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|  | <b>GoM Exploration Wells</b><br><b>MC 252 #1ST00BP01 – Macondo Prospect</b><br><b>7" x 9-7/8" Interval</b> |  |
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| Interval Notes    |   |
|-------------------|---|
| Item              | Comment   |
| Bits              | 14-3/4" QD507Z (primary)  |
| Underreamers      | N/A   |
| BHA               | PWD, GR, RES, DDS   |
| Special Equipment | Dril-Quip 1 <sup>st</sup> (dummy) / 2 <sup>nd</sup> position hangers (connected), Wear sleeve retrieval tool, mud surge tool, Weatherford dual plug system, Allamon Diverter and DTD, BlackHawk Automated cement head, 7" H513 x 9-7/8" H523 x-over, 4 pip tags, lockdown lead impression tool, lockdown sleeve running tool, LDS measurement tool, riser wiper brushes, foam cementing equipment, Welllife 734 LCM material, IBC-CBL log equipment, Versaflex 9-7/8" x 11-7/8" hanger (cont) |
| Drillstring       | 5-1/2" 21.9 ppf S-135 x 6-5/8" 32 ppf S-135   |
| Mud system        | 14.0 ppg SOBM   |
| Casing            | 7" 32 ppf HCQ-125, 0.5" wall, Hydril 513 x 9-7/8" 62.8 ppf Q-125, 0.625" wall, Hydril 523   |
| Landing string    | 6-5/8" 40 ppf S-135 FH x 6-5/8" 40 ppf V-150 FH   |
| Cementing         | 14.5 ppg Halliburton Class H nitrogen foam cement (see detailed cement program)   |





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## 9 Production Casing Operations

### 9.1 Operations Procedure

1. Ensure BOP has been tested (per compliance with approved APD).
2. Ensure 16" liner and blind shear rams have been tested (per APD requirements). Record pressure with volume pumped.
3. Pick-up and run-in-hole with **8-1/2" clean-out** drilling assembly (same as drilling assembly)
  - Dril-Quip Wear Sleeve Running/Retrieval Tool should be run in the 6-5/8" DP
4. RIH to bottom and wipe/work any tight spots (document)
5. At TD circulate per WSL recommendation / hole conditions
  - If a short trip is not required, circulate per step 7.
6. If tight spots were seen, make a short trip to the casing shoe to ensure any tight areas have been properly cleaned up and mud weight is correct.
7. Once at TD again, pump a 100 bbl weighted / viscous sweep and circulate hole clean with a minimum of 1-1/2 capacity.
  - Plan to set the 7" x 9-7/8" long string 50-60' off bottom
  - Circulate and condition, as required, to clean hole and lower yield point for running liner (lower YP to ~15 or as hole conditions dictate and keep gels flat).
  - Do not need to set 16.5 ppg mud in rat hole as volume is only ~4 bbls and a large volume may cause issues with the cement job or breaking down the formation.
8. POOH and retrieve the wear sleeve.
  - Do not rotate once the wear bushing has been pulled

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## 9.2 7" x 9-7/8" Casing and Cementing Operations

### 9.2.1 Casing and Cementing Preparation

- Drill-Quip will ship the primary running tool made up to the hanger (1<sup>st</sup> dummy and 2<sup>nd</sup> position hangers included). Weatherford dual plugs will also be stabbed up to this assembly.
- Landing string will be 6-5/8" 40 ppf FH, all surge reduction tools should be setup for use with 6-5/8" FH connections.
- Prior to shipping, primary float equipment will be bucked up and thread-locked onto a joint of pipe. Inspect shoe and float collar joints for debris prior to PU. 6 jts have centralizers which all should be run.
- Ensure cement, additives, fresh water, and seawater samples are sent to cement company lab for final lab testing.
- Boost riser while rigging up casing equipment (not while running 7" x 9-7/8" as mud can flow up through liner).
- Prepare 7" x 9-7/8" casing tally. Inspect box threads and clean as required.
- Prior to shipment, verify casing has been drifted. Visually inspect to ensure there is no debris in pipe.
- Back-up Drill-Quip running tool and hangers are supplied loose.
- Ensure all critical load-bearing equipment has been inspected.
- Calculate swab/surge pressures for various running speeds. Select an acceptable running speed to ensure formation breakdown pressure is not exceeded.
- Prior to running casing, rabbit landing string to a min of 2-3/8 in.
- Final ID for displacement calculations equals 6.143" (7" casing) and 8.598" (9-7/8").
- Ensure all crossovers in landing string have been inspected and that material certifications are provided to verify proper load capabilities.
- WSL should ensure proper Weatherford darts have been loaded in the Blackhawk cement head.
- WSL should confirm proper 1-5/8" Allamon conversion ball is loaded in the Blackhawk head prior to picking up.
- Ensure all crossovers do NOT have square shoulders (may hang up drill pipe darts).
- Ensure (4) pip tags are on location with Pro-Technics hand. (Placement will be per the Completions Engineer)
- Rig up the Blackhawk Top Drive Cement Head and stand back (if desired).
- Confirm Blackhawk equipment has the updated panel so darts can not be prematurely release.
- Ensure Versaflex Hanger (contingency) is shipped.
- Ensure IBC/CBL logs are shipped and proper wireline is in place prior to Schlumberger OH logging crews leave.



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### 9.2.2 Casing Procedure

1. Rig-up and run 7" x 9-7/8" casing:

| Item  | Ftg     | Size        | Wall   | ppf  | Grade   | Connection            |
|---|---------|-------------|--------|------|---------|-----------------------|
| Shoe Jt with reamer shoe (centralized)                                | ~48'    | 7"          | 0.500  | 32   | HCQ-125 | H513                  |
| Centralized Shoe Track Jts (centralized)                              | ~134'   | 7"          | 0.500  | 32   | HCQ-125 | H513                  |
| Float Collar Jt with M45AP float collar (centralized)                 | ~48'    | 7"          | 0.500  | 32   | HCQ-125 | H513                  |
| Intermediate jt (centralized)   | ~45     | 7"          | 0.500  | 32   | HCQ-125 | H513                  |
| Intermediate jts  | ~x,xxx' | 7"          | 0.500  | 32   | HCQ-125 | H513                  |
| X-over  | ~4      | 9-7/8"      | N/A    | N/A  | P110    | 7" H513 x 9-7/8" H523 |
| Intermediate jts (9-7/8")   | ~x,xxx' | 9-7/8"      | 0.625  | 88.2 | Q-125   | H523                  |
| Dril-Quip 1 <sup>st</sup> (dummy) and 2 <sup>nd</sup> Position Hanger | ~27'    | 18.615"     | N/A    | N/A  | P110    | H523                  |
| Weatherford Dual Plug   | ---     | 7" x 9-7/8" | N/A    | N/A  | NA      | N/A                   |
| Dril-Quip Running Tool  | ~5'     | N/A         | N/A    | N/A  | N/A     | 6-5/8" FH (top)       |
| Landing String (=>4 stands)   | ~240'   | 6-5/8"      | 0.500" | 32   | S-135   | FH                    |
| ATC DTD sub   | ~6'     | 9"          | N/A    | N/A  | Q-125   | FH                    |
| Landing String (=>4 stands)   | ~240'   | 6-5/8"      | 0.500" | 32   | S-135   | FH                    |
| ATC Diverter Sub  | ~6'     | 9-1/4"      | N/A    | N/A  | Q-125   | FH                    |
| Landing String  | ~x,xxx  | 6-5/8"      | 0.625" | 40   | S-135   | FH                    |

Centralizer details: Weatherford Bow Spring subs (6) / Weatherford Slip-on (15)

Casing ID: 6 in x 8.625 in -- > Caliper Avg 6.143" x 8.598"

Casing collar OD: 7 in x 10.087 in.

**Note:** Run all of the 7" followed by 9-7/8" casing to the wellhead.

| Connection Size | Minimum Torque Required | Optimum Torque | Maximum Torque |
|-----------------|-------------------------|----------------|----------------|
| 7 in.           | 10,700 ft-lb            | 12,900 ft-lb   | 68,000 ft-lb   |
| 9-7/8 in.       | 25,000 ft-lb            | 30,000 ft-lb   | 187,000 ft-lb  |

- Have Tenaris HydriL thread representative on location to inspect casing threads and connection make-up.
- Thread lock first 5 joints up.
- Monitor well via choke and kill lines on trip tank.





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- 7" and 9-7/8" pin threads will be delivered pre-doped with Jet Lube Seal Guard. Only pin should have a thin coating of Jet Lube.
  - As required, clean box threads prior to make-up.
  - 4 Pip tags should be placed in the string at: 18210.34 / 18114.82 / 12488.57 / 5084.74
  - Attach slip on centralizers every joint from 7-21 (use all that are available)
2. Limit running speed to avoid surging formation. (Actual running speed to be based on hole conditions.) Start and stop casing slowly.
- Recommended running speed **30-40 ft/min** (~3-4 min/stand)
  - Attempt to manage surge below 14.5 ppg if possible (based on models)
3. 2" ball is caged inside float equipment, do not drop a ball.
4. MU Drill-quip hanger / running tool per Drill-Quip procedure/hand:
- 1<sup>st</sup> position dummy hanger pre-installed
  - 2<sup>nd</sup> position hanger
  - Running tool with Weatherford dual tapered plugs previously stabbed.
  - Record liner weight
  - Run casing on 6-5/8" 40 ppf FH landing string.
  - Make up Allamon DTD and Diverter to the 6-5/8" 40 ppf FH landing string. (Ensure both tools have FH connections once on location).
  - Check to ensure pipe is filling (Fill every 10 stands).
  - Do not circulate liner greater than 5 bpm, unless required, as it will convert autofill equipment.
  - Slow running speed and proceed with caution when running shoe and hanger through the wellhead.

**Recommended Well Control consideration while running this equipment and subsea casing:**

**If fillups are marginal, there are two options:**

**Notes:**

- Convert auto-fill float equipment to a positive float shoe and run subsea casing conventionally.
- Run a 1-5/8" drop ball in place in ATC Diverter Sub to minimize time required to close tool. With the 1-5/8" drop ball on seat, if you observe any type of increased returns while running drillpipe, stop running drillpipe and screw top drive into drillstring. Commence pumping. It should take 20 to 30 strokes to pressure-up on ball to close diverter sub and then blow ball.

**WSL should check balls for correct size and witness Weatherford drop each ball as prescribed in the procedure.**

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5. Just prior to the liner reaching open hole, record pickup, slack-off, and slow pump rates (15 – 25 – 35 spm).
6. Free drop 1-5/8" wash down ball when the liner enters open hole (brass).
7. Continue RIH with casing until 1 stand off bottom. MU top drive.
8. While slacking off on the last stand prior to picking up the cement head, pressure up to 1000 psi slowly and hold for 2 minutes. Then increase to 2500 psi to yield the ball seat.
9. Let ball free fall to DTD sub, repeat step 9 (test diverter is close).
10. Give ball time to free fall through the liner hanger and plugs
11. Continue to circulate and slowly increase pump rates greater than 8 bpm to convert the float equipment (~ 500 - 700 psi) per Weatherford recommendation.
12. Make up Blackhawk cement head and land out casing in the wellhead
  - a. Monitor running speeds to minimize surge and reduce losses as much as possible.

### 9.2.3 Cementing Production Casing

Test Pressures and Volumes are only as a reference, review APD for final values.

1. Circulate at least one (1) casing and drill pipe capacity, if hole conditions allow. Recommend circulating at reduced rates (**3 bpm**) based on MI models to keep ECD below 14.5 ppg.
2. Pump **7 bbls** of **base oil**
  - Base oil volume is important to maintain 14.17 ppg on backside at all times which is equal to current hydrostatic and slightly above sand at 17,700')
3. Mix & displace the 14.3 ppg spacer (**4 bpm**) and launch the **bottom DP dart** (1.91" No Go).
  - When the dart leaves the cement head, the Blackhawk cement head indicator should confirm the dart has left the head.
4. Mix & pump the 14.5 ppg cement job per HES procedure (**2 bpm**).
  - Slow pump rates to 2 bpm while mixing foam cement (reduces surge on formation from nitrogen spike)
  - After pumping the cement job, **launch the top DP dart** (2.126" No Go) with 5-10 bbl of cement behind dart. Indicators should be seen from the Blackhawk cement head confirming the top dart left the head.
  - Line up rig pumps to take over cement displacement after cement unit pushes out top DP dart.



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5. After pumping cement job, launch Weatherford top dart (yellow) and displace with rig pumps (**4 bpm**). Maximize pump rates until displacing fluid has caught up with the cement slurry.

**Note: Minimum pump rate on darts in the landing string is 3 bpm.**

6. Continue with displacement (make sure to account for compressibility).
- Approximately 5 bbls before the **bottom DP Dart** reaches the diverter sub, ensure the pump rate is 3-4 bpm. The pressure required to yield the seat in the diverter and DTD with the bottom DP dart should be 2500-3000 psi above the circulating rate.
  - After yielding the seat, continue to pump the **bottom DP Dart** down to the **bottom plug** at 3-4 bpm. The bottom plug with launch with 800-1200 psi. After the plug is released, continue with the displacement of the cement at the maximum rate.
  - Approximately 5 bbls before the **top DP Dart** reaches the diverter sub, ensure the pump rate is 3-4 bpm. The pressure required to yield the seat in the Diverter and DTD with the top DP dart should be 2500-3000 psi above the circulating rate.
  - After yielding the seat, continue to pump the **top DP Dart** down to the **top plug** at 3-4 bpm. The top plug should release with 2000-2500 psi. After the plug is released, continue with the displacement of the cement at the maximum rate.
  - Just prior to the bottom plug reaching the float collar, ensure the pump rate is 3-4 bpm to witness the landing of the plug. The bottom plug burst tube should rupture with 900-1100 psi.
  - After bottom plug has landed, re-zero the stroke counter and pump calculated cement volume to see the top plug land.
  - If bottom plug does not bump or top plug is late, do not exceed 1/2 shoe track volume + compressibility. Bump top plug with 500-1000 psi over circulating pressure (land).
  - Bleed off pressure and check floats are holding. Measure flow back.
7. Once confirmed floats are holding prepare to release the running tool per DQ procedure/hand.
8. Pick up drill string leaving 20k down on the running tool (mark drill pipe for: rotation / vertical movement)
9. Rotate 5-6 turns to the right until drill string drops 10 inches.
10. Set entire drill string weight down.
11. Close rams and test to 3000 psi, then 10,000 psi for 10 seconds (locks down assembly and provides metal to metal seal). Release pressure
12. Pickup to retrieve the running tool (60-90k overpull to shear 12 pins).





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13. POOH and lay down running equipment
14. Test casing and blind shear rams (**per APD requirements**) while out of the hole preparing lockdown sleeve equipment. (2500 psi w/ 14 ppg mud)
15. Negative test with base oil to the wellhead (monitor for 30 min no flow)

### 9.2.4 Surface Cement Plug

1. If cement job **is not** successful: (no returns or lift pressure seen).
  - Set wear bushing
  - Run IBC-CBL log
  - Wait on decision to do remedial work (MMS and BP)
2. If cement job **is** successful (partial returns or lift pressure seen) **or** IBC/CBL log and required remedial work is completed.
3. RIH to 8367' and displace to seawater:
  - Run 3-1/2" (1000'+) stinger x 5-1/2" DP to above the wellhead (**no** mule shoe / open ended pipe)
  - Ensure MMS Departure to set deeper plug is approved (*if departure does not get approved, displacement & 300' cement plug will be completed after LDS is set at 5800'*)
  - Monitor well for 30 minutes to ensure no flow
  - *Pull wear bushing if it was set*
4. Set a 300' cement plug from 8367' – 8067' (*if approved*)
5. Wait on cement to set and tag top of cement with 15k down
  - Pump a nerf ball behind cement job
6. POOH retrieve wear bushing
7. Prepare to run lead impression tool and lockdown sleeve

**Note:** Drilling program will be updated with actual plug depths if MMS departure is **not** approved.

**Notes:**

- **Do NOT** slow displacement rate other than directed.
- To have a greater chance to bump plug on float collar:
  1. Caliper ~20% of casing with Tri-Mic's to determine a more accurate ID. (**Do NOT** use mill or book specs.)
  2. Calculate mud compressibility based on actual conditions.
  3. Factor in rig pump efficiency.
- **Whenever you attempt to wash-down, you have a greater chance of sticking subsea casing with additional ECD or creating a packing off problem due to cuttings bed you are pushing.**



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- When closing diverter sub, pipe should be moving at all times.
- After closing diverter tool, go back to circulating slowly (no more than 15 SPM) and start washing to bottom immediately.
- If you plan on using boost line prior to landing hanger, do NOT drop ball early. Circulate through diverter prior to dropping ball. (This prevents debris from plugging diverter sub and causing high shear out pressures.)
- All pup joints and cross-overs must be free of "bore-backs" or square shoulders (less than 1/8" transition) and must have high angle tapers to the ID from the root thread in the box. Tapers should be at least 30 degrees. \*Special attention should be given to the TIW valve below the Cement head. This is to prevent hanging-up the DP dart during displacement. A Teflon bushing on top of the valve assembly will help transition the dart cleanly.

It is responsibility of Driller, Mud Engineer, and Mud Logger to closely monitor and agree on amount of mud lost during liner job. Separate and report mud losses during different phases of job as follows:

Note:

- Bbls lost while PU and running casing.
- Bbls lost while TIH with casing on landing string.
- Bbls lost while washing casing to bottom, if required.
- Bbls lost while circulating, after casing is landed.
- Bbls lost while pumping and displacing cement.
- Bbls left behind pipe.



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### 9.1 Lead Impression / Lockdown Sleeve Ops

#### 9.1.1 LIT / LDS Operations

1. Prepare to run the lead impression tool / assembly per Dril-Quip and BP subsea procedures (steps below are just for quick reference).
  - A minimum of 40k buoyed is required to properly set LIT (~52k air)
  - Running tool has 4-1/2" IF x 6-5/8" xover on top / 4-1/2" x HT-55 on bottom
  - Run 6-1/2" collars XH x 5-1/2" HWD HT-55 x 5-1/2" 21.9 ppf HT-55 (confirm HT-55 (box) x XH pin X-over is available)
2. RIH to the wellhead
3. Set down to neutral weight and slack off 40k (don't exceed 60k)
4. Line up to pressure down the kill/choke lines
5. Pressure up to 2500 psi and hold for 2 minutes
6. Allow pressure to bleed off and hold 0 psi for 5 minutes
7. PU to neutral weight
8. Pressure up down drill pipe until gate shears (3450-3850 psi / max of 7500 psi)
9. Pressure will bleed off quickly, maintain 0 psi for 3 minutes
10. Retrieve the LIT and ensure impressions were properly made
11. Prepare the Lockdown sleeve and RIH
  - 100k air weight tail pipe
  - Running tool has 4-1/2" IF x 6-5/8" X-over on top / 4-1/2" x HT-55 on bottom
  - Run 6-1/2" collars XH (6) x 5-1/2" HWD HT-55 (28) x 5-1/2" 21.9 ppf HT-55 (~36) (confirm HT-55 (box) x XH pin X-over is available)
12. Record PU/Slack off weights
13. Slowly slack off and land the LDS
14. Set down 72k (do not exceed 78k / will put the string into compression)
15. Close pipe rams and line up to pressure down the kill/choke lines
16. Pressure up to 6400 psi assuming 14.0 ppg mud and hold for 10 minutes (no more than 100 psi loss)
17. Bleed off pressure and open rams, prepare to pump down the drill pipe
18. Pressure up to 1000 psi, followed by 100 psi increments to 2500 psi (do not exceed 300 psi) hold for 5 minutes
19. Bleed pressure to 0 psi
20. Repeat pressure build sequence again to ensure properly stroked





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21. Pull 30k over string weight (do not exceed 60k)
22. Release from LDS by picking up past 60k
23. POOH
24. Prepare to clean the riser for Nile PA

## 9.2 Riser Cleaning

### 9.2.1 Rig Cleaning Prior for Nile PA

1. Clean the shaker area thoroughly, especially the ditch lines from the sand traps to the pit room. Large amounts of water should be pumped through all centrifugal pumps at the shaker area including the desanders, desilters, centrifuge and degasser.
2. After the initial clean up has been completed 250 bbls of water treated with 138 gallons Safe Surf O (0.55 gpb) should be pumped through all of the surface equipment. This includes the pumps and pump manifolds, chemical hopper, barite hopper and any other seldom used lines that may affect the completion fluid. Capture the 250 bbl Safe Surf O flush for proper disposal.
3. Clean and dry all pits, then bring the completion fluid onboard. The take on hose must be dry and not contaminated with mud or seawater.
4. After displacing the hole, clean the shaker area again. At this point, cleaning the flow line from the slip joint to shakers should be cleaned as well. Do not allow any cleaning water to get down the ditch to the pit room.

### 9.2.2 Riser Cleaning

1. Build a pumpable volume of spacers as follows in Table 1 and
2. Table :

**Table 1: Spacer I - 200-bbls High Viscosity Spacer**

| Formulation for 1 barrel of Hi-Vis spacer: | Formulation for 200 barrels of transition spacer: |
|--|---|
| 1-barrel of seawater                       | 200-barrels of seawater                           |
| 0.75 gpb of Flo-Vis L                      | 150-gallons Flo-Vis L                             |

**Table 2: Spacer II - 350-bbls Solvent/Surfactant Spacer**

| Formulation for 1-barrel of solvent spacer: | Formulation for 350-barrels of solvent spacer: |
|---|--|
| 0.800-barrels of drill water                | 280-barrels of drill water                     |
| 0.200-barrels of ECF-1840                   | 2940 gallons of ECF-1840                       |

**Note:** • **Spacer II cannot be dumped overboard. Spacer II should be segregated**



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in a separate pit or container for disposal.

- Do not Run BHA below Wellhead



3. Install ditch magnets and eventually load shaker screens with 175 mesh to remove solids from the fluids.
4. Trip in Hole (TIH) with Riser Clean-Out Assembly to base of BOP (Caution: Do not enter wellhead with Clean-out Assembly as it may damage the lockdown sleeve).

| Riser Cleanout BHA                   |
|--------------------------------------|
| Bottom                               |
| Mule Shoe NC50 Box                   |
| 16" SABS Jetting tool NC50 Box X Pin |
| Crossover 6 5/8" FH Box X NC50 Pin   |
| Pup Joint 6 5/8" FH Box X Pin        |
| 1 Stand of 6 5/8" FH workstring      |
| Pup Joint 6 5/8" FH Box X Pin        |
| Crossover NC50 Box X 6 5/8" FH Pin   |
| PUP Riser Brush NC50 Box X Pin       |
| Crossover 6 5/8" FH Box X NC50 Pin   |
| Pup Joint 6 5/8" FH Box X Pin        |
| 6 5/8 FH workstring to surface       |
| Top                                  |

Note:

- For mud pump efficiency it is important to have accurate strokes and volumes to minimize interface.
- Assign specific pumps to specific lines and do not switch during the procedure.

5. Ensure that all valves are closed prior to beginning this operation. Open the boost valve and pump 20-bbls Spacer II followed by approximately 51-bbls of seawater down the boost line at 8 BPM and then close the boost line.
6. Open the lower choke valve and pump 20-bbls Spacer II followed by 78-bbls of seawater to the end of the lower choke line at 8 BPM. Isolate the lower choke. Momentarily open the upper choke line to flush. Ensure that all valves are closed
7. Open the lower kill valve and pump 20 bbls Spacer II followed by 78-bbls of seawater to the end of the lower kill line at 8 BPM. Isolate the lower kill line. Momentarily open the upper kill line to flush. Momentarily open the IGV to flush. Ensure that all valves are closed.

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8. Pump the following spacers at approximately 16-BPM (do not stop pumping once spacers are begun):
  - 100-bbl Spacer I
  - 250-bbl Spacer II
  - 100-bbl Spacer I
9. When the cleaning spacer has entered the riser, slow the rig pump rate to 2 BPM. Open the boost, choke and kill lines and pump 20 bbls of seawater down the choke line, 20 bbls of seawater down the kill line and 20 bbls of seawater down the boost. This pushes the cleaning spacer from the lines into the cleaning spacer entering the riser. Close the boost, choke and kill lines. Increase pump rate down the workstring to 16 BPM. Once the final 100-bbl Spacer I is 50' above the choke and kill lines, open the boost line, upper choke and upper kill lines and pump seawater at 8 BPM through each while continuing to pump down the drill pipe. (Do not exceed a combined pumping speed higher than 40 BPM as this will affect the contact time of the chemicals)
10. Displace the spacers to surface at the maximum rate (approximately 40-BPM); Reduce the pump rates as the spacers near the surface and divert spacer returns for proper disposal. Do not stop pumping until all spacers are recovered and seawater returns are visually clean.
11. Drop the 2 3/8-in ball to open the SABS jetting tool. Pump pressure can be applied to save time, no more than 3 bbl/min.
12. Apply approximately 900psi to shear open the SABS jetting tool
13. Once open, begin jetting the BOP stack at 10 bpm with 15 – 20 rpm. Make 3 passes through the BOP stack.
14. Pick up above BOP and function rams.
15. Make one more pass with SABS jetting tool.
16. Drop the 2 1/5-in ball to close the SABS jetting tool. Pump pressure can be applied to save time, no more than 3 bbl/min.
17. Apply approximately 2,800 psi to close the SABS jetting tool.
18. Pump down the workstring and boost riser for at least one bottoms up or until seawater returns are visually clean.
19. POOH and lay down Riser Cleanout BHA.





**GoM Exploration Wells**  
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**7" x 9-7/8" Interval**



**Attachments**

| No. | Title                                   |
|-----|---|
| 1   | Clean-out run - MOP                     |
| 2   | Clean-out BHA                           |
| 3   | 7" x 9-7/8" Casing Diagram              |
| 4   | 7" x 9-7/8" Casing Landing String – MOP |
| 5   | Rig Clean up Check List                 |
| 6   | Derrickman's Checklist                  |
| 7   | Riser Brush Assembly                    |



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**7" x 9-7/8" Interval**



**Attachment 1: Clean-out Run - MOP**

Yellow cells = input data, Green cells = calculated results

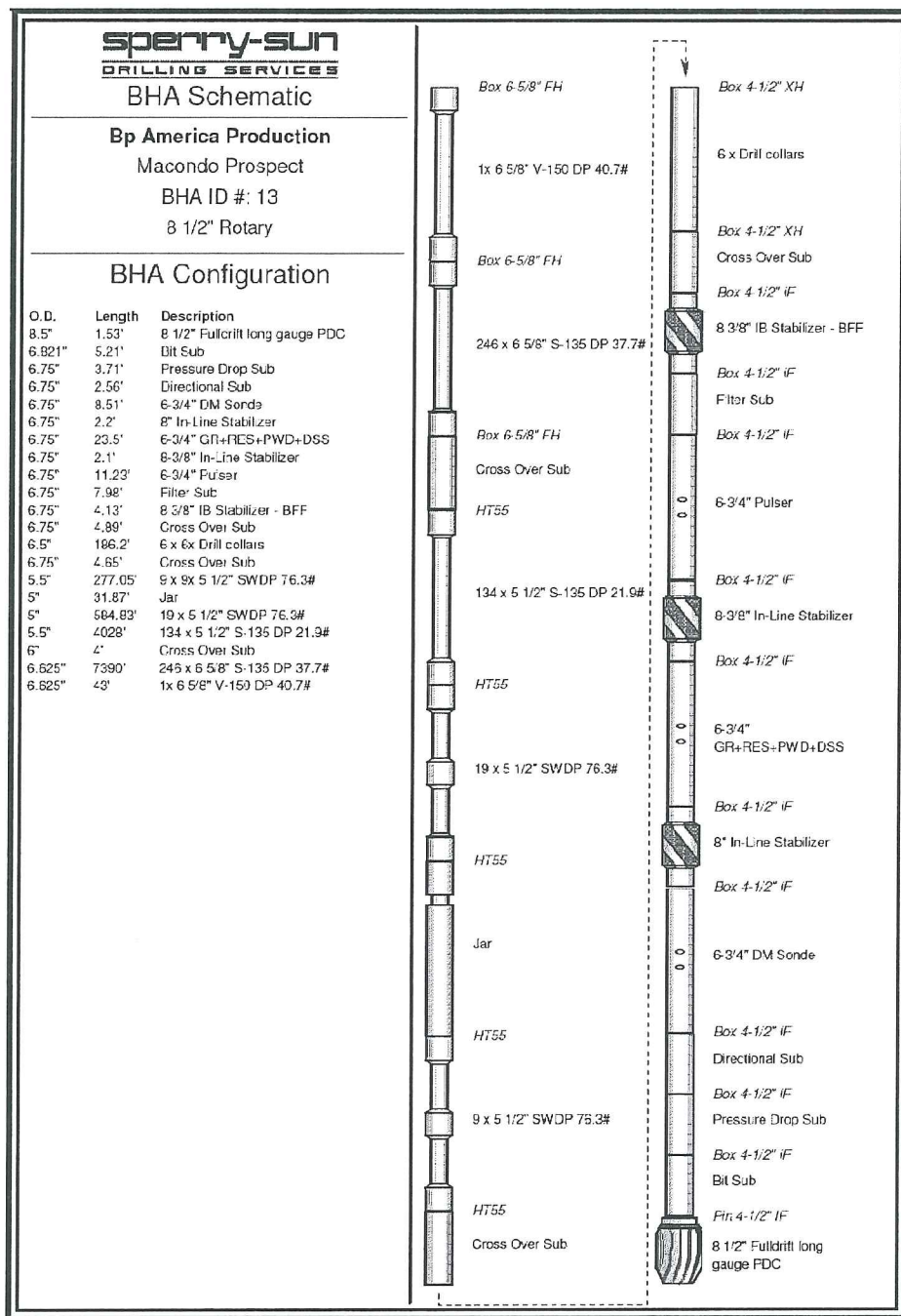
| <b>Drill String Design - Margin of Overpull</b>   |                       |  |  |                                   |                                |  |                       |                          |                       |
|---|-----------------------|--|--|-----------------------------------|--------------------------------|--|-----------------------|--------------------------|-----------------------|
| This worksheet calculates <i>Margin of Overpull (MOP)</i> for pipe configurations with up to 5 different sizes of drill pipe and 3 different sizes of drill collars plus hevi-wate dp. It can also incorporate a safety factor. |                       |  |  |                                   |                                |  |                       |                          |                       |
| <b>Well:</b>  | <b>Macondo</b>        |  | <b>Description:</b> 8-1/2" x 9-7/8" OH SECTION |                                   |                                |  |                       |                          |                       |
| <b>Drill Pipe Data</b>  |                       |  |  |                                   |                                |  |                       |                          |                       |
| <b>Bottommost Section</b>   |                       |  |  |                                   |                                |  |                       | <b>Uppermost Section</b> |                       |
| <b>Pipe #1</b>  |                       | <b>Pipe #2</b>                               |  | <b>Pipe #3</b>                    |                                | <b>Pipe #4</b>                               |                       | <b>Pipe #5</b>           |                       |
| 5.5   | OD                    | 6.625  | OD   |                                   | OD                             |  | OD                    |                          | OD                    |
| 4.778   | ID                    | 5.625  | ID   |                                   | ID                             |  | ID                    |                          | ID                    |
| 21.9  | Nominal Wt            | 32.67  | Nominal Wt                                     |                                   | Nominal Wt                     |  | Nominal Wt            |                          | Nominal Wt            |
| 25.42   | Adjusted Wt           | 37.71  | Adjusted Wt                                    |                                   | Adjusted Wt                    |  | Adjusted Wt           |                          | Adjusted Wt           |
| 135,000   | Tensile strength, psi | 135,000                                      | Tensile strength, psi                          |                                   | Tensile strength, psi          |  | Tensile strength, psi |                          | Tensile strength, psi |
| 80  | % rem wall            | 80   | % rem wall                                     |                                   | % rem wall                     |  | % rem wall            |                          | % rem wall            |
| <b>Tensile strengths from the pipe drill pipe data entered above</b>  |                       |  |  |                                   |                                |  |                       |                          |                       |
| 1,205,617   | Tensile Strength      | 1,022,117                                    | Tensile Strength                               |                                   | Tensile Strength               |  | Tensile Strength      |                          | Tensile Strength      |
| <b>BHA Data</b>   |                       |  |  |                                   |                                |  |                       |                          |                       |
| 8.500   | DC #1 OD              |  | DC #2 OD                                       |                                   | DC #3 OD                       | 5.5  | HWDP OD               | Tensile Str.             |                       |
| 2.8   | DC #1 ID              |  | DC #2 ID                                       |                                   | DC #3 ID                       | 3.375  | HWDP ID               | 918,400                  |                       |
| 260   | DC #1 Length          |  | DC #2 Length                                   |                                   | DC #3 Length                   | 1000   | HWDP Length           | HWDP Air Wt.             |                       |
| <input checked="" type="checkbox"/> Spiraled  | Spiraled ( )          | <input checked="" type="checkbox"/> Spiraled | Spiraled ( )                                   | <input type="checkbox"/> Spiraled | Spiraled ( )                   | <input checked="" type="checkbox"/> Spiraled | Spiraled ( )          | 51,101                   |                       |
| 88  | Wt/ft DC #1           |  | Wt/ft DC #2                                    |                                   | Wt/ft DC #3                    |  | Buoyancy Factor       | 0.7861                   |                       |
| 22,989  | Wt. DC #1             |  | Wt. DC #2                                      |                                   | Wt. DC #3                      |  | Air weight of BHA     | 74,090                   |                       |
|   |                       |  | Wt WH equip                                    |                                   |                                |  | Buoyed weight of BHA  | 58,244                   |                       |
| <b>Depth of Interest</b> =>=>=>=>   |                       |  |  | 18,360                            | Block Wt                       | 80 %   | Total length of BHA   | 1,260'                   |                       |
| <b>Anticipated Mud weight</b>   |                       |  |  | 14.00                             | Block Wt                       | 180,000                                      | <b>Total depth</b>    | 14,000                   |                       |
| <b>Summary</b>  |                       |  |  |                                   |                                |  |                       |                          |                       |
|   |                       | Buoyed Wt                                    | Section MOP                                    |                                   | Pipe needed on last sec.       |  | 0'                    |                          |                       |
| Enter Length DP #1 =>   |                       | 5,400  | 107,910  | 798,339 #                         | Weak point in string           |  | 304,694               |                          |                       |
| Enter Length DP #2 =>   |                       | 11,700                                       | 346,846  | 304,694 #                         | Total weight of string         |  | 513,000               |                          |                       |
| Enter Length DP #3 =>   |                       | C  |  |                                   | Total weight BLK & string      |  | 693,000               |                          |                       |
| Enter Length DP #4 =>   |                       | C  |  |                                   | Total weight Indicator Reading |  | 997,694               |                          |                       |
| Enter Length DP #5 =>   |                       | C  |  |                                   | With over pull                 |  | 997,694               |                          |                       |
| <b>NOTE:</b> The air weight of spiraled hevi-wate drill pipe is calculated as 96% of non-spiraled HWDP. Assumes lowest planned mud weight of 14.3 ppg for section   |                       |  |  |                                   |                                |  |                       |                          |                       |



**GoM Exploration Wells**  
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**7" x 9-7/8" Interval**



**Attachment 2: BHA Schematic**





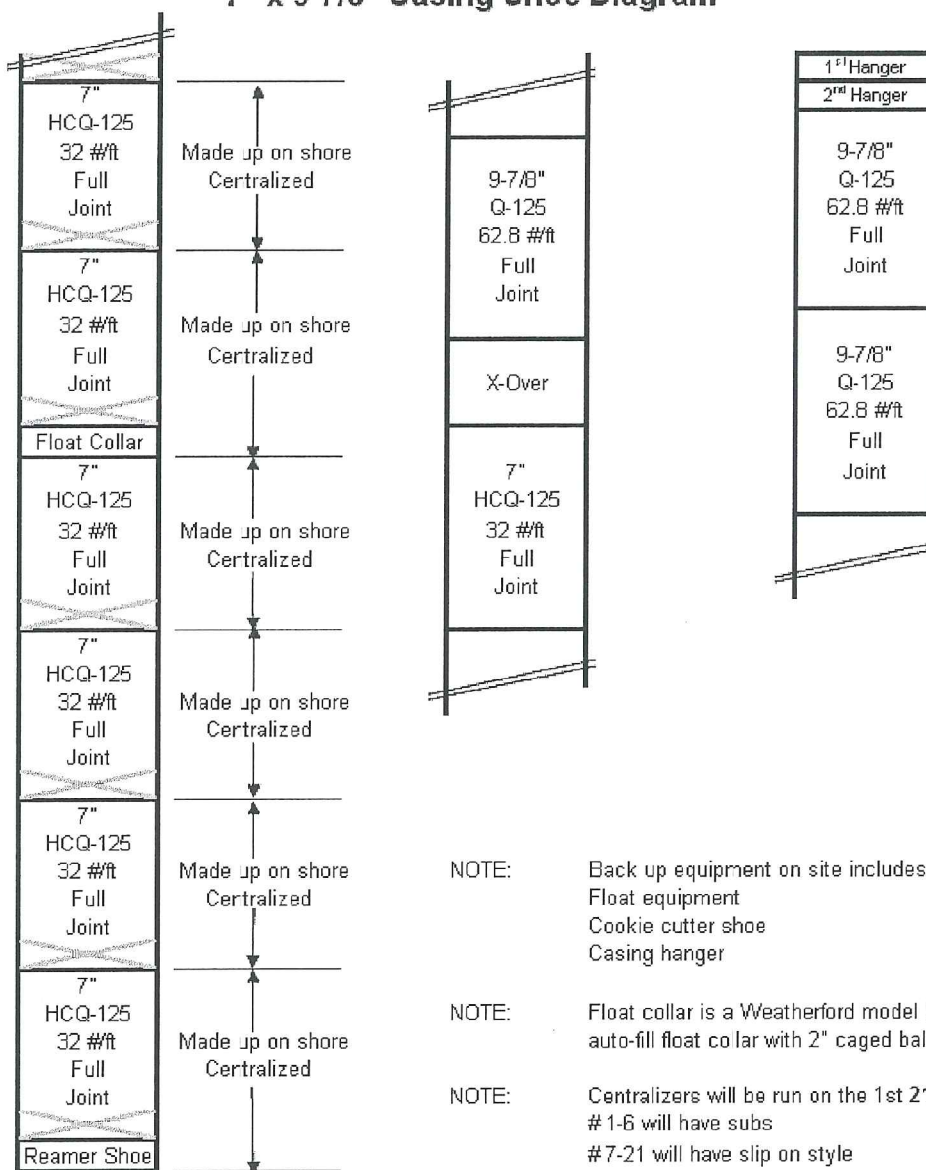


**GoM Exploration Wells**  
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**7" x 9-7/8" Interval**



**Attachment 3: 7" x 9-7/8" Casing Diagram**

**7" x 9-7/8" Casing Shoe Diagram**





## GoM Exploration Wells

MC 252 #1ST00BP01 – Macondo Prospect  
7" x 9-7/8" Interval



### Attachment 4: Production Casing Landing String – MOP

Yellow cells = input data, Green cells = calculated results

### Landing String Design - Margin of Overpull

This worksheet calculates **Margin of Overpull (MOP)** for pipe configurations with up to 5 different sizes of drill pipe and 3 different sizes of drill collars plus heavy-wate dp. It can also incorporate a safety factor.

**Well:** Macondo **Description:** 7" x 9-7/8" CASING LANDING STRING

| Bottommost Section |                       |         |                       | Drill Pipe Data |                       |         |  | Uppermost Section     |  |  |  |
|--------------------|-----------------------|---------|-----------------------|-----------------|-----------------------|---------|--|-----------------------|--|--|--|
| Casing             |                       | Casing  |                       | Pipe #1         |                       | Pipe #3 |  | Pipe #4               |  |  |  |
| 7                  | OD                    | 9.875   | OD                    | 6.625           | OD                    |         |  | OD                    |  |  |  |
| 6                  | ID                    | 8.625   | ID                    | 5.375           | ID                    |         |  | ID                    |  |  |  |
| 32                 | Nominal Wt            | 62.8    | Nominal Wt            | 40.01           | Nominal Wt            |         |  | Nominal Wt            |  |  |  |
| 32                 | Adjusted Wt           | 62.8    | Adjusted Wt           | 46.46           | Adjusted Wt           |         |  | Adjusted Wt           |  |  |  |
| 125,000            | Tensile strength, psi | 125,000 | Tensile strength, psi | 135,000         | Tensile strength, psi |         |  | Tensile strength, psi |  |  |  |
| 100                | % rem wall            | 100     | % rem wall            | 80              | % rem wall            |         |  | % rem wall            |  |  |  |

**Tensile strengths from the pipe drill pipe data entered above**

|           |                  |           |                  |           |                  |  |                  |
|-----------|------------------|-----------|------------------|-----------|------------------|--|------------------|
| 1,276,272 | Tensile Strength | 2,270,292 | Tensile Strength | 1,245,838 | Tensile Strength |  | Tensile Strength |
|-----------|------------------|-----------|------------------|-----------|------------------|--|------------------|

### BHA Data

|                                   |                                   |                                   |                                   |                                   |                                   |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| DC #1 OD                          | DC #2 OD                          | DC #3 OD                          | 6.625                             | HWDP OD                           | Tensile Str.                      |
| DC #1 ID                          | DC #2 ID                          | DC #3 ID                          |                                   | HWDP ID                           | 1,021,600                         |
| DC #1 Length                      | DC #2 Length                      | DC #3 Length                      |                                   | HWDP Length                       | HWDP Air Wt.                      |
| <input type="checkbox"/> Spiraled | <input type="checkbox"/> Spiraled | <input type="checkbox"/> Spiraled | <input type="checkbox"/> Spiraled | <input type="checkbox"/> Spiraled | <input type="checkbox"/> Spiraled |
| Wt/ft DC #1                       | Wt/ft DC #2                       | Wt/ft DC #3                       | Buoyancy Factor                   | 0.7861                            |                                   |
| Wt DC #1                          | Wt DC #2                          | Wt DC #3                          | Air weight of BHA                 | 200                               |                                   |
|                                   | WH / RT                           | 200                               | Buoyed weight of BHA              | 157                               |                                   |
| Depth of Interest                 | 18,300                            | 80 %                              | Total length of BHA               | 0'                                |                                   |
| Anticipated Mud weight            | 14.00                             | Block Wt.                         | 180,000                           | Total depth                       | 18,300                            |

|                     | Buoyed Wt | Section-MOP | Pipe needed on last sec        |           |
|---------------------|-----------|-------------|--------------------------------|-----------|
| Enter Casing Length | 6,000     | 150,937     | Weak point in string           | 303,426   |
| Enter Casing Length | 7,233     | 357,085     | Total weight of string         | 693,244   |
| Enter Length DP #2  | 5,067     | 185,065     | Total weight BUC & string      | 873,244   |
| Enter Length DP #3  | 0         | 303,426 #   | Total weight Indicator Reading |           |
| Enter Length DP #4  | 0         |             | With over pull                 | 1,176,670 |

Assumes lowest planned mud weight of 14.0 ppg for section  
WH / RT includes running tool, hanger, and seal assembly



## GoM Exploration Wells

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7" x 9-7/8" Interval



### Attachment 5: Rig Clean-up

#### A. AREAS TO CLEAN

1. *Strongly suggest removing all of the drilling mud from the rig.*
2. *Clean the suction, return, settling, and reserve pits.*
3. *Clean the sand traps.*
4. *Clean the ditches and troughs.*
5. *Clean the trip tank.*
6. *Clean the shaker area including all solids equipment and lines.*
7. *Clean the mixing hoppers.*
8. *Clean the cement unit.*
9. *Clean mud bucket and its related lines.*
10. *Any other pits or equipment that may come into contact with the completion fluid.*

#### B. ITEMS TO FLUSH OUT

1. *All mud pumps and suction lines.*
2. *All centrifugal pumps and lines.*
3. *Chemical and weight mixing lines.*
4. *Lines from the pit room to the trip tank.*
5. *Lines from the rig floor to the trip tank.*
6. *Choke, choke manifold and kill lines.*
7. *Standpipes.*
8. *Degassing and solids control equipment.*
9. *Lines to the cement unit and/or other pumping equipment.*
  10. *Casing fill up line.*
  11. *Lines to and from the filtration line.*
  12. *Take on and return lines to and from the boat.*
  13. *Any other lines that the completion fluid may contact.*

NOTE: A VALVE ON THE END OF THE TAKE ON HOSE, THE END THAT IS ON THE BOAT, IS STRONGLY RECOMMENDED. THE VALVE SHOULD BE ABLE TO BE CLOSED TO PREVENT FLUIDS FROM SPILLING INTO ANY ADJACENT WATERS OR ENVIRONMENTALLY SENSITIVE AREAS.





## GoM Exploration Wells

MC 252 #1ST00BP01 – Macondo Prospect  
7" x 9-7/8" Interval



### Attachment 6: Derrickman's Cleanup Checklist

| <i>EQUIPMENT</i>  | <i>CHECK<br/>(?)</i> | <i>EQUIPMENT</i>                 | <i>CHECK<br/>(?)</i> |
|---|----------------------|----------------------------------|----------------------|
| <i>Pits - (All where Drilling<br/>Fluid will be stored)</i> |                      | <i>Rig Pumps</i>                 |                      |
| <i>Sand Traps</i>   |                      | <i>Choke Lines</i>               |                      |
| <i>Degasser</i>   |                      | <i>Upper Kill Line</i>           |                      |
| <i>Mud Cleaner</i>  |                      | <i>Lower Kill Line</i>           |                      |
| <i>Mud Ditches</i>  |                      | <i>Reverse Circulating Line</i>  |                      |
| <i>Pumps</i>  |                      | <i>Overboard Lines</i>           |                      |
| <i>Header Box</i>   |                      | <i>Pit Gun Lines (All)</i>       |                      |
| <i>Shakers</i>  |                      | <i>Transfer Lines: -</i>         |                      |
| <i>Gumbo</i>  |                      | <i>To &amp; From All Pits</i>    |                      |
| <i>Poor Boy</i>   |                      | <i>To &amp; From Filter Unit</i> |                      |
| <i>Trip Tank</i>  |                      | <i>Diverter</i>                  |                      |
| <i>Trip Tank Fill Line</i>                                  |                      | <i>Equalizing Lines</i>          |                      |
| <i>Trip Tank Overflow Line</i>                              |                      | <i>Lines to Drill Floor</i>      |                      |
| <i>Standpipe Manifold</i>                                   |                      | <i>Hole Fill Pump</i>            |                      |
| <i>Top Drive</i>  |                      | <i>Pop Off Lines</i>             |                      |
| <i>Chiksans</i>   |                      | <i>Bleed Off Lines</i>           |                      |
| <i>Choke Manifold</i>                                       |                      | <i>Kill Pump</i>                 |                      |
| <i>Buffer Tank</i>  |                      | <i>Solids Handling Equip</i>     |                      |
| <i>Choke &amp; Kill Manifold</i>                            |                      | <i>Hose to Boat</i>              |                      |
| <i>Mud Pump Charging Pumps</i>                              |                      | <i>Relief Overboard (Cmt.)</i>   |                      |
| <i>General Service Pump</i>                                 |                      | <i>Mud Cleaner Pump</i>          |                      |
| <i>H.P. Suction Manifold</i>                                |                      |                                  |                      |



GoM Exploration Wells  
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7" x 9-7/8" Interval



Attachment 7: Riser Brush Assembly

MI SWACO

24 Hour Contact  
Broussard 337 837 8655

BHA 1 (Page 1):

Displace & clean riser, jet  
BOP

MI SWACO JOB NUMBER:

Quote #

SCHEMATIC BY:

Courtney Hughes

OPERATOR:

BP

AREA/REGION:

GOM Deepwater

WELL HEAD & NUMBER:

VK 914 #1 ST3

PROJECT NAME:

Nile

REVISION:

1

DATE:

9 Feb 2010

APPROX. SHIP DATE:

15 Mar 2010

WORKSTRING PROVIDER:

DWG. #:

8785

SALES CONTACT:

Neal Brackelmeier

ENGINEER:

MAXIMUM ANGLE:

RIG:

Deepwater Horizon

RIG PHONE:

DISPLACEMENT TYPE:

INITIAL FLUID:

COMPLETION FLUID:

SPECIAL BILLING / COMMENTS:  
Water Depth: 4,992'

Reviewed By: Courtney  
Hughes

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confidential and is the property of MI  
SWACO. It may not be disclosed to  
customers to the extent required by  
existing operations and on the  
understanding that it remains  
confidential. It may not be disclosed  
to third parties without prior written  
consent.

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2010 All Rights Reserved.  
Made in USA 11 1 C

| Casing  | Description   | OD<br>(in) | ID<br>(in) | Tool<br>Length<br>(ft) | Depth from<br>Top of<br>Tool<br>(ft) | Depth from<br>Bottom of<br>Tool<br>(ft) |
|---|---|------------|------------|------------------------|--------------------------------------|---|
| 21,000' Marine Riser<br>I.D. 19.500"<br>O.D. - 5015.00 ft |   |            |            |                        |                                      |   |
|   | 6.625", 27.70# Workstring w/ 6 5/8" FH<br>(Box up)  | 8.500      | 4.500      | 4917.23                | 0.00                                 | 4917.23                                 |
|   | Pus Jct 1 w/<br>6 5/8" F-4 (Box X 6 5/8" FH (Pin)   | 8.500      | 4.500      | 15.00                  | 4917.23                              | 4932.23                                 |
|   | Crossover w/ 6 5/8" F-4 (Box X NC-50 (Pin)  | 8.500      | 2.625      | 3.00                   | 4932.23                              | 4935.23                                 |
|   | 21,000' Riser Tool, Brush Type for<br>2" w/ NC-50 Box Pin (PFB 106)<br>NC-50 (Box X NC-50 (Pin)   | 17.000     | 2.750      | 10.60                  | 4935.23                              | 4945.83                                 |
|   | Crossover w/ NC-50 (Box X 6 5/8" FH (Pin)   | 8.500      | 2.625      | 3.00                   | 4945.83                              | 4948.83                                 |
|   | Pin, Int 1 w/<br>6 5/8" F-4 (Box X 6 5/8" FH (Pin)  | 8.500      | 4.500      | 10.00                  | 4948.83                              | 4958.83                                 |
|   | 6.625", 27.70# Workstring w/ 6 5/8" FH<br>(Box up)  | 8.500      | 4.500      | 90.00                  | 4958.83                              | 5048.83                                 |
|   | Pus Jct 1 w/<br>6 5/8" F-4 (Box X 6 5/8" FH (Pin)   | 8.500      | 4.500      | 10.00                  | 5048.83                              | 5058.83                                 |
|   | Crossover w/ 6 5/8" FH (Box X NC-50 (Pin)   | 8.500      | 2.625      | 3.00                   | 5058.83                              | 5061.83                                 |
|   | 1E 000' Single Action By-Pass Sub,<br>Jetting Type (SAB 105)<br>NC-50 (Box X NC-50 (Pin) [Ball 1 Size<br>OD: 2.375in] [Ball 2 Size OD: 2.500in] | 16.000     | 2.312      | 4.17                   | 5061.83                              | 5066.00                                 |
|   | Mule Shoe w/ NC-50 (Box)  | 6.625      | 2.625      | 1.00                   | 5066.00                              | 5067.00                                 |