


Overview - Well Capping Macondo No. 1

May 13, 2010



Integrity Management
Reducing Risk in GoM

11228
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Worldwide Court
Reporters, Inc.

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Overview



- Well Capping Team Challenges
 - 1. Start the team on day 5
 - 2. Worked capping stack 2 days
 - 3. Reverted to Enterprise BOP on BOP for next two weeks
 - 4. Worked Capping Stack as contingency
 - 5. Monday May 10 - BOP on BOP move to DDI
 - 6. Last 3 days working both options to closure

Work Completed

- 1. Detailed Procedures
- 2. HAZID to identify risk
- 3. Risk mitigation
 - 1. Numerous Engineering Studies

Work Remaining

- 1. DD11 Design Work
- 2. Final Procedures
- 3. Crew Engagement



Overview



- BOP on BOP was first option
- Capping stack contingency if LMRP will not release
- Video Animations of the two Procedures




Agenda




- Riser Removal - Michael Vandenbossche






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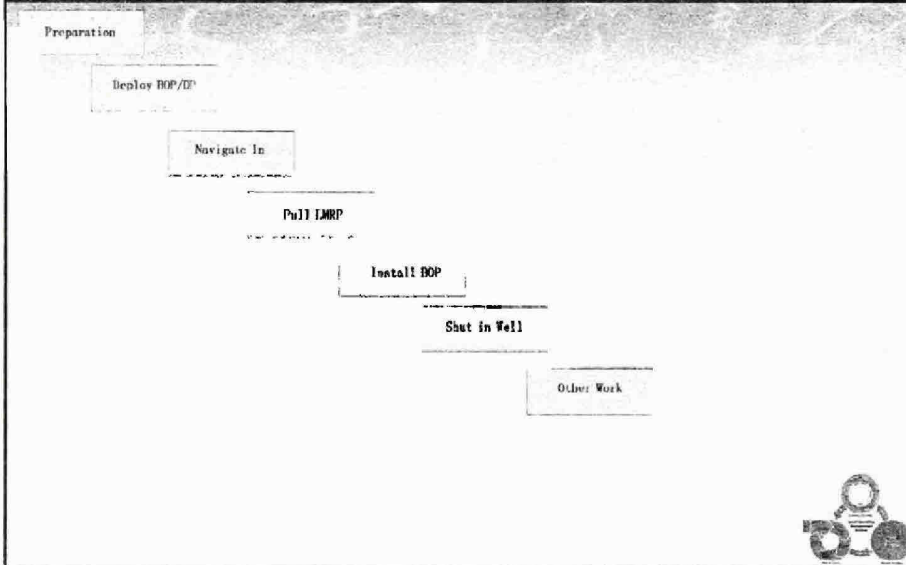
BOP on BOP

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Operation Sequence BOP on BOP



Preparation Steps - BOP on BOP



Test and Inspect Equipment

- Crew Engagement Sessions
- DP System Check and Box in on Compatts
- Ensure ROV vessel is ready with cutting saws
Prepare space out plan to land BOP
- Ensure Communications between ROV vessel and DDII
- SIMOPS Plan Review and Morning Meetings
- Prepare Post Shut-in Plan
- LMRP Slings Installed
- Riser Cut and removed from top of Horizon flex joint



Preparation Risks - BOP on BOP



RISK

- Health of Horizon BOP
- DP System
- Riser Analysis and BOP on BOP Analysis
- SIMOPS
- DDII BOP Certification
- LMRP Clash with BOP

MITIGATION

- Need full report on what has been done to date. Need to ensure the HC connector is locked and annulars are open. Lock Well head connector.
- Audit System
- Tighten watch circles
- Transit Lane Ingress and Egress
- Lessons Learned from DDIII
- Slope indicator on Drill Pipe



Deploy BOP Stack Steps - BOP on BOP



- Skid BOP with HC Connector over well center
- Install diverter joints and riser fill up valve
- Run remaining riser and space out
- Install tensioners
- Install Choke/Kill/Rigid Conduit/Boost Line
- Hook up to glycol/water and displace choke and kill lines
- Land with BLAT tool and hold BOP ready for transit



Deploy BOP Stack Risk - BOP on BOP



RISK

- Fill-up Valve on Riser
- Perforated Joint Design
- Blanking Sub
- Diverter Joints

- Hydrates build up at bottom of BOP and on HC connector and Diverter Joint

MITIGATION

- ROV Operated - Simple Design
- Vetted through BP, Stress and TOI
- 18" thick riser seal
- 2 times flow area - Low pressure drop - Back up
- Robust plan to include grease and glycol injection through HC connector and choke and kill lines



Deploy LMRP Pulling Assembly Steps - BOP on BOP



- Install rigging on 6-5/8" Drill Pipe in Auxillary Rotary
- 1. Double sling and hook on upside down 500T elevators
- 2. TIW valves to prevent flow up the drill pipe
- 3. Install hot line with pig tail for releasing LMRP
- Run 6-5/8" LMRP recovery string to depth



Navigate to Location Steps/Risks - BOP on BOP



Risks

- SIMOPS
- Plume impacting rig
- Gas Detection on Rig
- PPE for Gas/Fumes
- Grounding BOP

Mitigations

- DDII using plan now
- Contingency plan in place, plume monitoring
- Sensors installed
- Plan in place
- Rig transit plan



Pull LMRP Steps - BOP on BOP



- ROV attaches LMRP sling to 6-5/8" Drill Pipe in Aux. Rotary
- Rig takes straight pull of 50,000 lbs over LMRP Weight
- ROV releases mini-collet connectors
 - ROV installs hot line to unlatch primary and secondary posts
- Apply up to 1000 psi to release HC connector
- Pull up LMRP one stand and hold
 - Cut drill pipe in BOP if required



Pull LMRP Risk - BOP on BOP



RISK	MITIGATION
<ul style="list-style-type: none"> • Unlatch LMRP 	<ul style="list-style-type: none"> • FMEA - 21 potential reasons for not unlatching
<ol style="list-style-type: none"> 1. Seal Failures 2. Leaking Fittings 3. Shuttle Valve Shifting 	<p>Trouble shooting plan with alternatives</p>
<ul style="list-style-type: none"> • Unlatch problems due to getting power to the unlock side not due to connector health 	<ul style="list-style-type: none"> • Trouble shooting plan with alternatives
<ul style="list-style-type: none"> • Hot Line to LMRP Unlock 	<ul style="list-style-type: none"> • Hot line from rig primary. ROV can operate as back-up
<ul style="list-style-type: none"> • Lifting and Park LMRP - Clash due to off-center pull and plume dynamics 	<ul style="list-style-type: none"> • Slope indicator on drill pipe for straight pull.
<p>Cut Pipe in BOP with Diamond Wire Saw</p>	<ul style="list-style-type: none"> • Two saw contingency with one ROV cutting and one ROV pull pipe
<p>Stability - Two Sling arrangement</p>	<ul style="list-style-type: none"> • Contingency to land LMRP on Bottom



Install BOP Steps - BOP on BOP



- Move BOP over well center as close to male HC profile as practical
- Begin pumping glycol down choke and kill lines
- Stab BOP on HC connector and slack of 50,000 lbs
- Close and lock HC connector on DDII BOP
- Over pull 50,000 lbs and verify lock indicator



Install BOP Risk - BOP on BOP



RISK

- AX Installation or Removal - rigid pin or hydraulic release
- AX Gasket stays on AX male hub
- Condition of HC Mandrel
- Hydrates on BOP, HC Connector, and diverter joint
- DP System Drive Off
- Flow Force on BOP

BOP on BOP stability

MITIGATION

- Looking at statistics
- Remove with ROV or drop AX an using existing one
- Double resilient seal AX gasket
- Grease and glycol circulation down choke and kill lines
- Highest alert level DP watch during critical operations
- Modeled 1400 lbs up
- Analysis indicates need for tight watch circles



Shut-In Well Steps – BOP on BOP



- Close shear to stem flow
- Close lower Blind Shear Rams
- Close upper Blind Shear Rams
- Monitor Pressures



Shut-In Well Risk - BOP on BOP



RISK

- Hydrates in Rams
- Broaching at Sea bed
- BOP on BOP without DDII LMRP
- Leaks in the Horizon BOP
- Leaks in HC Connector

MITIGATION

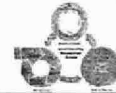
- Glycol pumping prior to closing well in
- Move to bull head kill
- Horizon BOP at near vertical
- Seal Tite
- Seal Tite



Other Operations – BOP on BOP



- Release LMRP and round trip to remove diverter joints
- Begin Well Kill Operations
- Monitor well and wait for relief wells



Peer Assistance Needs



- Hydrates
 1. Glycol v. Methanol
 2. Hydrate Mitigation Measures
 3. Probability of Forming hydrates
 4. Field testing we can do to understand probability of hydrates
 5. Procedure for pumping down choke and kill lines
- HC Connector Release
 1. What can we do now to improve results
 2. Trouble shooting guidelines
 3. Alternative methods to release connector



Peer Assistance Needs



- DD11 BOP Space Out
 1. Work riser analysis
 2. Work Transit Plan to location with BOP and LMRP recovery sling deployed
 3. Work clashing issues to minimize chance
- Other Procedures
 1. Closure on what will happen after the well is shut-in



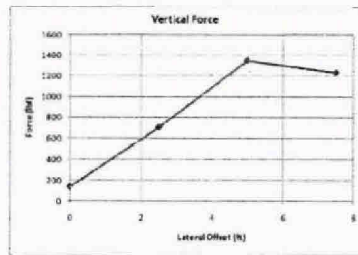
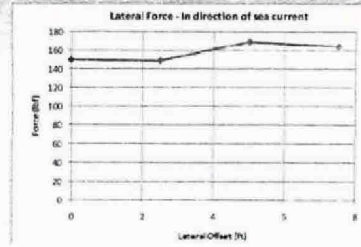
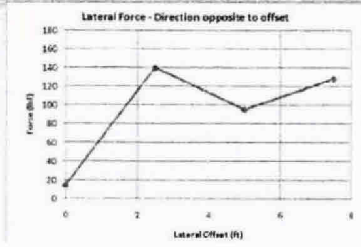
Back-Up Slides



Back-Up Slides



Results



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