Deepwater Horizon / Macondo Blowout Source Control and Regulatory Response

International Regulators Forum

Vancouver Conference

October 18, 2010

APRIL 20, 2010

21:40

DW Horizon

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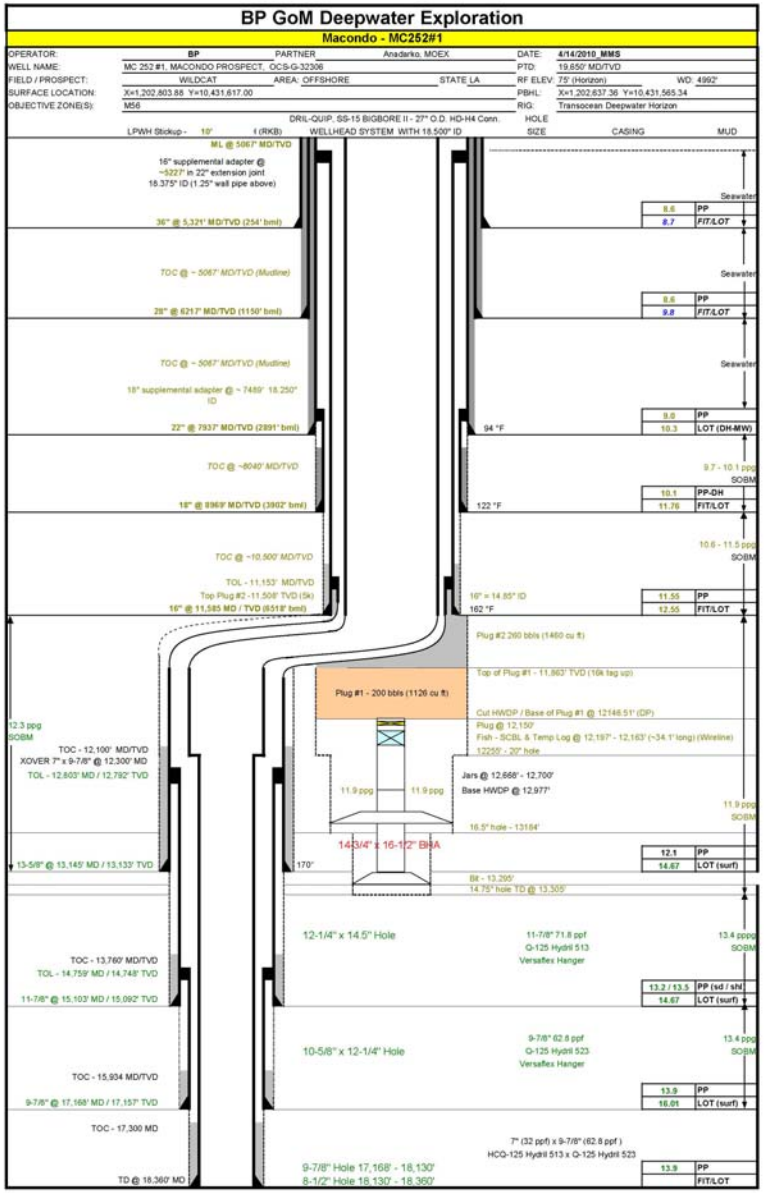
Presentation Outline

- Pre Accident Approvals
- Accident Insight
- Post Incident Regulatory Response
  - Safety Alert
  - 30 Day Report
  - Notice to Lessees
  - Notice to Lessees
  - Rulemaking?
- Path Forward

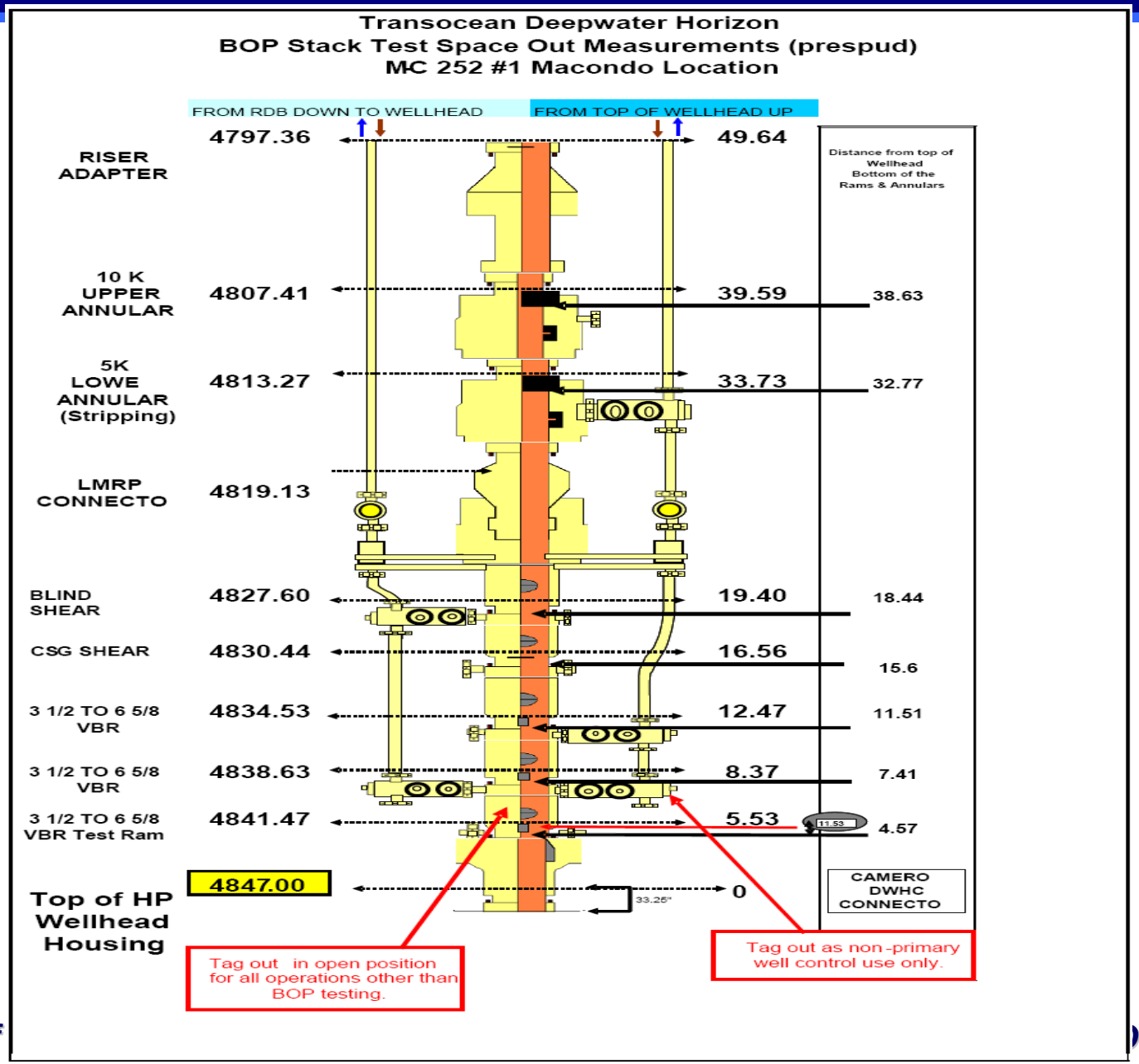
Deepwater Horizon Oversight

- Regional Oil Spill Contingency Plan approved for 250,000 BOPD. Macondo well worst case discharge calculated as 162,0000 BOPD
- Permits were reviewed and approved for drill, plug back, bypass, and temporarily abandon in accordance with 30CFR250- Oil and Gas and Sulphur Operations in the Outer Continental Shelf
- Inspectors conducted site visits
  - February 17, 2010
  - March 3, 2010
  - April 1, 2010
  - No violations were discovered

Macondo Wellbore Schematic



Horizon BOP Stack



Pre-Accident Operations

- Full production casing string (tapered 7x9-7/8) run and cemented and positively pressure tested.
- Being temporarily abandoned for a future completion.
- Well was in the process of conducting a negative pressure test in preparation of setting a “surface” cement plug.
- Well began to flow up riser.

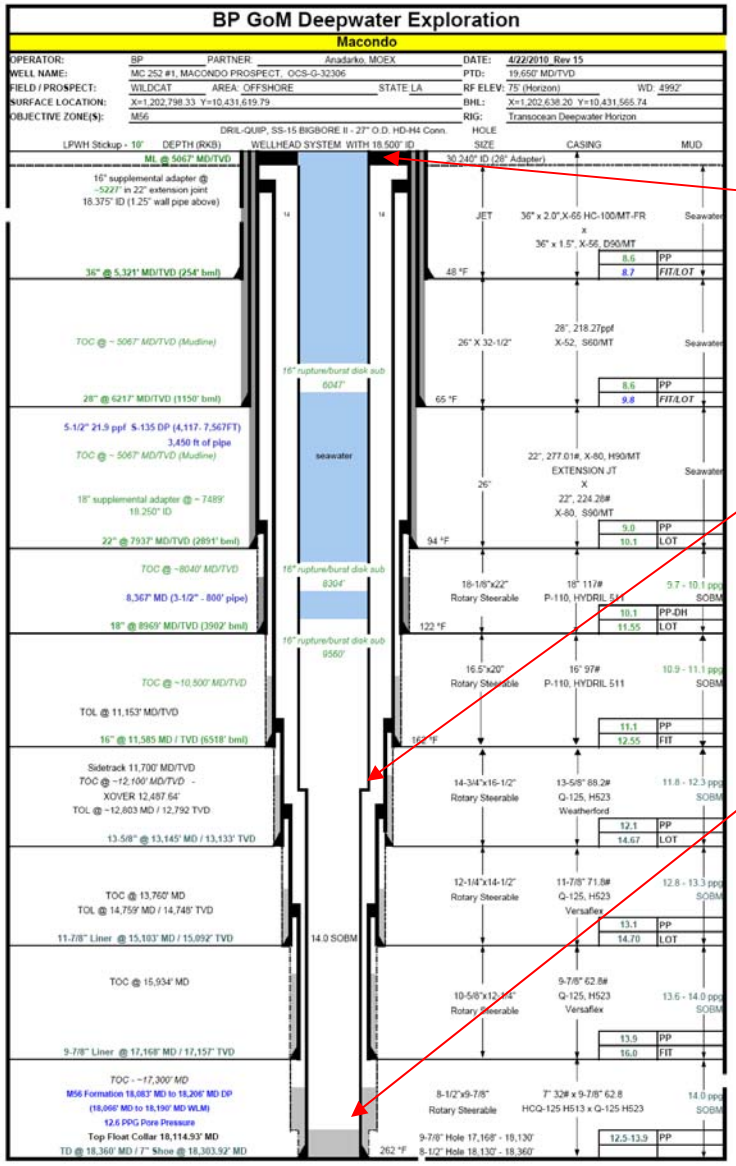
Accident Investigation

- Joint Investigation Panel of Bureau of Ocean Energy Management, Regulation and Enforcement established.
- Multiple hearings have been held to date, with at least one more hearing left.
- Target date for completion by the team is January 27, 2011
- Testimony is posted at: www.deepwaterinvestigation.com

Marine Board of Investigation

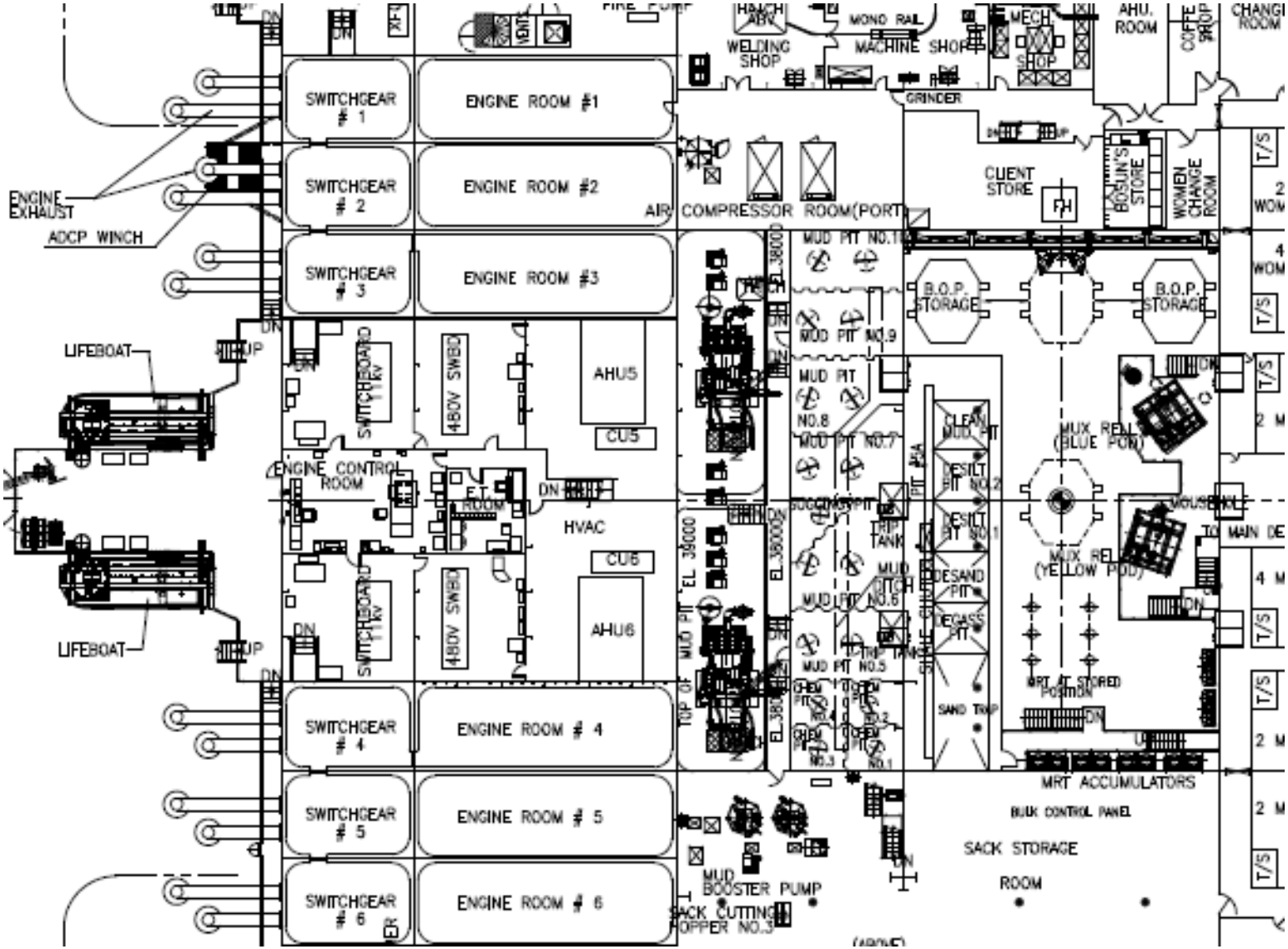
- <u>Investigative Areas</u>
  - Flow Path
  - Ignition Source
  - BOP Failure

Flow Paths

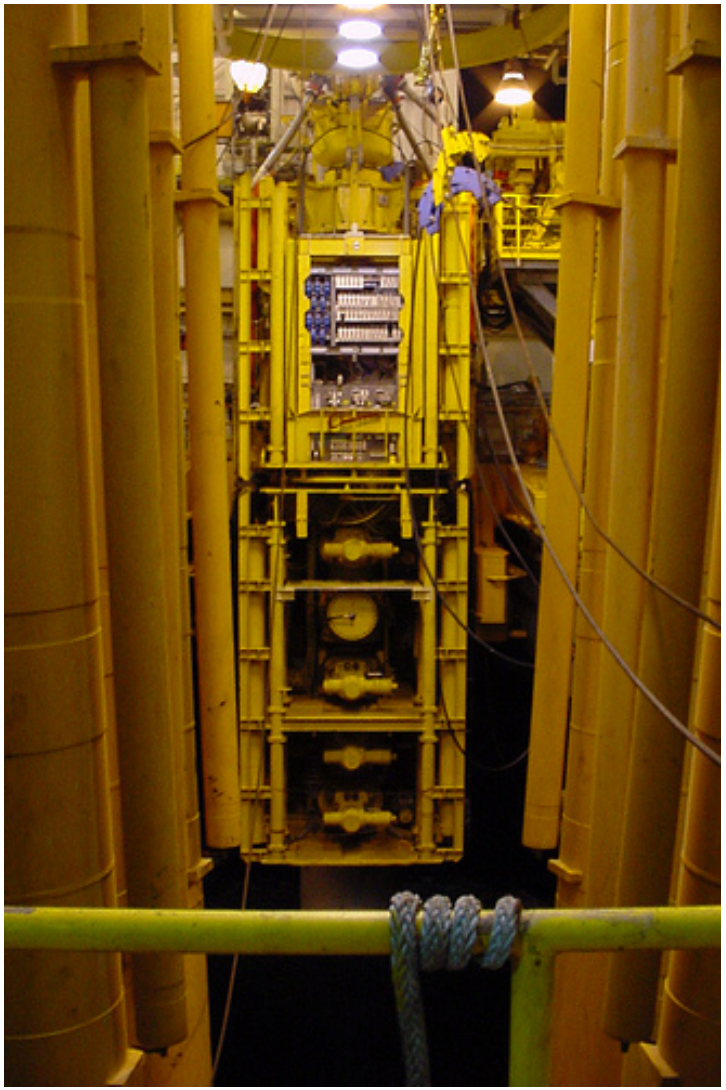


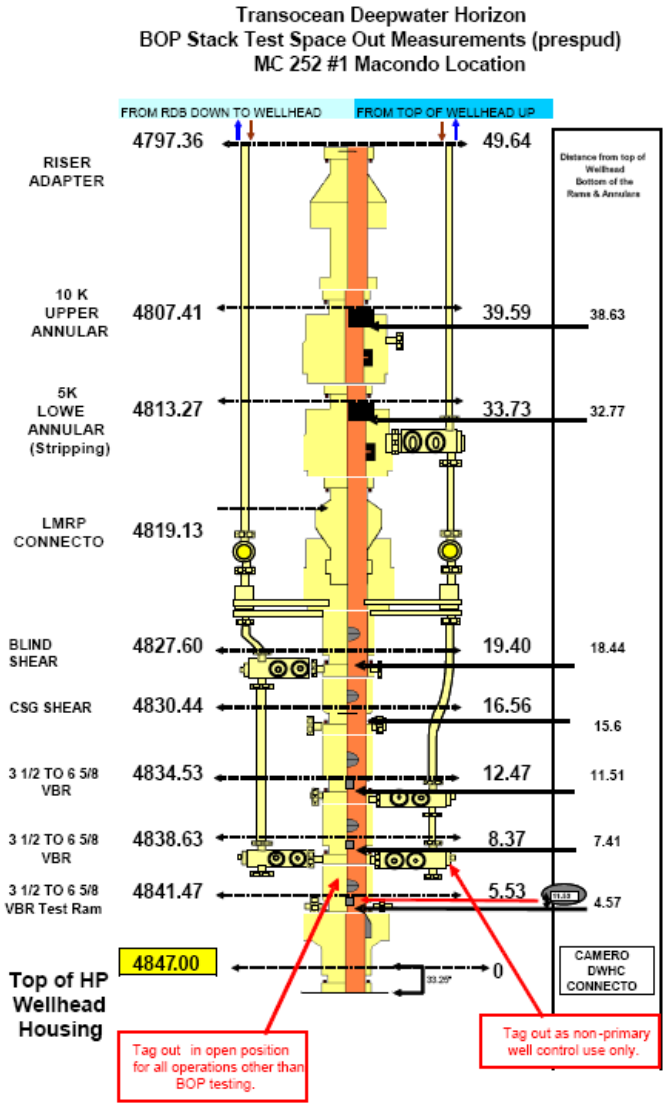
- Production seal assembly
- Production casing leak or collapse at crossover joint
- Casing cement shoe “check” valves at total depth

Ignition Sources

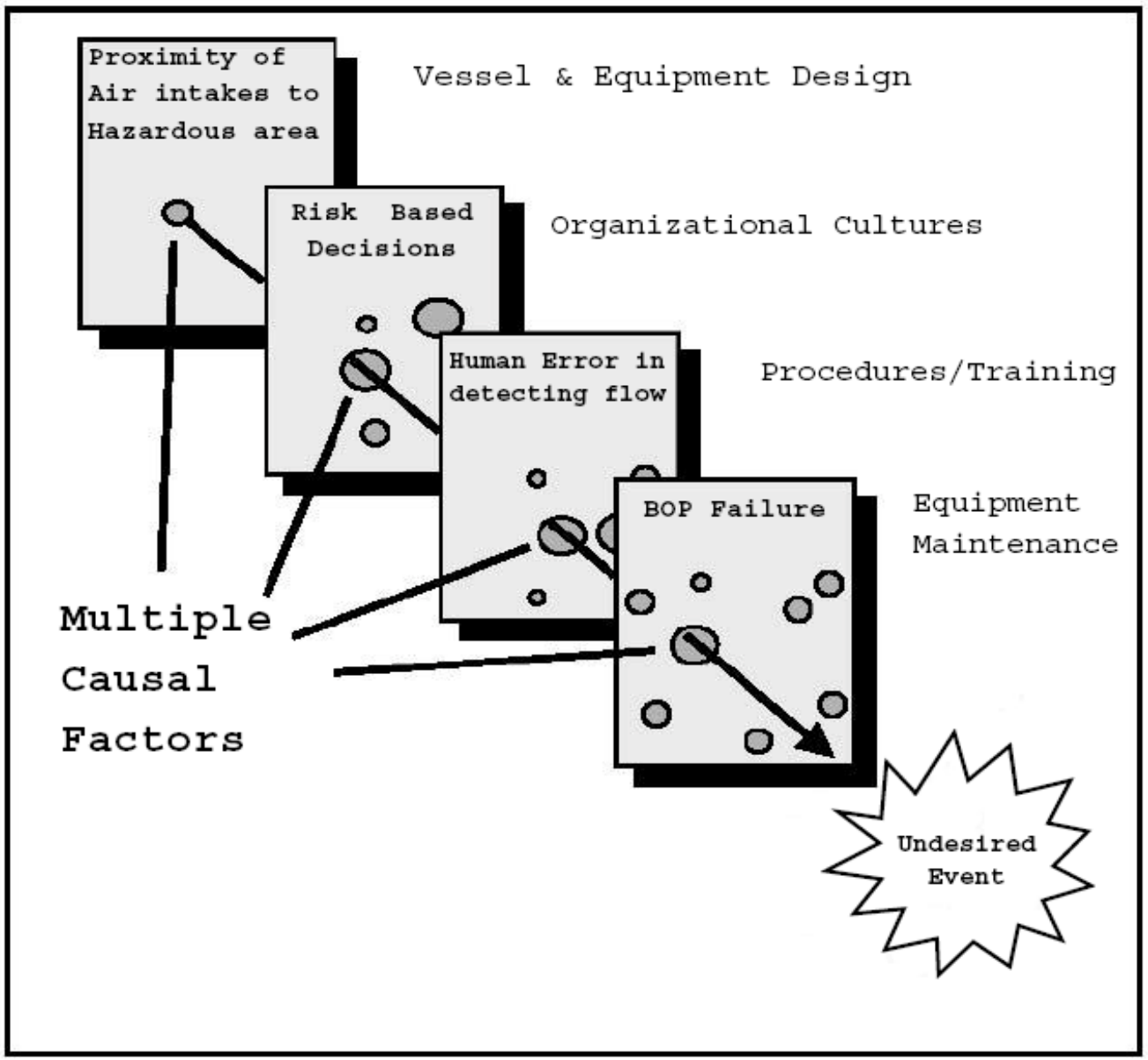


Horizon BOP Stack



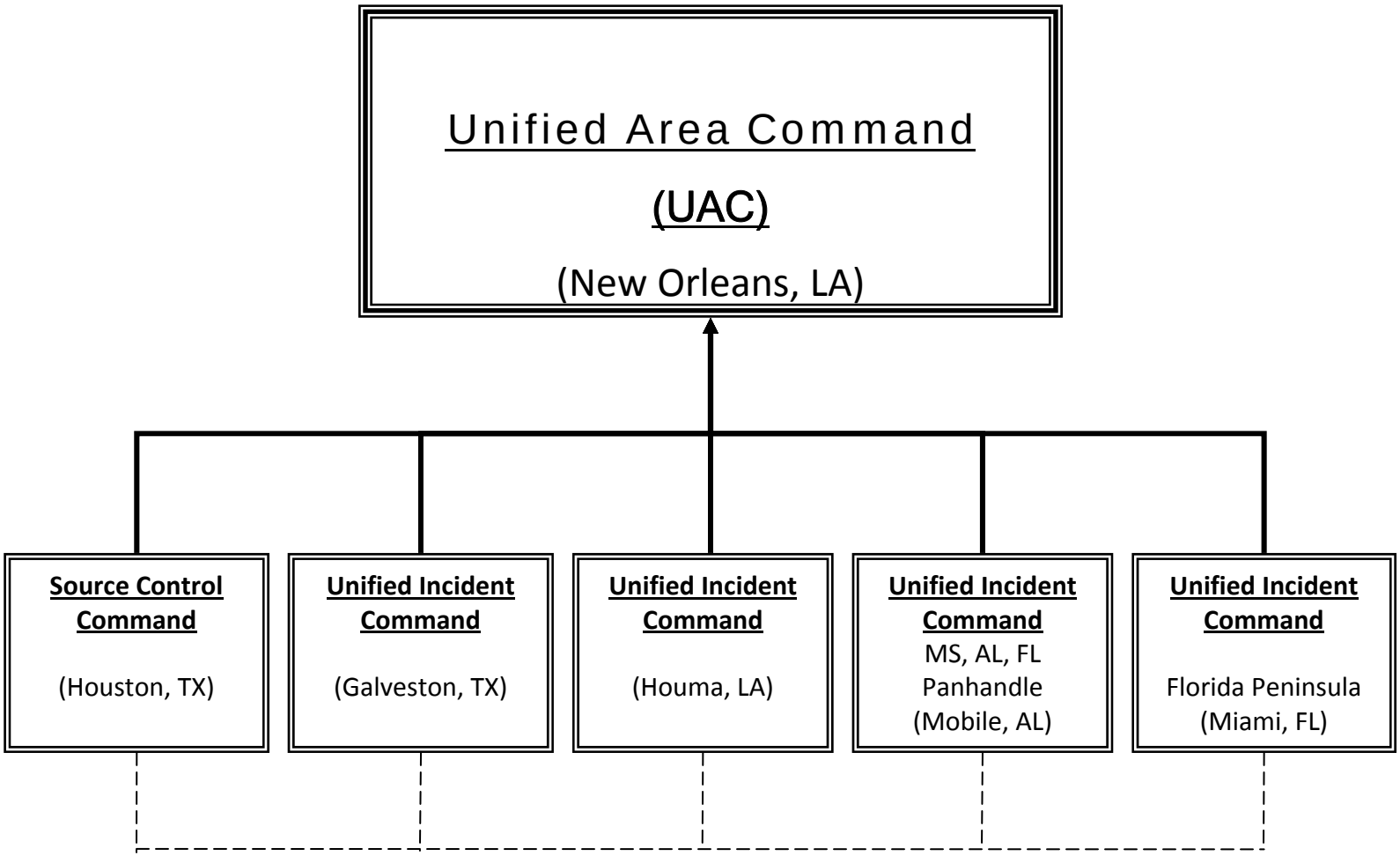


Multiple Causes



Source Control

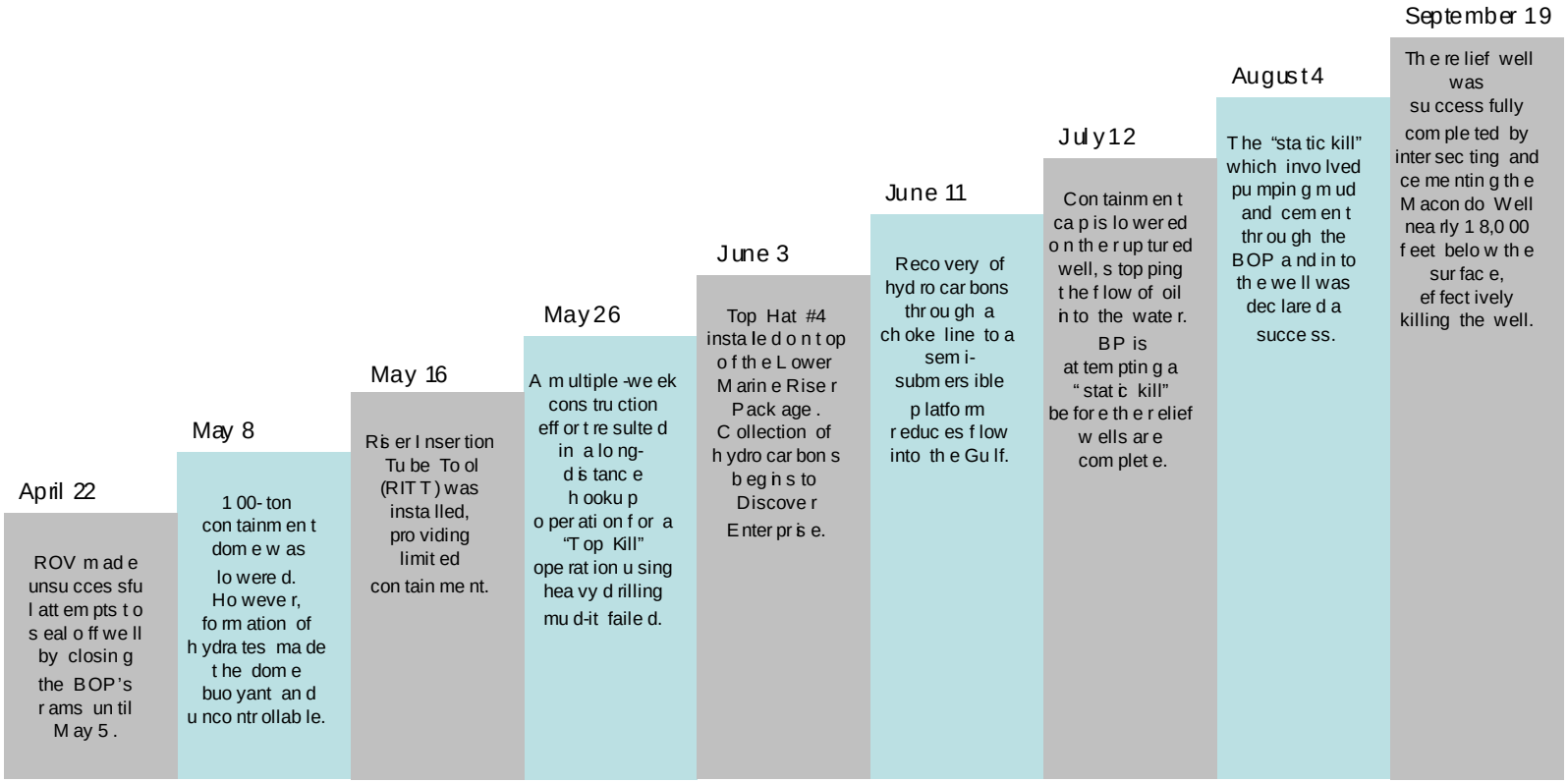
Unified Area Command Structure



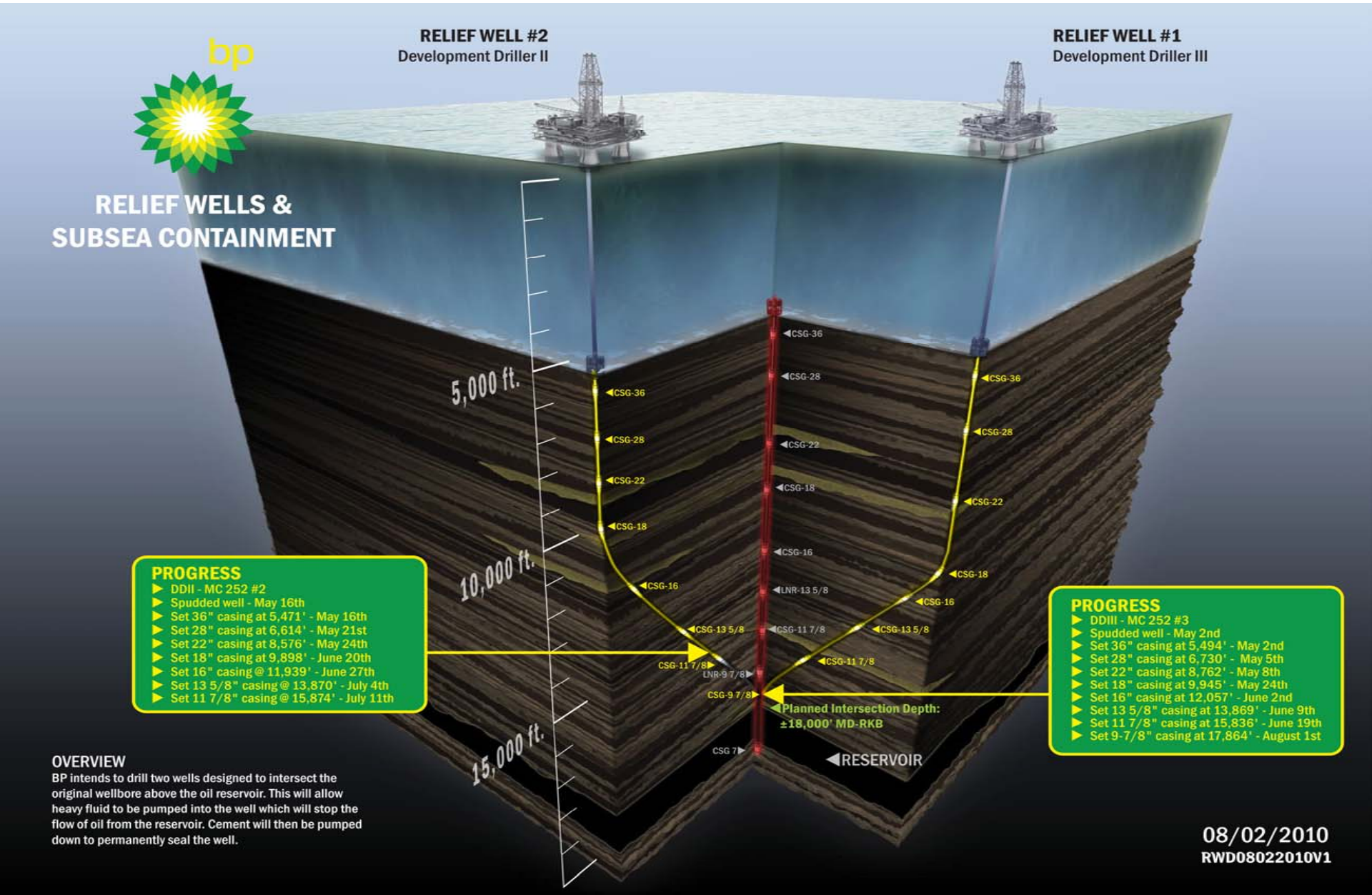
DEEPWATER HORIZON

Source Control / Containment

Improvised Attempts to Contain the Macondo Well

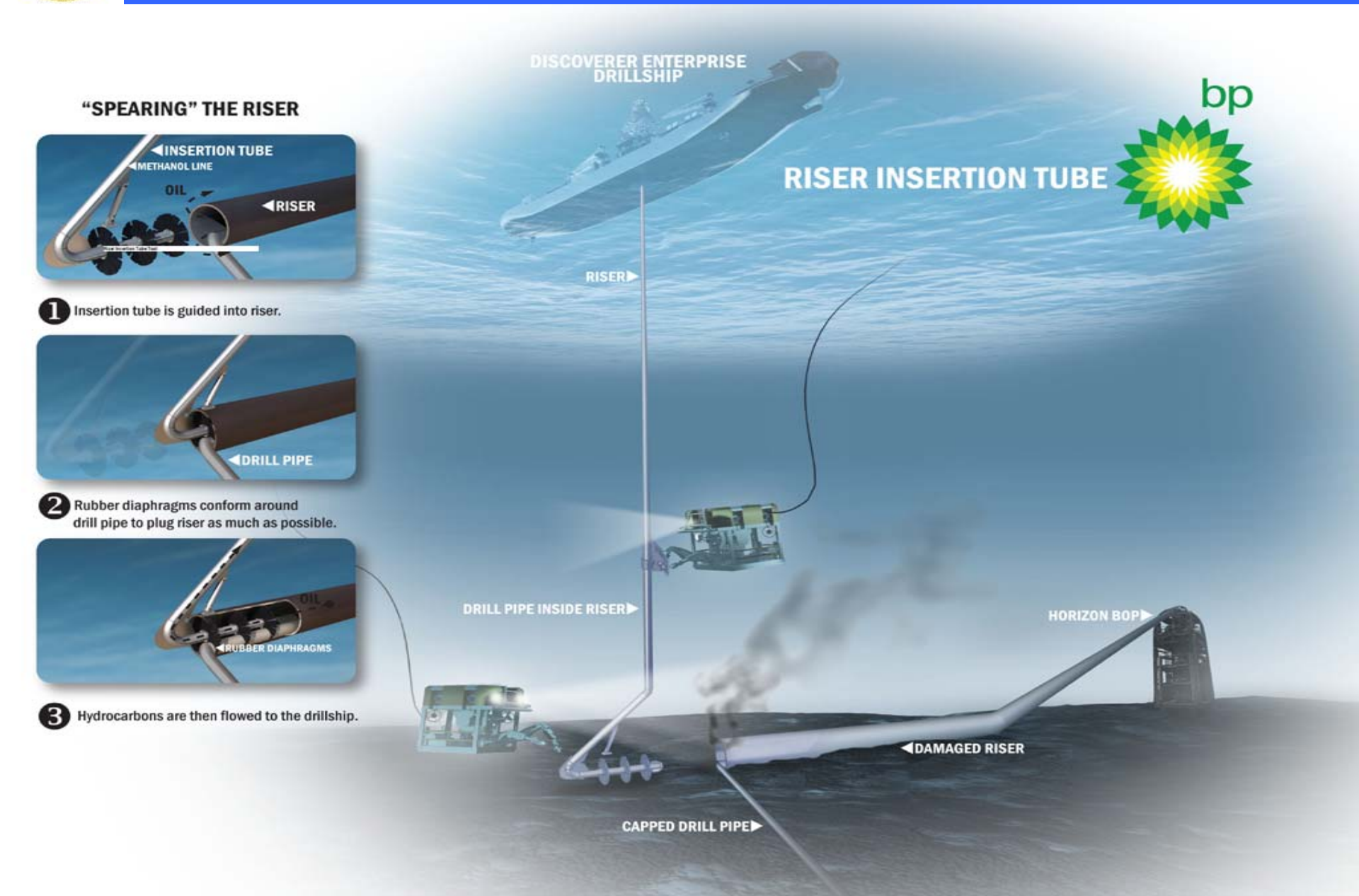


Drilling of Relief Wells Initiated May 2nd and May 16th

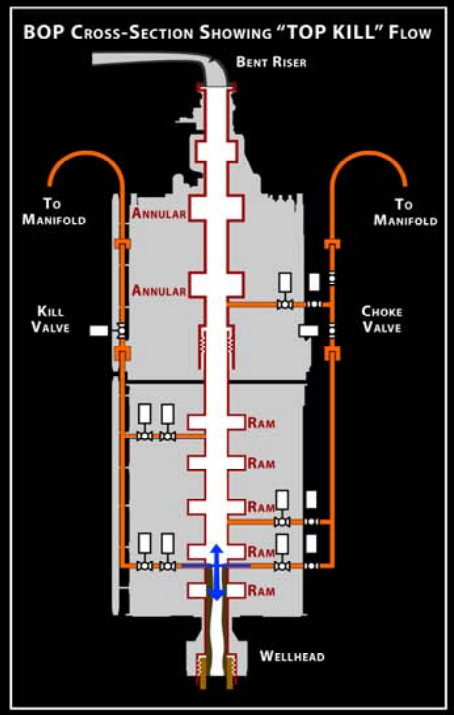


Containment – Coffer Dam- May 8

Riser Insertion Tube- May 16

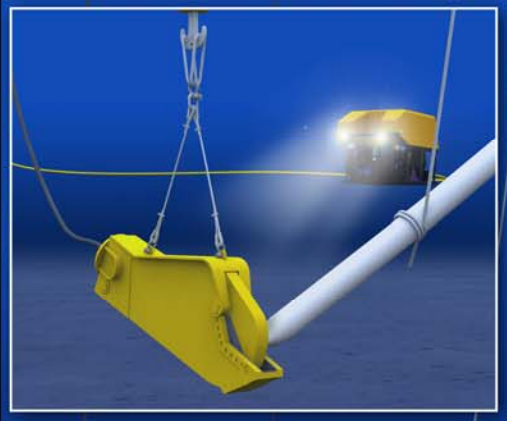


Top Kill Procedure- May 26

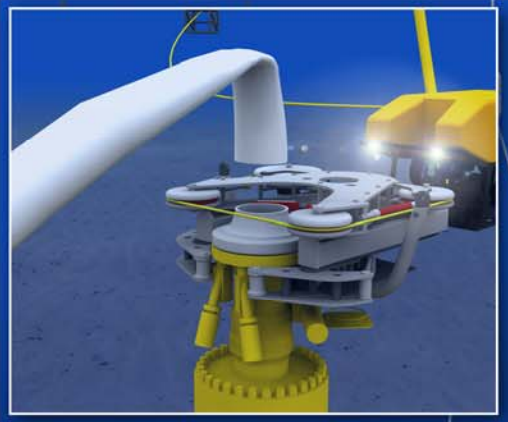


Top Kill

Riser Removal - June 3



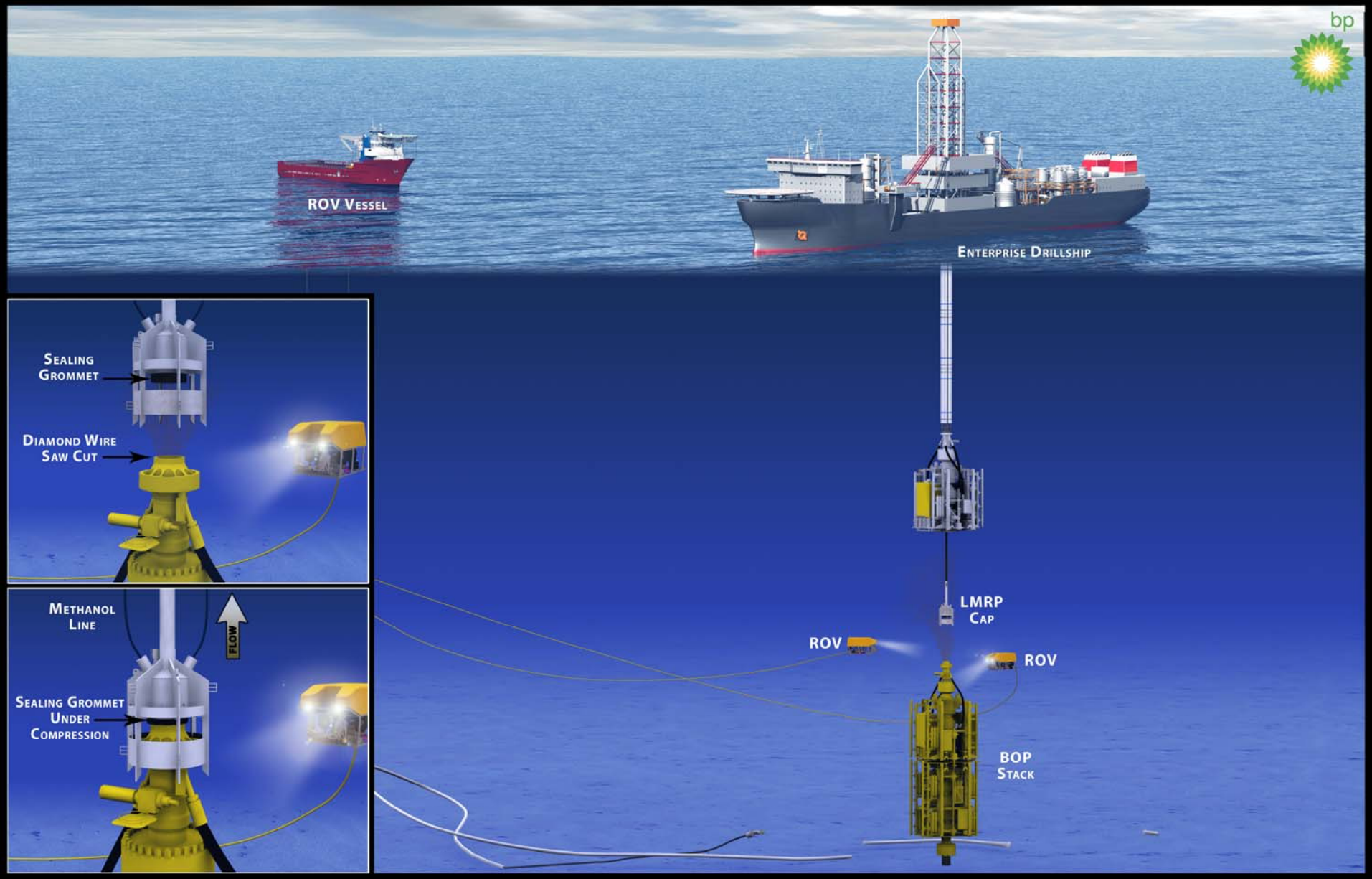
1st Cut Near Seabed Using Shears



2nd Cut Near LMRP Using Diamond Wire Cutter

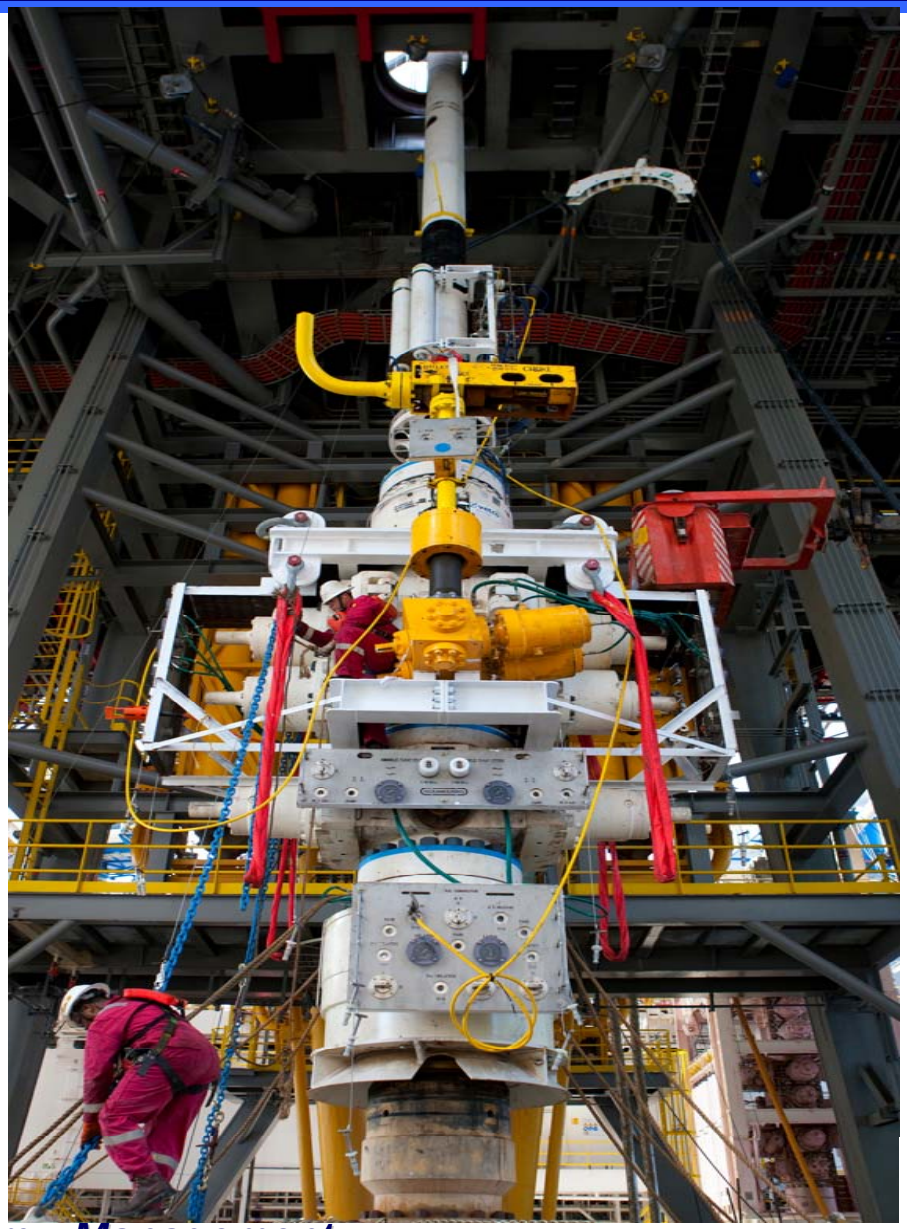
Riser Removal From LMRP

LMRP Cap- June 3

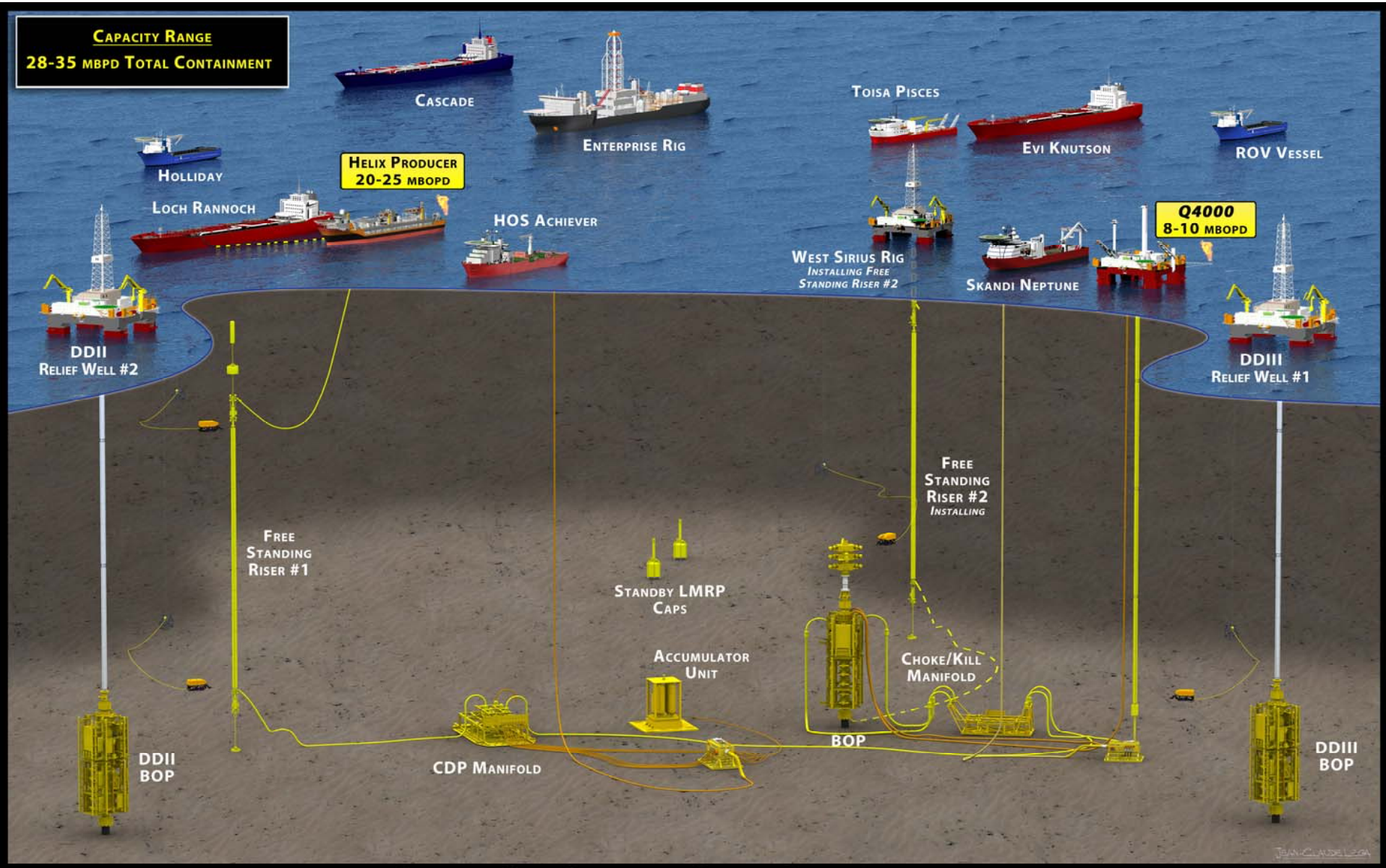


Containment Contingency Option - LMRP Cap

Capping Stack – July 12



Containment Vessels



Q4000 - Helix Producer - Capping Stack Containment

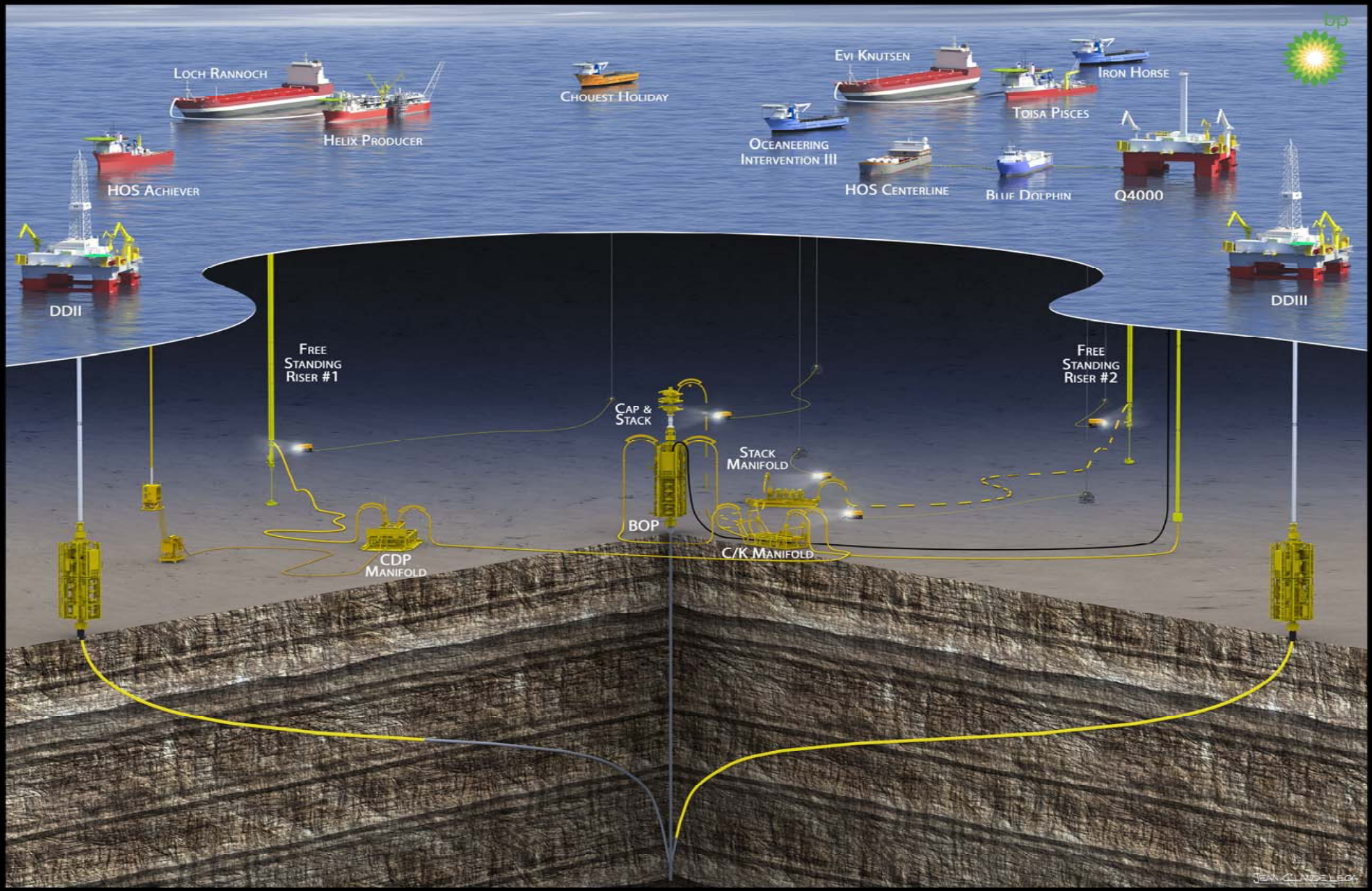
Rev - C 07/11/2010

DW Enterprise

Helix Q 4000

Helix Producer 1

Hydrostatic Kill – August 4



Hydro Static Kill Operation

Spill Response

Skimmers

1.2 million BOPD skimming capacity
Over 700 skimming vessels deployed

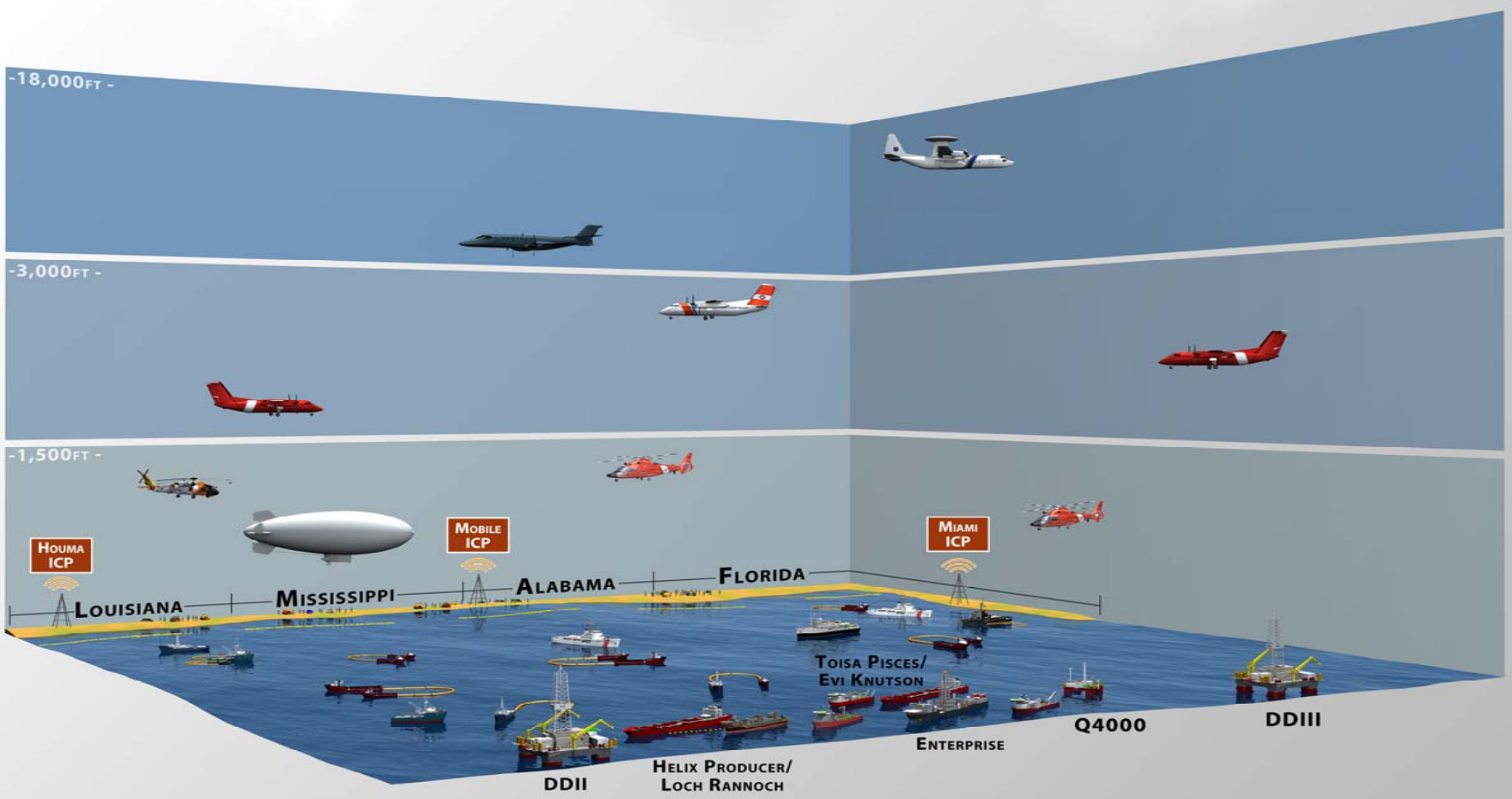
Fire Boom

Controlled Burns

411 Controlled Burns

Aerial Dispersants

Aviation Spill Support



DEEPWATER HORIZON RESPONSE: AVIATION COORDINATION COMMAND

Containment Boom

14 Million feet mobilized
4.2 Million feet of containment boom deployed
9.1 million feet of sorbent boom deployed

Regulatory Response

Safety Alert- April 30, 2010

- Requires well control equipment examined to ensure that it is properly maintained. Function test ROV stabs on BOP stack.
- Review drilling/casing/ completion programs to ensure that BOP equipment is not compromised at any time.
- Review emergency shutdown and dynamic positioning systems and interfaces with emergency well control operations.
- Inspect lifesaving and firefighting equipment
- Ensure all crew members are familiar with emergency / firefighting equipment
- Exercise emergency power equipment to ensure proper operation
- Ensure all personnel involved in well operations are properly trained for performing their tasks under normal drilling and emergency well control operations

Safety Measures Report – May 27, 2010

- Recommendations on BOPs and related safety equipment
  - Certification that the BOP meets the manufacturer's design specification
  - Requirement for two blind shear rams with 4 foot space out
  - Overhaul testing, inspection and reporting requirements for BOP systems to ensure proper functioning

Safety Measures Report – May 27, 2010

- Recommendations on well control systems
  - Development of enhanced deepwater well control procedures
  - Verification that safeguards are in place prior to displacement of kill weight fluid
  - New design, installation, testing, operations, and training related to casing and cementing
  - Study of methods for more rapid and effective response to deepwater blowouts

Safety Measures Report – May 27, 2010

- Recommendations on systems based safety
  - Certification of compliance with existing regulations
  - Enhance requirements for improving organizational and safety management for companies operating drilling rigs
  - Require offshore operators have in place a comprehensive systems based approach to safety and environmental management

Notice To Lessees 2010-N05 June 8, 2010

- Increased Safety Measures for Energy Development on the OCS (Lessee Certifications)
  - Certify:
    - That well control equipment has been examined to ensure that it is properly maintained. ROV stabs on BOP stack have been function tested
    - That drilling/casing/ completion programs have been reviewed to ensure that BOP equipment is not compromised at any time.
    - That emergency shutdown and dynamic positioning systems interface with emergency well control operations.
    - That all personnel involved in well operations are properly trained for performing their tasks under normal drilling and emergency well control operations
    - General compliance with all regulations

Notice To Lessees 2010-N05 June 8, 2010

- Increased Safety Measures for Energy Development on the OCS (BOP Systems)
  - Submit:
    - BOP and well control configuration
    - BOP and well control system test results
    - BOP and loss of well control events
    - BOP and well control system downtime
  - Certify:
    - BOP will operate as originally designed
    - Any modifications to the BOP system have not compromised the BOP operation
  - Maintain:
    - Records of maintenance and inspections of BOP system
  - Independent 3rd Party must verify:
    - Shear rams are designed for the project
    - BOP stack has not been damaged from previous service
    - BOP will operate in conditions to be used

Notice To Lessees 2010-N05
June 8, 2010

- Increased Safety Measures for Energy Development on the OCS(Control Systems)
  - Dynamically Positioned rigs must have BOP control systems that include:
    - Deadman system
    - Auto shear system
    - Acoustic system may be included in addition
  - ROV hot stab systems must:
    - Be tested on the stump with similar rate pump as the ROV pump
    - Be capable of closing the blind shear ram, a pipe ram, and unlatch from the LMRP
  - After a well control event, BOP system must be:
    - Inspected and tested

Notice To Lessees 2010-N05 June 8, 2010

- Increased Safety Measures for Energy Development on the OCS (Well Design)
  - Certified Professional Engineer must verify:
    - Casing design is appropriate for the expected well conditions
  - While installing the casing, the operator must:
    - Ensure casing hanger latching mechanism or locking mechanism are engaged when set in the subsea wellhead
    - Ensure installation of dual mechanical barriers after cementing(dual floats or one float and a mechanical plug)

Notice to Lessees 2010-N06 June 18, 2010

- Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents
  - Operator must submit:
    - **A scenario that addresses the highest volume of oil discharge including:**
      - **Flow rate, total volume and duration**
      - **Potential for the well to bridge over**
      - **Potential for surface intervention**
      - **Availability of rig for relief well**
    - **A description assumptions and calculations used to determine the daily worst case discharge including:**
      - **Well design**
      - **Reservoir characteristics**
      - **Fluid characteristics**
      - **Pressure, volume, temperature characteristics**
      - **Analog reservoirs**

Interim Final Rule- Safety Measures

- Codifies into regulations many of the requirements outlined in the Safety Measures Notice to Lessees- N05.
- Codifies some additional requirements of the original safety measures report to the President

Rulemaking ????

- Looking into various rules to incorporate into the Code of Federal Regulations
  - 2nd Blind Shear Ram?
  - Casing Shear Ram?
  - Safety Environment Management(Issued)
  - Containment requirements?

Path Forward

- Reorganization of the former MMS
- Addition of numerous new resources
  - Engineers, Inspectors, and Scientists
- Inspectors witnessing subsea BOP stack testing (stump testing and initial on bottom test)
- Inspectors witnessing other critical activities?
- Inspections versus audits?

Questions