pod, bottom of unit	Bolt	9/28/2010
3	Blue pod	Blue pod removed from LMRP	Blue control pod	9/28/2010
4	Debris	Yellow pod, after removal of unit, on bottom of LMRP	Bolt	9/28/2010
5	Yellow pod	Yellow pod removed from LMRP	Yellow control pod	9/28/2010
6	Fluid sample	Yellow pod	Pink fluid	9/28/2010
7	Debris	Blue side, bottom of LMRP, after removal of Blue Control Pod, back right side	Washer or seal	9/28/2010
8	Debris	LMRP, Blue Control Pod, after removal of Blue Control Pod, back left	Spring	9/28/2010
9	Debris	LMRP, Blue Control Pod, bottom, back, center	Bolt and nut	9/28/2010
10	Fluid	Choke side of LMRP	Fluid	10/13/2010
11	Fluid	Choke side of LMRP	Fluid	10/13/2010
12	Fluid sample	BOP, ST Lock Starboard, Lower VBR	Fluid	11/16/2010
13	Fluid sample	BOP, ST Lock, Starboard, Lower VBR	Fluid	11/16/2010
14	Fluid sample	BOP, ST Lock, Starboard, Middle VBR	Fluid	11/16/2010
15	Fluid sample	BOP, ST Lock, Starboard, Middle VBR	Fluid	11/16/2010
16	Fluid sample	BOP, ST Lock, Starboard, Upper VBR	Fluid	11/16/2010
17	Fluid sample	BOP, ST Lock, Starboard, Upper VBR	Fluid	11/16/2010
18	Fluid sample	BOP, ST Lock, Starboard, BSR	Fluid	11/16/2010
19	Fluid sample	BOP, ST Lock, Starboard, BSR	Fluid	11/16/2010
20	Fluid sample	BOP, ST Lock, Port, BSR	Fluid	11/16/2010
21	Fluid sample	BOP, ST Lock, Port, BSR	Fluid	11/16/2010
22	Fluid sample	BOP, ST Lock, Port, Upper VBR	Fluid	11/16/2010
23	Fluid sample	BOP, ST Lock, Port, Upper VBR	Fluid	11/16/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
24	Fluid sample	BOP, ST Lock, Port, Middle VBR	Fluid	11/16/2010
25	Fluid sample	BOP, ST Lock, Port, Middle VBR	Fluid	11/16/2010
26	Fluid sample	BOP, ST Lock, Port, Lower VBR	Fluid	11/16/2010
27	Fluid sample	BOP, ST Lock, Port, Lower VBR	Fluid	11/16/2010
28	Fluid sample	Filter unit	Fluid	11/18/2010
29	Fluid sample	LMRP, flex joint bore	Fluid	11/18/2010
30	Fluid sample	BOP, Wellbore	Fluid	11/19/2010
31	Fluid Sample	BOP, Wellbore	Fluid	11/19/2010
32	Hose	LMRP	Coflexip high pressure hose including 1 gasket	11/19/2010
33	Flex Joint	LMRP	Flex Joint	1/20/2011
34	Fluid sample	LMRP, Wellbore	Fluid	11/22/2010
35	Debris	BOP, Wellbore	Rubber	11/22/2010
36	Fluid sample	BOP, Starboard, Lower VBR bonnet, closed circuit side	Fluid	11/23/2010
37	Fluid sample	Filter pump unit, blank	Clear fluid	11/23/2010
38	Fluid sample	BOP, Starboard, BSR bonnet, closed circuit side	Fluid	11/24/2010
39	Drill pipe	LMRP, Upper Annular Preventer	Drill pipe	11/24/2010
40	Fluid sample	BOP, Port, BSR closed circuit; (operator fluid sample)	Fluid	11/29/2010
41	Fluid sample	BOP, Port, BSR closed circuit; (operator fluid sample)	Fluid	11/29/2010
42	Fluid sample	BOP, Port, Upper VBR, close circuit operator fluid sample; (operator fluid sample)	Fluid	11/29/2010
43	Fluid sample	BOP, Port, Upper VBR, close circuit operator fluid sample; (operator fluid sample)	Fluid	11/29/2010
44	Fluid sample	BOP, Port, Middle VBR, open circuit; (operator fluid sample)	Fluid	11/29/2010
45	Fluid sample	BOP, Port, Middle VBR, open circuit; (operator fluid sample)	Fluid	11/29/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
46	Fluid sample	BOP, bonnet drill pump	Clear fluid	11/29/2010
47	Fluid sample	BOP, Port, Lower VBR, closed circuit; (operator fluid sample)	Fluid	11/29/2010
48	Fluid sample	BOP, Port, Lower VBR, closed circuit; (operator fluid sample)	Fluid	11/29/2010
49	Fluid sample	BOP, stud side Upper VBR closed circuit; (operator fluid sample)	Fluid	11/29/2010
50	Fluid sample	BOP, stud side Upper VBR open circuit; (operator fluid sample)	Fluid	11/29/2010
51	Fluid sample	BOP, stud side, Middle VBR, closed circuit, (operator fluid sample)	Fluid	11/29/2010
52	Fluid sample	BOP, stud side, Middle VBR, open circuit, operator sample tube	Fluid	11/29/2010
53	Fluid sample	Bonnet drill pump blank sample from filter pump unit	Clear fluid	12/1/2010
54	Fluid sample	BOP, Starboard, open circuit, Middle VBR (operator fluid sample)	Pink Fluid	12/1/2010
55	Fluid sample	BOP, Starboard, open circuit, Lower VBR (operator fluid sample)	Pink Fluid	12/1/2010
56	Fluid sample	Bonnet drill pump blank sample from filter pump unit	Clear fluid	12/1/2010
57	Port BSR	BSR - Port	Ram	12/2/2010
58	Sample of debris	BSR - Port	Mud	12/2/2010
59	Debris	BSR - Port	Scrapings and mud	12/3/2010
60	Debris	BSR - Port	Scrapings and debris from kill side of Port BSR	12/3/2010
61	Debris	BSR - Port	Scrapings and debris from choke side of Port BSR	12/3/2010
62	Debris	BSR - Port	Scrapings and debris from back side of Port BSR	12/3/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
63	Debris	BSR - Port	Debris from underside of Starboard BSR	12/3/2010
64	Debris	BSR - Port	Cubic debris attached to bottom side of Port BSR	12/3/2010
65	Fluid sample	Hoses connected to lower, inner, and outer close valve open side/Yellow Control Pod	Pink fluid	12/3/2010
66	Fluid sample	Hoses connected to lower, inner, and outer open valve open side/Yellow Control Pod	Pink fluid	12/3/2010
67	Fluid sample	Upper BSR from ROV panel out of shear ram close Port	Pink fluid	12/3/2010
68	Starboard BSR	BSR - Starboard	Ram	12/3/2010
68	Debris	BSR - Starboard	Mud	12/4/2010
68	Debris	BSR - Starboard	2 pieces of hard plastic	12/4/2010
69	Debris	BSR - Starboard; from Item 68	Mud	12/3/2010
70	Debris	BSR - Starboard; from Item 68	Mud	12/3/2010
71	Fluid sample	BOP lower, inner, and outer choke, Blue Control Pod, close side	Pink fluid	12/4/2010
72	Fluid sample	BOP lower, inner, and outer choke, Blue Control Pod, open side	Pink fluid	12/4/2010
73	Debris	BOP/Starboard BSR bonnet face & ram cavity	Mud	12/4/2010
74	Fluid sample	BOP wellbore through choke line	Pink fluid	12/4/2010
75	Debris	BOP/Port, BSR bonnet face and ram cavity	Mud	12/4/2010
76	Debris	BSR - Starboard; 18 bags from Item 68	Rubber, metallic pieces, "junk shot"	12/6/2010
77	Fluid sample	Port hose (blue) from Yellow Control Pod to open shutter valve on CSR	Pink fluid	12/6/2010
78	Fluid sample	Port from Blue Control Pod hose connected to open shutter valve on CSR	Pink fluid	12/6/2010
79	Fluid sample	Port from Blue Control Pod hose connected to CSR closed shutter valve	Pink fluid	12/6/2010
80	Debris	CSR - Port, ram cavity & bonnet face	Mud	12/7/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
81	Fluid sample	Inner and outer kill valve from hoses on open side of Yellow Control Pod on BOP	Pink fluid	12/7/2010
82	Fluid sample	Hoses connected to lower/inner open close kill valves Yellow Control Pod	Pink fluid	12/7/2010
83	Drill pipe	Q-4000	Drill pipe	
83	Debris	Kill line of BOP	Rubber and metallic pieces	12/7/2010
84	Port CSR	BOP	Ram	12/7/2010
84	Drill pipe	Mates to Item 83, recovered on Q-4000	Drill pipe	2/8/2011
85	Debris	CSR - Port: bolt	Bolt	12/7/2010
86	Debris	CSR - Port, from 84 in 3 bags	Debris	12/7/2010
87	Fluid sample	Hoses connected to lower/inner open close kill valves Blue Control Pod	Pink fluid	12/7/2010
88	Fluid sample	Hoses connected to lower/inner open close kill valves Blue Control Pod	Pink fluid	12/7/2010
89	Fluid sample	Hoses connected to lower/inner open close kill valves Blue Control Pod	Pink fluid	12/7/2010
90	Fluid sample	Hoses connected to lower/inner open close kill valves Blue Control Pod	Pink fluid	12/7/2010
91	Fluid sub sample	BOP, ST Lock, Starboard, Middle VBR; Sample from Item 14	Pink fluid for MIC testing	12/7/2010
92	Fluid sub sample	BOP, ST Lock, Port, Middle VBR; Sample from Item 24	Pink fluid for MIC testing	12/7/2010
93	Fluid sub sample	BOP, Wellbore; Sample from Item 31	Pink fluid for MIC testing	12/7/2010
94	Fluid sub sample	LMRP, Upper Annular Preventer; Sample from Item 38	Pink fluid for MIC testing	12/7/2010
94	Drill pipe	Recovered on Q-4000; in BOP	Drill pipe	
95	Fluid sub sample	BOP, Port, BSR close circuit; Sample from Item 40	Pink fluid for MIC testing	12/7/2010
96	Fluid sub sample	BSR - Port from Item 57	Pink fluid for MIC testing	12/7/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
97	Fluid sample	Starboard CSR open operator	Pink fluid	12/8/2010
98	Fluid sample	Starboard, CSR open operator	Pink fluid	12/8/2010
99	Fluid sample	Upper Middle and Lower Port ST Lock hoses	Pink fluid	12/8/2010
100	CSR pin Starboard/debris	CSR - Starboard	Starboard CSR pin and mud	12/8/2010
101	Debris/fluid sample	CSR - Starboard bonnet & ram	Pink fluid and mud	12/8/2010
102	Debris	CSR - Starboard connecting rod and seal	Mud and cloth material	12/9/2010
103	Starboard CSR pin	CSR - Starboard	Pin for Starboard CSR	12/9/2010
104	Starboard CSR	BOP	Ram	12/9/2010
105	Debris/fluid sample	CSR - Starboard cavity	Mud and pink fluid	12/9/2010
106	Fluid sample	Starboard ST Lock hoses	Pink fluid	
107	Connecting rod seal	Starboard CSR connecting rod seal Sample #1	Seal	12/9/2010
108	Connecting rod seal	Starboard CSR connecting rod seal Sample #2	Seal	12/9/2010
109	Connecting rod seal	Starboard CSR connecting rod seal Sample #3	Seal	12/9/2010
110	Connecting rod seal	Starboard CSR connecting rod seal Sample #4	Seal	12/9/2010
111	Port Upper VBR	BOP	Ram	12/10/2010
112	Starboard Upper VBR	BOP	Ram	12/10/2010
113	Fluid sample	Starboard Upper VBR ST Lock-close	Brown-pink fluid	12/10/2010
114	Fluid sample	Port Upper VBR ST Lock-close side	Pink fluid, bolt	12/10/2010
115	Debris	Upper VBR - Port bonnet and ram cavity	Mud	12/10/2010
116	Debris	Top of Upper VBRs	Mud	12/10/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
117	Debris	CSR - Starboard	Mud	12/7/2010
118	Debris	CSR - Starboard; front face	Mud	12/10/2010
119	Debris	CSR - Starboard; from outside edge of pin	Scale and mud	12/10/2010
120	Debris	Bottom back of Starboard CSR (Item #104) CSR - Starboard	Mud-like	12/10/2010
121	Debris	Kill side of CSR - Starboard; lower lip of runner	"Junk shot", mud	12/10/2010
122	Debris	Top of Middle VBRs	Mud, concrete, pink-orange fluid; three buckets	12/10/2010
123	Debris	Upper VBR - Starboard bonnet and ram cavity	Mud-like	12/10/2010
124	Debris	Top of Middle VBRs	Rubber, 5 pieces	12/10/2010
125	Debris	Upper VBR - Port; choke side	Mud	12/10/2010
126	Debris	Upper VBR - Port; kill side	Mud	12/10/2010
127	Debris	Upper VBR - Port element	Mud	12/10/2010
128	Debris	Upper VBR- Starboard element	Mud	12/10/2010
129	Debris	Upper VBR - Starboard; choke side	Mud	12/10/2010
130	Filter	Filter from left chamber of diaphragm pump; BOP	Filter	12/13/2010
131	Debris	Top surface of Middle VBR	Concrete and mud, 2 buckets	12/13/2010
132	Debris	Starboard upper VBR	Rubber and concrete; three sample bags	12/13/2010
133	Debris	Top surface of Middle VBR	Concrete and mud, 10 buckets	12/14/2010
134	Debris	Upper VBR - Port cavity	Rubber, mud, concrete	12/14/2010
135	Filter	Filter removed from filtration until of LMRP	Filter	12/14/2010
136	Debris	Top surface of Middle VBR	Mud, 10 buckets	12/15/2010
137	Fluid Sample	Fluid from the closed side shuttle valve on the Middle VBR, Yellow Control Pod	Pink fluid	12/15/2010
138	Debris	Port Middle VBR bonnet: six buckets	Mud	12/15/2010
139	Port Middle VBR	BOP	Ram	12/15/2010
140	Starboard Middle VBR	BOP	Ram	12/15/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
141	Fluid sample	Starboard Middle VBR, ST Lock - close side/BOP	Orange-pink fluid	12/15/2010
142	Fluid Sample	Port Middle VBR ST Lock-closed side/BOP	Fluid	12/15/2010
143	Debris	Starboard Middle VBR/BOP	Mud, 5 buckets	12/15/2010
144	Debris	Collected on ground near BOP during normal sampling procedures	Concrete	12/15/2010
145	Debris	BOP between Lower and Middle VBRs	Sponge-like substances (two separate white buckets)	12/16/2010
146	Fluid Sample	BOP between Lower and Middle VBRs	Liquid varies in color from bright pink to pink-brown in four buckets	12/16/2010
147	Filter	Filter used for pressure washing above MVBR	Filter	12/16/2010
148	Drill pipe from BOP	Drill pipe from BOP	Drill pipe, "junk shot"	12/16/2010
149	Fluid sample	Fluid from hose 44 B Blue Control Pod to closed side shuttle valve to lower annular of LMRP	Yellow fluid	12/16/2010
150	Fluid sample	Fluid from hose Yellow Control Pod to closed side shuttle valve to lower annular of LMRP	Yellow fluid	12/16/2010
151	Fluid sample	Fluid from Blue Control Pod to open side shuttle valve to lower annular of LMRP	Purple Fluid	12/16/2010
152	Fluid sample	Fluid from Yellow Control Pod to open side shuttle valve to lower annular of LMRP	Yellow-pink fluid	12/16/2010
153	Fluid sample	Fluid from Blue Control Pod to close side shuttle valve to upper annular of LMRP	Yellow-brown fluid	12/16/2010
154	Fluid sample	Fluid from yellow Pod closed side shuttle valve on Lower VBR	Pink fluid	12/17/2010
155	Fluid sample	Yellow Pod hose open side shuttle valve on Lower VBR	Pink-orange fluid	12/17/2010
156	Fluid sample	Port Lower VBR	Pink fluid	12/17/2010
157	Fluid sample	Starboard Lower VBR	Fluid	12/17/2010
158	Starboard Lower VBR	BOP	Ram	12/17/2010

MANAGING RISK

Item #	Evidence	Location of Retrieval	Description	Find Date
159	Port Lower VBR	BOP	Ram	12/17/2010
160	Fluid sample	Port Lower VBR bonnet	Brown fluid	12/17/2010
161	Debris	Debris from Port Lower VBR bonnet	Mud-like, brown	12/17/2010
162	Fluid sample	Fluid from Starboard Lower VBR bonnet	Mud-like, brown fluid	12/17/2010
163	Debris	Debris from Starboard Lower VBR bonnet	Mud-like, brown	12/17/2010
166	Debris	Port Middle VBR	6 clear jars and one zip loc bag containing debris samples	12/20/2010
167	Debris	Starboard Middle VBR	1 jar containing debris sample	12/20/2010
168	Fluid sample	Upper annular accumulator hose	Green fluid	12/20/2010
169	Filter	Used during cleaning of BOP WELLBORE	Filter	12/20/2010
170	Debris	Port Middle VBR	5 jars containing debris	12/20/2010
171	Debris	Starboard Lower VBR	8 jars containing debris	12/20/2010
172	Filter	Used during cleaning of BOP WELLBORE	Filter	12/21/2010
173	Filter	Used during cleaning of BOP WELLBORE	Filter	12/21/2010
174	Debris	Port Lower VBR	Solid debris recovered during cleaning	12/21/2010
175	Debris	Starboard Lower VBR	Solid debris collected during cleaning	12/21/2010
176	Fluid sample	Stack fluid from Yellow Control Pod	Pink fluid	12/22/2010
177	Fluid sample	LMRP stinger fluid from Yellow Control Pod	Pink fluid	12/22/2010
178	Fluid sample	LMRP stinger fluid from Blue Control Pod	Pink fluid	12/22/2010
179	Fluid sample	Stack fluid from Blue Control Pod	Pink fluid	12/22/2010
180	Debris	Middle VBR/BOP (Port)	Debris	12/22/2010
181	Fluid/mud	Middle VBR/BOP (Port)	Brown mud-like	12/22/2010
182	Debris	Middle VBR/BOP (Starboard)	Debris	12/22/2010
183	Debris	Middle VBR/BOP (Port)	Port VBR packer, kill side	12/22/2010
184	Fluid sample	LMRP Accumulators (Bucket 1 of 2 samples)	Pink fluid	1/26/2011
185	Fluid sample	LMRP Accumulators (Bucket 2 of 2 samples)	Pink fluid	1/26/2011
186	Debris	Riser near kink	Metallic ball	1/27/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
187	Fluid Sample	Hose 103 Y located on high pressure shear panel	Pink fluid	1/28/2011
188	Fluid Sample	Green hose connected to Autoshear valve	Clear fluid	1/28/2011
189	Fluid Sample	Hose 99 Y connected to high pressure shear panel	Pink fluid	1/28/2011
190	Fluid Sample	Hose 121 Y connected to high pressure shear panel	Pink fluid	1/28/2011
191	Fluid Sample	Hose 121 Y connected to Autoshear panel	Pink fluid	1/28/2011
192	Fluid Sample	Hose 93 Y, upper inner choke valve open side	Pink fluid	1/28/2011
193	Fluid Sample	Hose 85 Y, upper inner kill valve open side	Pink fluid	1/28/2011
194	Fluid sample	BOP/HP BSR Valve - High Pressure BSR Valve - pilot bleed; on back of High Pressure Shear Panel	Brown-red fluid	1/30/2011
195	CSR Regulator	BOP - High pressure CSR regulator (leaking after overnight pressure test)	CSR Regulator	2/1/2011
196	Debris	Debris from waste water (1 of 1); debris sample is from Item 138 buckets 1-6 and Item 105	Concrete pieces, rubber	2/1/2011
1A-1 (1 of 2 lengths)	Drill pipe	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 3 total pieces	Drill pipe	2/8/2011
1A-1 (2 of 2 lengths)	Drill pipe	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 3 total pieces	Drill pipe	2/8/2011
1-A-1-Q	Test Coupon	Riser test coupon from 1-A-1	Metallurgical sample from Item 1-A-1	2/3/2011
1A-2 (1 of 1)	Drill pipe	From Item #1 (Riser)	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 1 piece	2/8/2011
1B-1 (1 length)	Drill pipe	From Item #1 (Riser)	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 3 total pieces	2/8/2011
1-B-1-Q	Test Coupon	Riser test coupon from 1-B-1	Metallurgical sample from Item 1-B-1	2/8/2011
1-B-1-Z	Test Coupon	Riser test coupon from 1-B-1	Fracture sample from Item 1-B-1	2/8/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
1B-2 (1 of 2 lengths)	Drill pipe	From Item #1 (Riser)	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 3 total pieces	2/8/2011
1B-2 (2 of 2 lengths)	Drill pipe	From Item #1 (Riser)	Pipe from Riser (see Evidence Yard Recovery Log, Item #1); 3 total pieces	2/8/2011
1-B-2-Q	Test Coupon	Riser test coupon from 1-B-2	Metallurgical sample from Item 1-B-2	2/3/2011
1C-1	Debris	Sub sample 1 of 10; Debris from within Riser outside the drill pipe (DP)	Rubber, "junk shot"	2/8/2011
1C-10	Debris	Sub sample 10 of 10; adherent debris recovered from outside of pipe A (Riser)	Rubber, "junk shot"	2/8/2011
1C-2	Debris	Sub sample 2 of 10; debris recovered from kink, short piece of pipe B (Riser)	Rubber, "junk shot"	2/8/2011
1C-3	Debris	Sub sample 3 of 10; debris recovered from kink, short piece of pipe B (Riser)	Rubber, "junk shot"	2/8/2011
1C-4	Debris	Sub sample 4 of 10; debris recovered from kink, short piece of pipe B (Riser)	Rubber, "junk shot"	2/8/2011
1C-5	Debris	Sub sample 5 of 10; debris recovered from kink, short piece of pipe B (Riser)	Rubber, "junk shot"	2/8/2011
1C-6	Debris	Sub sample 6 of 10; debris recovered from kink, short piece of pipe B (Riser)	Rubber, "junk shot"	2/8/2011
1C-7	Debris	Sub sample 7 of 10; adherent debris recovered from outside of pipe A (Riser)	Rubber, "junk shot"	2/8/2011
1C-8	Debris	Sub sample 8 of 10; adherent debris recovered from outside of pipe A (Riser)	Rubber, "junk shot"	2/8/2011
1C-9	Debris	Sub sample 9 of 10; adherent debris recovered from outside of pipe A (Riser)	Rubber, "junk shot"	2/8/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
32A	Brackets	LMRP	Two brackets; Flex joint bullseye with plastic face; bullseye encased in steel bracket removed from flex joint; from coflexip hose	1/20/2011
32B	Bolts, brackets, nuts	LMRP	12 nuts and bolts, originally part of Item 32 entered on 11/19/2010 repackaged as sub Item 32A; from coflexip hose	
33A	Bolts, brackets, nuts	Removed form Flex Joint	Flex Joint bulls eye with plastic face; bulls eye encased in steel w/ bracket	1/20/2011
33A-1	Bolts and nuts	Flex Joint bulls eye	4 nuts & bolts belonging to Flex Joint bulls eye repackaged as sun Item 33A-1	1/20/2011
33B	Mud boost valve	Removed from Flex Joint	Mud boost valve	1/20/2011
33C	Bolts and nuts	Removed from Flex Joint	20 nuts and bolts threaded together with rope, removed from Flex Joint, repackaged as a sub Item of 33, Flex Joint	1/20/2011
33D	Debris	Removed from washer/spacer on flange where hose connects on kill side of Flex Joint	Mud, red fluid	1/28/2011
33E	Debris	Removed from base of flange connection point on Flex Joint	Mud, spring, "junk shot", paint chips, nuts, bolts	1/28/2011
33F	Debris	Removed from washer/spacer on flange where hose connects on kill side of Flex Joint	Mud, red fluid	1/28/2011
39A	Debris	Sub sample 39A (1 of 2 sub samples) of Item 39 (drill pipe)	Rubber & metallic pieces	1/17/2011
39B	Debris	Sub sample 39A (2 of 2 sub samples) of Item 39 (drill pipe)	Rubber & metallic pieces	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
39Q	Drill pipe	LMRP, Upper Annular Preventer/DP (test coupon)	Metallurgical and mechanical samples from Item 39 (test coupon)	2/3/2011
39Z	Drill pipe	From Item 39, DP in LMRP, Upper Annular Preventer	Fracture samples 39-Z from Item 39 (originally from drill pipe in LMRP dockside, Upper Annular Preventer)	2/3/2011
58A	Debris	Subsample 58A (1 of 2 subsamples) of Item 58 (debris) recovered by DNV; contains debris from Port BSR	Concrete pieces, gray	1/17/2011
58B	Debris	Subsample 58A (2 of 2 subsamples) of Item 58 (debris) recovered by DNV; contains debris from Port BSR	Partial brown ball	1/17/2011
69A	Debris	Sub sample 69A (1 of 2 sub samples) of Item 69 collected by DNV from Starboard BSR	Rubber, washer, metallic pieces	1/17/2011
69B	Debris	Sub sample 69B (2 of 2 sub samples) of Item 69 collected by DNV from Starboard BSR	Concrete pieces, gray	12/3/2010
70A	Debris	Sub sample 70A (1 of 2 sub samples) of Item 70 collected by DNV from Starboard BSR	Debris	1/17/2011
70B	Debris	Sub sample 70B (2 of 2 sub samples) of Item 70 collected by DNV from Starboard BSR	Concrete pieces, gray	1/17/2011
73A	Debris	Sub sample 73A (1 of 1) of Item 73 collected by DNV from Starboard BSR bonnet face & ram cavity	Concrete pieces, gray	1/17/2011
80A	Debris	Sub sample 80A (1 of 1) of Item 80 collected by DNV from Port CSR, bonnet face & cavity ram	Metallic pieces	1/17/2011
83 (1 of 2 lengths)	Drill pipe	Item #83 DP on Q-4000	Drill pipe recovered while on Q-4000 (see Q-4000 Evidence Recovery Log); samples taken from original length resulting in 4 pieces	2/8/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
83 (2 of 2 lengths)	Drill pipe	Item #83 DP on Q-4000	Drill pipe recovered while on Q-4000 (see Q-4000 Evidence Recovery Log); samples taken from original length resulting in 4 pieces	2/8/2011
83Q	Test Coupon	Item #83 DP on Q-4000	Metallurgical and mechanical samples from Item 83 (test coupon)	2/3/2011
83Z	Test Coupon	Item #83 DP on Q-4000	Fracture samples 83-Z from Item 83 (original from drill pipe in LMRP dockside, Upper Annular Preventer	2/8/2011
84A	Drill pipe	mates to Item 83, recovered on Q-4000	Sub sample 84A (1 of 2) of Item 84 collected by DNV from Port casing shear	1/17/2011
84B	Drill pipe	mates to Item 83, recovered on Q-4000	Sub sample 84B (2 of 2) of Item 84 collected by DNV from Port casing shear	1/17/2011
94 (1 of 2 lengths)	Drill pipe	Q-4000 between BSR and CSR	Drill pipe recovered while on Q-4000 (see Q-4000 Evidence Recovery Log); samples taken from original length resulting in 4 pieces lengths 1 of 2)	2/8/2011
94 2 of 2 lengths)	Drill pipe	Q-4000 between BSR and CSR	Drill pipe recovered while on Q-4000 (see Q-4000 Evidence Recovery Log); samples taken from original length resulting in 4 pieces lengths 1 of 2)	2/8/2011
94Q	Test Coupon	Q-4000 between BSR and CSR	Metallurgical and mechanical samples from Item 94 (test coupon)	2/3/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
94Z	Test Coupon	Q-4000 between BSR and CSR	Fracture samples 94-Z from Item 94 (original from drill pipe in LMRP dockside, Upper Annular Preventer	2/8/2011
95A	MIC	BOP, Port, BSR closed circuit	MIC ADL bottle	2/9/2011
95B	MIC	BOP, Port, BSR closed circuit	MIC ADL bottle	2/9/2011
101A	Debris	Sub sample 101A (1 of 3 sub samples) from Item 101 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	Metallic pieces	1/17/2011
101B	Debris	Sub sample 101A (2 of 3 sub samples) from Item 101 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	White cubes, brown balls, partial brown balls	1/17/2011
101C	Debris	Sub sample 101A (3 of 3 sub samples) from Item 101 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	Plastic debris, concrete pieces, rubber	1/17/2011
102A	Debris	Sub sample 102A (1 of 1 sub samples) from Item 102 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	Concrete pieces, rubber debris	12/9/2010
105A	Debris	Sub sample 105A (1 of 2 sub samples) from Item 105 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	Concrete pieces, rubber	1/17/2011
105B	Debris	Sub sample 105B (1 of 2 sub samples) from Item 105 recovered by DNV; contains debris & fluid from Starboard CSR bonnet & ram	Metallic pieces	1/17/2011
111-1 through 111-5	Segments	Segments Item #111, Port, Upper VBR.: VBR. segments (teeth) 1 of 5 pieces; 111-1; 111-2; 111-3; 111-4; & 111-5	Segments	2/9/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
112-1 through 112-7	Segments	From Item #112, Starboard, Upper VBR.: VBR. segments (teeth) 1 of 7 pieces; 112-1; 112-2; 112-3; 112-4; & 112-5; 112-6; & 112-7	Segments	2/9/2011
115A	Debris	Sub sample 115A (1 of 2) from Item 115 recovered by DNV; contains debris from Port Upper VBR.	Mud sub-sample	1/17/2011
115B	Debris	Sub sample 115B (2 of 2) from Item 115 recovered by DNV; contains debris (solids) from Port Upper VBR.	Concrete pieces, gray	1/17/2011
116A	Debris	Sub samples 116A (1 of 4) from Item 116 recovered by DNV; contains debris from top Upper VBR.	Concrete pieces, gray	1/17/2011
116B	Debris	Sub sample 116B (2 of 4) from Item 116 recovered by DNV; contains debris from top Upper VBR.	Concrete pieces, gray	1/17/2011
116C	Debris	Sub sample 116C (3 of 4) from Item 116 recovered by DNV; contains debris from top Upper VBR.	"Junk shot": 2 white balls, 1 brown ball, 3 white cubes, one washer	1/17/2011
116D	Debris	Sub sample 116D (4 of 4) from Item 116 recovered by DNV; contains debris from top Upper VBR.	Two small pieces of metallic material	1/17/2011
117A	Debris	Sub samples 117A (1 of 4) from Item 117 recovered by DNV; contains debris from top Upper VBR.	Concrete pieces, gray	1/17/2011
117B	Debris	Sub sample 117B (2 of 4) from Item 117 recovered by DNV; contains debris from top Upper VBR.	"Junk shot": 2 white cubes, 4 brown balls	1/17/2011
117C	Debris	Sub sample 117C (3 of 4) from Item 117 recovered by DNV; contains debris from top Upper VBR.	Metal pin, 3 curved pieces of metal, 1 partial ball, 1 partial brown ball	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
117D	Debris	Sub sample 117D (4 of 4) from Item 117 recovered by DNV; contains debris from top Upper VBR.	1 piece of rubber, 1 red string, 1 partial ball, metal pieces,	1/17/2011
122A (1 of 3 bkts)	Debris	Sub sample 122A (1 of 4 sub samples from bucket 1 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	12/10/2010
122A (2 of 3 bkts)	Debris	Sub sample 122A (1 of 3 sub samples from bucket 2 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
122A (3 of 3 bkts)	Debris	Sub sample 122A (1 of 4 sub samples from bucket 3 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Rubber, partial while ball, small metallic pieces	1/17/2011
122B (1 of 3 bkts)	Debris	Sub sample 122B (2 of 4 sub samples from bucket 1 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
122B (2 of 3 bkts)	Debris	Sub sample 122B (2 of 3 sub samples from bucket 2 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
122B (3 of 3 bkts)	Debris	Sub sample 122B (2 of 4 sub samples from bucket 3 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
122C (1 of 3 bkts)	Debris	Sub sample 122C (3 of 4 sub samples from bucket 1 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Rubber, white cubes, partial brown balls	1/17/2011
122C (2 of 3 bkts)	Debris	Sub sample 122C (3 of 3 sub samples from bucket 2 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Metallic piece	1/17/2011
122C (3 of 3 bkts)	Debris	Sub sample 122C (3 of 4 sub samples from bucket 3 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
122D (1 of 3 bkts)	Debris	Sub sample 122D (4 of 4 sub samples from bucket 1 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
122D (3 of 3 bkts)	Debris	Sub sample 122D (4 of 4 sub samples from bucket 3 of 3) from Item 122 (3 buckets); contains debris from top of Middle VBRs	Concrete pieces	1/17/2011
123A	Debris	Sub sample 123A (1 of 4) from Item 123 recovered by DNV; contains debris from Starboard Upper VBR. bonnet	Piece of cloth, glove	1/17/2011
123B	Debris	Sub sample 123A (2 of 4) from Item 123 recovered by DNV; contains debris from Starboard Upper VBR. bonnet	Cloth towel	1/17/2011
123C	Debris	Sub sample 123A (3 of 4) from Item 123 recovered by DNV; contains debris from Starboard Upper VBR. bonnet	Concrete pieces	1/17/2011
123D	Debris	Sub sample 123A (4 of 4) from Item 123 recovered by DNV; contains debris from Starboard Upper VBR. bonnet	Rubber, partial brown ball, red string	1/17/2011
131A (1 of 2 bkts)	Debris	Sub sample 131A (1 of 2 sub samples from bucket 1 of 2) from Item 131; contains debris from top surface of Middle VBRs	Concrete pieces	1/17/2011
131A (2 of 2 bkts)	Debris	Sub sample 131A (1 of 1 sub samples from bucket 2 of 2) from Item 131; contains debris from top surface of Middle VBRs	Concrete pieces	1/17/2011
131B (1 of 2 bkts)	Debris	Sub sample 131B (2 of 2 sub samples from bucket 1 of 2) from Item 131; contains debris from top surface of Middle VBRs	Metallic pieces	1/17/2011
133A (10 of 10 bkts)	Debris	Sub sample 133A (1 of 2 sub sample from bucket 10 of 10) from Item 133; contains debris from top surface of Middle VBR.	Concrete pieces	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
133A (2 of 10 bkts)	Debris	Sub sample 133A (1 of 1 sub sample from bucket 2 of 10) from Item 133; contains debris from top surface of Middle VBR.	Metallic pieces	1/17/2011
133A (4 of 10 bkts)	Debris	Sub sample 133A (1 of 1 sub sample from bucket 4 of 10) from Item 133; contains debris from top surface of Middle VBR.	Metallic pieces	1/17/2011
133B (10 of 10 bkts)	Debris	Sub sample 133A (2 of 2 sub sample from bucket 10 of 10) from Item 133; contains debris from top surface of Middle VBR.	Metallic pieces	1/17/2011
136A	Debris	Sub sample 136A (1 of 1 sub sample) from Item 136; containing debris from top surface of Middle VBRs	Concrete pieces	1/17/2011
138A (1 of 6 bkts)	Debris	Sub sample 138A (1 of 1 sub sample) from Item 138, 1/6 buckets; containing debris from Port Middle VBR. bonnet	Concrete pieces	1/17/2011
138A (2 of 6 bkts)	Debris	Sub sample 138A (1 of 1 sub sample) from Item 138, 2/6 buckets; containing debris from Port Middle VBR. bonnet	Concrete pieces	1/17/2011
138A (3 of 6 bkts)	Debris	Sub sample 138A (1 of 1 sub sample) from Item 138, 3/6 buckets; containing debris from Port Middle VBR. bonnet	Concrete pieces	1/17/2011
138A (4 of 6 bkts)	Debris	Sub sample 138A (1 of 1 sub sample) from Item 138, 4/6 buckets; containing debris from Port Middle VBR. bonnet	Concrete pieces, rubber piece	1/17/2011
138A (5 of 6 bkts)	Debris	Sub sample 138A (1 of 2 sub sample) from Item 138, 5/6 buckets; containing debris from Port Middle VBR. bonnet	Rubber pieces	1/17/2011
138A (5 of 6 bkts)	Debris	Sub sample 138A (2 of 2 sub sample) from Item 138, 5/6 buckets; containing debris from Port Middle VBR. bonnet	Concrete pieces, mud-like	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
138A (6 of 6 bkts)	Debris	Sub sample 138A (1 of 1 sub sample) from Item 138, 6/6 buckets; containing debris from Port Middle VBR. bonnet	Rubber	1/17/2011
139-1 through 139-7	Segments	VBR. segments (teeth) 1 of 7 pieces; 139-1; 139-2; 139-3; 139-4; & 139-5; 139-6; & 139-7	Segments	2/9/2011
139A	Debris	Sub sample 139A (1 of 1 sub sample) from Item 138, 1/6 buckets; containing debris from area behind segments 1-4; Port Middle VBR.	Rubber, concrete, metallic pieces	1/17/2011
140-1 through 140-5	Segments	Segments from Item #140, Starboard. Middle VBR.: 1 of 5 pieces; 140-1; 140-2; 140-3; 140-4; & 140-5	Segments	2/9/2011
143A	Debris	Sub sample from all 143 buckets (1 of 3 sub samples from all 143 bkts) from Item 143, containing waste bucket water from Starboard Middle VBR. bonnet	Metallic pieces	1/17/2011
143A (1 of 5 bkts)	Debris	Sub sample 143A (1 of 3 sub samples from bkt 1 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143A (2 of 5 bkts)	Debris	Sub sample 143A (1 of 3 sub samples from bkt 2 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143A (3 of 5 bkts)	Debris	Sub sample 143A (1 of 2 sub samples from bkt 3 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143A (4 of 5 bkts)	Debris	Sub sample 143A (1 of 4 sub samples from bkt 4 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Metallic pieces	1/17/2011
143A (5 of 5 bkts)	Debris	Sub sample 143A (1 of 1 sub samples from bkt 5 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
143B	Debris	Sub sample from all 143 buckets (2 of 3 sub samples from all 143 bkts) from Item 143, containing waste bucket water from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143B (1 of 5 bkts)	Debris	Sub sample 143B (2 of 3 sub samples from bkt 1 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143B (2 of 5 bkts)	Debris	Sub sample 143B (1 of 3 sub samples from bkt 2 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Rubber pieces	1/17/2011
143B (3 of 5 bkts)	Debris	Sub sample 143B (2 of 2 sub samples from bkt 3 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Rubber	1/17/2011
143B (4 of 5 bkts)	Debris	Sub sample 143B (2 of 4 sub samples from bkt 4 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143C	Debris	Sub sample from all 143 buckets (3 of 3 sub samples from all 143 bkts) from Item 143, containing waste bucket water from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
143C (1 of 5 bkts)	Debris	Sub sample 143B (3 of 3 sub samples from bkt 1 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Metallic pieces, rubber	1/17/2011
143C (2 of 5 bkts)	Debris	Sub sample 143C (3 of 3 sub samples from bkt 2 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Skid pad for pipe ram	1/17/2011
143C (4 of 5 bkts)	Debris	Sub sample 143C (3 of 4 sub samples from bkt 4 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
143D (4 of 5 bkts)	Debris	Sub sample 143D (4 of 4 sub samples from bkt 4 of 5) from Item 143, containing debris from Starboard Middle VBR. bonnet	Concrete pieces	1/17/2011
148AA	Debris	Sub sample 148AA (1 of 1 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	1/17/2011
148B-1	Debris	Sub sample 148B-1 (1 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-10	Debris	Sub sample 148B-10 (10 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-11	Debris	Sub sample 148B-11 (11 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-12	Debris	Sub sample 148B-12 (12 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-13	Debris	Sub sample 148B-13 (13 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-14	Debris	Sub sample 148B-14 (14 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
148B-15	Debris	Sub sample 148B-15 (15 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-16	Debris	Sub sample 148B-16 (16 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-17	Debris	Sub sample 148B-17 (17 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-18	Debris	Sub sample 148B-18 (18 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-19	Debris	Sub sample 148B-19 (19 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-2	Debris	Sub sample 148B-2 (2 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-20	Debris	Sub sample 148B-20 (20 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
148B-3	Debris	Sub sample 148B-3 (3 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-4	Debris	Sub sample 148B-4 (4 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-5	Debris	Sub sample 148B-5 (5 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-6	Debris	Sub sample 148B-6 (6 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-7	Debris	Sub sample 148B-7 (7 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-8	Debris	Sub sample 148B-8 (8 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148B-9	Debris	Sub sample 148B-9 (9 of 20 sub sample) from Item 148 recovered by DNV; contains debris collected from top surface of drill pipe located in BOP	"Junk shot"	2/3/2011
148Q	Test Coupon	drill pipe from BOP/test coupon	Metallurgical sample from Item 148 (test coupon)	2/3/2011

Item #	Evidence	Location of Retrieval	Description	Find Date
158-1	Segment	from Item #158, Starboard, Lower VBR.	Segment	2/9/2011
161A	Debris	Sub sample 161A (1 of 2 sub samples) from Item 161 recovered by DNV; debris from Port Lower VBR. bonnet	Rubber pieces, metallic pieces	1/17/2011
161B	Debris	Sub sample 161B (2 of 2 sub samples) from Item 161 recovered by DNV; debris from Port Lower VBR. bonnet	Concrete pieces	1/17/2011
163A	Debris	Sub sample 163A (1 of 2 sub samples) from Item 163 recovered by DNV; debris from Starboard Lower VBR. bonnet	Concrete pieces	1/17/2011
163B	Debris	Sub sample 163B (2 of 2 sub samples) from Item 163 recovered by DNV; debris from Starboard Lower VBR. bonnet	Metallic pieces, rubber, rope, partial ball	1/17/2011
164 (1 of 8)	Debris	Debris from Starboard Middle VBR.	Mud-like, brown	12/17/2010
164 (2 of 8)	Debris	Debris from Starboard Middle VBR.	Mud-like, brown	12/17/2010
164 (3 of 8)	Debris	Debris from Starboard Middle VBR.	Mud-like, brown, concrete	12/17/2010
164 (4 of 8)	Debris	Debris from Starboard Middle VBR.	Mud-like, brown, concrete	12/17/2010
164 (5 of 8)	Debris	Debris from Starboard Middle VBR.	Concrete	12/17/2010
164 (6 of 8)	Debris	Debris from Starboard Middle VBR.	Mud	12/17/2010
164 (7 of 8)	Debris	Debris from Starboard Middle VBR.	Mud-like, brown, concrete	12/17/2010
164 (8 of 8)	Debris	Debris from Starboard Middle VBR.	Rubber	12/17/2010

Item #	Evidence	Location of Retrieval	Description	Find Date
165 (1 of 3)	Debris	Debris from Port Middle VBR.	Mud-like, brown, concrete	12/17/2010
165 (2 of 3)	Debris	Debris from Port Middle VBR.	Concrete	12/17/2010
165 (3 of 3)	Debris	Debris from Port Middle VBR.	Rubber, mud	12/17/2010
197A	Debris	BOP/Debris from waste bucket collected after cleaning Item 131 (bucket 1 of 2 and 2 of 2) and Item 161	Concrete pieces, rubber	2/3/2011
197B	Debris	BOP/Debris from waste bucket collected after cleaning Item 131 (bucket 1 of 2 and 2 of 2) and Item 161	Metallic pieces	2/3/2011

APPENDIX E

SITE TEST RESULTS

SITE TEST RESULTS

1.1 Breakout Torques

The breakout torques for all pertinent bolts and fittings removed are contained in this appendix.

Table 1 Annular Hoses at Shuttle Valves – Open and Close

	Breakout Torque Ft-Lbs			
	Upper Annular		Lower Annular	
Shuttle Valve	Yellow Pod	Blue Pod	Yellow Pod	Blue Pod
Open	211.9	0	101.7	201.2
Close	0	126.6	0	107.5

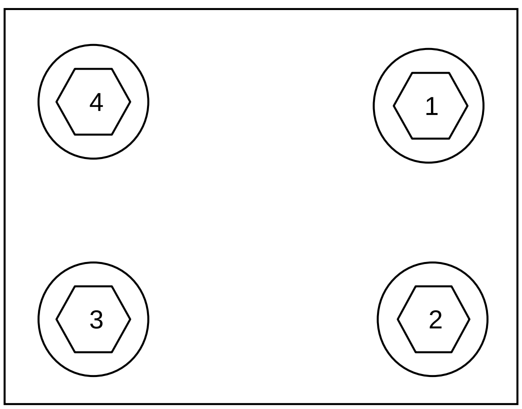


Figure 1 Drawing Showing Bolt Numbers as described in Table 2, when viewed head on

Table 2 Bonnet Cap Nuts

		Bolt #1		Bolt #2		Bolt #3		Bolt #4	
	Ram Bonnet	Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)
Port Side	Lower Pipe Ram	3,000	4,679	4,000	6,260	3,000	4,679	4,600	7,219
	Middle Pipe Ram	4,200	6,580	9,000	14,272	8,000	12,663	6,000	9,458
	Upper Pipe Ram	6,800	10,764	3,200	4,995	5,800	9,138	8,000	12,663
	Casing Shear Ram	4,200	6,382	4,200	6,382	4,800	7,312	4,000	6,260

	Ram Bonnet	Bolt #1		Bolt #2		Bolt #3		Bolt #4	
		Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)	Pressure (psi)	Torque (ft-lbs)
	Blind Shear Ram*	2,000	2,118	3,200	3,287	2,000	2,118	2,500	2,567
STBD Side	Lower Pipe Ram	3,200	3,287	3,000	3,174	5,600	5,812	2,400	2,464
	Middle Pipe Ram*	4,200	4,333	4,000	4,239	3,600	3,704	3,800	3,704
	Upper Pipe Ram	4,200	6,382	2,000	3,075	800	1,174	3,500	5,306
	Casing Shear Ram	2,800	4,227	3,400	5,152	3,200	4,855	3,800	5,765
	Blind Shear Ram	5,000	7,858	3,800	5,765	5,200	7,933	2,500*	2,567*

Note: All nuts broken out with IU-17XL Fitting unless denoted with a *.
* indicates that the nut was broken out with SU-11XL Fitting.

Table 3 Flex Joint Flange Bolts – Connection to Upper Annular

Bolt #	Pressure (psi)	Torque (Ft-lbs)
1	5,000	4,905
2	4,200	4,093
3	3,400	3,323
4	4,800	4,702
5	3,400	3,323
6	4,400	4,296
7	3,800	3,701
8	4,800	4,702
9	3,100	3,039
10	4,600	4,499
11	4,200	4,093
12	4,600	4,499
13	3,400	3,323
14	5,000	4,905
15	4,000	3,890
16	5,000	4,905
17	5,200	5,100
18	5,000	4,905
19	4,200	4,093
20	4,600	4,499
21	3,800	3,701

Bolt #	Pressure (psi)	Torque (Ft-lbs)
22	4,800	4,702
23	5,000	4,905
24	4,000	3,890

Note: Bolts are 2 ¼", nuts are 3 ½"

Table 4 Blowout Preventer Hoses

Hose Description	Torque (Ft-Lbs)		Notes
	Yellow Pod	Blue Pod	
70J Upper - 1/2" Blue hose from T-Connection to ST Locks on Port Side BSR		No value recorded	Assumed blue pod b/c of hose color
70J Lower - 1/2" Blue hose from T-Connection to ST Locks on Port Side BSR		No value recorded	Assumed blue pod b/c of hose color
Port Side BSR Close Side Shuttle Valve - 1" Hose	91.8		
Port Side BSR Open Side Shuttle Valve - 1" Hose	86.4		
Upper - 1/2" Blue hose from T-Connection to ST Locks on STBD Side BSR		41.6	Assumed blue pod b/c of hose color
Lower - 1/2" Blue hose from T-Connection to ST Locks on STBD Side BSR		37.2	Assumed blue pod b/c of hose color
Lower/Outer Choke Valve - Closed	38.2		
Lower/Inner Choke Valve - Closed	36.2		
Lower/inner Choke Valve - Open	66.7		
Lower/Outer Choke Valve - Open	34.2		
Lower/Outer Choke Valve - Closed		41.0	Leak during opening required Blue hoses to be capped
Lower/Inner Choke Valve - Closed		Hand tight.	Leak during opening required Blue hoses to be capped
Lower/inner Choke Valve - Open		46.2	Leak during opening required Blue hoses to be capped
Lower/Outer Choke Valve - Open		31.9	Leak during opening required Blue hoses to be capped
Hose #4 - Hose to Open Side Shuttle Valve on Casing Shear	40.3		Hose Blue in color but connected to Yellow Pod
Hose #71B - Hose to Open Side Shuttle Valve on Casing Shear		46.2	

Hose Description	Torque (Ft-Lbs)		Notes
	Yellow Pod	Blue Pod	
Hose to Top of Open Side Shuttle Valve on Casing Shear	65.9*		Hose Green in color
Hose to Close Side Shuttle Valve on Casing Shear		45.8	
Hose to Top of Close Side Shuttle Valve on Casing Shear	40.0*		Hose Green in Color
Lower/Inner Kill Valve - Close	No value recorded		
Lower/Outer Kill Valve - Close	37.9		
Lower/Inner Kill Valve - Open	37.9		
Lower/Outer Kill Valve - Open	31		
Lower/Inner Kill Valve - Close		43.5	
Lower/Outer Kill Valve - Close		73.4	
Lower/Inner Kill Valve - Open		32.4	
Lower/Outer Kill Valve - Open		33.1	
Lower Kill Valve ROV Hose / Inner side of T-Connection	45.8*		
Lower Kill Valve ROV Hose / Outer side of T-Connection	44.9*		
Hose #J71 - Hose to STBD Casing Shear Ram Open Side Shuttle Valve	51.3		Need to Confirm Yellow Pod
Hose #J72 - Hose to STBD Casing Shear Ram Close Side Shuttle Valve	65.9		Need to Confirm Yellow Pod
Port Side lower Pipe Ram ST Lock Hose	44.5*		
Port Side Middle Pipe Ram ST Lock Hose	0		
Port Side Lower Pipe Ram ST Lock Hose	0		
STBD Side lower Pipe Ram ST Lock Hose	31.7*		
STBD Side Upper Pipe Ram ST Lock Hose	35.2*		
Hose #Y75 - Hose to Open Side Shuttle Valve on Upper Pipe Ram	96.2		
Hose #Y76 - Hose to Close Side Shuttle Valve on Upper Pipe Ram	69.9		
Hose to Open Side Shuttle Valve Yellow Pod on Middle Pipe Ram.	80.9*		Hose not Yellow. From ROV intervention connection
Hose to Close Side Shuttle Valve Yellow Pod on Middle Pipe Ram.	127.5*		Hose not Yellow. From ROV intervention connection

Hose Description	Torque (Ft-Lbs) Yellow Pod	Torque (Ft-Lbs) Blue Pod	Notes
Hose #68Y - Hose to Close Side Shuttle Valve on Lower Pipe Ram	119.2		
Hose #67Y - Hose to Open Side Shuttle Valve on Lower Pipe Ram	56.4		
BOP Stack accumulator discharge hose	129.9		
Hose from HP Shear Panel to BSR (Green)	113.7		
Hose #103Y	39.2		
Hose (Green) from Autoshear valve to connection on HP Shear Panel – at HP Shear Panel	40.8		
Hose #99Y – From HP Shear Panel to CSR Close – at HP Shear Pane.	41.0		
Hose #121Y – From Autoshear Arm Shuttle valve to Autoshear Panel	43.3		
Hose #121Y – From Autoshear Panel to Autoshear Valve – At Autoshear Panel	48.2		
Hose #122Y – From Autoshear Disarm Shuttle Valve to Autoshear Panel	34.6		
Hose #93Y – Upper Inner Choke Valve Open	32.0		
Hose #85Y – Upper Inner Kill Valve Open	27.0		
ROV Panel Hose – Pipe Ram Close	41.0		
ROV Panel Hose – Shear Ram Close	47.6		
Hose #82Y – Accumulator Charge Hose	35.4		

* indicates that the hose is not specific to either the Yellow Pod or the Blue Pod

Table 5 Actuator Screw Subassembly Bolts (LMRP)

Bolt #	Torque (Ft-lbs)
1	112.3
2	59.1
3	0.0
4	0.0

Table 6 Lower Marine Riser Package Hoses

Hose Description	Breakout Torque Ft-Lbs		Notes
	Yellow Pod	Blue Pod	
Hose #44 - Hose to Lower Annular Closed Side Shuttle Valve		107.5	
Hose to Lower Annular Closed Side Shuttle Valve	0		Hose from an ROV intervention connection
Hose #13B - Hose to Lower Annular Open Side Shuttle Valve		201.2	
Hose to Lower Annular Open Side Shuttle Valve	101.7		Label partially obscured, read "3Y"
Hose to Upper Annular Closed Side Shuttle Valve		126.6	
Hose to Upper Annular Closed Side Shuttle Valve	0.0		Label partially obscured, read "2Y"
Hose to Upper Annular Open Side Shuttle Valve	211.9		Plate that hose is connected to is labeled "11"
Hose to Upper Annular Open Side Shuttle Valve		0.0	
Hose from 15-gal. accumulator to Upper Annular Close Shuttle Valve	57.0		
Pilot line fitting on top of LMRP accumulator dump valve	15		
Flexible Hose for blue pod supply from rigid conduit		264.6	
Hot line supply hose to rigid conduit manifold	119.9		

- indicates that the hose is not specific to either the Yellow Pod or the Blue Pod

Table 7 Pod Hoses

Hose Description	Breakout Torque (ft-lbs)		Notes
	Yellow Pod	Blue Pod	
Hot Stab Hose (removed to facilitate removal of pod top plates)	5	5	
Tubing 103 (Between Solenoid and Hydraulic side)	5		
Tubing 103 (Between Solenoid and Hydraulic side)		0	Slightly Loose
Tubing 121 (Between Solenoid and Hydraulic side)	5		
Tubing 103 (Between Solenoid and Hydraulic side)		5	

Table 8 BSR ST Lock Sequencer Removal

Sequencer Cap	Breakout Torques (ft-lbs)			
	Bolt #1	Bolt #2	Bolt #3	Bolt #4
STBD BSR ST Lock	47.6	49.6	42	40.1
Port BSR ST Lock	68.4	76.2	88.3	70.3

Note: Bolts are number Clockwise from the upper left.

Table 9 BSR ST Lock Sequencer Tubing Removal

	STBD BSR ST Lock Sequencer	Port BSR ST Lock Sequencer
1/2" Tubing Located Closer to Choke Side	49.4	109.6
1/2" Tubing Located Closer to Kill Side	66.3	109.6

Table 10 LMRP Rigid Conduit Supply Removal

Rigid Conduit Supply	Breakout Torques (ft-lbs)			
	Bolt #1	Bolt #2	Bolt #3	Bolt #4
Blue Pod	45	No value recorded	40	No value recorded

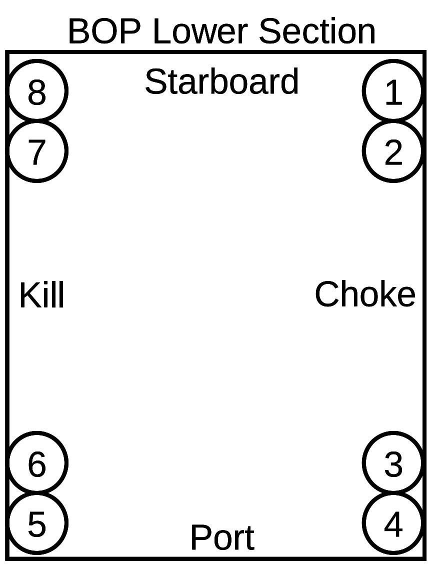
Table 11 Solenoid Breakout Torques

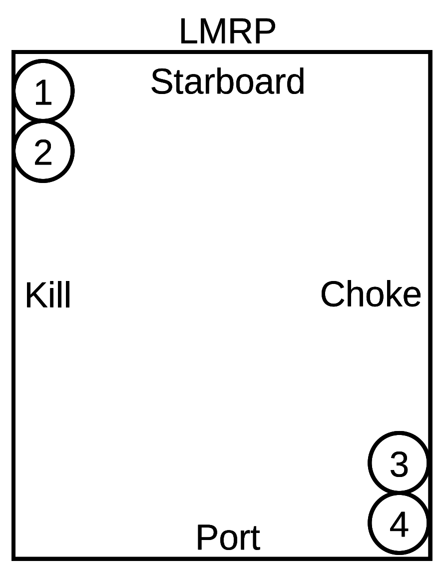
Solenoid	Breakout Torques (ft-lbs)			
	Bolt #1	Bolt #2	Bolt #3	Bolt #4
Replaced (Non-original) Solenoid 103Y	5	5	3	3

1.2 Pre-Charge Levels Measured on the LMRP and BOP Accumulators

Date	Location	Accumulator	Pressure psig Reference Gauge	Pressure psig Calibrated Gauge	Notes
Dec 22, 2010 - Temp Hi: 73F, Lo: 61F Barometric Press: 30.09 - 30.18					
12/22/10	LMRP	1	5200	5200	
12/22/10	LMRP	2	5200	5200	
12/22/10	LMRP	3	5200	5200	
12/22/10	LMRP	4	5200	5200	
12/22/10	BOP	1	4000	3900	
12/22/10	BOP	2	3900	3850	
12/22/10	BOP	3	3750	3800	
12/22/10	BOP	4	3750	3800	
12/22/10	BOP	5	3800	3700	
12/22/10	BOP	6	3600	3600	
12/22/10	BOP	7	3750	3700	
12/22/10	BOP	8	3900	3875	
Jan 25, 2011 - Temp Hi: 60F, Lo: 54F Barometric Press: 29.79 - 29.80					
1/25/11	LMRP	1	4950	4900	
1/25/11	LMRP	2	5000	4900	
1/25/11	LMRP	3	4600	4700	Small leak at 'O' ring during test
1/25/11	LMRP	4	4975	4900	
1/25/11	BOP	1	3850	3800	
1/25/11	BOP	2	3800	3725	see pg 126
1/25/11	BOP	3	3750	3650	Leak at valve collar, believe in 'O' ring
1/25/11	BOP	4	3750	3650	
1/25/11	BOP	5	3625	3550	
1/25/11	BOP	6	3500	3425	
1/25/11	BOP	7	3625	3575	
1/25/11	BOP	8	3800	3725	
Jan 26, 2011 Temp: Hi 50F; Lo 42F Barometric Press: 30.15 – 30.22					
1/26/11	LMRP	1	1200	1225	
1/26/11	LMRP	2	3450	3425	
1/26/11	LMRP	3	3425	3400	Heavy leak during check
1/26/11	LMRP	4	3425	3400	

Date	Location	Accumulator	Pressure psig		Notes
			Reference Gauge	Calibrated Gauge	
			Reference Gauge	Calibrated Gauge	
Jan 27, 2011 Temp: Hi 57F; Lo, 47F Barometric Press: 30.12 - 30.21					
1/27/11	LMRP	1	1200	1200	
1/27/11	LMRP	2	3425	3375	
1/27/11	LMRP	3	2250	2300	Leak during test
1/27/11	LMRP	3	2350	2375	Recheck-heavy leak at 'O' ring
1/27/11	LMRP	4	3450	3400	
1/27/11	BOP	1	3625	3600	Leak at 'O' ring during test
1/27/11	BOP	2	3800	3750	
1/27/11	BOP	3	3800	3700	
1/27/11	BOP	4	3800	3725	
1/27/11	BOP	5	3750	3650	
1/27/11	BOP	6	3550	3500	
1/27/11	BOP	7	3675	3675	
1/27/11	BOP	8	3850	3825	





1.3 AMF/Deadman Test Measurements

On February 7, 2011, a test of the AMF/Deadman functions of the lower section of the BOP was completed. Below are the results of various measurements taken with respect to that test. Certain measurements were repeated on 8/Feb to confirm the data recorded on February 7. That data is provided on the attached page.

This test was undertaken with the Pre-Charge levels on the eight (8) – eighty (80) gallon accumulators in their ‘As Is’ condition. That information was previously provided. For quick reference those Pre-Charge levels were on the order of 3500 – 3800 psig.

Where a number or value is provided in parentheses in a particular row, that number has been provided as a reference value for that particular function or measurement

Remainder of this page left blank.

1.3.1 February 7 2011 As-Is Pre-Charge Measurements

Data to Record for AMF/Deadman System:	Measured Value
1. Red HPU Reservoir Level Start/Finish (gal.)	3
2. Triplex Tote Level – Start/Finish (in.)	47.5 / 23.25
3. Pre-charge Condition – *Note data previously provided*	As Is
4. BSR Tank Level / Choke and Kill Tank Level (in.) (pre-test)	0 / 0
5. Volume Required to fill accumulators – 1st Fill (gal.)	206.1
6. Volume Required to fill accumulators – 2nd Fill (gal.)	4.25
7. Accumulator Pressure (5,000 psig)	5,000
8. HPU to Y103 Gauge Pressure (3,000 psig)	3,000
9. Autoshear Valve Gauge Pressure (3,000 psig)	0
10. BSR Close - Gauge Pressure (4,000 psig)	3,850
11. ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,525
12. ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,500
13. Time to Close BSR Rams (sec.)	23
14. BSR Rams closed (fully)	yes
15. Fluid discharge from BSR Open Hose	yes
16. Approximate Volume discharged from BSR Open Hose (in.) confirmed)\	14 3/4 (to be
Measured again on 8/Feb (in.)	14-5/8
Approximate Volume discharged from BSR (gal.)	26.4
17. Inner Upper/Lower Choke/Kill Valves Closed	yes
18. Fluid discharge from Choke/Kill Open Hoses	yes
19. Approximate Volume discharged from Choke/Kill (in./gal) (error)	1.5 in/~~12.75 gal~~
Measured again on 8/Feb	1.25/2.3 gal
20. Port Side BSR ST Lock Position (in.)	3-3/8
21. Starboard Side BSR ST Lock Position (in.)	3-5/8
22. Fluid discharge from ST Lock Open Hose	yes
23. Accumulator Dump Volume	Unable to confirm

Anomalies, Leaks non-functionality, Notes:

Final accumulator gauge pressure was 4,475 psig before venting.

1.3.2 February 17, 2011 Reduced Pre-charge Measurements

No.	Description	Value
1	Red HPU Reservoir Level Start / Finish (gal.)	521 / 216
2	Triplex Tote Level – Start / Finish (in.)	62-1/16 / 44-1/16
3	Pre-charge Condition	Reduced
4	BSR Tank Level / Choke and Kill Tank Level (in.)	0/0
5	Volume Required to fill accumulators – 1st Fill (gal.)	458
6	Volume Required to fill accumulators – 2nd Fill (gal.)	n/a
7	Accumulator Pressure (5,000 psig)	4,975
8	HPU to B103 Gauge Pressure (3,000 psig)	3,400
9	Autoshear Valve Gauge Pressure (3,000 psig)	0
10	BSR Close Gauge Pressure (4,000 psig)	3,900
11	ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,450
12	ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,460
13	Time to close BSR Rams (sec.)	24
14	BSR Rams closed (fully)	Yes
15	Fluid discharge from BSR Open Hose	Yes
16	Approximate Volume discharged from BSR Open Hose (in./gal.)	14 / 25.3
17	Inner Upper/Lower Choke/Kill Valves Closed	Yes
18	Fluid discharge from Choke/Kill Open Hoses	No
19	Approximate Volume discharged from Choke/Kill (gal.)	0
20	Accumulator Pressure Following Function (psig)	
21	H.P. Blind Shear Vent – During BSR Retract (in. / gal.)	13 / 23.5
22	Accumulator Dump Volume (in. / gal.)	36.75 / 312.4
23	H.P. Blind Shear Vent – After Function (in. / gal.)	8.375 / 71.2
24	Blind Shear Ram Retract Volume (start / finish / total) (gal.)	216 / 190 / 26

Notes: Check valve from BOP Stack Accumulators did not leak

H.P. Blind Shear vent initiated after test due to a leak on the hose leading from HPU to B103. Vent stopped by reapplying pilot pressure. A total 8.375-inches, which is equivalent to 71.2-gallons was dumped during the vent.

1.3.3 February 18, 2011 Reduced Pre-charge Measurements

No.	Description	Value
1	Volume from Red HPU (gal.)	320
2	Triplex Tote Level – Start / Finish (in.)	61-¼ / 46-3/8
3	Pre-charge Condition	Reduced
4	BSR Tank Level / Choke and Kill Tank Level (in.)	0 / 0
5	Volume Required to fill accumulators – 1st Fill (gal.)	446[1]
6	Volume Required to fill accumulators – 2nd Fill (gal.)	0
7	Accumulator Pressure (5,000 psig)	5,000
8	HPU to B103 Gauge Pressure (3,000 psig)	3,000
9	Autoshear Valve Gauge Pressure (3,000 psig)	0
10	BSR Close Gauge Pressure (4,000 psig)	3,800
11	ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,400
12	ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,400
13	Time to close BSR Rams (sec.)	24
14	BSR Rams closed (fully)	Yes
15	Fluid discharge from BSR Open Hose	Yes
16	Approximate Volume discharged from BSR Open Hose (in./gal.)	13.5 / 24.4
17	Inner Upper/Lower Choke/Kill Valves Closed	Yes
18	Fluid discharge from Choke/Kill Open Hoses	No
19	Approximate Volume discharged from Choke/Kill (gal.)	0
20	Accumulator Pressure Following Function (psig)	4,125
21	H.P. Blind Shear Vent – During BSR Retract (in. / gal.)	15-1/8 / 27.4
22	Accumulator Dump Volume (in. / gal.)	46.5 / 395.3
23	H.P. Blind Shear Vent – After Function (in. / gal.)	0 / 0

Notes:
[1]Calculated from #1 and #2.

No bleed back from BOP Stack Accumulators

1.4 HP Casing Shear Pressure Decay

On January 31 a leak in the High Pressure Casing Shear regulator mounted on the back of the High Pressure Panel was identified.

The hydraulic side of the eight 80-gallon Stack Accumulators was pressurized to 3700 psig at approx. 18:22. The pressure to the Accumulators was then shut-in. The pre-charge levels were as previously recorded and reported.

One video camera was arranged to monitor and record changes in Accumulator pressure. A second camera was arranged to monitor the actual leak from the Regulator. Further a means to capture the fluid leaking from the Regulator was set-up.

From the period of about 17:30 (31/Jan) (when the fluid capture arrangements were complete) through to 08.10 (1/Feb) a total volume of approximately 1.5 gallons of fluid was captured. Table 1 below summarizes the pressure readings taken from the video-recordings of the pressure gauge. Time ‘0’ (zero) equates to 18.22 hours (31/Jan).

Table 1

Time (min)	Pressure (psig)
0	3700
30	3700
60	3500
90	3250
120	2900
150	2500
180	2300
210	2000
240	1800
270	1650
300	1500
330	1300
360	1200
390	1050
420	950
450	850
480	800
510	750
540	650
570	600
600	550
630	450
660	450
690	450
720	400

1.5 Autoshear Test Measurements

1.5.1 February 8, 2011 – As-Is Pre-Charge

No.	Description	Value
1	Red HPU Reservoir Level Start / Finish (gal.)	221 / 221
2	Triplex Tote Level – Start / Finish (in.)	61.5 / 46.25
3	Pre-charge Condition	As-is
4	BSR Tank Level / Choke and Kill Tank Level (in.)	0 / 0
5	Volume Required to fill accumulators – 1st Fill (gal.)	129.6*
6	Volume Required to fill accumulators – 2nd Fill (gal.)	N/A
7	Accumulator Pressure (5,000 psig)	5,000 (5,600 spike)
8	HPU to Y103 Gauge Pressure (3,000 psig)	3,000
9	Autoshear Valve Gauge Pressure (3,000 psig)	3,150
10	BSR Close Gauge Pressure (4,000 psig)	3,800
11	ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,500
12	ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,500
13	Time to close BSR Rams (sec.)	28
14	BSR Rams closed (fully)	Yes
15	Fluid discharge from BSR Open Hose	Yes
16	Approximate Volume discharged from BSR Open Hose (in./gal.)	15.5 / 28.1
17	Inner Upper/Lower Choke/Kill Valves Closed	Yes
18	Fluid discharge from Choke/Kill Open Hoses	No
19	Approximate Volume discharged from Choke/Kill (gal.)	0
20	Port Side BSR ST Lock Position (in.)	3-5/16
21	Starboard Side BSR ST Lock Position (in.)	3-5/8
22	Accumulator Dump Volume (in. / gal.)	13-1/8 / 111.6
23	H.P. Blind Shear Vent during Ram Retraction (in. / gal.)	31.3 / 56.6

Notes:
*Based on tote level recorded in No. 2. Value might not be accurate due to leak on Triple Pump bypass valve

-4,500 psig Accumulator Pressure following function.

1.5.2 February 11, 2011 – Reduced Pre-Charge

No.	Description	Value
1	Red HPU Reservoir Level Start / Finish (gal.)	196/195[1]
2	Triplex Tote Level – Fluid Delivered (in. / gal.)	48 / 408
3	Pre-charge Condition	Reduced
4	BSR Tank Level / Choke and Kill Tank Level (in.)	0 / 0
5	Volume Required to fill accumulators – 1st Fill (gal.)	408[2]
6	Volume Required to fill accumulators – 2nd Fill (gal.)	n/a
7	Accumulator Pressure (5,000 psig)	5,000
8	HPU to Y121 Gauge Pressure (3,000 psig)	3,100
9	Autoshear Valve Gauge Pressure (3,000 psig)	3,150
10	BSR Close Gauge Pressure (4,000 psig)	3,825
11	ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,500
12	ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,500
13	Time to close BSR Rams (sec.)	26
14	BSR Rams closed (fully)	Yes
15	Fluid discharge from BSR Open Hose	Yes
16	Approximate Volume discharged from BSR Open Hose (in./gal.)	16.5 / 29.9
17	Inner Upper/Lower Choke/Kill Valves Closed	Yes
18	Fluid discharge from Choke/Kill Open Hoses	No
19	Approximate Volume discharged from Choke/Kill (gal.)	0
20	Port Side BSR ST Lock Position (in.)	3-5/16
21	Starboard Side BSR ST Lock Position (in.)	3 ½
22	Accumulator Dump Volume (in. / gal.)	Not Captured[3]
23	Accumulator Pressure Following Function (psig)	4,000

Notes:
[1]Volume used for activating Autoshear
[2]Volume based on #2
[3]Hose did not stay in tote.

1.5.3 February 16, 2011– Reduced Pre-Charge

No.	Description	Value
1	Red HPU Reservoir Level Start / Finish (gal.)	535 / 240
2	Triplex Tote Level – Start / Finish (in.)	62.0 / 44.5
3	Pre-charge Condition	Reduced Pre-Charge[1]
4	BSR Tank Level / Choke and Kill Tank Level (in.)	0 / 0
5	Volume Required to fill accumulators – 1st Fill (gal.)	443.8[2]
6	Volume Required to fill accumulators – 2nd Fill (gal.)	n/a
7	Accumulator Pressure (5,000 psig)	4,900
8	HPU to B121 Gauge Pressure (3,000 psig)	2,900
9	Autoshear Valve Gauge Pressure (3,000 psig)	3,300
10	BSR Close Gauge Pressure (4,000 psig)	3,850
11	ST Lock Regulator Gauge Pressure – Port (1,500 psig)	1,475
12	ST Lock Regulator Gauge Pressure – Starboard (1,500 psig)	1,500
13	Time to close BSR Rams (sec.)	26
14	BSR Rams closed (fully)	Yes
15	Fluid discharge from BSR Open Hose	Yes
16	Approximate Volume discharged from BSR Open Hose (in./gal.)	13.25 / 24
17	Inner Upper/Lower Choke/Kill Valves Closed	Yes
18	Fluid discharge from Choke/Kill Open Hoses	No
19	Approximate Volume discharged from Choke/Kill (gal.)	0
20	H.P. Blind Shear Panel Vent (in./gal.)	16 / 29.0
21	Accumulator Pressure Following Function (psig)	3,900
22	Accumulator Dump Volume (in. / gal.)	46.5 / 395.3

Notes:

[1]Second AutoShear Test at Reduced Pre-Charge Level.

[2]Calculated from #1 and #2

No Leak on check valve from BOP Stack Accumulators

1.6 Blind Shear Ram Closing and Opening Volumes February 18, 2011

Operation	Accumulator Pressure (psig	
	1500	3000
	Volume Output (gal.)	
BSR Close	25.6	26.2
BSR Open	27.4	27.2
BSR Open	*	29

*BSR was in close position prior to test

APPENDIX F

COMPREHENSIVE TIMELINE

TIMELINE: APRIL 25, 1979 TO APRIL 18, 2010

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/25/79				Shear Blind Rams - Operations Care and Maintenance - tool joint "positively NOT" in cavity, may destroy seals without cutting pipe	Engineering Bulletin				
4/10/80				Low Temperature Operation of the Cameron D Annular BOP - low temperature requires higher pressure to close rams	Engineering Bulletin				
6/21/85				Type A Lip Seals Update for D and DL Annular Blowout Preventers	Engineering Bulletin				
5/5/89				ST Lock Sequencing Valve for T BOP	Engineering Bulletin				
5/14/90				General Maintenance Procedures - Control Fluids - recommend routine maintenance, monthly at least	Engineering Bulletin				
6/19/90				Recommended Practices for Installation and Operation of BOP and Workover Control Hose Bundles - recommends to "inspect periodically"	Engineering Bulletin				
9/13/90				Shearing Limitations Due to Increased Pipe Strength - discusses 30% variability in strength and use of boosters	Engineering Bulletin				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/15/91				Cameron Collet Connector - Self Locking Design	Engineering Bulletin				
10/31/91				Recommendations for Field Testing of the Cameron D Annular Blowout Preventer - recommend open / close on pipe daily	Engineering Bulletin				
2/8/92				D Seal - D Shaped Seal Used as an Operational Replacement for the Standard Lip Seal in Annular BOPs	Engineering Bulletin				
3/22/93				Inspection and Servicing Modular BOP Control Pod Stingers and Receptacles - provides quarterly, semi-annual and annual inspections	Engineering Bulletin				
11/29/93				Low Temperature Testing of VBRs - packers must be "exercised"	Engineering Bulletin				
11/30/94				Variable Bore Ram - Engineering Data - estimated service life and hangoff capacity for various models	Engineering Bulletin				
10/29/98				Shear Ram Product Line - includes original ram specs for various models, but pre-TL	Engineering Bulletin				
5/20/99				Sequence Valve On Site Inspection Procedure	Engineering Bulletin				
Aug-99		TOI performed HAZOP on BOP Control System	31						

MANAGING RISK DNV

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
8/30/99				Welding on the Stack with MUX PODs Installed	Engineering Bulletin				
9/27/99				Ceramic Seal Plates	Engineering Bulletin				
12/10/99				Deadman / AMF System Surface Testing	Engineering Bulletin				
2/3/00				Cameron 18-3/4" 5/10,000 psi TL BOP Variable Bore Rams Assembly 3-1/2 to 7-5/8" - field testing indicated leakage during testing of smaller diameters, so spec changed to 5" and up, and smaller pipe to 2-7/8 to use flexpacker	Product Advisory				
3/7/00				ST Lock Operating and Predictive Maintenance - identified ball bearing non-compliance with original spec, recommended new bearing spec	Product Advisory				
3/9/00				Untitled - discussion of debris accumulation in SSR	Product Advisory				
3/30/00				Sequence Valve for ST Lock - report of improper functioning due to elastomer deterioration	Product Advisory				
6/6/00				Long Term Storage of D &DL Annular BOPs	Engineering Bulletin				
6/12/00				Long Term Storage of T & TL BOPs Equipped with ST and Ram Locks - errata from June 12, 1999	Engineering Bulletin				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/15/00				Bearing, Overhauling Nut, ST Lock - report of premature wear to overhaul nut threads, new bearings available	Product Advisory				
8/28/00				Shuttle Valves Drilling Multiplex BOP Control Systems - unclear photocopy	Product Advisory				
9/11/00				LMRP & Wellhead Connector Function Lockout - unintentional disconnection of LMRP due to human error, see Safety Advisory #186 and NTL No2000-G07	Product Advisory				
9/29/00				Existing Diverter Packer Circuits	Engineering Bulletin				
10/6/00				Drilling Multiplex BOP Control System Mark II Control Pod Subsea Electronic Module Power Supply - 5 V power operating at near or above rated capacity	Product Advisory				
2001		Deepwater Horizon was built…and employed a 15,000 psi BOP system."	19						
Mar-01								R.B. Falcon Deepwater Horizon BOP Assurance Analysis (FMECA)	30

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
Apr-01		"A qualification test of Deepwater Horizon BOP BSRs was conducted at the surface…, when a joint of 5.5 in., 21.9 ppf, S-135 drill pipe was successfully sheared at a shearing pressure of 2,900 psi, which is slightly greater than the pressure predicted by Cameron's shearing formula."	19						
9/4/01				18-3/4" 15M TL BOP Super Shear Ram Bonnets - two reported incidents of restricted closures, modification provided	Engineering Bulletin				
9/4/01				18-3/4" 15M TL BOP Super Shear Ram Retainer Pins - incident reported of sheared pin, attributed to corrosion, recommended lubrication or corrosion resistant coating	Engineering Bulletin				
Nov-01		Pod subsea plate mounted (SPM) valves. All 1 in. valves have been changed out to upgrade 3/4 in. valve.	19						
1/30/02						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
Mar-02		Pod flow meters - "Spare pod sent to Cameron for upgrade to install high-shock flow meters"	19						
3/6/02				Fuses in Subsea Architecture - relates to failures that may render both pods inoperable, provide protection kits, see 006024 May 6, 2002	Product Advisory				
3/6/02				Cooling Kits for Drillers Control Panels - heat expected to decrease component life, provide cooling kits that require 100 psi air at 25 CFM	Product Advisory				
3/13/02				ST Lock Brake Hub- Global Marine Santa Fe - TL ram BOP ST parts with "discrepant tooth profile", replacement offered	Product Advisory				
3/13/02				ST Lock Brake Hub- Crosco - TL ram BOP ST parts with "discrepant tooth profile", replacement offered	Product Advisory				
3/13/02				ST Lock Brake Hub - Transocean Sedco Forex - TL ram BOP ST parts with "discrepant tooth profile", replacement offered, mention of Sovereign Explorer, DW Navigator and DW Expedition	Product Advisory				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/14/02				ST Lock Overhauling Nut P/N 644682-03 - incident of excessive thread wear (see June 2000), recommended inspection 546 cycles or 18 months, replacement offered, note 3-67 ST Lock Inspection in Manual	Product Advisory				
3/29/02						MMS Inspection of Deep Water Horizon	9		
4/2/02				Super Shear Ram Retainer Pin Part Number - incident of SSR deformed / broken retainer pin, replacement offered, see EB Sept 2001	Product Advisory				
4/22/02						MMS Inspection of Deep Water Horizon	9		
5/6/02				Fuses in Subsea Architecture - report of single point electrical failure rendering both subsea pods inoperable, provide protection kits, see 086024 March 2002	Product Advisory				
5/16/02						MMS Inspection of Deep Water Horizon - 2 INCS concerning pit drill and manhole	9		
6/4/02						MMS Inspection of Deep Water Horizon - follow up Inspection form	9		
6/5/02						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/11/02				Continuous Latch pressure Control for Collet Connectors - recommendations on maintaining hydraulic pressure	Engineering Bulletin				
9/20/02				16-3/4 5/10M U BOP VBR Packer Range Change - design modification, does not allow 2-7/8 to 5" but rather 3-1/2 to 5"	Product Advisory				
Dec-02		ST lock modifications (also BOP stack)	19						
Jan-03		Change from retrievable to non-retrievable control pod. LMRP must be retrieved to the surface to maintain pods	19						
1/1/03						Three high-shock flow meters installed in the BOP control pods to replace the ultrasonic flow meters [2003]. The ultrasonic, if the seas are real rough or anything like that, they would continuously count off, and the turbine type was way more reliable.	11	BOP Modification - "Three high-shock flow meters were installed in the BOP's control pods to replace the ultrasonic flow meters currently in place"	1
1/1/03								BOP Modification - "Retrievable control pods were replaced with non-retrievable control pods"	1

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
1/23/03				BOP Control System Recommendations for the Efficient Operation of Cameron BOPs Equipped with ST or RamLock Operating Systems	Engineering Bulletin				
3/24/03						MMS Inspection of Deep Water Horizon	9		
4/21/03						MMS Inspection of Deep Water Horizon	9		
5/13/03						MMS Inspection of Deep Water Horizon	9		
5/23/03				Preventative Maintenance of Cameron Blow Out Preventers - complete overhaul at least once a year, test to MRWP	Engineering Bulletin				
6/16/03						MMS Inspection of Deep Water Horizon	9		
7/7/03						MMS Inspection of Deep Water Horizon	9		
7/19/03						MMS Inspection of Deep Water Horizon	9		
8/6/03						MMS Inspection of Deep Water Horizon - "Lessee polluted offshore waters when the booster pump failed…" BP letter states it was a "leak in the boost line system"	9		
8/8/03						MMS Inspection of Deep Water Horizon	9		
8/18/03						MMS Inspection of Deep Water Horizon	9		
9/17/03						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
10/20/03						MMS Inspection of Deep Water Horizon	9		
Nov-03		New high-interflow shuttle valve (also BOP stack)	25						
11/5/03						MMS Inspection of Deep Water Horizon	9		
12/11/03						MMS Inspection of Deep Water Horizon	9		
2004		"Cameron…issued an engineering bulletin, EB 891D, recommending that battery banks be replaced after one year of operation or when the number of actuations exceeds 33 for that year, whichever comes first"	19						
2004						[Around 2004, 2005] Lower stack ROV panel was reconfigured. Redesigned by Steve Donahue (TO)	11	BOP Modification - "ROV stab panel modified to consolidate functions to close and lock rams as one function." [2004 through 2005]	1
1/20/04						MMS Inspection of Deep Water Horizon	9		
2/20/04						MMS Inspection of Deep Water Horizon	9		
3/17/04						MMS Inspection of Deep Water Horizon	9		
May-04		Pod regulators - "Install orifices in pod regulators to stop regulators oscillating	19						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
Jun-04		Pod SEM - "Cameron installed software for upgrade"	19						
Jul-04								[July and August 2004] BOP Modification - "Modifications were made to reduce unnecessary components on the BOP including some hoses and valves. At the same time, a new rigid conduit manifold was installed and the RMJBs, or riser mounted junction boxes, were removed."	1
Aug-04		Replacement of conduit valve package. LMRP accumulators are isolated on loss of hydraulic power	19			[Date/Time Not Given] "There was a conduit valve package being switched out and replaced with one made by ATAG which is now Oceaneering." [no time specified]	11		
Aug-04		Removal of fail safe panels on choke and kill valves (also on BOP stack). Choke and kill valves will close on spring force only.	19			removed some accumulator valves before the failsafe assist	11		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
9/8/04				AMF / Deadman Battery Replacement - one year on time operation OR 33+ activations OR five year date of purchase, changes in manufacturers product line and redesign necessary	Engineering Bulletin				
10/11/04									
Nov-04		Pod select - "Add a second pod select solenoid functioned by an existing pod select switch - to add double redundancy to each control pod."	19						
Nov-04								BOP Modification - "The lowest variable-bore ram on the BOP stack was modified by inverting it from its original position to make it a test ram."	1
Dec-04		Change from lower VBR to test ram.	19			[Date/Time Not Given] "The lower pipe ram was replaced with a test ram" [no date given]	11		
Dec-04		AMF (Deadman) system was modified. Two subsea accumulators were combined into one bank	30						
6/27/05						ABS CDS certification inspection	10		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/27/05						The Deepwater Horizon switched flags from Panama to Marshall Island and Transocean discontinue ABS certification of the vessel drilling system.	10		
1/12/05				Subsea Accumulator Module - report of incident during disassembly of high pressure accumulator, advised to contact Cameron for instructions	Safety Alert				
Feb-05		Pod - "Replace all unused functions on pod with blind flanges."	19						
6/21/05						MMS Inspection of Deep Water Horizon	9		
7/21/05						MMS Inspection of Deep Water Horizon	9		
8/17/05						MMS Inspection of Deep Water Horizon	9		
8/31/05						Transocean DEEPWATER NAUTILUS sustained damage to its mooring system and lost approximately 3,200 feet of marine riser and a portion of its subsea well control system during Hurricane Katrina	10		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
Sep-05		Pilot regulator - " Replace pilot regulator with a better designed, more reliable regulator, regulator leaks. (Gilmore is a larger unit and will require a bracket to be fabricated for mounting"	19						
9/2/05				Top Seals (all types) for 21-1/4 5M &10M U BOP - mating issue	Product Advisory				
9/27/05				Low Temperature and Ambient Temperature Testing of Shearing Blind Rams	Engineering Bulletin				
10/18/05						MMS Inspection of Deep Water Horizon	9		
11/22/05						MMS Inspection of Deep Water Horizon	9		
11/29/05						MMS Inspection of Deep Water Horizon	9		
2006						ABS as a Marshall Island-recognized organization and they issued an IMO MODU Code to the Deepwater Horizon	10		
1/1/06						ISM Audit of Transocean by the American Bureau of Shipping	10		
1/3/06						MMS Inspection of Deep Water Horizon	9		
1/5/06				18-3/4" 5,000/10,000 TL BOP with RamLock - report of incident of hydrogen embrittlement of bolts, new parts offered	Safety Alert				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
1/11/06				18-3/4" 15,000 TL BOP with RamLock - possible hydrogen embrittlement of bolts, new parts offered	Safety Alert				
1/11/06				18-3/4" 15,000 TL BOP with Super Shear - possible hydrogen embrittlement of bolts, new parts offered	Safety Alert				
Feb-06		Control panel - "Modification of Cameron control software to sound an alarm should a button stay pushed for more than 15 seconds. If a button is stuck and not detected it will lock up panel".	19						
6/2/06				Stripping Recommendation - Cameron D Annular BOP	Engineering Bulletin				
6/12/06						MMS Inspection of Deep Water Horizon	9		
Jul-06		Replacement of lower annular preventer to stripping annular. Reduced rated working pressure of lower annular preventer from 10ksi to 5ksi	19						
7/18/06						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/29/06								BOP Modification - (proposal approved) "The lower annular valve packing of the BOP was modified to permit stripping operations when the lower annular valve was closed. Specifically, an 18 3/4 in annular stripper packer was installed."	1
8/21/06				High Temperature BOP Elastomers General Guidelines - "no industry accepted method of formally rating BOP packers and seals", cold seawater provides convective cooling and high temperature replacements only required on ram packers and top seals	Engineering Bulletin				
Jan-07		AMF system - "Cameron will remove the SEM from the [multiplex] section to replace the pie-connectors (customer provided) and to install the AMF/deadman modification kit	19						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
1/21/07				EB702D Update Regarding Shearing Capabilities of Cameron Shear Rams - discussion of variance in strengths, listed capabilities based on maximums in testing i.e. conservative	Product Advisory				
3/12/07				Subsea Suitability of Cameron Ram Type BOPs - standard low torque seal carrier to 3000 ft, deep water to 12000 ft, verification Cameron Eng Report 3121	Engineering Bulletin				
3/20/07						MMS Inspection of Deep Water Horizon - INC: "pressure washer located on drill floor has no external ground available"	9		
4/6/07						MMS Inspection of Deep Water Horizon	9		
5/10/07									
5/10/07				Inspection Requirements for Upper and Lower 18-3/4" 15,000 psi DVS and 13-5/8" 5,000/10,000 psi ISR Ram Blocks - field experience indicates DVS bodies crack at front of side packer pocket location	Safety Alert				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/26/08						Due to inadequate work company system, the Transocean DEEPWATER HORIZON suffered a major flood and casualty	10		
6/10/07								BOP Modification - "Software changes were made to allow all functions that previously had been locked out from any of the BOPs control panels on rig to become unlocked whenever the EDS command was issued from any of the control panels"	1
6/21/07									
6/21/07				EB702D Update Regarding Shearing Capabilities of Cameron Shear Rams - discussion of variance in strengths, listed capabilities based on maximums in testing i.e. conservative	Product Advisory				
10/9/07						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
10/16/07				Operating Pressure, General Recommendations for Annular BOPs - minimum closing pressure 1500psi to maximum 3000psi, "not subject to wellbore pressure assist"	Engineering Bulletin				
11/9/07						MMS Inspection of Deep Water Horizon	9		
11/13/07				Cameron Ram BOP Hydro-Mechanical Locking Systems General Information - comments on ST locks	Engineering Bulletin				
Jan-08						BP audit of the drilling operations on DWH	10		
1/11/08						MMS Inspection of Deep Water Horizon	9		
1/21/08				Shearing Capabilities of Cameron Rams - provides equations and tabled constants for various models and pipe sizes	Engineering Bulletin				
1/24/08				Design improvement to 18-3/4" 15M TL BOP Operating Piston Buttons - done to increase fatigue life	Engineering Bulletin				
2/8/08						MMS Inspection of Deep Water Horizon	9		
3/12/08						MMS Inspection of Deep Water Horizon	9		

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/2/08				Modular Control Pod Mark I Stack& Riser Multiport Stinger Segment Inspection - reports of cracking in stinger assemblies, attributed to "environmental embrittlement"	Product Advisory				
8/15/08						MMS Inspection of Deep Water Horizon	9		
Sep-08		Replacement of flex joint. Used flex joint from Transocean Deepwater Nautilus with a 37.5 in. 'G' x 'H' crossover	19						
Sep-08								BOP Modification - "The riser flex joint was replaced"	1
10/21/08								BOP Blue MUX Control Pod (Need cylinders for pods) - parts requested from ICS	15
10/28/08						MMS Inspection of Deep Water Horizon	9		
11/18/08						MMS Inspection of Deep Water Horizon	9		
2/12/09				Mark III Modular Drilling Control Pod SEM Indication Faults - reports of 2 indication faults, inspection recommended	Safety Alert				
2/24/09				ST Locks - manufacturing process issue identified in TL BOP, inspection recommended	Product Advisory				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/25/09				Cameron Well Control equipment - Periodic Inspection / Recertification - recommends elastomer change outs every 12-18 months and recertification 3-5 years OR local authority OR customer specific	Engineering Bulletin				
3/30/09				VBR packer Range 5 to 2-7/8" for use with 11-15K Type U-BOP - decreased fatigue life of packers, recommended removal of service until replacement parts can be provided	Safety Alert				
Jun-09		late June, "a detailed engineering, a shallow hazard assessment, and a design peer review had been completed"	19						
6/4/09				Reduced Fatigue Life of Packer for 21-1/4" 5K Type DL Annular BOP - MRWP reduced to 3000 psi, amended July 28, 2009 with new part	Safety Alert				
7/30/09				Variable Bore Ram and Flex Packer - Sealing and Hangoff	Engineering Bulletin				
7/30/09				Driller Riser Buoyancy Collar Slippage - riser joints shipped since 2005	Safety Alert				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
8/3/09								BOP Modification - "The auto-shear valve was replaced with a new auto-shear valve supplied by Cameron."	1
8/31/09									
Sep-09		Deepwater Horizon follow-up rig audit	19			out-of-service period occurred between wells	10		
Sep-09						BP rig and maritime assurance audit (follow up to Jan 2008 audit) - audit indicated the spare pod were not operable	10,11		
9/23/09								BOP Yellow MUX Control Pod (Send in Defective SEM Removed from Yellow) - Send SEM removed from yellow Pod last rig move. On the start up of Kodiak Well 272 #2	15
9/28/09						MMS Inspection of Deep Water Horizon	9		
10/6/09		"initial drilling of the Macondo well began with Transocean's semi-submersible Marianas and continued until November 8, 2009."	19						

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
10/9/09								BOP Yellow MUX Control Pod (Send in Defective SEM Removed from Yellow) - 20 pie connectors on this Job need to be delivered to Dana Burkett	15
10/13/10								BOP Yellow MUX Control Pod (Rebuilding Pod Valve) - parts requested from ICS	15
10/19/09								18 3/4" BOP Stack/Frame (Rebill Rubber goods for Puma 1) - parts requested from ICS	15
10/20/09						MMS Inspection of Deep Water Horizon	9		
10/21/10								BOP Yellow MUX Control Pod (Pod Valve Part) - parts requested from ICS	15
10/25/09								18 3/4" BOP Stack/Frame (Replacement PBOF Cable for LMRP STM to) - parts requested from ICS	15
10/30/10								BOP Yellow MUX Control Pod (Pod Valve Part) - added cylinder, pilot, for the ST-Lock valve on this job	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
Nov-2009						During the Hurricane Ida in 2009, the DWH activated its EDS.	11		
11/2/09								BOP Yellow MUX Control Pod (Pod Valve Part) - parts requested from ICS	15
11/2/09								18 3/4" BOP Stack/Frame (D&I Super Shear Bonnets) - added to new quote for overhaul of super shear rams 28"	15
11/3/10								18 3/4" BOP Stack/Frame (D&I Super Shear Bonnets) - removed quote, Mike Fry is going to have Cameron revise the quotes	15
11/11/09				Reduced Fatigue Life of Packer for 18-3/4 15 K Type T/TL BOP CDVS Ram & 18-3/4" 10/15K Type U-II BOP CDVS Ram - reported failures after 42 open/close and/or 6 pressure cycles update November 30, 2009 limit WP to 10,000psi	Safety Alert				
11/12/09						MMS Inspection of Deep Water Horizon	9		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
11/20/09								BOP Yellow MUX Control Pod (Send in Defective SEM Removed from Yellow) - received (1) 12 pin male connector ICN #10010449 from warehouse and sent to Cameron	15
11/24/09								BOP Blue MUX Control Pod (Sending Solenoids to D&D for Repair) - Parts requested from ICS	15
12/3/09						In the North Sea, Transocean Vessel SEDCO 711 had a blowout	10		
12/24/09								18 3/4" BOP Stack/Frame (Rebill - Rental Conn. And test stump) - Reqs for rental have been can-xed in ICS	15
12/28/09				Cameron Ram BOP Cavity "In Service" Acceptance Criteria - ram bore surface finish to 125RMS	Engineering Bulletin				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
1/3/10								BOP Stack LMRP Connector - Tested LMRP connector to 250 / 5000 while testing upper annular on BOP test on 1-2-10. Also tested HD. Tested well head connector while testing blind shear rams against casing.	14
1/3/10								18 3/4" BOP Stack/Frame (Testing BOP and Choke and Kill Manifold) - tested BOP to 250/3500/5000/9600 psi. Tested Choke manifold to 250/500/9600 psi. Tested Kelly host to 250/5000 psi	15
1/3/10								BOP HPU (Need to Tote Tank of Stack Magic) - parts requested from ICS	15
1/7/10								18 3/4" LMRP Stack/Frame (Send in Old Mini Connector Removed From) - Mini collet connector repair complete and returned to Amelia Yard	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
1/9/10								18 3/4" BOP Stack/Frame (D&I Super shear bonnets) - bonnets are being overhauled, Job #102370	15
1/10/10								Subsea BOP Choke Hoses (replace LMRP Coflexip Jumper Hoses) - quote information. Rather than replacing the jumper hoses with same, we are going to try the metal flex loops from BOP Stacking Inc. Need to create a card for these based on the quote #111 from BOPSI dated 2/13/08. Closed with no action.	15
1/14/10		"MMS approved an application for Revised New Well…and the Macondo well plan was updated to reflect the replacement of Marianas with Deepwater Horizon."	19						
1/20/10				Bonnet Bolts and Bonnet Studs, 13-15M U-BOP and 18-15M TL BOP - issue with one heat of parts, not believed to be in service	Product Advisory				

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
1/21/10								18 3/4" LMRP Stack/Frame (Order Flex loop piping for LMRP) - Need to order flex loop piping and associated accessories for LMRP.	15
1/27/10								BOP HPU (Solution cleaner and moy paste needed) - parts requested from ICS	15
1/31/10		"Deepwater Horizon arrived on site."	19						
1/31/10								BOP Blue MUX Control Pod (Replace broken VHF radios for SS) - parts requested from ICS	15
1/31/10								BOP Yellow MUX Control Pod (Need o-rings for Cameron Solenoids) - parts requested from ICS. Replacing defective solenoids on yellow pod	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/1/10						[First week of February] …The last time maintenance was specifically performed on the BOP before it was run on the Macondo well. All the rubber goods, the upper annular element, lower annular element, the ram packers, top seal, bonnet seals, the riser connector ring gasket, 3/16th miniconnector ring gaskets and the wellhead ring gasket were replaced.	11		
2/1/10								BOP Blue MUX Control Pod (Assembly Ratchet Clamps for SEM) - parts requested from ICS	15
2/2/10								18 3/4" BOP Upper Double Ram Lower L/H Bonnet - Bonnet seal carrier coming from C?. Parts requested from ICS	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/3/10	00:00							finish attaching co-flex hoses on LMRP. Change POD receptacle seals. Do pre-charge on LMRP. Close blind shear ram doors. Finish changing riser seals. Removed load ring, auto IBOP, manual IBOP, and saver sub for Hadco inspection. Mechanic inspected shaft on aft PRS. Hadco inspected auto IBOP, manual IBOP, quill shaft and load ring. Reassemble load ring, auto IBOP, manual IBOP, saver sub.	2
2/3/10	12:00							continue BOP maintenance. Subsea continued checking pre-charge in accumulator bottles. Greased wellhead connector, and changing out all 1/2" hoses. ET's and electrician continue to perform routine maintenance checks on aft PRS. Mechanics performed 180 day PM on forward PRS.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/4/10	00:00							continue to change out hoses on BOPs. Mechanics replaced roller on forward PRS and inspect hydraulic hoses on top drive and clock. Replaced 1 hose on block. Replace bladder in drawworks. Replace air hoists sheaves at crown.	2
2/4/10	12:00							continue with BOP maintenance. Changing out hoses on LMRP surge bottles. Repair manifold block and changed out all hoses to SDC ring. Changed out hillman roller on BOP cart. Changed out Schlumberger sheaves in crown. Changed out safety sling on kelly hose. mechanics working on counter balance cylinder on fwd PRS. Hadco load tested air tuggers on rig floor.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/5/10	00:00							continue with BOP maintenance. Powering up pods. Perform function test on LMRP. Take down starboard forward air hoist on rig floor. Repair counter balance cylinder on forward PRS lower carriage. Replace lube oil temperature switch on top drive. Latch back on hook on block.	2
2/5/10	12:00							continue with BOP maintenance. Stacked up LMRP onto stack. Performed function test on both pods. Performed drops survey on all traveling equipment and derrick. Performed ZMS checks on all traveling equipment	2
2/5/10								Drillers BOP Control Panel - Work complete. Repaired purge problem.	14
2/5/10								18 3/4" BOP Upper Double Ram Lower L/H Bonnet - Installed new bonnet seal carrier on starboard blind shear ram bonnet. 2/1/10	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/6/10	00:00							testing BOPs on 6 5/8" drill pipe, test blind shear and pipe rams and associated valves to 250 psi low 15000 psi high. Test upper annular to 250 psi low to 10000 psi high. Test lower annular to 250 psi to 5000 psi high for 5 minutes straight line each test. see test charts for additional information.	2
2/6/10	12:00							finish stump testing BOPs. Installed new hydrate seal. Installed new ring gasket in wellhead connector, repaired slope indicator on LMRP. Performed brake test, total break capacity 2525.6 kips. Mechanics installed new counter balance on forward PRS.	2
2/6/10						functioned hot stab capabilities [before BOP was run]	11		
2/6/10	23:00							take weight of BOP. Remove transporter. Install MUX clamp platform. Install MUX clamps. Run BOP and riser from surface to 177'	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/6/10		"drilling activities recommenced"	19						
2/6/10								BOP Test Unit (High Pressure Needle Valve for Shaffer) - Parts requested from ICS. Had to replace rupture disc and high pressure needle valve on shaffer test unit.	15
2/8/10	05:30							install drap hoses on termination joint	2
2/8/10	08:00							install mux sheaves and mux cables into storm sheaves. pickup landing joint and land out fluid bearing in SDC ring. make 150 meter move to well center, hold 720 with block, hold 515 with tensioners. latch BOP's with 100k down at 10:22. After latch up take 75k overpull. Gallon count 16.1, rig heading 135deg, bullseye reading prior to latch up = LMPR 0 deg, BOP 0 deg. ROV assisted with landout of BOP's. Halliburton tested connector to 250 psi low and 2600 psi high. Pumped 4.25 bbls for 2,600 psi, bled back 3.75 bbls	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/8/10								BOP Stack LMRP Connector Service - Test connectors on against blind shears to 250/2600 psi	14
2/8/10								Well Head Connector - HD- Service - Tested connectors on against blind shears to 250/2600 psi	14
2/9/10	01:30							Function test diverter from driller's control panel on blue POD at 1:45 hours. Flow through diverter overboard lines on starboard and port side	2
2/9/10	01:45							function test diverter from driller's control panel on blue pod. Flow through diverter overboard lines on starboard lines on starboard and port side.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/9/10	05:00							pump down drill pipe at 15 spm till pressure began to build to verify dart was seated. land out drill quip test plug in well head with 70k down to test plug. Pickup to neutral drill string weight(275k) above dual cam tool, apply 5k down and back out dual cam tool with 7 rounds to the right. Pull out and pick up above BOP's to test blind shear rams.	2
2/9/10	05:00							pull out and pickup above BOPs to test blind shear rams	2
2/9/10	05:30							Halliburton broke circulation down kill and tested line to 7500 psi, good test. Halliburton broke circulation again down kill line. Closed blind shear rams and test blind shear rams and wellhead connector to 250 psi low and 6500 psi high for 5 minutes straight line each test. See test charts for additional information.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/9/10	06:30							open blind shear rams and slack off to reengage dual cam tool. Reengage dual cam tool	2
2/9/10	15:30							spaced out 6 5/8" drill pipe across BOP. Halliburton broke circulation through top drive and kill line. Halliburton test lines to 7,500 psi, good test. Halliburton broke circulation again down both lines.	2
2/9/10	16:30							Halliburton pressured up on lower annular. started noticing lose of weight on weight indicator. checked BOP pressure and noticed that BOP pressure was increasing. called Halliburton to stop pumps-before Halliburton could stop pumps pressure was at 3,684 psi then fell to 520 psi. Test rams were found to be open.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/9/10	16:30							Halliburton test subsea BOP on 6 5/8 drill pipe on blue pod from drillers control panel as per BP and MMS requirements. Test lower annular and associated valves to 250 psi low and 3500 psi high for 5 minute straight line each test. test upper annular, kelly hose, and associated valves to 250 psi low and 5000 psi high until green light on digital atomized BOP testing. test all rams and fail safe valves to 250 psi low and 6500 psi high until green light on digital atomized BOP testing. See test charts for more information	2
2/9/10				Cameron DR 30 3" Hydraulic Drilling Choke Operations with Cameron Choke Control Console - provided recommended operational instructions, update April 14, 2010 with modifications	Safety Alert				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/9/10								BOP Stack LMRP Connector Service - Test connectors on against blind shears to 250/2600 psi	14
2/10/10	00:00							Halliburton continue to test subsea BOP on 6 5/8 drill pipe on blue pod as per BP and MMS requirements. Test lower annular and associated valves to 250 psi low and 3500 psi high for 5 minutes straight line test. Test upper annular, kelly hose, and associated valves to 250 psi low and 5000 psi high until green light on digital automized BOP testing. test all rams and fail safe valves to 250 psi low and 6500 psi high until green light on digital automatized BOP testing see test charts for additional information	2
2/10/10	02:30							function test BOP's from tool pusher's control panel on yellow pod function test diverter from tool pusher's control panel on yellow pod at 02:56	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/10/10	02:30							function test BOPs from tool pushers control panel on yellow pod. Function test diverter from tool pushers control panel on yellow pod. Monitor well on trip tank	2
2/10/10	08:00							attempted to test with nu-tec tool, seal on nu-tec test stump was leaking, replace and attempt low test again, seal leaked again. remove nu-tec stump and pick up test kelly. test lines to 7500 psi, good test	2
2/10/10	13:00							performed casing integrity test using Halliburton. Test casing to 3500 psi high. Broke circulation down drill pipe and down kill line and test lines to 4500 psi.	2
2/10/10								EVENT: pressure transducer on standpipe #1 was not reading correctly	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/11/10	07:30							test casing to 250 psi low and 3000 psi high against blind shear rams. Bbls pumped 15.25, bbls bled back 15.25, max psi 3050 psi., ICP 3,008 psi, pressure after 30 minutes 2950 psi.	2
2/11/10	11:00							function blind shear rams from tool pushers control panel on yellow pod	2
2/11/10								EVENT: both trip tank pumps stop pumping	2
2/12/10								18 3/4" BOP Stack/Frame (Testing BOP and Choke Manifold) - tested BOP to 250/3500/5000/6500 psi	15
2/12/10	08:30							broke circulation down kill line and down drill pipe with Halliburton and tested lines to 1500 psi, good test	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/12/10	09:00							made 2 attempts to perform leak off test at 8,956'. Leak off test shut down due to a gain in trip tank. Checked valve alignment and reposition pipe in annular. While breaking circulation down drill pipe on third attempt, noticed a pressure increase after 5 bbls was pumped and no returns due to pack off. free pack off and stage mud pumps up to circulate bottoms up. monitor active system for gains or losses, no losses at this time	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/12/10	13:00							Halliburton broke circulation down kill line and chicksan lines. test lines to 1500 psi, good test. -close upper pipe rams. attempt leak off test, Halliburton pumped 4 bbls mud, max pressure 352 psi, ISIP 290 psi after 10 minutes 246 psi. While performing leak off test gained 1.7 bbls in trip tank. open up pipe rams and pump up static density 11.29.	2
2/12/10	18:30							locate on upper annular. Halliburton broke circulation down kill line and tested line to 250 psi low and 2000 psi high, good test. Halliburton broke circulation again down kill line. closed test rams and upper annular. Test upper annular to 250 psi, 500 psi, and 1000 psi. straight line was held on each test.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/13/10	11:00							perform leak off test at 8,953'. Halliburton pumped 5 bbls, max pressure 317 psi. Instant shut in pressure 269 psi, after 10 minutes. Pressure 250 psi, bled back 3 1/4 bbls. Attempted to pump up static density, unsuccessful.	2
2/13/10								Comment: ROV dove to inspect subsea BOP's and Marine riser	2
2/14/10	08:30							Halliburton broke circulation down drill pipe and kill line. Test lines to 2000 psi good test. Close annular. Perform squeeze job using Halliburton. Max pressure = 430 psi total bbls pumped = 100 bbls, instant shut in pressure 330 psi, cement in place at 09:12 hours.	2
2/14/10	15:00							Halliburton bled off pressure. Bled back 1.25 bbls. Open annular. Monitor well on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/14/10	21:14							pick up BHA from surface to 224'. Sperry plugged in and programmed tools. Monitor pipe displacement on trip tank. Function test blind shear rams from driller's control panel on Blue pod	2
2/14/10								18 3/4" BOP Stack/Frame (Rebill Rubber goods for Puma 1) - work is complete. Installed rubber goods	15
2/15/10								Deck Foreman: 8. assisted sub sea in BOP house	2
2/16/10								Comment: ROV dove to inspect subsea BOP's and Marine riser	2
2/16/10								Sub Sea: working up TSTPs for tensioner and connector change out, and BOP test	2
2/17/10	00:00							at 12,350' noted flow losses, stage pumps down, still losing. Switch to trip tank and monitor well. Unable to keep up loosing 3 bbl a minute. Bring boost pump on at 6 bbls a min to keep hole full.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/17/10	02:30							at 12,350' monitor on trip tank. After 30 minutes lost 6.3 bbls., 1 hour lost total of 6.9 bbls, 1.5 HR lost total of 8.1 bbls, 2 hours lost total 8.8 bbls	2
2/17/10	04:30							close annular and line up mini trip tank to monitor well	2
2/17/10	20:30							function test subsea BOP's on blue pod from driller's control panel. Function test diverted at 20:36	2
2/17/10	20:30							function test subsea BOPs from blue pod from drillers control panel. Function diverter at 20:36 hours	2
2/17/10	23:30							at 12,350' lost returns. Shut pumps down and monitor on trip tank. Total lost 121 bbls.	2
2/17/10						MMS Inspection of Deep Water Horizon	9		
2/17/10								18 3/4" BOP Stack/Frame (Need Hose and Fittings for BOP) - parts requested from ICS. Closing job with no action, will make out new job to replace this one. O. mc.	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/18/10	15:30							monitor well on trip tank. Closed annular and monitor BOP and LMRP pressure. Start building 200	2
2/18/10	17:30							pull out of hole from 9080 to 8907'. Monitor losses on tank.	2
2/18/10	18:00							closed annular monitor BOP and LMRP pressures. Monitor riser on trip tank. Continue to build 200	2
2/18/10								18 3/4" BOP Stack/Frame (Need Hose and Fittings for BOP) - parts requested from ICS	15
2/19/10	20:30							monitor BOP pressure and trip tank and mix LCM pill. Total mud losses for the past 24 hours = 1370 bbls	2
2/20/10	07:00							monitor well on trip tank and strip tank. Monitor BOP pressures and LMRP pressures while mixing Form-A-Set pill.	2
2/20/10								MECHANICAL: pm on central hydraulics pumps	2
2/23/10	02:00							close upper pipe rams. Locate on upper annular from 8320' to 8328'. Test choke and kill lines, good test	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/23/10	04:00							open upper rams and position bit from 8328' to 8320'. Filled strip tank with 6.9 ppg base oil. Continue to monitor pressures and volumes	2
2/23/10		Pilot valve leak of 1 gpm noticed on yellow pod of BOP; leak reduced after switching to blue pod	19			one of the control pods leaking in late February or mid-March	10		
2/24/10	14:35	function blind shear rams from driller's control panel on blue pod.	8					function blind shear rams from driller's control panel on blue pod. Monitor well on trip tan. Well static.	2
2/24/10	23:00	Test BOPs as per BP and MMS requirements on 6 5/8" drill pipe. Test performed from tool pushers control panel on yellow pod to 250 psi low and 6500 psi. high using Halliburton automatized digital BOP testing	8					Test BOPs as per BP and MMS requirements on 6 5/8" drill pipe. Test performed from tool pushers control panel on yellow pod to 250 psi low and 3500 psi. high on lower annular 5 min straight line each test	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/24/10		Remarks: Pilot leak on BOP's yellow pod at 1 GPM switched to blue pod and leak slowed - put valve function in block - checked out okay - will put BOP stack functions in block when drill pipe is above stack to confirm leak is on stack	8						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/25/10		Update: Continue to test sub-sea BOPs as per MMS and BP requirements on 6 5/8" drill pipe. Test performed on yellow pod from TPTP. Test lower annular and associated valves to 250 psi low and 3500 psi high for 5 minutes each test. Test upper annular, kelly hose and associated valves to 250 psi low for 5 minutes straight line and 5000 psi high until green light registered on Halliburton automatized digital BOP testing system. Test all pipe rams and fail safe valves to 250 psi low for 5 minutes straight line and 6500 psi high until green light registered on Halliburton automatized digital BOP testing system. (note BOP testing performed at 6,726' MD)	8						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/25/10	00:00							Test upper annular and kelly hose and associated valves 250 psi low for 5 minutes straight line and 5000 psi high until green light on automatized digital BOP testing. Test all pipe rams and fail safe valves to 250 psi low for 5 min straight line and 6500 psi high until green light on automatized digital BOP testing. see test charts for additional information. perform BOP testing at 6,726'	2
2/25/10	06:00							perform function test on sub-sea BOP as per BP and MMS requirements from driller's panel on blue pod. Function test diverter on blue pod from driller panel. Monitor well on trip tanks. Well static.	2

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
2/25/10								BOP Yellow MUX Control Pod (Send in defective SEM removed from yellow) - This SEM was remove from POD #2 which is in the yellow spot on the stack. The SEM in it now is for #1 POD which is in the test stand. 2-24-10	15
2/25/10								18 3/4" LMRP Stack / Frame (order flex loop piping for LMRP) - This job being cancelled. Not purchasing steel flex loops this year. Will budget for them in 2011	15
2/26/10								BOP White MUX Control Pod (Rebuild Upper Annular Regulator for Pod) - parts requested from ICS	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
2/28/10								Stack Mounted Hose/Fitting (Change 1/2" Hoses on BOP) - parts requested from ICS on October 13, 2010. Changed hoses on BOP till we got down to just a little hose left. Saving that for emergency. Ordering more hose to change some more on next rig move.	15
3/1/10						Mr. Rodriguez (BP) inspection of DWH	10		
3/1/10						Patrick Morgan had been set up to drill and had pulled drill string 15 to 20 feet through the BOP. 200,000 pounds of hook load pressure spiked as that drill pipe was pulled up through that annular.	11		
3/1/10								BOP HPU (Need stack magic and houghto-safe) - Parts requested from ICS on February 20, 2010. Received February 28, 2010	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/1/10	08:00							Halliburton test lines to 6000 psi, good test. Halliburton break circulation after testing lines. Close middle pipe rams at 08:22 hours and perform test to 3600 psi for 5 minutes straight line, good test. Pull and shear out of seal assembly with 80k over.	2
3/1/10	15:30							function blind shear rams. Toolpusher control panel from yellow pod	2
3/1/10	17:00							function blind shear rams from drillers control panel on blue pod. Test casing and blind shear rams 250 psi low for 5 minutes and 3600 psi high for 30 minutes. Pumped 20 bbl bled back to 20 bbls	2
3/3/10	04:58							fill strip tanks with 11.1 heavy ppg. Closed middle pipe rams	2
3/3/10	05:47							flush choke line with 11.1 heavy ppg. Close upper annular and open middle pipe rams	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/3/10	05:55							monitor pressures 5 minutes. Open annulus on kill line and monitor for 5 minutes- annulus static	2
3/3/10						MMS Inspection of Deep Water Horizon	9		
3/4/10	15:40							locate on upper annular at 8,859' on 6 5/8" drill pipe. Perform function test on sub-sea BOPs from toolpusher panel on yellow pod. Function test diverter from tool pusher panel on yellow pod.	2
3/4/10	16:00							flow check at 6,475' prior to pulling BHA across BOPs	2
3/4/10								SUBSEA: Fabricated a lock for BOP house toolbox to secure it	2
3/5/10	00:00							clean and clear rig floor. Functioned blind shear rams on yellow pod from toolpushers control panel	2
3/7/10		"drilling of the 14.75 in x 16 in hole section commenced"	19						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/7/10								BOP HPU (New potwater valve for mix system) - parts requested from ICS on January 12, 2010. New valve is in SS show.	15
3/8/10	01:00							drop 1 3/4" reamer activation ball and pump down at 35 spm. Took 30 psi pressure increase to shear reamer pins. Pull tested against bottom of cement with 6k overpull. Monitor active system for gains and losses.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/8/10	22:00							observe gain of 10/12 bbls. Picked up off bottom, check for flow well flowing. Shut well in on lower annular at 22:05 hours, with estimated 30 bbl gain. Monitor pressure and record data. Attempt to open float in drill pipe to establish drill pipe pressure by bring mud pump #4 to 2 spm. Drill pipe pressure 480-500 psi. Casing pressure 380 psi, no communications established, continue to monitor pressure and record data.	2
3/8/10						a well control incident occurred	10		
3/10/10	00:00							monitor shut in casing, shut in drill pipe, BOP, and LMRP pressures. Pressures as follows: at 0:00 SICP=430 psi, SIDP=180 psi, BOP=2720 psi, LMRP=3460 psi	2
3/10/10	00:30							SICP=430 psi, SIDP=180 psi, BOP=2720 psi, LMRP = 3450 psi	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/10/10	01:00							SICP=430 psi, SIDP=180 psi, BOP=2720 psi, LMRP = 3450 psi	2
3/10/10	01:30							SICP=430 psi, SIDP=180 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	02:00							SICP=430 psi, SIDP=180 psi, BOP=2710 psi, LMRP = 3440 psi	2
3/10/10	02:30							SICP=430 psi, SIDP=180 psi, BOP=2720 psi, LMRP = 3440 psi	2
3/10/10	03:00							SICP=430 psi, SIDP=180 psi, BOP=2710 psi, LMRP = 3440 psi	2
3/10/10	03:30							closed middle pipe rams and flush choke and kill lines: BOP=2720 psi	2
3/10/10	04:00							BOP=2710 psi	2
3/10/10	04:30							SICP=420 psi, SIDP=180 psi, BOP=2710 psi, LMRP = 3340 psi	2
3/10/10	05:00							SICP=420 psi, SIDP=170 psi, BOP=2690 psi, LMRP = 3440 psi	2
3/10/10	05:30							SICP=430 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/10/10	06:00							SICP=440 psi, SIDP=150 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	06:30							SICP=440 psi, SIDP=150 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	07:00							SICP=440 psi, SIDP=150 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	07:30							SICP=440 psi, SIDP=150 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	08:00							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	08:30							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	09:00							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	09:30							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	10:00							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/10/10	10:30							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	11:00							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	11:30							SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	12:00							monitor shut in casing, shut in drill pipe, BOP, and LMRP pressures. Pressures as follows: at 12:00 SICP=440 psi, SIDP=160 psi, BOP=2700 psi, LMRP=3440 psi	2
3/10/10	12:30							SIDP=160 psi, SICP=440 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	13:00							SIDP=160 psi, SICP=440 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	13:30							SIDP=160 psi, SICP=440 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	14:00							SIDP=160 psi, SICP=440 psi, BOP=2700 psi, LMRP = 3440 psi	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/10/10	14:30							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	15:00							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	15:30							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	16:00							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3430 psi	2
3/10/10	16:30							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3430 psi	2
3/10/10	17:00							SIDP=160 psi, SICP=430 psi, BOP=2700 psi, LMRP = 3440 psi	2
3/10/10	17:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	18:00							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	18:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/10/10	19:00							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	19:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	20:00							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	20:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	21:00							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	21:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3430 psi	2
3/10/10	22:00							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3420 psi	2
3/10/10	22:30							SIDP=150 psi, SICP=420 psi, BOP=2690 psi, LMRP = 3420 psi. monitor riser on trip tank, riser static	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/11/10	09:30							wireline tools would go down but would not come up. Pressured up to 500 psi on drill pipe with Halliburton and Schlumberger attempted to work free, no success. Bleed pressure off and take 70k overpull on drill pipe, jars fired. Maintain 50k overpull on drill pipe while Schlumberger tried to get free.	2
3/11/10	12:00							continue holding 50k over on drill pipe. Pressure up drill pipe to 500 psi. Schlumberger attempted to move stuck tools, no success. At 14:00, bleed off drill pipe and pack off. Shut in casing pressures and BOP pressures…	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/12/10								18 3/4" BOP Stack/Frame (Replacement PBOF Cable for LMRP STM to) - EMPAC Work order no. 8709-000118-000. Long lead time, Contacted Seacon for update. Changed date to SEP EMPAC work order no. 8709-000118-000. Changed the required date again to 7-13-09. New PBOF cable is here in the SS shop.	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/12/10	09:30							run in hole with severing gun on wireline from surface to 12,100'. Pickup on drill pipe and take 60k overpull to fire jars, hold 50k overpull on drill pipe (hook load 560k). While running in hole with wireline, close middle pipe rams and bleed off pressure (330 psi) open upper kill valves and pump down kill in taking returns up choke line. shut down circulating and apply 330 psi back on choke line, open middle pipe rams. monitor riser on trip tank.	2
3/12/10	11:00							smith wireline tied in severing gun at 12,100'. Halliburton pressured up down drill pipe with 450 psi. Smith fired severing gun at 11:14. Hook load dropped from 560k to 460k indicating pipe was severed. Drill pipe pressure dropped to 360 psi. Casing pressure remained the same.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/12/10		Contingency liner used, a new drilling liner was added and production casing changed to a 9 7/8 in. x 7 in. long string. MMS approved changes [3/12/10 to 3/22/10]	19						
3/13/10		Remarks: Pilot leak on BOP's yellow pod at 1 GPM switched to blue pod and leak slowed - put valve function in block - checked out okay - will put BOP stack functions in block when drill pipe is above stack to confirm leak is on stack	8					BOP White MUX Control Pod (Need hose for pod manifold regulator) - parts requested from ICS	15
3/13/10		ROV Operations: Continued Dive #1911. Remain on sea floor monitoring BOP's and riser	8						
3/13/10								Drillers BOP Control Panel (Order Universal Keys for BOP Panel) - parts requested from ICS on February 4, 2010. Parts received and issued out. Work complete	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/16/10	03:30							clean rig floor. Monitor well on trip tank. Function blind shear rams from toolpusher control panel on yellow pod	2
3/16/10								Subsea: working in RMS. Installed SEM in Spare pod. Assisted crane operator with moving spider in giimbal in front of BOP house in order to check it out.	2
3/16/10								BOP Stack LMRP Connector - Tested LMRP connector to 5000 psi against upper annular while testing BOP. Vetco connector was tested when testing blind shears	14
3/16/10								Well head Connector HD Service - Tested LMRP connector to 5000 psi against upper annular while testing BOP. Vetco connector was tested when testing blind shears	14
3/17/10	04:00							slip and cut drill line. Cut 300' and slip 200' of drill line. Monitor well on trip tank. Recalibrate block, reset floor saver and verify crown saver.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/17/10								18 3/4" BOP Stack/Frame (Testing BOP and Choke Manifold) - Tested BOP, Choke Manifold, and surface equipment to 250/3500/5000/65000	15
3/18/10								Subsea: crimped fittings on 1 1/2 hoses for upper and lower annular. Tested hose to 7500 psi which is 1.5 times working pressure. Updating subsea work book.	2
3/19/10								BOP HPU Accum Banks #1, 2, 3, and 4 - Isolated one rack at a time and check the precharge on each bottle in rack. Checked isolation valve to ensure no leakage. Checked all piping for rack to ensure no visual damage.	14
3/19/10								BOP Yellow MUX Control Pod Service - all work was done by Cameron when SEM went in to be repaired. Official paperwork in file cabinet.	14

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/19/10								BOP White MUX Control Pod Service - all work was done by Cameron when SEM went in to be repaired. Official paperwork in file cabinet.	14
3/19/10								BOP Stack - Inspection - Check fastener security for all flanges, joints, and other fasteners on the LMRP and BOP stack	14
3/20/10								BOP Stack Inspection - Inspect the LMRP and BOP stack framework for mechanical damage. Inspect all BOP guidance system framework components, connections, and fasteners for security and condition. Perform a random spot check of all other LMRP and BOP Stack fasteners for tightness. Check the condition of the sacrificial anodes.	14
3/20/10						About a month before the DWH casualty, Transocean commissioned Lloyds to conduct a survey of the vessel safety culture	10		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/20/10								BOP Test Unit (Needle valve for Shaffer test unit) - parts requested from ICS. Installed valves on BOP Test unit.	15
3/21/10								BOP Blue MUX Control Pod (Need cylinders for pods) - received parts and installed 3 of the cylinders	15
3/21/10								BOP White MUX Control Pod (Need hose for pod manifold regulator) - installed hose in on 3-11-10	15
3/21/10								BOP Test Unit (Need charts for testing BOPs) - parts requested from ICS on March 20, 2010. Received charts to test hoses for BOP crane.	15
3/22/10								BOB Sub Sea Accumulator Bank Wilkerson Regulator Needed - Parts requested from ICS	15
3/22/10								BOP Control & Data Logger (need TV to monitor slip joint) - wrong tag	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/26/10	00:00							continue testing BOP and surface equipment from TPCP on yellow pod. Lay down test stand. Position 6 5/8" drill pipe across BOP and test from TPCP on yellow pod. Finish testing BOP.	2
3/26/10	14:30							slip 100' of drill line. Monitor well on trip tank. Reset floor saver and recalibrate block. Verify crown saver. While slipping drill line begin casing test to 1800 psi high.	2
3/26/10	15:30							continue with casing test. Test blind shear rams from toolpusher's control panel on yellow pod to 250 psi low and 1800 psi high for 5 minutes each test. See test charts for additional information.	2
3/26/10	16:22							function test blind shear rams from driller's control panel on blue pod. Monitor riser on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/26/10	22:00							Fill drill pipe. Pickup test kelly locate on upper annular to verify 5 1/2" range 2 drill pipe across BOPs. Rig up chicksan lines. Monitor pipe displacement on trip tank.	2
3/26/10								Sub Sea: continue with solenoid project on spare pod. Test Choke manifold to 250/5000/6000 psi. Test BOP to 250/3500/5000/6500 psi. Assist bridge with heading charge. Test blind shear rams.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/27/10	00:00							test sub sea BOPs as per BP and MMS requirements on 5 1/2" drill pipe test performed from tool pushers control panel on yellow pod. Test upper annular and kelly hose to 250 psi low and 5000 psi high. Test lower annular to 250 psi and 3500 psi high. Test all pipe rams and failsafe valves to 250 psi low to 6500 psi high. test performed using Halliburton's automatized test procedure. see test charts for additional information.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/27/10	04:30							test sub sea BOPs as per BP and MMS requirements on 5 5/8" drill pipe test performed from tool pushers control panel on yellow pod. Test upper and lower annular to 250 psi low and 3500 psi high. Test all pipe rams and failsafe valves to 250 psi low to 6500 psi high. test performed using Halliburton's automatized test procedure. see test charts for additional information.	2
3/27/10	08:00							function test sub sea BOPs from drillers control panel on blue pod. Diverter functioned at 8:00	2
3/27/10	16:30							take slow pump rates and choke line friction pressures. Close upper annular and perform D-5 drill as per BP requirement. Monitor active for gains and losses.	2
3/27/10								BOP Stack LMRP Connector Service - Tested connectors while testing BOP to test procedures	14

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
3/27/10								Well head Connector HD Service - Tested connectors while testing BOP to test procedures	14
3/28/10								Mechanical: fixed hydraulic leak on aft prs. And replaced spiral roll pin on upper claw carrier.	2
3/28/10								BOP Blue MUX Control Pod (Assembly Ratchet Clamps for SEM) - Received straps and they're on the workbench in the shop	15
3/28/10								Surface BOP Hydraulic Hoses (1/2" Parker Dies needed for hose crimper) - parts requested on March 17, 2010. Received dies and they're in the stand	15
3/29/10								Subsea: finished installing solenoids on spare pod	2
3/30/10								18 3/4" BOP Middle Single Rams (HQS-OPS-EAL-POPR-005) - The part numbers in these bulletins do not match the part numbers in the BOP on the horizon.	15

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
3/30/10								Surface BOP Hydraulic Hoses (Need new parker hose cutter) - parts requested from ICS on February 7, 2010. Hose cutter received and installed by Chris pleasant and Eric Estrada	15
3/31/10								Subsea: troubleshoot purge system on driller panel	2
4/1/10	00:00							continue with 6 hour planned maintenance in agreement between Transocean and BP	2
4/1/10	12:00							test casing and blind shear rams to 250 psi low and 914 psi high, after 30 min 887 psi. pumped 5.75 bbl and bled back to 5.75 bbl. Function test blind shear rams at 14:00 toolpushers panel on yellow pod.	2
4/1/10						MMS Inspection of Deep Water Horizon	9		
4/2/10	03:30							held D-5 control drill per BP at 17158' to 17173' with no indication of shoe.	2
4/2/10	09:00							perform fit test as per BP on 9 7/8" casing shoe at 17168'	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/2/10		"drilling of final 8.5 x 9 7/8 in hole section started…and continued until April 4, 2010…when the well encountered lost circulation at 18,260 ft."	19						
4/3/10	01:52							flow check well unable to obtain a no flow. Shut well in on lower annular	2
4/3/10	02:47							work pipe free	2
4/3/10	02:55							bleed psi off to mini trip tank and monitor flow back at 18bbls per hour.	2
4/3/10	03:16							closed back in at 3 bbls bleed back and monitor psi of 120 after 7.5 minutes and monitor flow back at 24 bbls per hours.	2
4/3/10	03:24							shut back in and monitor psi of 140 after 22 minutes open choke.	2
4/3/10	03:47							bleed psi to 0 psi and monitor flow back at 24 bbls per hour	2
4/3/10	03:54							shut back in	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/3/10	04:16							monitor psi of 130 after 8 minutes psi decreased to 120 psi, after 15 minutes, work pipe free. Bleed psi to 0 psi monitor flow back at 24 bbls per hour	2
4/3/10	04:28							shut in and monitor psi of 120 after 6 minutes	2
4/3/10	04:52							open bleed to 0 psi flow back at 18 bbls per hour	2
4/3/10	05:10							shut in monitor psi of 100 after 6 minutes	2
4/3/10	05:30							open choke bleed psi to 0 psi and flow back at 12 bbls per hour	2
4/3/10	05:36							work pipe free	2
4/3/10	06:25							shut in monitor psi of 80 after 20 minutes	2
4/3/10	06:42							bleed off	2
4/3/10	06:47							work pipe free	2
4/3/10	07:41							work pipe free	2
4/3/10	08:23							open lower annular	2
4/3/10	21:00							function test BOPs from tool pushers control panel from yellow pod. Function diverter at 21:30 from tool pushers control panel on yellow	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/5/10		Stripped drill pipe through upper annular preventer from 17,146 ft to 14,937 ft while addressing wellbore losses [4/5/10 to 4/6/10]	19						
4/7/10	03:00							open annular and monitor losses at 12 bbls per hour. Pump 80 bbls form-a-squeeze pill at 9.5 bbls per minute as per BP and MI procedure. Getting returns. Put well on trip tank and monitor for 8 minutes. Well static.	2
4/7/10	13:00							flow check well on trip tank. Well static.	2
4/7/10	13:30							close upper annular and middle pipe rams. Displace choke and kill lines with 14 ppg mud	2
4/9/10		"the well was drilled to a final depth of 18,360 ft."	19						
4/9/10								BOP Blue MUX Control Pod (Sending Solenoids to D&D for Repair) - parts received	15
4/9/10		"well reached total depth"	19						

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/10/10	00:00							continue sub-sea BOP test as per BP and MMS requirements on 6 5/8 drill pipe. Test performed from drillers panel on blue pod. Test lower annular and associated valves to 250 psi low and 3500 psi high for 5 minutes each test straight line test. Upper annular, kelly hose, and associated to 250 psi low 5 minutes straight line and 5000 psi high until green light on automatized digital BOP testing. Test all pipe rams and fail safe to 250 psi low for 5 minutes straight line and 6500 psi high until green light on automatized digital BOP testing. see test chart for additional information. Monitor BOP pressure and trip tank well static.	2
4/10/10	03:30							Rig down Halliburton chicksan lines and lay out test kelly @ 17,006'. Monitor well on trip tank well static.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/10/10	04:00							Pull out of the hole with 8 1/2 " drilling assembly from 17,006' to 16,667'. (noted from 17,006' to 16914' 18-30k drag)(16,672' to 16,667' 10-15k drag) Slack off from 16,667' to 16,693. Monitor well on trip tank for gains and losses.	2
4/10/10	04:30							Make up top drive circulate for 15 minutes per BP work pipe up to 16,594' and down to 16,731'. No drag noted. Located on upper annular to space out to test. Monitor well on active system for gains and losses.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/10/10	05:00							continue sub-sea BOP test as per BP and MMS requirements on 5 1/2" drill pipe. Test performed from drillers panel on blue pod. Test lower annular and associated valves to 250 psi low and 3500 psi high green light on automatized digital. Test upper annular and associated valves 250 psi low 5 minute straight line and 3500 psi until automatized green light. Test all pipe rams and fail safe to 250 psi flow for 5 minutes straight line and 6500 psi high until green light on automized digital BOP testing. see test chart for additional information. monitor BOP pressure and trip tank. well static	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/10/10	08:30							perform function test as per BP and MMS requirements from tool pusher panel on yellow pod at 16,663'. Function test, diverter from tool pusher panel on yellow pod. Monitor well on trip tank. Well static.	2
4/10/10	09:00							Pump out hole from 16,693' to 15,493' pump #3 at 56 SPM (300 GPM). Monitor active system for gains and losses.	2
4/10/10	12:00							Pump out of hole from 16,693' to 14,667'. Pull out wet to 14,117'. Pump pressure 1700 psi. 57 strokes a minute 300 GPM.	2
4/10/10	13:00							Pump 75 bbls 17 PPG slug	2
4/10/10	13:30							Pull out of hole from 14,117' to 1,155'. Monitor pipe displacement on trip tank.	2
4/10/10	18:30							Pull out of hole with heavy weight drill pipe and drill collar's from 1,155' to 73'. Monitor pipe displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/10/10	19:30							Lay out BHA on riser skate from 73' to surface	2
4/10/10	20:00							Clean and clear rig floor of BHA handling equipment	2
4/10/10	20:30							Held pre-job meeting on rigging up wire line equipment and picking up triple combo wire line tools	2
4/10/10	21:00							Rig up wire line equipment	2
4/10/10	23:00							Load radio active source test triple combo wire line tools	2
4/11/10	00:00							Run in hole with schlumberer triple combo tools from surface to 17,168' monitor well on trip tank for gains and losses.	2
4/11/10	02:00							Log down with Schlumberger triple combo from 17,168' to 18,280' log up from 18,280 to 17,168'. Monitor well on trip tank for gains and losses	2
4/11/10	03:30							Pull out of hole with Schlumberger triple combo from 17,168' to surface. Monitor well on trip tank for gains and losses	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/11/10	05:30							Remove radio-active source and lay down triple combo tools from 78' to surface. Monitor well on trip tank for gains and losses	2
4/11/10	06:00							Pick up CMR tools from surface to 66'. Monitor well on trip tank for gains and losses.	2
4/11/10	06:30							Run in hole with CMR tool from 66' to 17,168'. Monitor well on trip tank for gains and losses.	2
4/11/10	09:00							Log down with CMR tools from 17,168' to 18,280. Log up from 18,280' to 18,155'. Monitor well on trip tank for gains and losses.	2
4/11/10	12:00							Log up with CMR-ECS wire line tools from 18,280' to 17,168. Monitor displacement on trip tank.	2
4/11/10	12:30							Pull out of hole with wire line tools from 17,168' to surface. Monitor displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/11/10	14:00							Held pre-job meeting on unloading radio active source and laying out CMR ECS wire line tools and picking up OBMI sonic tools	2
4/11/10	14:30							Laid out CMR ECS tools from 66' to surface and picked up OBMI tools from surface to 113' and tested tools	2
4/11/10	16:30							Run in hole from surface to 18,264' with OBMI wire line tools. Monitor displacement on trip tank	2
4/11/10	19:00							Log up from 18,264' to 12,500' with OBMI tools. Monitor well on trip tank. Cleaning sand traps in shaker house.	2
4/12/10	00:00							Continue logging up with Schlumberger OBMI tools from 12,500' to 11,700'. Monitor well on trip tank for gains and losses	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/12/10	00:30							Pull out of the hole with Schlumberger OBMI tools from 11,700' to 113'. Monitor well on trip tank for gains and losses.	2
4/12/10	02:00							Pull and lay down Schlumberger OBMI tools from 113' to surface. Monitor well on trip tank for gains and losses.	2
4/12/10	03:00							Run in the hole with Schlumberger MDT tools from surface to 165'. Monitor well on trip tank for gains and losses	2
4/12/10	04:00							Run in the hole with Schlumberger MDT tools from 165' to 18,250'. Monitor well on trip tank for gains and losses	2
4/12/10	07:30							Pull up with Schlumberger MDT tools from 18,250' to 18,121. Monitor trip tank for gains and losses.	2
4/12/10	08:00							Take samples from 18,121' to 18,143' 6 attempts with 2 successes. Monitor well on trip tank for gains and losses.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/12/10	12:00							Take sample at 18,142' to 18,124'. Total of 3 samples 2 tight test with total of 5 test. Monitor well on trip tank.	2
4/13/10								All anodes changed out 9/12/09. All frame work to be painted in first quarter of 2011	14
4/13/10	00:00							Continue taking pressures with Schlumberger wireline MDT tools from 18,157' to 17,701'. Total attempts 17 with 7 successful. Monitor well on trip tank for gains and losses.	2
4/13/10	03:00							Pull out the hole with Schlumberer MDT tools from 17,701' to 165". Monitor well on trip tank for gains and losses. (Hold pre-task with crews on laying out MDT tools).	2
4/13/10	06:00							Lay out Schlumberger MDT tools from 165' to surface.	2
4/13/10	07:00							Clean and clear rig floor of remaining Schlumberger MDT tools. Monitor well on trip tank. Well static.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/13/10	07:30							Pick up Schlumberger rotary side wall coring tools from surface to 47'	2
4/13/10	08:00							Run in hole with Schlumberger rotary side wall coring tools on wire line from 47' to 18230'. Monitor displacement on trip tank	2
4/13/10	12:00							Core with Schlumberger rotary side wall coring tools on wire line 18,230'. Monitor displacement on trip tank	2
4/13/10	13:30							Pull out of hole with Schlumberger rotary sidewall coring tools on wire line from 18,230' to 47'. Due to tool failure. Monitor displacement on trip tank.	2
4/13/10	14:00							Lay out and pick up Schlumberger rotary side wall coring tools monitor displacement on trip tank	2
4/13/10	18:00							Run in hole with Schlumberger rotary side wall coring tools on wire line from 47' to 18,087'. Monitor displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/13/10	20:30							Cut 5 cores monitor displacement on trip tank	2
4/13/10	22:00							Pull out of hole with Schlumberger rotary side wall coring tools on wire line due to tool failure form 18,987' to 8,000'. Monitor displacement on trip tank.	2
4/13/10								Toolpushers BOP Control Panel - Panel is operating normal in by-pass mode currently. Awaiting parts on separate W/O	14
4/14/10						Audit (ModUSpec) performed in April of 2010 indicated spare pods were not operable [April 1-14, 2010]	11		
4/14/10	00:00							Continue pulling out of hole with Schlumberger MSCT tools from 8,000' to 47' held pre-task meeting on swapping out MSCT tools and picking up USIC tools. Monitor trip tank for gains and losses.	2

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/14/10	01:30							Pull and lay down Schlumberger MSCT tools from 47' to surface. Monitor trip tank for gains and losses.	2
4/14/10	02:00							Pick up Schlumberger seismic tools from surface to 187'. Monitor trip tank for gains and losses.	2
4/14/10	03:00							Run in hole with Schlumberger seismic tools from 187' to 17,575'. Monitor well on trip tank fro gains and losses.	2
4/14/10	05:30							Logging with Schlumberger seismic logging tools from 5,054' to 187'. Monitor wireline displacement on trip tank.	2
4/14/10	12:00							Continue logging up from 10,300' to 5,054'. Monitor wireline displacement on trip tank	2
4/14/10	13:30							Pull out of the hole with Schlumberger seismic logging tools from 5,054' to 187'. Monitor wireline displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/14/10	14:00							Lay down Schlumberger seismic logging tools from 187' to surface. Monitor wireline tool displacement on trip tank	2
4/14/10	15:00							Pick up Schlumberger rotary sidewall coring tools from surface to 47' monitor wireline tool displacement on trip tank	2
4/14/10	16:00							Run in the hole with Schlumberger rotary sidewall coring tools from 47' to 18,230'	2
4/14/10	18:00							Logging with Schlumberger rotary side wall core samples from 18,230' to 18,072'. With 26 cores attempts. Monitor well on trip tank for gains and losses.	2
4/15/10	00:00							Continue taking core samples from 18,072' to 17,707'. Cut 14 cores, making a total of 40 cores. Monitor wireline displacement trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/15/10	03:30							Pull out of the hole with Schlumberger sidewall core samples from 17,707' to 47'. Monitor wireline displacement on trip tank.	2
4/15/10	07:00							Lay down Schlumberger coring tools from 47' to surface. Monitor displacement on trip tank.	2
4/15/10	07:30							Rig down wireline equipment. Recovered a total of 44 core samples. Monitor well on trip tank, well static.	2
4/15/10	08:00							Performed traveling equipment hazard hunt. Monitor well on trip tank, well static.	2
4/15/10	08:30							Held pre-job safety meeting with crew on picking up 8 1/2" clean out assembly. Monitor well on trip tank, well static	2
4/15/10	09:00							Pick up 8 1/2" clean out assembly from surface to 66'. Monitor displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/15/10	09:30							Plug in and program MWD tools. Monitor well on trip tank, well static	2
4/15/10	10:30							Continue picking up 8 1/2" clean out assembly from 66' to 262'. Monitor displacement on trip tank.	2
4/15/10	11:00							Run in the hole with 5 1/2" heavy weight drill pipe from 262' to 1,155'. Monitor displacement on trip tank	2
4/15/10	11:30							Fill 5 1/2 heavy weight drill pipe and 8 1/2" clean out assembly at 1,155. Monitor active system for gains and losses.	2
4/15/10	12:00							Hold pre-task safety meeting on running in hole with 8 1/2" drilling assembly. Completed zone management checks. Monitor well on trip tank for gains and losses.	2
4/15/10	12:30							Run in hole with 8 1/2" drilling assembly. From 1,155' to 4,598' Monitor pipe displacement on trip tank.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/15/10	13:30							Fill drill pipe at 4,598' and shallow test MWD tool monitor well on active system for gains and losses.	2
4/15/10	14:00							Continue to run in hole with 8 1/2" drilling assembly from 4,598' to 6,664'. Monitor pipe displacement on trip tank.	2
4/15/10	15:00							Changed pipe handling equipment from 5 1/2" to 6 5/8" at 6,664'. Monitor well on trip tank for gains and losses.	2
4/15/10	15:30							Pick up Drill-Quip wear sleeve retrieval tool assembly and continue running in hole from 6,664' to 8,101'. Monitor pipe displacement on trip tank	2
4/15/10	16:00							Fill drill pipe and break circulation at 8,101' Monitor well on active system for gains and losses	2
4/15/10	16:30							Continue to run in hole with 8 1/2" drilling assembly from 8,101' to 11,541'. Monitor pipe displacement on trip tank	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/15/10	17:30							Fill drill pipe and break circulation 11,541' monitor well on active system for gains and losses.	2
4/15/10	18:00							Continue to run in hole with 8 1/2" drilling assembly from 11,541' to 14,759'. Set Dril-Quip wear sleeve running tool at well head, set 20k down, 30k over pull slack off 40k down picking up with 5k down rotate 1/2 turn to right. Monitor well on trip tank well static.	2
4/15/10	20:00							Fill drill pipe at 14,708' break circulation and stage pump up to 300 GMP and circulate. Flow check well static.	2
4/15/10	21:00							Continue to run in the hole with 8 1/2" drilling assembly from 14,708' to 17,168' at reduced rate. Monitor pipe displacement on trip tank.	2
4/15/10	23:00							Fill drill pipe at 17,168' and stage pump up to 300 GPM. Monitor active system for gains and losses.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/16/10		"MMS approved the procedure for temporary abandonment of the well"	19						
4/18/10	00:00							Service block and top drive, perform drops inspection on traveling equipment. Monitor well on trip tank, well static	2
4/18/10	00:30	"the rig started running the 9 7/8 in x 7 in long string"	19					Held pre-job safety meeting with crew on rigging up casing equipment. Monitor well on trip tank, well static	2
4/18/10	01:00							Rig up casing handling equipment. Install and function low torque valve on casing swedge. Monitor well on trip tank, well static.	2
4/18/10	03:00							Held pre-job safety meeting with crew on picking up casing. Monitor well on trip tank, well static.	2
4/18/10	03:30							Pick up 7" casing from surface to 4,446'. Monitor casing displacement on trip tank.	2
4/18/10	12:00							Held pre-task safety meeting with crews on running 7" and 9 7/8" casing	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/18/10	12:30							Continue to pick-up and run 7" casing from 4,446' to 5,397'. Monitor casing displacement on trip tank.	2
4/18/10	13:30							Lay out one double of 7" casing and one single of 7" casing bad threads. Monitor casing displacement on trip tank	2
4/18/10	14:00							Continue picking up 7" casing from 5,397' to 5,816'. Monitor casing displacement on trip tank.	2
4/18/10	15:00							Swap out 7" casing elevators and pick up 9 7/8" casing elevators and pick up 7" x 9 7/8" cross over from 5,816' to 5,820'. Monitor casing displacement on trip tank.	2
4/18/10	15:30							Change out 7" casing slips to 9 7/8" casing slips and remaining 9 7/8" casing equipment an dragged up OES tool. Monitor well on trip tank well static.	2

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/18/10	17:00							Continue to run in hole with 7" x 9 7/8" casing from 5,820' to 9,833' monitor casing displacement on trip tank.	2
4/18/10								Mechanical: done 30 day P.M. on the gulf gulp. Done 30 day P.M on the central hydraulic	2

TIMELINE: APRIL 19, 2010 TO MAY 4, 2010

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/20/10	16:00					[15:00 to 16:00] the lower annular preventer was closed at the beginning of the negative test in from panel without difficulty. BOP responded as expected	11		
4/20/10						[Date/Time Not Given] Upper annular was used during the negative tests	17		
4/20/10	16:15					Approximately 10-15 minutes after closing the lower annular, the lower kill valve was opened	11		
4/20/10	17:30					Finished first negative test	16		
4/20/10	17:30					They bumped the annular up to 1900 to keep it closed; not losing any mud	16		
4/20/10	17:50					All Stop	16		
4/20/10	21:10					Finished second negative test	16		
4/20/10	21:25					Lower annular was at 1900psi and Chris dropped it back to 1500 psi (normal operating pressure)	16		
4/20/10	21:31	"…the rig crew shut down the mud pumps"	19						
4/20/10	21:40					Water and mud observed on the rig floor	16		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/20/10	21:41	"BOP activated" - annular BOP closed but appears not have sealed the annular; unknown whether upper or lower	19						
4/20/10	21:43	Stand pipe pressure begins rapid increase	20						
4/20/10	21:46	the drill pipe pressure increased from 1,200 psi and rapidly increased to 5,556 psi	40						
4/20/10	21:47	Drill pipe pressure started rapidly increasing from 1,200 psi to 5,730psi	19						
4/20/10	21:49:15	Sperry-Sun real-time data transmission lost - Rig Power Lost	40						
4/20/10	21:49:20	"First Explosion"	19			[Date/Time Not Given] Well, it was a major explosion, followed by a second explosion, a lot of back draft in the living quarters.	17		
4/20/10	21:50:00					Received call that well is blown out and Jason Anderson was shutting it in (prior to explosion)	18		
4/20/10	21:56					EDS exercised/activated/sheared up	17		
4/20/10	21:56					Panel indicated lower annular was closed (red light) and the upper annular was open (green light). Everything for the rams was showing open in the green position	16		

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/20/10	21:56	EDS buttons pushed by Subsea Engineer. EDS announced by Captain to be 21:56.	31			While on the bridge, before hitting the EDS, Chris Pleasant looked at the panel and observed that it indicated the lower annular was closed (the only things closed)	16		
4/20/10	21:56					After activating the EDS button, the light for the BSR was green then it went to red and then he doesn't know what happened. Looked at the flow meters and neither showed movement.	16		
4/20/10	22:28							Confirm rig on fire and abandoned - From United States Coast Guard	6
4/20/10	23:35							Rig fully engulfed in flames	6
4/20/10	23:46							John Guide (BP) informed gas got into riser and blew out	6
4/20/10						VIP visit to DWH	10		
4/20/10		LMRP did not unlatch (timed to occur 25 sec after initiation of EDS)	31						
4/20/10		Rig drifted off location	19						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/21/10	01:35							Call from Paul King on DEN, said there are secondary explosions, port, bow list of 15-20 feet out of water. Water cooling for about an hour backed off 200 feet.	6
4/21/10	02:04							Call from John Keeton. BP ERC and Don Winslow have been in contact. It looks as if rig is getting hotter and indication show they're not disconnected. They are going to try and get an ROV boat in close to try and shut in the well (Ocean Intervention 3) Also discussed plan to get injured on Nakika and send Bankston in. Have BP send down a couple of medics to evaluate personnel on Bankston.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/21/10	02:23							John Guide called. John Robert Sanders has his mobile. BP have requested BOP Drawings. Paul Johnson informed them that we would get the drawings to them.	6
4/21/10	02:33							John Keaton confirmed that the derrick is now down.	6
4/21/10	02:54							4 USCG vessels en route. 1 arrived. It has assumed on scene command.	6
4/21/10	03:27							John K said the flames were 2.5 times as high as the derrick and the rig has drifted 1500' to the North East. Everything still appears to be intact.	6
4/21/10	03:29							Daun said the DWH has drifted 1600' off of location and is at a 2-3 degree list. There is fuel in the water and a sheen can be seen.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/21/10	03:50							call from Daun Winslow. Confirmed numbers as follows: Bankston 99, Nakika 16, Missing 11. Confirmed that the vessel POB was 126. Still 2-3 degree list.	6
4/21/10	04:15							USCG vessel is still in command of the search. Fire is still burning.	6
4/21/10	04:30							TOI is looking to hire (ROV Boat)	6
4/21/10	05:24							The fire is still burning on the DWH	6
4/21/10	05:31							John K. called to have Paul J. and Mike W. conduct the Risk Assessment on shutting the well in and email it back to BP and do a conference call	6

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/21/10	07:06							The intervention team is currently being assembled (Mark Hay, Chris Pleasant, Daun Winslow, and possibly Randy Ezell). They have to get the stabs off of the Nautilus because the ones they currently have are incorrect. Rig has lowered 1' in the last 20 minutes. It appears the rig has floated back towards it's original position. Stated that the flames are about 200' high w/gray smoke. Daun said the first incident occurred at approximately 21:30. They attempted to EDS from the bridge, the lights functioned as expected. The lower annular was closed at the time of the incident. Daun mentioned he saw the blocks fall right before he left the rig.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/21/10	07:45							Mike W. called John Richards from Diamond regarding landing a helicopter coming from the Nautilus with the hot stabs needed for the ROV to kill the well.	6
4/21/10	07:47							The USCG has taken over as the command vessel onsite	6
4/21/10	08:24							Helicopter landing right now on Nautilus, will transport hot stabs to Ocean Endeavor	6
4/21/10	09:07							flames are contained in the well bay. No flames are coming from the surface of the water.	6
4/21/10	11:40							Updated on operations prior to incident - Just completed displacing the well to water when the well let go. No indication of a problem.	6
4/21/10	12:31							Update about rig condition - 10 deg list, 5 firefighting vessels on site shooting water. ROV live video feed to BP office.	6

MANAGING RISK

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/21/10	12:32							BP aligned with plan to get water curtain established to get ROV in to do remote stab to control well. TOI will call firefighting team on site to continue water curtain to give ROV vessel guidance on where they can come in to get close to DWH safely.	6
4/21/10	13:47							Group walking through procedures as far as RAMs being closed, etc. Procedure for ROV intervention and task risk assessment is in a final draft stage.	6
4/21/10	14:06							Horizon listing 30 degrees. Plan is to cut the open side hoses on the pipe rams first to release any trapped pressure. Pipe rams then pipe shears. If pipe rams close and shut in well, then close ST locks.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/21/10	18:00	ROV first attempt to close Middle VBR. ROV attempt to close by pumping into ROV hotstab; ROV pump failure. On May 3rd it was determined that the ROV line to the Middle VBR was connected to the Test Ram	31			By this time, we had gotten the tools that we needed, ROV, stab, everything, actually located at the BOP on bottom. And we initially stabbed in to the rams to try to close them. Listed as pipe ram on the ROV panel. There were no indications that the ram actually functioned	11		
4/21/10	18:20							ROV deployed from MAX. After several attempts to close pipe rams, hydraulic pumps failed. ROV returned to deck.	6
4/21/10	19:30							Rig down another 6" begin repairs on ROV hydraulic pumps.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/21/10	20:49							Call from Daun Winslow STBD AFT 12-15 ft of free board. STBD FWD lower portion of bumper rubber is 6 ft above water. PRT AFT 4ft below step on column. PRT FWD 100 ft. MAX Chouest repaired pump and at 3400 ft. Possibly engage deadman as a change in plan. C-Xpress ROV entering water now. Both ROVs can pump 17 liters per minute. Oceaneering Rep enroute with materials. Not using BOA at this time but it has a crane available.	6
4/21/10	21:00	First attempt activate autoshear - ROV unable to cut Shear Trigger Pin	31			ROV first attempt to activate the autoshear. ROV attempted to cut shear trigger pin to activate autoshear. ROV unable to cut pin.	11		
4/21/10	21:37							Max Chouest ROV back in water to attempt to close pipe rams	6

MANAGING RISK DNV

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/21/10	22:35							ROV communicates no luck with pipe rams, attempting shears.	6
4/21/10	22:46							BP calls to say they received a report DWH is starting to list further.	6
4/21/10	22:53							C Express ROV enroute to stack to assist	6
4/21/10	22:55							Daun Winslow confirms derrick shifted, causing 2 ft freeboard shift. Approx 10 ft freeboard remain. Rig appears stable at this time.	6
4/21/10	23:01							C Express ROV arrives at stack - attempt to cut the cord on the power shear rams in order to close the rams	6
4/21/10	23:18							Current shift dropped rig further. Stabilized with approximately 6-7' of freeboard remaining. Reports DWH is 714' NE of wellhead.	6
4/22/10	1:15	First attempt to close BSR via hot stab - Low pressure and flow, possible ST lock leak	31			Plug into hot stab and attempt to close shear rams. Unable to build pressure. Low flow rate.	11		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	01:39							John K. called to inform us that Cameron says pulling the PBOF cable will make the rams fire	6
4/22/10	02:20							John K. called relaying information from Ramsey Richards that 2 of the 4 PBOF cables have been pulled	6
4/22/10	02:42							John K. called stating there is 1 more PBOF cable to pull	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	02:44							DWH changed heading 15-20 degrees. Deckload had bunch of containers & 5 jts of riser. Monkey board is mashed down to crane boom pedestal level. Top of monkey board hanging off STBD side. Intervention III will be in about 1.5 hours. They said they have 14 gal/min at 3500 psi pump. Will pump out of his unit Mike W. said we're looking into getting an accumulator with a hose reel or jumper. Looking at sending accumulator out. Deck box on STBD side at 35 degrees. Blind RAM circuit - try pumping. Freedboard on S/A is 8 feet, P/F 100'. Believe top on pontoon out of water. All 4 PBOF pulled with no evidence of firing.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	2:45	ROV first attempt to simulate AMF ("Deadman). ROV cut pilot lines from rigid conduit manifold to both pods, cut pressure balanced oil filled (PBOF) cables from Subsea Transducer Module (STM1) & STM2 to the SEM on both pods to simulate "Deadman" and activate BSRs. Three necessary conditions for AMF ("Deadman") satisfied no later than this time. BSR had not sealed; well continued to flow.	31			First attempt to fire the deadman system. Not successful, did not see any changes once performed those tasks.	11		
4/22/10	02:56							All 4 PBOF cables pulled. May have had deadman disarmed unintentionally. Ramsey was going to go back to pumping with the ROV.	6
4/22/10	02:59							Derrick monkey board down to crane pedestal level.	6
4/22/10	03:42							Meanwhile going to have the Intervention III use it's 30 gallon tank to pump on the hot stab.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	04:14							The Max Chouest is pumping and have confirmed that the stack is armed with the deadman	6
4/22/10	4:40	Second attempt activate autoshear - SS grinder - ROV unable to cut Shear Trigger Pin	31			Fifth attempt, attempted to activate the autoshear a second time. No successful, unable to cut the trigger mechanism.	11		
4/22/10	04:43							2 options outlined: 1) have located an accumulator bottle in Amelia. Lower and stab to get volume needed. 2) rig with hotline (DDIII) that will provide an endless capacity to pump.	6
4/22/10	05:20							Draft is currently 5-6' S/A, no change on P/F. List is at 28-32 degrees Stbd. Port pontoon appears to be coming out of water. Explosions and fire burning hot. Stbd center of deck box looks bent down. Structural damage. Riser still connected. Rig about the same as midnight with the exception of structural damage.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	06:26							stability the same as midnight. S/A 8' freeboard. There is a bow in the deck box. S/F - no change. P/F - can't see. Thruster Capwell 18-20" from coming out of the water. Tells Daun that pontoon is coming out of the water. The DWH keeps rotating 20-30 degrees. Max Chouest is currently pulling their ROV.	6
4/22/10	7:36	ROV third attempt to activate Autoshear. Autoshear rod was successfully cut. BSR had not sealed, as well continued to flow	31			The third attempt to activate the autoshear. Was successfully cut, and the trigger mechanism fired, and we know that pressure went to the shear rams. Did not see any change in flow.	11		
4/22/10	07:45							Objectives have not changed. Attempts to gain control of the source. None have reduced or eliminated the source. Fire is out, source is control, stability of the unit, substantial discharge of unit.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/22/10	08:44							ROV with cutter has cut off plunger. It traveled 2", enough to activate deadman. Currently pumping on the shear rams closed at 5 gal/min. No change in flow out of the well bore. Confirmed the deadman feeds off of 80 gallons accumulator. Pumped on shear rams for 10-15 minutes. Currently the flames are between 300-400 ft tall. BP wanted to pump on pipe rams. Daun doesn't want to do that yet with low flow ROV because we'll burn off the packers and have nothing left to shut off the well. P/F side at know on the hull. Port center is 8' below knob. S/F knows around column. 1 whole set of 15' ladders. 12-15' above the ladder. Port about the same. Have a belly on the Stbd side box.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	09:19							…get a bank of accumulator bottles, manifold together, 5000' of water, burst disc with 100' of 1" hotline that would make up to 1/2" JIC to a ball valve. Get a high flow rate and drive shuttle valves closed. Eric Hall mentioned about the 3 x 160 gallons accumulators with 300' hoses. 2 tied together to shut shear rams, and other 1 together with manifold for shear rams. Nautilus mix florecine dye to see if we have any leaks.	6
4/22/10	09:43							Transocean Naval architect assessment from Smit 6:00 am observation. Trim of the rig 7-8 degrees, Heel 12-13 degrees. Combination is about 20 degrees.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	10:07							…the rig had fatigued in the middle and buckled due to excessive heat and the rig was going down. He also mentioned the BOP was leaning over. It was confirmed via live video feed.	6
4/22/10	10:22							Riser appeared to snap over on top of leaning stack	6
4/22/10	10:30	Horizon vessel sank	31						
4/22/10	10:57							Riser is crumpled over at the top of the flex joint and is laying at 343 degrees. Have moved up current some 400 meters until things settle down.	6
4/22/10	12:15	ROVs: OI3, Sea Express, and SD	7						
4/22/10	12:15	Sea Express doing a sweep	7						
4/22/10	12:50							Plan is to take the accums to the DWN for pre-charge, then carry them to BOA subsea	6
4/22/10	13:20							C Express going into the water, was given authorization to go down and survey BOP/riser.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/22/10	16:00							ROV reports back current position 58 ft above sea floor, no flow visible, water is turbid, choke and kill lines gone at the LMRP, flex joint is broken on top of LMRP.	6
4/22/10	20:30							Robert is checking to ensure OI3 crane is operational to offload accumulators from jeanette when she arrives on station.	6
4/22/10	20:56							call from OIM on Nautilus says Jeanette is 15 min from his location	6
4/22/10	22:30							ROV conducts dive to check structural integrity of subsea components, riser heading 330 degrees, LMRP bullseye reading - top + 5 degrees / bottom - center, possible small crack with perforations seen in riser, LMRP ROV integration panel in good condition, no evidence EDS fired. Dive complete 02:00 (April 23, 2010)	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/23/10	05:10							Graham Park notifies P10 0730-0800 departure time. Max pressure on system will be 5k psi. 200	6
4/23/10	07:45							Unified response meeting highlights: BOA Sub C- remain vic BOP, C Express - conduct Nakita pipeline survey, OI3 - conduct riser/debris field survey/locate rig, USCG to continue SAR flights / 0800 - 0830 announcement scheduled on plan to continue or not.	6
4/23/10	11:15							conference call with BP - current direction is to continue with accumulators being sent to site, additionally BP is gathering the coil tubing unit and accum rack to assist with accum operation. BP ground survey operation procedures done, being reviewed then BP will launch ground survey. No indication the slick has increased.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/23/10	11:31							Call from Robert White - BP would like to stack risers as part of riser analysis.	6
4/23/10	15:32							Billy Stringfellow notes that end of riser was found and well is flowing.	6
4/23/10	15:45							Call from Andy Dywan, end of pipe is 337 ft from BOP, at a bearing of 345	6
4/24/10	01:05							ROV on OI3 located rig at heading 330 degrees. TOI accumulators to be deployed at daylight tomorrow. BP accumulators "8 60 gal bottle skid" would be ready to deploy Saturday night. Coil Tubing ready to deploy from the Skandi Neptune approximately late Sunday night. Timelines on 2 and 3 are fluid but improving.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/24/10	07:26							Graham Parks calls from BOA to get permission to take ROV from flex joint to look for ST Lock for ram. Graham released the Jent to return to Fourchon due to weather picking up. He also want to have a TRA onboard before we begin ROV intervention.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/24/10	13:05							Discussion covered potential plans for ROV intervention: Waiting on word to close rams. USCG, BP, MMS, TO discussing options. Ram closure could take place in the next few hours utilizing bottles at sea floor. Had discussion on possible pod retrieval, the possibility of formation fracture was discussed. Additionally if bottles do not supply adequate pressure to close rams, plan was discussed to bring bottles back to surface and recharge system to 6k lbs and replace ball valves with 10k ball valves.	6
4/25/10	00:57							call from Steve Thames at BP: BP is going to reposition the BOA Subseas ROVs to the top of the BOP stack.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	01:09							Email from Steve Thames at BP: Change in ROV configuration until later morning. 36 will be moved above the BOP to observe the stack. 37 will be move to survey area.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/25/10	01:49							At 8:00 AM Sunday morning a flyover with the ROV will be done to survey the location and we proceed with closing the pipe rams. Another flyover will be done to survey the location to observe for any changes. This work will be performed with command team still on the MV BOA. At 4:00 AM the MV Sea Champion will arrive on location with the BP accumulator (8 x 60 gal. bottles) (DHR). The Skandi is expected to arrive at approximately 5:00 AM. The Skandi will have the coil tubing team arrive via helicopter to prep the coiled tubing. The site team will be transferred from the BOA to the Skandi as soon as logistics and weather allow. Geoff Boughton/Mike fry composing procedure for closing blind shear ram (DHR)	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	04:30							Skandi Neptune arrived on location	6
4/25/10	07:23							Call from Robert White at BP: Procedure to close pipe rams with ROV intervention received final approved. Operation will begin at 8 AM	6
4/25/10	07:42							Robert White sends email update: HIT is currently located on Nakkika. Waiting on weather to move device from current location to the BOA subsea where Oceaneering will take custody and begin preparation of kit for deployment. Operations procedure is under development along with pictures of kit by Oceaneering.	6
4/25/10	08:15							Begin procedure to close pipe rams	6
4/25/10	08:40							ROV turned on accumulators	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	9:00	ROV second attempt to close Middle VBR failed; only able to hold 2,000 psi. On May 3rd it was determined that the ROV line to the Middle VBR was connected to the Test Ram	31			Second attempt to close the VBR. ROV attempted to close metal VBRs, only able to hold 2000 psi. At this point we were getting more tools to be able to work with it, and I think at that point there, we were no only using the ROV, I think we had then -- had set on the bottom a bladder with dye, and we were using other means to assist with the ROV.	11		
4/25/10								Email from Robert White at BP: TOI and Oceaneering are developing "simple procedure' to accomplish removal of TOI stab and insertion of ROV stab to allow use of ROV to pump up to system pressure. Procedure will be vetted from offshore then routed to BP local for distribution as per Harold Reeves, BP.	6
4/25/10	10:25	At 3000 psi - either: rams have not moved or they are restricted	7						
4/25/10	10:31	pull out stab, no fluid flow back	7						
4/25/10	10:45	pumping wide open - pressure gauge 0	7						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	10:47	pressure = 0	7						
4/25/10	10:53	pressure = 0	7						
4/25/10	10:57	pressure = 0, stop and test pump, …looking for possible interflow at shuttle	7						
4/25/10	10:57	Pess? S75 lock leaking	7						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	11:40							Notes received from Steve Thames at BP: Timeout has been called due to "lack of function". Expected reconvene in one hour. Diagnostic team is working issue collectively between TOI/BP/Cameron/TOI P10 resources. TOI Accumulator package will be used as it has 1000 psi remaining pressure - onsite vs. recover/deployment delays of kits. Visual survey list for ROV will be part of response package to facilitate inspection points - Expect to dry run inspection points prior to actual pressurizing of system. BP Source Control is looking at next deployable package - BP accumulator panel with greater capacity and dye capability and/or Coil tubing unit. At some point the decision will need to be made regarding move of personnel and kits to Skandi Neptune based on weather conditions.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	13:30							ROV is checking behind panel and pods - still attempting to determine whether pipe rams closed this morning or not	6
4/25/10	13:50							Timing for response has been extended till 14:15 by BP management. One ROV will be released to surface for modification required to operate BP accumulator kit by BP Source Control. BP Source Control is executing deployment of BP bladder kit to seafloor. BP Source Control is managing kit location and potential conflicts on sea floor relative to BOP stack. Identification of inspection points continues and will be validated prior to pressuring system again. Visual inspection will begin once pressure has been applied utilizing ROV left on location for stack monitoring.	6
4/25/10	14:15	sub Sea on plume	7						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	14:15	Make a dry run for POI's. Trace the plumbing and inspect shuttle valves	7						
4/25/10	14:15	ST locks were removed, plumbing may have been changed by Transocean	7						
4/25/10	15:50	"the S75 system was modified and ? Of months ago" "this changed a ? Hot stab panel capability to a combined close/S75 function" "This may be a leak path … because it is common to the VBR/shear ram function"	7			[Date/Time Not Given] "the lower stack ROV panel was reconfigured with the hot-stab configurations"	11		
4/25/10	19:30							BP Dye rack touches down to bottom	6
4/25/10	20:15	plugging stab into pipe rams with sequence: 1) high pressure shear panel valve 2) ST Lock valves	7						
4/25/10	20:45							Dye pumped through and leaks found - ROV focused in on hose fitting coming out of the shuttle valve to the ST locks. Appears fitting is backed out. Group at BP is debating potential solutions for tightening the connection.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/25/10	22:00	ROV third attempt to close Middle VBR with portable subsea accumulator; System leaks identified. On May 3rd it was determined that the ROV line to the Middle VBR was connected to the Test Ram	31						
4/26/10						Transocean DISCOVERER CLEAR LEADER had to drydock and caused…damage to the lower marine riser package and marine riser system	10		
4/26/10	02:45							Steve Thames called P10, said nut/fitting tightened on BOP.	6
4/26/10	03:40							ROV stabs in, pressures up on BOP, leak seen again	6
4/26/10	05:00	Fix Leak in Control System of Middle VBR	31						
4/26/10	05:00	Identify and fix leak in control system Middle VBR							
4/26/10	07:00	repaired leaking connection on S75 shuttle	7						
4/26/10	07:00							additional leak found by ROV on BSRs	6
4/26/10	08:50	second leak on S75 hose connection	7						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/26/10	10:30	looks like MPR's are closed, pump up to 3500 for second check. Bleed down pressure, pull out stab	7						
4/26/10	10:30							BOA procedure underway - as per Rob White - pumping on BOP	6
4/26/10	10:50	stab in to shear rams, apply 4100 psi	7						
4/26/10	10:56	pressurize down to 3600 psi	7						
4/26/10	11:00	pull stab and bleed off, re-stab. Pumping, leak at stab, pull. Pump to 4000 - slow leak at 3500, probably via pump	7						
4/26/10	11:00	ROV second attempt to close BSRs - low flow rate	31						
4/26/10	11:00	Fourth attempt to close Middle VBR via subsea accumulator - Pressure to 3500psi Indication of movement	31						
4/26/10	11:07							BOA Sub C-ROV 37 summoned to surface-ROV 36 going to look at plume.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/26/10	13:14							ROV has returned to surface to be outfitted with intensifier capable of producing 5k psi. Upon return to BOP it will be deployed again on the Blind shear to assure full function. Super shear function will be through coil tubing unit with multiple Oceaneering HIT devices (these are being fabricated - (3) 1.5" and (1) 1.0". They will be fabricated to allow insertion into various control lines and be "left in place" for future interventions and controls. Delivery is unknown at this time but they will be flown out vs. trucked.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/26/10	14:28							Meeting minutes below requested to be added to log 25 April 2010 6:00 - Transocean completing procedures on actuating BOP. Accumulator skid being staged. DDIII being mobilized to location to drill relief well. Enterprise also being mobilized to location for second relief well. 25 April 2010 13:00 - BOP tested. Leak detected. time out called before proceeding with actuating BOP. A diagnostic plan is currently being developed to further test the BOP before actuating the shear rams. 25 April 2010 16:00 - BOP leak found, attempt to tight and seal. First attempt is unsuccessful. Will continue to fighting fittings in an attempt to stop; leakage. Dye has been injected into BOP system to detect additional leaks. Additional BOP test procedures being developed in Houston.	6

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/26/10	22:00	ROV third attempt to BSRs with ROV using portable subsea accumulators - system leaks identified	31						
4/27/10	0:00	Identify and fix leak in Control system (BSR entry)	31						
4/27/10	4:00	ROV fourth attempt to close BSRs - pressurized up to 5,000 psi eight times, no movement identified. BSR had not sealed, as the well continued to flow	31						
4/27/10	10:00	Cut hydraulic hoses to access CSR	41						
4/27/10	15:45	second attempt to attach hose to coil tubing unit	7						
4/28/10	0:00	ROV first attempt to close CSRs with coiled tubing unit; low flow rate	31						
4/28/10	23:00	ROV second attempt to close CSRs with wand; apparently moved shuttle valve, but system leaks	31						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
4/28/10		Overnight efforts to close the CSR's: modified the stab in tools for the 1" hose. Re-run it and applied 5000 psi via the CTV - could not move the shuttle valve. Cameron manufactured pod (shuttle) vent ? last night. Looking up alternative methods of getting flow directly to shuttle on CSRs.	7						
4/29/10	17:25	ROV third attempt to close CSRs with subsea accumulator to 4,200 psi. Accumulator pressure dropped to 2,000 psi, indicating hydraulic fluid motion; accumulator pressure built back up to 4,500 psi; right hand plume from ROV perspective on riser stopped, but then resumed flowing. The hydraulic signal of the ROV indicated that the CSR was either fully closed or was being obstructed. It was not possible to determine the position of the CSR.	31			[Date/Time Not Given] The only function that stopped flow was with the casing shear rams, and when they were functioned, we saw the plume at he bend of the riser on there right side go away completely for less than one minute, and then the plume came back - We feel that was the shear rams closing	11		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
4/29/10	21:30	ROV fifth attempt to close BSRs - pressured up to 5,500 psi twice. BSR may have been activated by EDS, AMF, ROV (autoshear), or ROV hot stab. This was the final attempt to close the BSR before it was determined on 10 May that the BSR was closed and locked. However, regardless whether this or previous action had closed the BSR, it had failed to seal in this fully closed position.	31						
4/30/10	6:00	Cut hose and attempt to close Upper A via subsea accumulator - System leaks identified?	41						
5/1/10	06:30	all ready to go on upper annular. Observed leak on Parker? Clamps, will retighten and try again while we fabricate a clamshell type clamp.	7						
5/1/10	12:00	ROV found and fixed leaks in Upper Annular circuit/control system	31						
5/1/10	13:50					Theiren's log states: "Stab-in on the middle pipe rams as being plumbed for the test rams, not the middle pipe rams."	11		

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/1/10	16:00	ROV first attempt to close Upper Annular with subsea accumulator to 3,000 psi. ROV hydraulic signature indicated that the Upper Annular may have moved towards the closed position,	31						
5/2/10	14:00	ROV first attempt to close Lower Annular with subsea accumulator; system leaks identified.	31						
5/2/10	15:00	ROV second attempt to close Lower Annular with subsea accumulator; held pressure for 45 min; system leaks identified	31						
5/3/10	0:00	ROV second attempt to close Upper Annular with subsea accumulator to 4,000 psi; apparent successful function. Hydraulic signature indicated that Upper Annular may have moved toward the closed position.	31						
5/3/10	5:00	ROV third attempt to close Lower Annular with subsea accumulator; system leaks identified	31						
5/3/10	8:00	ROV fourth attempt to close Lower Annular with subsea accumulator; system leaks identified	31						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/3/10		It was discovered that the ROV line to the Middle VBR was connected to the Test Ram	31						

1 TIMELINE: MAY 5, 2010 TO MAY 1, 2011

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/5/10	5:00	ROV fifth attempt to close Middle VBR (first attempt after determining incorrect plumbing on May 3 2010); pressure up to 3,500 psi and no indication of movement. Middle VBR may have been closed with this action or was closed with Horizon crew action on 20 April. (see May 10 gamma rays)	31						
5/6/10	3:00	Position indicator confirmed positioning of choke and kill line valves	41						
5/6/10		Retrieval of Yellow Pod. Yellow pod solenoid 103 failed on test after recover (EDS, HP Shear Rams, yellow pod redundancy lost)	31						
5/6/10		AMF battery. Battery on AMF circuit found to be charged to 18.4 volts (normally 27 volts)	31			Yellow pod was full and tested on May 6th	11		
5/6/10	14:38			Began JSA for work on the POD	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/6/10	15:13			Tape off cut lines for safety to prevent cuts from sharp edges due to ROV demolition: ***(1)*** S1 supply line, ***(2)*** function #24 (this function is labeled blank on SK-122108-21-05), ***(3)*** function #49 (this is POD select on SK-122108-21-05), ***(4)*** function was not labeled - Hyd line will have to be traced to determine what this line was used for.	16				
5/6/10	15:18			Removal of (2) unknown pilot line	16				
5/6/10	15:20			Removal of (3) function #49 pilot line	16				
5/6/10	15:21			Removal of (4) unknown pilot line	16				
5/6/10	15:26			Removal of (1) S1. The code 62 flange was unbolted and the demolished portion of the supply line was removed	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/6/10	15:37			Removal of flow meter assembly from POD and moved to workbench. This was done to allow the installation of the new pre bent pipe work to be assembled to the supply side of the flow meter. In order to complete this step a section of pipe work that was not demolished had to be removed [***(5)*** this section was on the supply side and was code 62 by CVP union that secures in to the flow meter]	16				
5/6/10	15:43			Dry fit up on hydraulic supply adapter. (5) code 62 by CVP union was moved to lockbox.	16				
5/6/10	15:52			Building of scaffolding to allow removal of PBOF cables in the MUX section	16				
5/6/10	15:57			Removal of Roughneck connector ***(6)***. At the same time adjustments were made to the new supply adaptor at the workbench.	16				
5/6/10	15:58			(6) Roughneck connector was moved to lockbox.	16				
5/6/10	16:02			Qty. 2 o-rings were found to be in the connector for the face seal	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/6/10	16:16			Install 1" hydraulic supply adapter - Note: it was noticed at this time that the radial seal in the flow meter was missing.	16				
5/6/10	16:26			Drill hole to mount a 1" ball valve for ROV operations while subsea	16				
5/6/10	16:28			Install radial o-ring for flow meter ***(7)*** and face seal for flow meter. Installed made up electrical connector for flow meter.	16				
5/6/10	16:50			Found 2 Stinger seal blown - unknown functions at this time ***(8)*** stinger seal, pn 11687-01 moved to lock box. At this time Erwin entered the Mod section in order to obtain the function number that is stenciled on top of the riser stinger assy. Was able to determine that the function was directly behind #41 at 1/2" port. Machine detail x-200030-01	16				
5/6/10	16:57			***(9)*** stinger seal removed and moved to lockbox	16				
5/6/10	17:01			Installed 2 new stinger seals	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/6/10	17:21			Pressure balanced oil field cables removal. 2 new ones will be installed	16				
5/6/10	17:30			Suspend work while scaffolding was being completed. Eat supper	16				
5/6/10	18:30			Began set up of PETU (Portable Electronic Test Unit)	16				
5/6/10	18:46			Identified two each stinger seal functions that were removed at 16:50	16				
5/6/10	18:54			Installed pilot line on #4	16				
5/6/10	18:56			Removed PBOF for STM ll/B item ***(10)***	16				
5/6/10	18:57			Removed PBOF for STM1 item ***(11)***	16				
5/6/10	19:10			Number of functions for valves to make it easier to identify. 11735-01 seal stinger puller	16				
5/6/10	19:20			Removed PBOF cable from SEM ***(12)*** (subsea electronic module) to RCB (riser control box)	16				
5/6/10	19:22			Installed pressure cap on SEM where the PBOF cable connects to the SEM. Remove o-ring from PBOF cable ***(13)***	16				
5/6/10	19:27			Removed o-ring ***(14)*** from STM I housing pn:619088-33-20-21	16				
5/6/10	19:28			Removed o-ring ***(15)*** from STM II housing pn:619088-20-21	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/6/10	19:31			Installed pilot 1/4" line to ROV valve (pilot supply to solenoid) STM II left side and STM I right side	16				
5/6/10	19:47			connect new PBOF cable on STM PN:2185879-22-05	16				
5/6/10	19:53			Connect new PBOF cable on STM II pn:2185879-22-05	16				
5/6/10	19:55			Connect PBOF cable from STM I to SEM	16				
5/6/10	19:57			Connect PBOF cable from SM II to SEM	16				
5/6/10	20:15			Pre-job safety meeting with Cameron, TOI, BP to complete JSA for PETU testing	16				
5/6/10	20:35			Power up PETU connect to SEM. Verified .ini file was RBS8D. Read back on the yellow POD shows the SEM is BLUE A and BLUE B. It should be noted that the Distribution cabinets on surface designate which POD is BLUE and which POD is yellow	16				
5/6/10	20:43			Deadman system was armed via PETU. Read back from the STMs were good, no faults were noted.	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
5/6/10	21:00			Verify battery voltage in SEM. 8.85 VDC on the 9VDC batteries was recorded. 18.41 VDC on the 27VDC was recorded.	16				
5/6/10	21:28			Lockbox secured	16				
5/6/10	21:40			simulated deadman test on solenoid. Electromagnetic pin was used but held next to the solenoid valve for the casing shears. This was the incorrect sol valve as during the deadman the high pressure blind shear, solenoid valve # 103 is the solenoid valve that energizes.	16				
5/6/10	21:46			Simulated deadman test with the correct solenoid valve #103. Electromagnetic pin was held against Solenoid valve #103 and the deadman was fired. No indications of the valve firing. This valve was rebuilt in Feb 2010 by unknown person. It appears this was done on the rig as the date was written in paint pin.	16				
5/6/10	21:48			suspend operations for the night	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
5/7/10	09:00			Discussion on layout of equipment for running the POD subsea. Oceaneering is providing a LARS (Landing and Recovery System) to run the hotline and MUX cable on	16				
5/7/10	09:40			Cut and terminated 1" hose for S1 to Ball valve mounted on the MUX section for solenoid supply. Waiting on pressure test from rig	16				
5/7/10	10:00			began terminating MUX cable to Jbox on the reel	16				
5/7/10	11:30			discussions held with service department regarding which functions to use to operate the mini-connectors that will latch onto the choke and kill lines. The plane will be to use gasket release for the LMRP and wellhead connectors along with the solenoid valve for POD select and one of the unknown solenoid valves that was going to the CVP (conduit valve package). Qty 4 hoses with be connected directly to POD via JIC fitting.	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/7/10	12:37			Began JSA for seal testing of PBOF cables. Downloaded seal test procedure to perform test (x-200136-05)	16				
5/7/10	13:30			Jumper hose from ball valve to supply completed test and installed	16				
5/7/10	14:30			fluid kit arrived on deck. Fluid testing underway. Note: the HPU skid does not have a circulation pump to circulate the fluid in the tank. First fluid sample from HPI skid was NAS Class 12. (this was taken from the discharge hose from the accumulators). Second fluid sample taken from Tank. Testing in progress.	16				
5/7/10	15:12			PBOF cable from SEM to STM II began and ended at 3:22. Test was good per x-200136-05. Note both ends of the PBOF were tested at the same time.	16				
5/7/10	15:30			Discussion regarding by passing the tank on the skid and pull straight from the totes if NAS class was not acceptable from the tank.	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
5/7/10	15:36			PBOF cable from SEM to STM I began and ended at 3:36. Test was good per x-200136-05. Note both ends of the PBOF were tested at the same time. This completes seal testing of PBOF cables until we hook the MUX cable up to the POD prior to running subsea.	16				
5/7/10	16:00			Megger of the MUX reel through the slip ring. Test results were good on all wires. At 1 GHz all wires were greater than 500 MHz. Continue to flushing accumulators / HPU system.	16				
5/7/10	21:00			Achieved NAS class 8 on the HPU skid	16				
5/7/10	21:09			Began deck test procedure. Note: function 103 would not fire using the PETU on SEM A or SEM B.	16				
5/7/10	22:00			Completed testing for the night. Will pick up testing on page 11 in the morning. Expected completion of the remainder of the test is approximately 1 hour 30 min.	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/8/10	-			Note: Word was received that the 11,000 ft hotline has not left the Port Fourchon as it is waiting on equipment from Houston.	16				
5/8/10	08:00			Began JSA to complete pages 11-22 of deck test. Completed work permit 30917	16				
5/8/10	08:45			Began testing remainder	16				
5/8/10	10:48			Completed pages 11-22 on SEM A. Upper annular regulator increase sol. Valve would not fire on SEM A so we moved on in the procedure	16				

MANAGING RISK DNV

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/8/10	11:22			Completed pages 11-22 on SEM B. Upper annular regulator increase sol. Valve would not fire on SEM B so we moved on in the procedure. Require approval for the following from TO/Cameron: 1. Replace upper annular regulator increase solenoid valve, 2. Replace HP shear sol. valve if this is still a viable function after all of the ROV intervention if this is not a viable function them remove and blank off high pressure blind shear solenoid valve (function 103) and verify if any additional testing is required on the deadman circuit. Note: Once these two items are completed we will be on standby. Hot line hose reel is not expected to be on location until tomorrow night. Once it arrives then we have to connect the hoses via a 1" JIC x JIC fitting and spool the 5,000 ft of hose currently on hand onto the new reel. Then we can flush the hose. LARS from Oceaneering is being organized but don't have a clear idea of when to expect it. Based on conversations not until tomorrow as well. Upper Deck where the equipment is to be staged is loaded down with	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
5/8/10	12:50			Measuring for jumper hose from HPU which will be on lower deck to the planned location of the hotline reel on the upper deck.	16				
5/8/10	13:30			Phone call with Houston and BP rep has given approval to move forward on replacement of solenoid valves. Note: solenoid valve #103 was noted not to have a Cameron supplied e-connector installed. This e-connector is different than the Cameron issued. The plated pins are approx. 1/16" shorter than the ground pin. Seacon identifications numbers were (35996) and (19164112)	16				
5/8/10	13:35			Solenoid valve for upper annular increase and high pressure blind shear (#103) were replaced with spare solenoid valves from the Transocean Nautilus POD that was sent over as a spare.	16				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
5/8/10	13:53			Began testing of upper annular increase sol. Valve and function testing of the corresponding POD valve. Along with testing of the high pressure blind shear (#103) solenoid valve. Test was successful on both functions.	16				
5/8/10	14:16			Deck test procedure has been completed with sign off by all parties	16				
5/8/10	15:32			Hotline jumper completed. 230 FT jumper was reeled off and hose fittings were crimped. Unable to test as rig does not have test fitting, or charts. We have contacted Berwick and fittings and charts are being shipped to BP heliport for morning flight.	16				
5/8/10	16:00			Hotline jumper passed 5K test. Once fitting arrive we will test to 7500 psi. Working with TO make mounting bracket to bolt the roughneck break way to on top of the POD.	16				
5/10/10		Gamma-ray sensing data show all but one of the ST locks were in the locked position; one side of the Upper VBR (East) ST lock was inconclusive.	31						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
5/10/10		AMF Test. After changing solenoid 103, AMF sequence worked using battery that had only 18.4 V (AMF only needs one of 103 or 66)	31						
5/13/10	16:00	ROV survey of ST locks using gamma ray sensing confirmed one ram of Upper VBR confirmed closed; other ram ST lock inconclusive.	31						
5/20/10		"…remotely operated vehicle (ROV) intervention activities to close the BOP were ceased."	19						
6/29/10	15:20	Rov Operators functioning testing Rov Units with cutter machine, unload the Pod receptacles covers from the work boat, attempted to unload the shackle assembly for the work boat, unsuccessful. The Shackle assembly consisted of 1- 10" sling, and one 55 ton Rov friendly shackle.	3						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/29/10	18:00			Meeting with Subsea Wells team. Decision is to continue to move forward with recovery pending several variables: weather permitting seas, wind, etc - the enterprise can hold a heading of 120 deg +/- 20 deg - we will not stop well test flare. If we have to reduce the well flow or shut it in we need the permission of the Unified command and the white house - we can land the POD on the Enterprise with them still stuck on Olympic Challenger. They must also agree that we can pull the pod with them on the Olympic Challenger. The coast guard official says he has no problem with pulling or landing the POD on deck if the issue is custody of the equipment as long as all parties agree. We will secure the area where the equipment is landed and wait until all parties are present for the testing.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/29/10	15:10			Prepare to run ROV to cut connection from LMRP to Blue pod (approximately 3 hour operation once ROV starts the actual cutting). TO onboard the Olympic Challenger directing ROV. The weather is deteriorating as a result of TS Alex. Currently blue pod recovery is 3rd priority. A decision will be made at 18:00 to determine if the operation will continue. It is decided that it will be terminated the next possible window, according to weather forecast, will be 7/2/10 or 7/3/10. This is a loose estimate as there will probably be other operations with higher priority at that time also. Note: Cameron personnel that was present for recovery of Yellow POD stated that only one of the coils of the solenoid #3 upper annular pilot supply increase was defective.	17				
6/30/10	09:00	Rov UHD 30 making cut on the 1.22 OD Mux cable (electronic cable) cut completed @ 09:20	3						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
6/30/10	06:00			The ROV operations on the Olympic Challenger were delayed last night until this morning. The cutting of the electrical and hydraulic connections will start at 6:30. Upon completion the decision will be made on whether to run drill pipe for recovery of the blue pod. The seas are deteriorating so likelihood of retrieval is low for the next 24-48 hours. We will keep monitoring weather and deploy the drill pipe and retrieval rigging if conditions allow.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
6/30/10	18:00			Olympic Challenger has completed the cutting operations on the pod connections. Weather is still holding us from pulling the blue pod. Looks like Friday would be the earliest opportunity to continue. Pod recovery is still 3rd priority behind project work for bringing Helix on line and lightering operations for the Enterprise. We are still at the mercy of meeting perfect conditions concerning heading, weather, and operations. It has been confirmed that we will not receive permission to shut down oil collection for the purpose of blue pod retrieval. This adds a realm of uncertainty to the operation.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/1/10	06:00			Olympic Challenger is completing preparation work for pulling the blue pod (stringers). We are still waiting on weather to cooperate for the blue pod retrieval operation to begin. Friday is going to be best opportunity. Pod retrieval is still third priority behind project work for the Helix Producer, and lightering operations on the Enterprise. If we can safely transfer TOI back to the Enterprise we are going to schedule a meeting later today to discuss the operation, raise any concerns, and finalize details. Meeting to include TOI, BP investigation, BP operations, and Cameron.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/1/10	18:00			Olympic Challenger is completing preparation work for pulling the blue pod (stingers). They are having trouble de-energizing the stinger. We are still waiting on weather to cooperate for the blue pod retrieval operation to begin. Friday is going to be best opportunity. Pod retrieval is still third priority behind project work for the Helix Producer, and lightering operations on the Enterprise. If we can safely transfer TOI back to the Enterprise we are going to schedule a meeting later today to discuss the operation, raise any concerns, and finalize details. Meeting to include TOI, BP investigation, BP operations, and Cameron.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/2/10	16:30-19:25	Held meeting with the Enterprise Team, Cameron, Bp and Tim Williams and Ray Picard. Discussed that town had stated that they had function tested the Blue Pod with the OI3, Enterprise Rov notice that the 17 D hot stab was not hooked up to the Blue Pod. Rov from OI3 assist they where at the accumulator pack, we requested to flush the line.	3						
7/2/10	19:25-20:00	Enterprise Rov retrieved the 17 D hot in arm and waited on the OI3 Rov to open value on the accumulator pack. While waiting on the OI3 Rov to flush the line. Had the Rov look at the stack stingers, on the Blue Pod, it visually looked to be de-energized, visually looked at the stack stingers on the yellow pod, and looked to be energized.	3						
7/2/10	00:00			ROV UHD 30 troubleshoot electronics on the ROV unit, and re-position Olympic challenger to assist the Helix Express with jumper.	17				
7/2/10	01:57			Rove UHD 30 going back to depth and assisting the Helix Express with jumper.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/2/10	06:00			Continue assisting the Helix Express with the jumper hose. We spoke with the OI3, and confirmed that they had the 200" jumper with the 17D hot stab	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/2/10	06:00			Olympic Challenger is completing preparation work for pulling the blue pod (stingers). They are having trouble de-energizing the stinger. ROV was reprioritized last night to work on the Helix Producer manifold work so no attemps were made to de-energize and retract the stingers. If they can get the BOP stinger to work we will run drill pipe so we are ready should a situation arise were the heading of the ship can be changed to 120 deg +/- 20 deg and secure the pod. The wind is currently holding us at around 190 deg. We are married to the flare so the only 2 possibilities of getting a window are a wind shift or an outside reason to shut the well in. Both scenarios are up to chance. Pod retrieval is still third priority behind project work for the Helix Producer and lightering operations on the enterprise. If we can safely transfer TO back to the Enterprise we are going to schedule a meeting to discuss the operation, raise any concerns, and finalize details. Meeting to include TOI, BP investigation, BP operations, and cameron.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/2/10	16:30			Held meeting with the Enterprise Team, Cameron, BP, and TOI. Discussed that town had stated that they had function tested the blue pod with the OI3, Enterprise ROVE notice that the 17D hot stab was not hooked up to the blue pod. ROV from OI3 assist they where at the accumulator pack, we requested to flush the line.	17				
7/2/10	18:00			TOI have been transferred back to the Enterprise. All previous attempts have been inconclusive and reported as leaking. It was determined that they had only put 2000 psi on the circuit that is normally operated to 3000 psi. We are jumping the Enterprise port ROV to intervene and determine what is happening and put the correct pressure on the function. The same priority exists and we are at 310 deg and need to be at 120 deg to make retrieval. Lightering operations are still a priority.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/2/10	19:25			Enterprise ROV retrieved the 17 D hot in arm and waited on the OI3 ROV to open valve on the accumulator pack. While waiting on the OI3 ROV to flush the line. Had the ROV look at the stack stingers, on the blue pod, it visually looked to be de-energized, visually looked at the stack stingers on the yellow pod, and looked to be energized.	17				
7/2/10	20:00			The OI3 requested that if we had a class 4 manipulator tool to function the accumulator pack non found in the tool tray.	17				
7/2/10	20:35			Enterprise ROV port side coming to surface to retrieve a class 4 manipulator tool to open valve on the accumulator pack. Enterprise ROV go back to the blue pod to perform test on the stack stingers.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/3/10	16:25-16:31	Enterprise Rov re-position and OI3 Rov open accumulator pack valve 0-1, and attempt to de-energized stack stingers lost pressure when the 17 D hot stab on the Blue Pod leaked, lost 500 psi the starting pressure was 3000 psi.	3						
7/3/10	00:00			Enterprise ROV instructed to go back to the cage and wait on orders	17				
7/3/10	00:47			Enterprise ROV moving to blue pod and retrieve 17D hot stab, OI3 ROV at the accumulator pack, prepare to flush out the stab with BOP fluid.	17				
7/3/10	01:00			OI3 ROV open O1 on the accumulator pack, had indication of fluid coming out the pressure activation valve. The accumulator pack had 2000 psi at the start of the stack stinger test. OI3 ROV closed O1 valve on the accumulator pack.	17				
7/3/10	01:21			Enterprise ROV monitoring the blue pod while the OI3 pressured up the accumulator pack to 3000 psi	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/3/10	02:23			Enterprise ROV in position and OI3 opened up 01 valve on the accumulator pack, and got indication the stack stingers were de-energizing, both the LMRP and Stack stinger re-traced. Verified the stingers retracted. OI3 closed the O1 valve on the accumulator pack	17				
7/3/10	02:40			Held discussion with the BP company man that the stack stinger retracted.	17				
7/3/10	03:00			Successfully de-energized and retracted both stingers. Attempting to trip drill pipe and retrieve pod.	17				
7/3/10	03:15			Enterprise port ROV come to surface. The drill floor preparing to run in hole with the pod retrieve assembly. Enterprise ROV followed the drill string down.	17				
7/3/10	12:00			Enterprise ROV lost visual of the drill sting stop tripping operations and locate the drill string. Enterprise ROV located, and tripping of the drill string was suspended to hook up the Houser hose to the Motor vessel Overseas Cascade.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/3/10	13:00			Enterprise ROV standing by on the blue pod, waiting on OI3 ROV to assistants to proceed with the blue pod recovery.	17				
7/3/10	16:00			Enterprise ROV move out to the top of the blue pod, with the ROV hook, and connect to the blue pod, communicated to the Aft Rotary on the rig the connection had been made to the blue pod. The Enterprise made heading change for 160 to 120 degrees. Communicated to the rig floor to take the slack out cable and wait on heading changes to be completed.	17				
7/3/10	16:13			Enterprise ROV re-position and OI3 ROV open accumulator pack valve O1, the 17D hot stab in the blue pod was leaking OI3 closed the O1 valve, Enterprise ROV reseated the 17D hot stab on the blue pod.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/3/10	16:25			Enterprise ROV re-positioned the OI3 ROV open accumulator pack valve 0-1, and attempt to de-energized stack stingers lost pressure when the 17D hot stab on the blue pod leaked, lost 500 psi the starting pressure was 3000 psi	17				
7/3/10	16:31			OI3 ROV pressure the accumulator pack back from 2500 to 3000 psi	17				
7/3/10	17:45			OI3 ROV open O1 valve, got conformation that the blue pod stack stingers de-energized and retracted.	17				
7/3/10	17:50			Pick up on the Aft Tope Drive and picked up and cleared the POD receptacle. Remove the 17D hot stab and have the Enterprise ROV surveyed around the blue pod. Install the blue pod receptacle covers.	17				
7/3/10	18:00			Blue pod is in transit from LMRP to aft drill center. Pod removal went smoothly	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/3/10	18:04			Aft Rotary pull out the hole with the blue pod up, the OI3 ROV retrieved the 200" jumper with the 17D, and stored on the accumulator pack, the Enterprise ROV followed the blue pod to surface.	17				
7/4/10	00:00			Aft Rotary continue pull out the hole with the blue pod up, the OI3 ROV retrieved the 200" jumper with the 17D, and stored on the accumulator pack, the Enterprise ROV followed the blue pod to surface.	17				
7/4/10	06:00	Skid the cart under the Blue Pod, and land and secure on cart and move the Pod to area in Moon Pool for evaluation and Deck Testing.	3	Skid the cart under the blue pod, and land and secure on cart and move the pod to area in moonpool for evaluation and deck testing.	17	Blue pod was pulled back [first week in July]	11		
7/4/10	06:45			While standing by waiting on the MMS and USCG, get hot lines ready, with tools need to remove the component the we prep on the Olympic Challenger.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/4/10	12:00			Held meeting with Enterprise Team, BP, MMS, USCG, Cameron, Tim Williams and Ray Picard. Discussed the scope of work with the blue pod, with removing and tagging components. (reviewed the hazards in the work area and communication in work area) The group met in the work area inspected and began the work scope.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/4/10	13:00	Remove and tagged components. Below is the list of components list as Items on Blue Pod.	3	Removed and tagged components. Below is the list of components list as Itemss on Blue Pod. #1 1-38" pilot line, #2 1-3/8" pilot line, #3 1-1/2' Pod select line, #4 1-62 flange for the supply line, #5 1-MUX cable with Rough Neck connector, #6 1-PBOF cable from the STM/SEM, #7 STEM strap, #8 1-PBOF cable for SEM to STM, #9 1-Bandit Clip for securing the Rough Neck Connector, #10 1-O-ring from the PBOF cable, #11 1-Oring from the PBOF cable, #12 1-RCB cable, #13 1-PBOF cable from the STM/SEM, #14 1-O-ring from the PBOF cable, #15 1-SAE Flange x NPT Hydraulic supply line Note: found shaving in flow meter, cause from cutting the 1 1/2" supply line on the Olumpic Challenger (Took Item 15 out the lock box to use to hook up the 1" supply line, once the correct fitting get out here will put back in the lock box, #16 1-Sample of shavings, #17 1-PBOF cable from the STM/SEM, #18 1-Bandit strap, #19 1-O-ring from the PBOF cable, #20 1-O-ring from the STBM, #21 1-O-ring from SEM, #22 1-O-ring from STM, #23	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/4/10	14:00	Made up 1" Hydraulic Supply line, for the deck test on the Blue Pod in the sub sea shop	3	Made up 1" hydraulic supply line, for the deck test on the blue pod in the subsea shop.	17				
7/4/10	15:08	Attempted to locate 1 1/2' x 1' Swedge Lock fitting with 5000 psi work pressure to connect to the flow meter for the 1' Hydraulic supply for the Blue Pod. (Remove Item #15 to use to hook up the 1" Hydraulic Supply line for the deck test of the Blue Pod. This item will be put back into the lock box.	3	Attempted to located 1 1/2' x 1' Swedge Lock fitting with 5000 psi work pressure to connect to the flow meter for the 1' hydraulic supply for the blue pod. (Remove #15 to use to hook up the 1" hydraulic supply line for the deck test of the blue pod. This item will be put back into the lock box. Electronics Tech installed the new PBOF cables from the STM to SEM.	17				
7/4/10	15:08	Electronics Tech installed the new PBOF cables from the STM to SEM.	3						
7/4/10	17:52	Powered up Blue Pod on A SEM and got verification that PETU was communicating with the Blue Pod.	3	Powered up blue pod on A SEM and got verification that PETU was communicating with the blue pod	17				
7/4/10	18:00			The blue pod recovery team suspended scope of work for dinner.	17				
7/4/10	18:00	The Blue Pod Recovery Team suspended scope of work for dinner.	3	Blue pod is in the moonpool. MMS and USCG will be returning to the Enterprise at around 11:00 AM to start the inspection of the pod.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/4/10	19:00	Open Hydraulic Supply to the Blue Pod, and supply hose for the Bop room ruptured, change out hose, open Hydraulic Supply to Blue Pod, no leaks.	3	Open hydraulic supply to the blue pod, and supply hose for the BOP room ruptured, change out hose, open hydraulic supply to blue pod, no leaks.	17				
7/4/10	20:04	Select SEM A, reviewed the position of the regulators switched to SEM B and reviewed position of regulator no concerns.	3	Select SEM A , reviewed the position of the regulators switched to SEM B and reviewed position of regulator, no concerns.	17				
7/4/10	20:10	Retracted Stack Stingers and energized both LMRP, and Stack Stinger.	3	Retracted stack stingers and energized both LMRP, and stack stinger	17				
7/4/10	20:20			Deck test the Mark II blue pod as per Cameron Procedures, on the A SEM.	17				
7/4/10	21:30	Deck test the Mark II Blue Pod as per Cameron Procedures, on the B SEM.	3	Deck test the Mark II blue pod as per Cameron Procedures, on the B SEM.	17				
7/4/10	23:39	Notice that Pod Select Regulator began leaking, The Pod Recovery Team suspended operation till morning. Team gathered in the sub sea shop and discussed the scope of work for tomorrow.	3	Notice that Pod select regulator began leaking, the pod recovery team suspended operation till morning. Team gathered in the subsea shop and discussed the scope of work for tomorrow.	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/5/10	10:04	Performing check on Blue Pod on A and B SEM for the Sub Sea Electronics Module Test, as per Cameron procedure, perform Deadman test and failed watt the time at 3.5 minutes did not fire Deadman, once we put the power back on the PETU the Deadman fired, on SEM A.	3						
7/5/10	10:27	Review drawings # SK-122178-21-06. Perform Battery check on 9 and 27 volt with a new calibrated meter (Fluke Type 115 RMS MultiMate Serial #12990354 Item #2538790 (1) GAH9. The SEM A 9 volt reading 8.78 volts SEM B 9 volts reading .142 volts reading on the 27 volt 7.61. Dustin Atwood the Transocean person checking the Battery, ET Supervisor.	3						
7/5/10	14:20	Began test on SEM B with the Electronics Module test as per Cameron Procedure. Test unsuccessful Review the procedure, that addresses the issues with the Deadman.	3						
7/5/10	19:25	Rov 30 attempt to pressure up and there was a leak on the lower part of the Blue Pod unable to located due to the fluid cloud.	3						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/5/10		"The examination of the control pods by Transocean and Cameron when the pods were retrieved after the accident (yellow on May 5-7, 2010, and the blue pod on July 3-5, 2010) revealed potential problems with AMF batteries in both pods."	19						
7/5/10		Item #1 1- 3/8" Pilot line	3						
7/5/10		Item #2 1- 3/8" Pilot line	3						
7/5/10		Item #3 1- 1/2' Pod Select line.	3						
7/5/10		Item #4 1-62 flange for the supply line.	3						
7/5/10		Item #5 1- Mux cable with Rough Neck connector.	3						
7/5/10		Item #6 1- PBOF cable from the STM/SEM	3						
7/5/10		Item #7 1-STEM strap	3						
7/5/10		Item #8 1- PBOF cable for SEM to STM	3						
7/5/10		Item #9 1- Bandit Clip for securing the Rough Neck Connector.	3						
7/5/10		Item #10 1- O-Ring from the PBOF cable.	3						
7/5/10		Item #11 1- O-Ring from the PBOF cable.	3						
7/5/10		Item #12 1-RCB cable	3						
7/5/10		Item #13 1- PBOF cable from the STM/SEM	3						
7/5/10		Item #14 1- O-Ring from the PBOF cable.	3						

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	**Time**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**	**Event**	**Ref.**
7/5/10		Item #15 1- SAE Flange X NPT Hydraulic supply line, Note found shaving in flow meter, cause from cutting the 1 1/2" supply line on the Olympic Challenger.(Took Item #15 out the lock box to use to hook up the 1" supply line, once the correct fitting get out here will but back in the lock box.	3						
7/5/10		Item #16 1- Sample of the Shavings	3						
7/5/10		Item #17 1- PBOF cable from the STM/SEM	3						
7/5/10		Item #18 1 Bandit Strap	3						
7/5/10		Item #19 1- O-Ring from the PBOF cable.	3						
7/5/10		Item #20 1- O-Ring from the STBM	3						
7/5/10		Item #22 1-O-Ring from SEM	3						
7/5/10		Item #21 1-O-Ring from STM	3						
7/5/10	06:00			Attended departmental meeting with BP, TO and reviewed the planned operation for the day.	17				
7/5/10	08:00			Standing by waiting on the blue pod team gather and continue with the blue pod testing	17				
7/5/10	09:20			Rig up PETU, power up blue pod on SEM B got verification blue pod communications	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/5/10	09:54			Performing check on blue pod on A and B SEM for the subsea electronics module test	17				
7/5/10	10:04			Performing check on blue pod on A and B SEM for the Subsea electronics module test, as per Cameron procedure, perform Deadman test and failed watt the time at 3.5 minutes did not fire deadman, once we put the power back on the PETU the deadman fired, on SEM A.	17				
7/5/10	10:27			Review drawings # SK-122178-21-06. Perform battery check on 9 and 27 volt with a new calibrated meter (Fluke type 115 RMS Multimate Serial #12990354 Item #2538790 (1) GAH9. The SEM A 9 volt reading 8.78 volts SEM B 9 volts reading. 0.142 volts reading on 27 volt 7.61. Dustin Atwood the TO person checking the battery, ET supervisor.	17				
7/5/10	11:27			blue pod team break for lunch	17				

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/5/10	12:00			Testing blue pod through the night. All functions tested correctly and the POD was in very good shape. There are some minor leaks on the BOP Manifold regulator and the POD select solenoid. All in all operationally the POD was in good working order. In testing the deadman we fired the A system first. After 3 1/2 min of waiting for the card to fire we turned the PETU on immediately at that time the function fired. This was concerning as it should take approximately 15 sec for the SEM to reboot and 47 sec for the solenoid 103 to fire. We checked the battery voltage and found the following: deadman 27 VDC - 7.61, SEM A 9VDC - 8.77, SEM B 0.142VDC. We are now discussing how to proceed.	17				
7/5/10	12:37			held discussion about the blue pod, calling town and what is the next step move forward with the blue pod	17				

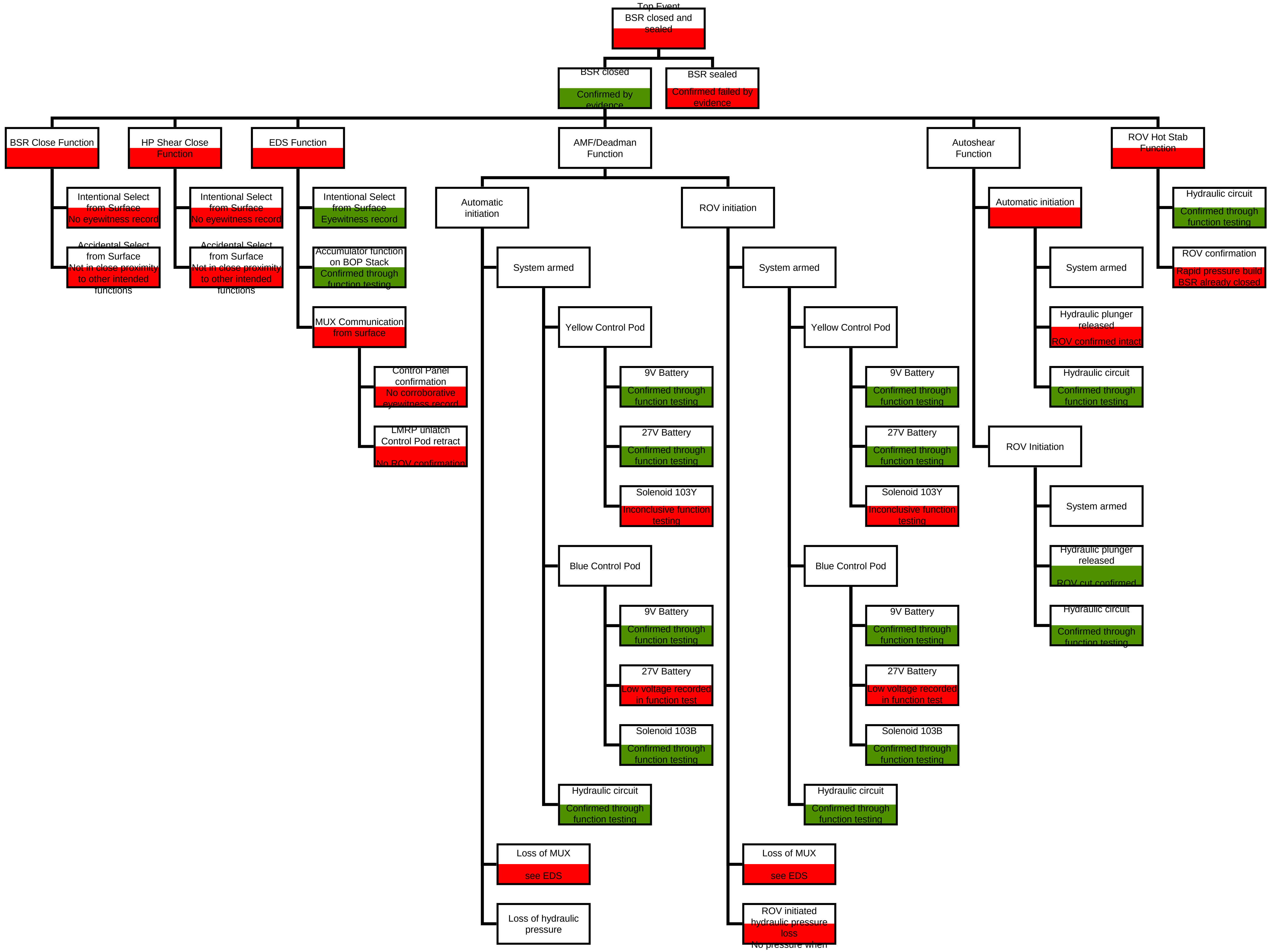
		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/5/10	13:15			Held conference call with town about continue completing the subsea electronic module testing	17				
7/5/10	13:49			Blue pod team returned to the blue pod work area, and prepared to continue with Electronics Module test on SEM B.	17				
7/5/10	14:20			Began test on SEM B with the Electronics Module test as per Cameron Procedure. Test unsuccessful. Review the procedure that addresses the issues with the deadman	17				
7/5/10	15:45			Review the paper work and sign off on the blue pod test procedure, and the electronics module test, up date the reports and give copy to the MMS and USCG.	17				
7/5/10	-			Enterprise subsea check the pre-charge, and the electronics tech tested the PBOF cables, on the blue pod as per procedure. Test the PBOF cable with Helium with 15 psi all tested good.	17				
7/6/10				Prepped the blue pod to run, making checks on MUX cable and working on Wet Mate Connection.	17				

MANAGING RISK DNV

		Perspective = BP		Perspective = Cameron		Perspective = Regulatory Source		Perspective = Transocean	
Date	Time	Event	Ref.	Event	Ref.	Event	Ref.	Event	Ref.
7/16/10		flow from reservoir stopped [87 days]	19						
7/16/10		flow from reservoir stopped [87 days]	19						
7/25/10	02:20	1/4 pod valve of stack stinger extend	4						
7/25/10	08:45	replace 1/4 pod valve of stack stinger extend	4						
7/25/10	10:05	replace 1 1/2 pod valve to lower annular close	4						
7/25/10	10:45	replaced 2 cylinders for stack stinger	4						
7/25/10	20:23	Replace lower annular close valve [yellow pod - SEM A] due to slide not going into vent position	4						
7/25/10		Yellow POD/BOP stack on MC252 well. Brought to surface with ROV and placed on deck of Q4000 to undergo repairs	4						
5/1/11						the out-of-service period was scheduled for around May, 2011 (sometime in late first quarter, early second quarter)	10		
5/1/11						schedule dry dock during which it was planned to have Cameron change out the BOP bonnets	10		

APPENDIX G

FAULT TREE



Top Event
BSR closed and sealed
BSR closed
Confirmed by evidence
BSR sealed
Confirmed failed by evidence
BSR Close Function
HP Shear Close Function
EDS Function
AMF/Deadman Function
Autoshear Function
ROV Hot Stab Function
Intentional Select from Surface
No eyewitness record
Accidental Select from Surface
Not in close proximity to other intended functions
Intentional Select from Surface
No eyewitness record
Accidental Select from Surface
Not in close proximity to other intended functions
Intentional Select from Surface
Eyewitness record
Accumulator function on BOP Stack
Confirmed through function testing
MUX Communication from surface
Control Panel confirmation
No corroborative eyewitness record
LMRP unlatch Control Pod retract
No ROV confirmation
Automatic initiation
ROV initiation
System armed
Yellow Control Pod
9V Battery
Confirmed through function testing
27V Battery
Confirmed through function testing
Solenoid 103Y
Inconclusive function testing
Blue Control Pod
9V Battery
Confirmed through function testing
27V Battery
Low voltage recorded in function test
Solenoid 103B
Confirmed through function testing
Hydraulic circuit
Confirmed through function testing
Loss of MUX
see EDS
Loss of hydraulic pressure
System armed
Yellow Control Pod
9V Battery
Confirmed through function testing
27V Battery
Confirmed through function testing
Solenoid 103Y
Inconclusive function testing
Blue Control Pod
9V Battery
Confirmed through function testing
27V Battery
Low voltage recorded in function test
Solenoid 103B
Confirmed through function testing
Hydraulic circuit
Confirmed through function testing
Loss of MUX
see EDS
ROV initiated hydraulic pressure loss
No pressure when cut
Automatic initiation
System armed
Hydraulic plunger released
ROV confirmed intact
Hydraulic circuit
Confirmed through function testing
ROV Initiation
System armed
Hydraulic plunger released
ROV cut confirmed
Hydraulic circuit
Confirmed through function testing
Hydraulic circuit
Confirmed through function testing
ROV confirmation
Rapid pressure build BSR already closed

Det Norske Veritas

Det Norske Veritas (DNV) is a leading, independent provider of services for managing risk with a global presence and a network of 300 offices in 100 different countries. DNV's objective is to safeguard life, property and the environment.

DNV assists its customers in managing risk by providing three categories of service: classification, certification, and consultancy. Since establishment as an independent foundation in 1864, DNV has become an internationally recognized provider of technical and managerial consultancy services and one of the world's leading classification societies. This means continuously developing new approaches to health, safety, quality and environmental management, so businesses can run smoothly in a world full of surprises.

Global Impact for a Safe and Sustainable Future