



## Project Memo

<b>Operator:</b>	BP GoM Deepwater Exploration	<b>Well Name:</b>	Macondo – MC252#1
			WWCI Job # 2010-116
<b>Date:</b>	22 Apr 2010	<b>Time:</b>	04:30am
<b>To:</b>	Mark Mazzella John Shaughnessy	<b>From:</b>	Dicky Robichaux Chris Murphy Mike Cargol
<b>CC:</b>	D. Moody, Joe Dean Thompson, R. Gomez, K. Girlinghouse, S. Jortner, W. Burch		
<b>Subject:</b>	Securing of MC252#1 and Intervention Kill		

### History:

Macondo well blew out at 22:00 hours on the 20<sup>th</sup> of April 2010.

### Intervention Options – Preface

- After reviewing the sequence of events leading to the loss of well control plus review of the well construction, WWCI believes that the likely cause of the well control event may be a failure (collapse) of the 9-7/8" casing string at or near the casing hanger due to pressure differential and casing string weight (tension). 16" liner may be subjected to excessive wellbore pressure should the current BOP Blind rams be functioned to the CLOSED position. Calculations indicate that the wellbore pressures may exceed the burst ratings of the 16" which could result in a breach of wellbore.
- WWCI recommends that the riser package be disconnected ASAP from the subsea BOP/wellhead.
  - PROS: reduce risk of further damage to BOP/wellhead and Horizon rig
  - CONS: possible increase in pollution (no burn off)
- WWCI recommends that ROV's be utilized to deploy chop saw/diamond wire to sever Marine riser as outlined in next slide.

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### Intervention Option #1 – Relief Well Only

#### Summary Procedure

1. Conduct no subsea/surface intervention operations allowing hydrocarbons to burn-off at surface
2. Spud / drill (2) relief wells as per plan
3. Conduct well kill and isolation
4. Conduct salvage operations of subsea BOP, Riser and Rig

#### Pros:

- Relief wells have highest likelihood of success
- Pollution risks lessened if surface burn-off continues
- Less risk to personnel and equipment

#### Cons:

- Increased likelihood that Horizon may sink resulting in additional salvage liability and possible catastrophic damage to BOP
- Unpredictable releases of gas at surface poses hazard to relief well operations 'gas plume'



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### Intervention Option #2 – Function BOP to CLOSED position

#### Summary Procedure

1. Position ROV vessel upwind of well center
2. Deploy ROV with hydraulic umbilical to BOP
3. Utilize ROV to stab umbilical into BOP Blind/Shear CLOSED stab plate
4. Function BOP Blind/Shear to CLOSED position from surface monitoring line pressure

#### Pros:

- Potential to immediately secure well and cease release of hydrocarbons
- Eliminate hydrocarbon flow to Deepwater Horizon allowing for fire to be extinguished and reducing likelihood that vessel may be lost (reduction in salvage liability)

#### Cons:

- Hard shut-in of BOP will result in shock loading of subsea hardware and may cause equipment failure and/or wellbore broach (i.e. 16" casing)
- Damage to BOP and/or wellbore broach may limit intervention options to relief well only



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### Intervention Option #3 – Cut riser without well isolation

#### Summary Procedure

1. Deploy (2) AHV's to Horizon and secure rig to prevent uncontrolled departure from location
2. Position ROV vessel upwind of well center
3. Deploy ROV with super cutter/grinder to riser spool cut location
4. Cut off all external plumbing on riser spool to allow for chop saw/diamond wire cutter installation.

NOTE: Minimum 10' of prepped 'clean' riser required to install 60" chop saw/diamond wire

5. Deploy ROV with chop saw/diamond wire to cut location and install saw on riser
6. Utilizing ROV hydraulics, cut riser spool and drill pipe (size/weight of DP TBD) with chop saw/diamond wire
7. Utilize AHV's to move Horizon off location

NOTE: Consider deployment of pollution dome/recovery system

NOTE: Survey wellbore to identify flow path and confirm presence of DP (i.e DP, casing annulus or both)

#### OPTION A – No drill pipe present and/or flow from casing annulus only

8. Connect MSV surface crane to riser stub above LMRP and utilize ROV to function secondary LMRP disconnect
9. Recover riser stub with upper LMRP connector to surface
10. Deploy LMRP intervention assembly (Lower LMRP connector, Diverters, Shear/Seal Ram, Upper LMRP connector) to wellhead utilizing MSV crane
11. Utilize ROV to function Lower LMRP connect
12. Confirm that diverters are in OPEN position
13. Function new install blind ram to CLOSED position
14. Conduct soft shut-in of diverter
15. Well kill options pending

#### OPTION B – Drill pipe present

8. Deploy DP hydraulic overshot assembly (overshot, Pump-in sub, pup joint, isolation valve)
9. Utilize ROV install overshot on drill pipe and activate hydraulic latch & pack-off
10. Conduct soft shut-in of isolation valve
11. Connect kill line to pump-in sub
12. Open kill line valve and attempt dynamic kill through drill string



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**Pros:**

- Reduce likelihood of further damage to subsea BOP assembly
- Eliminate hydrocarbon flow to Deepwater Horizon allowing for fire to be extinguished and reducing likelihood that vessel may be lost (reduction in salvage liability)

**Cons:**

- Possible increase in pollution due to subsea dispersal of hydrocarbons as opposed to concentrated surface burn
- Re-latch of tubing and LMRP/BOP assembly may not be possible