Deepwater Drilling Safety, Containment and Spill Response Discussion

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Marine Well Containment System

- Spill Containment Independent of the Wellbore Pressure Containment System
  - Industry initiative recently announced
  - Chevron, ConocoPhillips, ExxonMobil, & Shell
  - Discussed at Aug 4 BOEM Forum (New Orleans)
  - Pre-engineered, pre-staged, and demonstrated capability to quickly implement methods used successfully on the Macondo well.
  - Even if completely effective, a MWCS cannot protect personnel during initial blowout event (11 lost in Macondo Blowout).
- Needed level of redundancy to reassure public that an additional layer of environmental protection is in place.
- Every industry professional should (will) endeavor to ensure that it is never needed.

Drilling Safety – Blowout Prevention

- Two broad categories for safety concerns from a Well Drilling Perspective.
  - Operational Safety (protecting personnel from equipment and accidents)
  - Well Control (Blowout Prevention)
- General requirements are common to both categories.
  - Training/ demonstration of competence.
  - Planning/ ensuring required equipment and procedures are in place and available.
  - Vigilance/ monitoring operations; identifying and reacting to unexpected and/or un-foreseen problems.

Safety through Prevention

- Historically emphasis has been placed on prevention of blowouts.
  - Most effective means to protect personnel from fire/explosion hazard posed by blowouts.
  - Most effective means to protect the environment from oil spill events.
- Utilize redundant wellbore pressure containment systems and well control monitoring systems.
- Spill containment methods other that booms/skimming not extensively investigated, developed or tested.
- Design philosophy much like air-craft design . . . resources and effort focus on crash prevention, not crash worthiness.

How could the Macondo Tragedy have been Prevented?

- Root cause or causes behind the Macondo blowout have yet to be determined.
- Multiple barriers to contain the oil and gas were not effective or were not employed?
  - Primary: Cement/ Casing/ Casing Sealing System
  - Secondary: Annular BOP's, T.D. Check-valves, Pipe Ram BOP
  - Final: Blind-sear BOP, Emergency Disconnect
- Was the Primary barrier properly tested and verified with the "Negative Test?"
- Why did secondary and final barriers/ contingencies prove ineffective?

Could Vigilance have Prevented the Macondo Incident?

- Expert testimony to the Deepwater Horizon Joint Investigation Team (7/23/10) indicates that none of the tests performed to verify the integrity of the primary barriers were conclusive.
- The same expert testimony suggest that well monitoring equipment showed symptoms of impending blowout as much as 1-hr before a shut-in was attempted.

Disconnect between Training & Practice?

- If attempts to shut-in the well had been started an hour earlier would they have been successful?
- Victim of Success?
  - Training and techniques improve and as a result the number of incidents decreased.
  - Low occurrence risks, no matter how severe the consequences are the most difficult to stay vigilant for.
- Would everyone involved in the operation have called for an early shut-in if this was stated as a situation in a training class? (in class, vigilance is high).
- Had the professionals involved seen these kind of anomalies in the past and were the causes benign?