bp

MACONDO

Top Kill Procedure

for

MC252-1

Momentum Kill Pumping Operations

Logged in Source Control William Brennan 5/25/10 2100 hr

RPIC APPROVAL: JEFF BRAUN Print Name above — J.M. Braun Sign Above — Date 5/25/10 Time 2300 hrs

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2	5/23/2010	Issued for Use	Pumping Team
REV	DATE	DOCUMENT STATUS	PREPARED BY
PRINT DATE	26-May-10	Document Number	2200-T2-DO-PR-4100

Gulf of Mexico SPU	**MC252-1 Top Kill Procedure** **Momentum Kill Pumping Operations**	bp

AMENDMENT RECORD

Rev	Date	Author	Description	Sec	Page
0	5/17/2010	Keith R. Powell, Mike Mullen, Darrell Loya	Issued for use		
0	5/20/10	Keith R. Powell	Revisions per Peer Review and HAZID.		
0	5/20/10	Wayne Sutton/John Sharadin	Revisions: changed 10,000-psi to 12,000-psi in the 3rd bullet on page 4; Changed "cement" to "mud" in Step 21 on page 9; Added "safety meeting to Step 13 on page 8	1.3 1.4 1.4	4 9 8
0	5/20/10	Wayne Sutton/John Sharadin	Revisions: Cut Steps 27 and 28 and moved them to Well Status/Assumptions; Deleted Note from page 15	1.3, 1.6	5, 27 15
0	5/20/10	Wayne Sutton/John Sharadin	Added note to Attachment 3 and Attachment 4		
0	5/21/10	Eric Beyer	Deleted note referencing FWHP	1.3	4
0	5/21/10	Eric Beyer	Deleted reference to "Wellbore Diagnostic Injections Decision Tree"	1.3	5
1	5/21/10	Eric Beyer	Deleted table referencing mud recipe	1.5	10
1	5/22/10	Keith R. Powell			
1	5/23/2010	Keith R. Powell	Revised Kill Fluid Table to reflect new mud formula	1.5	11
2	5/25/2010	Mike Mullen	Switch kill mud to 16.4-ppg mud from 14.2-ppg mud, corrected all corresponding text and graphs	All	All
2	5/25/2010	Keith R. Powell	Updated with revised Pump Schedule Boundaries (at request of Bill Kirton)	1.5	11

TABLE OF CONTENTS

ATTACHMENTS

1 Momentum Kill Pumping Operations

1.1. Objective

- Load the wellbore with 16.4-ppg Water Based Mud (hydrate inhibited for Macondo conditions).
- Kill the wellbore.
- Prepare for cementing operations.

1.2. High Level Procedure

Note: Well conditions to dictate execution of guide procedure below.

- Reference "Wellbore Diagnostic Injections Decision Tree" to prepare injection plan based on results of the Wellbore Diagnostic Injections.
- Establish ability to inject through Upper Choke and Lower Kill lines with 16.4-ppg Hydrate Inhibited WBM (500-bbls.)
- Inject 16.4-ppg mud, at highest possible rate, with BOP pressure not to exceed that identified in **Attachment 3**.
- Perform injection diagnostics with mud to determine cement pumping procedures.

1.3. Well Status / Assumptions

- Well is under blowout conditions. **Flowing Wellhead Pressure is 3,492-psi** (5/23/10 21:00 hrs) below the Test Ram, and **2,600-psi** (5/16/10) in the Boost Line. Maximum Anticipated Shut-In Pressure in the BOP's is 8,900-psi. Wellbore diagnostics testing from prior operation will confirm the actual wellhead pressure, and should be used to manage this section

Note: Over the past week, BOP pressure has decreased from 3,850-psi to 2,900-psi and Boost Line pressure has varied from 2,600-psi to 2,750-psi.

- **Maximum pressure (P-max) in BOP will be based on volume of mud pumped into the BOP stack and can be seen in Attachment 3**. If maximum pressure is approached in the BOP stack, slow pumps to remain below P-max, if required shut down all pumping operations and monitor well.
- **For this procedure and subsequent pumping procedures into the BOP stack, water-based mud will be venting to sea and seabed through the riser leak points.**
- Assumes all surface lines have been successfully functioned and pressure tested to 12,000-psi surface. Surface nitrogen pop-off valves have been tested at 11,000-psi.
- Assumes all drill pipe, subsea lines and BOP systems have been successfully functioned and pressure tested to 12,000-psi surface (14,100-psi at BOP's).
- All pop-off valve settings may be adjusted based on results from the diagnostic tests in previous section (Pumping vessel, rig floor, and pump trips). All settings will be posted with the pumping commander prior to starting pumping operations.
- Assumes wellbore diagnostic tests have identified acceptable injection paths through the BOP Choke and Kill lines to continue with wellbore pumping operations.

- If only one injection line is available, evaluate the results of the diagnostics injections and current flow conditions from the well to determine if we should proceed with the Momentum Kill Pumping Operations. If continuing with one injection line, modify the procedure as needed to account for only one injection path.

- Assumes that WBM will enter the flow path and exit the leak points in the riser to sea.
- Assumes the source of the flow is accessible from the BOP Choke and Kill lines.
- Confirm the BOP Upper Pipe Rams are CLOSED at this time. If drill pipe stub is inside the BOP stack, and the rams are closed, this will help to prevent the inadvertent dropping of the pipe stub when the Test Rams are opened.
- Confirm the BOP Lower Pipe Rams are CLOSED at this time. If drill pipe stub is inside the BOP stack, and the rams are closed, this will help to prevent the inadvertent dropping of the pipe stub when the Test Rams are opened.
- Ensure several ROVs are equipped with the tools to "hot stab" into the BOP's for pressure verification.
- Assumes data (visual and pressures) being received from ROVs is with 10-second delay.
- Assumes all equipment, from the surface to the BOP, is rated to15,000-psi Working Pressure. Exceptions are as follows:
  - Cement pumps: 10,000-psi (however units will be isolated with 15,000-psi manual valves)
  - The ball valve on the LDIS:
    - LDIS mandrel rating is 15,000-psi.
    - Closed ball is rated to 15,000-psi differential from below.
    - Closed ball is rated to 12,500-psi differential from above.
  - VA and VB flanges on junk shot manifold: 10,000-psi (closed vent valves inboard of the blind flanges are 15,000-psi).
- Wellbore volumes.

9 7/8-in x 7-in "B" annulus volume =			1,078-bbls
9 7/8-in x 5 ½-in volume	5,067-ft to	7,567-ft =	107-bbls
9 7/8-in x 3 ½-in volume	7,567-ft to	8,367-ft =	48-bbls
9 7/8-in casing volume (below DP)	8,367-ft to	12,488-ft =	298-bbls
7-in casing volume	12,488-ft to	18,360-ft =	203-bbls
5 ½-in drill pipe volume (2,500-ft)	5,067-ft to	7,567-ft =	55-bbls
3 ½-in drill pipe volume (800-ft)	7,567 ft to	8,367-ft =	6-bbls
Total system volume =			718-bbls
Total system volume =			**1,795-bbls**

- We will be pumping through two 3-in coflex hoses in parallel. For brief periods - less than an hour - flow per hose will be 25-BPM. Technip advises that this rate is acceptable at the friction drop levels we expect for a period of months..
- Coflexip hoses have a collapse rating of **40-psi.**
- **Maximum pressure (P-max) will be based on Attachments 1-3, and will vary through the pumping operations**. Once pumping starts, 100% of fluid pumped will be assumed to be going downhole and the pressure chart will be followed, as per **Attachment 3**.
- Assumes that the prior operations left the wellbore in the following state:
  - MEG in the BOP Choke and Kill service lines
  - MEG in the Coflexip hoses and manifold
  - 16.4 ppg WBM from the surface pumps to the LDIS
  - LDIS Ball Valve is OPEN
  - Reference Tables 1 and 2 for subsea valve status

Table 1 - "Junk Shot Manifold" & Subsea Valves (Beginning State)

VA	Junk Shot Vent "A"	CLOSED	VB	Junk Shot Vent "B"	CLOSED
V1	Upstream Bypass "A"	**OPEN**	V5	Upstream Bypass A	**OPEN**
V2	Upstream Junk Shot "A"	CLOSED	V6	Upstream Junk Shot "B"	CLOSED
V3	Downstream Junk Shot "A"	CLOSED	V7	Downstream Junk Shot "B"	CLOSED
V4	Downstream Bypass "A"	**OPEN**	V8	Downstream Bypass B	**OPEN**
PV C	Pressure Valve "Choke"	**OPEN**	PV K	Pressure Valve "Kill"	**OPEN**
SVC C	Vent Valve "Choke"	CLOSED	SVC K	Vent Valve "Kill"	CLOSED

Table 2 - BOP Valves (Beginning State)

Choke Line Isolation Valve:	**OPEN**	Kill Line Isolation Valve:	**OPEN**
Outer Gas Vent Line:	CLOSED		
Inner Gas Vent Line:	CLOSED		
Outer Upper Choke Line:	CLOSED	Outer Upper Kill Line:	CLOSED
Inner Upper Choke Line:	**OPEN**	Inner Upper Kill Line:	**OPEN**
Outer Lower Choke Line:	CLOSED	Outer Lower Kill Line:	CLOSED
Inner Lower Choke Line:	**OPEN**	Inner Lower Kill Line:	**OPEN**

Note: Verify an Open valve with gauge tool. If unable to read or get information from required gauges and pressure gauge at surface is not sufficient shut down until proper pressure requirements can be obtained.

1.4. Pre-Job Preparation

1. Be sure to communicate the ROV requirements and roles during SIMOPS meetings prior to the job. See **"4066 - Pumping SIMOPS"** for the ROV roles and responsibilities required for this operation.
2. Depending on the wellbore and reservoir performance, the kill operation could last for several hours or over a day. Pressure may need to be held high for a long duration in order for matrix injection of the fluid to finally kill the well. BOP stack pressure will still need to be managed, although at lower pump rates the danger of lock-up is much reduced.
3. Overpressure prevention is critical to prevent creating an underground exchange.
   a. Pressure decisions will be made using stack pressure, not the surface pumping pressures.
   b. Pump kickouts and pop-offs based on surface readings will not protect the wellhead and weak points from failure.
   c. Pressure readings will need to be constantly monitored by a competent individual ready to shut down all engines at any approach of overpressure or any accelerating increase in pressure.
   d. During the initial high-rate pumping, visually monitor the analogue gauge on the stack (as visibility conditions permit) for pressure surges with an ROV, being ready to stop all HP pumping with a kill switch.
   e. This analogue gauge provides the shortest delay to reading the pressure, so provides the first indication of lockup. Resolution is not fine on this gauge, so monitoring of the actual pressure via the stack bottom acoustic gauge is also required
4. Calibrated subsea continuous reading pressure gauges on the stack, with 24-7 access to the gauges, **is required**. This data is **VITAL** and will be used to make real-time pumping decisions during the Momentum Kill and Cementing operations.
   a. BOP gauges will be observed via ROV acoustic relay to surface
      - Acoustic gauge installed on PTB on 5/19. (Gauge to ROV to surface)
      - As of 5/19, attempting to install acoustic gauge on Boost Line.
   b. Gooseneck gauges will be observed via ROV visual and ROV acoustic signals
   c. Riser gauge is acoustic and (if reading) should be monitored and recorded.
5. Confirm both PTC and PTK gauges are functional and transmitting acoustically to the Q4000 data acquisition system. Deploy ROV(s) to visually confirm and record that the digital readout feature of the gauges is functional, and clearly visible to the ROV.

6. Confirm PTB gauge (below the Lower Pipe Rams) is functional and transmitting through the Yellow POD MUX to the Q4000 data acquisition system.
7. **If real-time delivery of the gauge data is not functioning, immediately inform the Pumping Commander.** Deploy ROV(s) to visually monitor and record the PTC and PTK gauge faces at the Coflexip goosenecks. Deploy an ROV to attempt acquisition of the PTB gauge at the base of the BOP stack.
8. Review ROV videos of the plume at the BOP Riser "kink" during the prior wellbore diagnostics testing. Understand the effects of the WBM discharge on the near wellbore environment. **If the ROVs were unable to visually monitor the gauges, and/or were unable to see the manifold panel, then DO NOT PROCEED.** A meeting must be held to discuss the risks of no visibility, and identify alternate methods for managing the pressure and valve positions.
9. The kill will be initiated at highest possible rates - approximately 50-BPM. Friction needs to be accounted for using hydrated-inhibited 14.2-ppg WBM and 16.4-ppg WBM.
   - Daryl Patterson (BP Fluids Engineer) provided the following viscosities for friction calculations
     - 14.2-ppg WBM: viscosity is 33 cp
     - 16.4-ppg WBM: viscosity is 39 cp
     - 16.4-ppg cement: viscosity is 210 to 215 cp
   - Minimum volumes are as follows:
     - 10,000-bbls of 14.2-ppg WBM
     - 10,000-bbls of 16.4-ppg WBM
   - The pumping operation requires pumps and piping to deliver 1 to 50-bpm for the momentum kill and cementing operations.
10. Fluid hydrostatics at 5,035-ft TVD (Q4000 to ML) are as follows:
    a. Hydrostatic head for 8.6-ppg seawater = 2,260-psi
    b. Hydrostatic head for 14.2-ppg WBM = 3,732-psi
    c. Hydrostatic head for 16.4-ppg WBM = 4,310-psi
11. Review "volume vs. pressure" information, from prior operations, to understand compressibility pumping volumes required to apply pressure to system.
12. Ensure several ROVs are equipped with the tools to "hot stab" into the BOPs for pressure verification. Acoustic relay capability is required.
13. Hold a joint Pre-Job safety meeting and conference call with all operations teams: Q4000, HOS Centerline, HOS Strongline, BJ MV Blue Dolphin, HES MV StimStar III, all ROV vessels, Houston Operations Center, Transocean Discoverer Enterprise, and any other operations affected by the upcoming pumping operations.

14. Assign an individual to track the status of all junk shot manifold valves and record all operations. The number of activations must be tracked to prepare for accumulator recharge.
15. Ensure the Primary and Secondary pumping vessels are "hosed up" to the Q4000 surface frac iron via the Port Forward and Port Aft "hose hangers".
16. As of this procedure release, the MPSV HOS Strongline will be staged near the BJ MV Blue Dolphin, but will not be connected to the vessel in any manner.
17. Should it be necessary to transfer pumping operations to the MV Blue Dolphin, the following is a "sample" operations procedure.
    a. Begin pumping with the MV Blue Dolphin, as directed by the Pumping Commander
    b. The MPSV HOS Centerline will disconnect from the Q4000 and retreat to a safe distance.
    c. The MPSV HOS Strongline will approach to within approximately 50-ft of the MV Blue Dolphin.
    d. A 6-in fluid transfer line will be pulled to the MV Blue Dolphin using the tugger lines on both vessels. The line will be connected to the boarding valve, and the MPSV HOS Strongline will begin transferring fluid at maximum rate.

Note: The Captains of all vessels have agreed that the hose transfer, connection and fluid transfer can occur while the Blue Dolphin is actively pumping.

18. This same procedure can be followed to replenish the MPSV HOS Centerline. The Captains of both HOS vessels have agreed that the hose transfer, connection and fluid transfer can occur while the frac skid equipment on the MPSV Centerline is actively pumping.
19. ESD operations during pumping will entail closing in the well via the outer outlet valve(s). Secondary closure points include the Choke or Kill Isolation valves, followed by valves V4 or V8 on the "junk shot" manifold.
20. Any transfers or switching of kill fluids between vessels may be required for mechanical or supply problems. Specific plans will be developed in a JSA process preceding the activity, and may be done in advance by the crews of the affected vessels.
21. Consider partial BOP plugging with frac or Brinker platelets to increase the psi drop in the BOP, allowing more mud to be pumped down the well.

1.5. Fluids

- Kill fluids:
  - 34,300-bbls of 14.2-ppg WBM (hydrate inhibited for Macondo conditions) to be loaded out as follows:
    - MV HOS Centerline 10,000-bbls
    - MV HOS Strongline 10,000-bbls
    - BJ Blue Dolphin 9,000-bbls
    - StimStar III 5,300-bbls
  - 22,700-bbls of 16.4-ppg WBM (hydrate inhibited for Macondo conditions) to be loaded out as follows:
    - MV HOS Centerline 10,000-bbls
    - MV HOS Strongline 10,000-bbls
    - BJ Blue Dolphin 1,500-bbls
    - StimStar III 1,200-bbls

Note: WBM MUST be hydrate inhibited, and documentation can be found in the Fluid Assurance document located on the share point under the MC252 Intervention Response/interventions team/shared documents/pumping and interventions/ Fluid Assurance for Well Kill Operations for MC252_Rev B.

Mud recipe is as follows:

Fresh Water, bbl	0.632	0.564
Caustic Soda, ppb	0.50	0.50
DUOVIS, ppb	1.50	1.25
Ethylene Glycol, ppb	83.00	74.50
MI BAR, ppb	247.29	376.56

Note: Mud agitation requirements for the HOS vessels are 12 rotations per minute until pumped.

Note: Tests on the 16.4-ppg WBM showed very little settling during a 54-hour test for frac-boat usage.

1.6. Establish Ability to Inject Through Choke and Kill Lines

1. Configure the surface frac iron to pump downhole from the kill vessel through the line run with Halliburton ball droppers. Reference the frac iron valve configuration in **Attachment 4**.

2. Load Halliburton Ball Dropper with fracturing balls, as shown in ball loading plan in **Attachment 5.** The ball drop leg will be isolated prior to pumping.

   This is a contingency operation only and will require an approved MOC to perform any ball dropping procedures operation

3. Notify well relief team, all surface vessels, and ROV operations of intention to pump so they can watch for changes in flow at leak observation locations during injection operations.

4. Reference **"4066 - Pumping SIMOPS"** and deploy all ROVs to operate subsea BOP, manifold valves, and provide visual confirmation of all hydraulically operated valves.

   - Anticipated ROV job assignments **(actuals to be assigned by Document 4066)**:

     a. ROV #1 (Q4000): Monitor LDIS, bottom of riser and Coflexip hoses between riser and manifold.

     b. ROV #2 (Q4000): Monitor manifold condition and valve positions. Monitor Coflexip jumpers between manifold and BOP.

     c. ROV #3 (Support Boat): Operate valves on manifold and monitor Coflexip hoses between riser and manifold.

     d. ROV #4 (Support Boat): Monitor BOP condition and valve positions. Monitor Coflexip jumpers between manifold and BOP.

     e. ROV #5 (Support Boat): Charge Subsea accumulator if volumes, or pressures, get low. Monitor hydraulics on skids.

     f. ROV #6 (Support Boat): Monitor fluid flow from plume #1 (top of BOP stack).

     g. ROV #7 (Support Boat): Monitor Plume #2 (at seabed on top hat operations).

5. Confirm Choke and Kill line isolation valves are **OPEN** with function 37-O, observe valves are open with ROV.

6. Confirm Outer Gas Vent valve is **CLOSED** with function 28-C. Confirm valve is closed with ROV.

7. Confirm Inner Gas Vent valve is **OPEN** with function 25-O. Confirm valve is open with ROV.

8. Confirm Outer Upper Choke valve is **CLOSED** with function 92-C. Confirm valve is closed with ROV.

9. Confirm Inner Upper Choke valve is **OPEN** with function 91-O. Confirm valve is open with ROV.

10. Confirm Outer Lower Choke valve is **CLOSED** with function 96-C. Confirm valve is closed with ROV.

11. Confirm Inner Lower Choke valve is **OPEN** with function 97-O. Confirm valve is open with ROV.

12. Confirm Outer Upper Kill valve is **CLOSED** with function 84-C. Confirm valve is closed with ROV.

13. Confirm Inner Upper Kill valve is **OPEN** with function 83-O. Confirm valve is open with ROV.
14. Confirm Outer Lower Kill valve is **CLOSED** with function 88-C. Confirm valve is closed with ROV.
15. Confirm Inner Lower Kill valve is **OPEN** with function 89-O. Confirm valve is open with ROV.
16. Confirm SVC C and SVC K are **CLOSED** on the Goosenecks.
17. Confirm PV C and PV K are **OPEN** on the Goosenecks.
18. Confirm both PTC and PTK gauges are functional and transmitting acoustically to the Q4000's or OI3's data acquisition system.
19. Confirm PTB gauge (below the Lower Pipe Rams) is functional and transmitting through the assigned ROV to the Q4000 or OI3's data acquisition system.

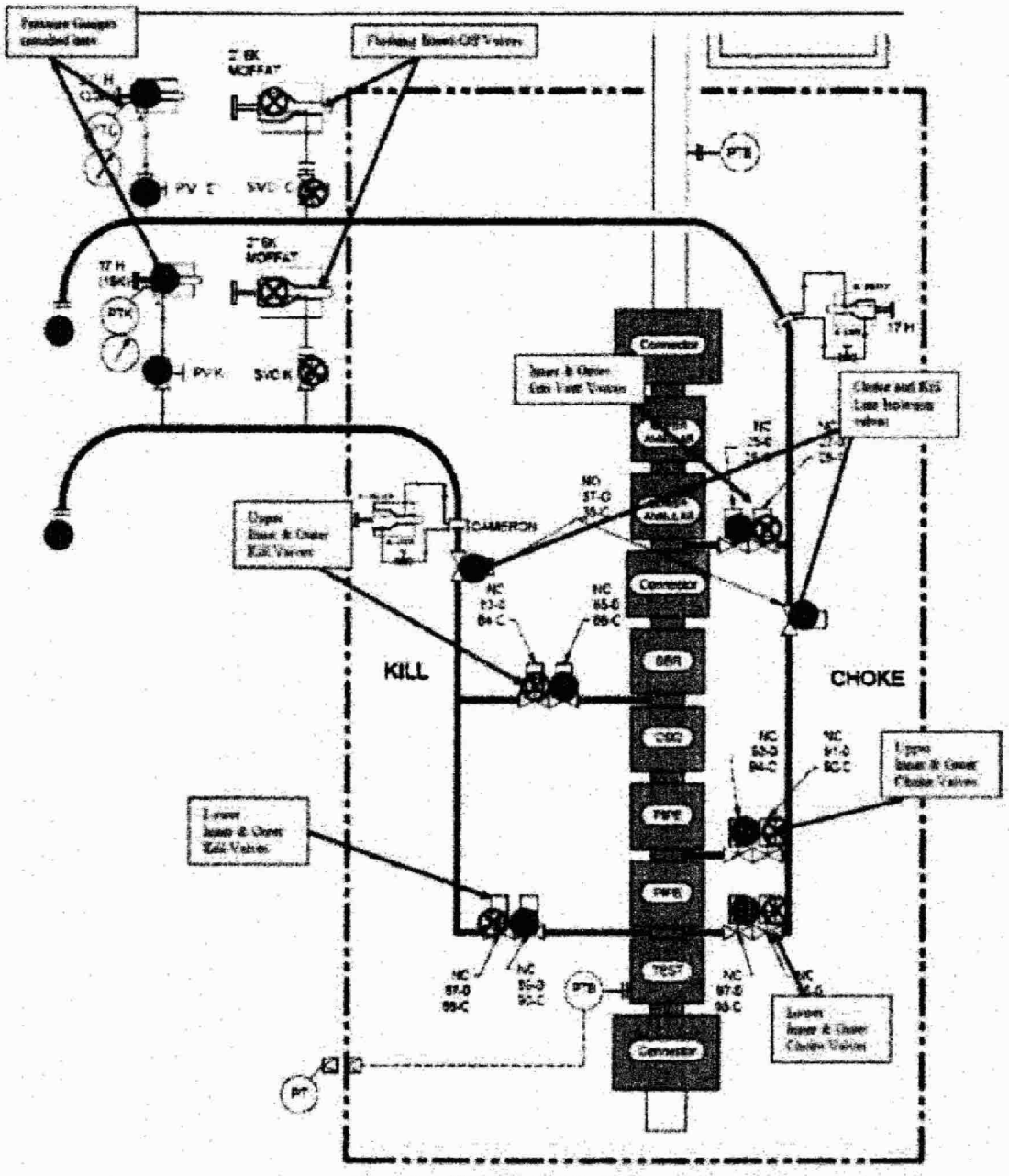


Figure 1: BOP Configuration

20. Confirm Junk Shot manifold confirm valves V1, V4, V5 and V8 are Open.
21. Confirm Junk shot manifold confirm valves V2, V3, V6 and V7 are closed.

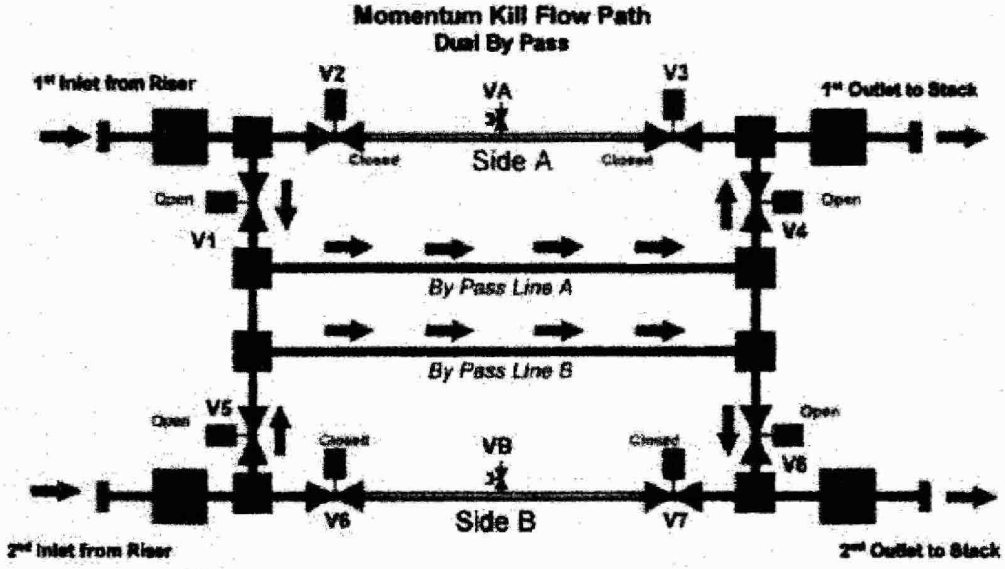


Figure 2: Junk Shot Manifold

22. Confirm the LDIS RIV valve is Open.
23. Line up the primary pumping vessel to pump downhole (either with the H.O.S. frac skid package, BJ or Halliburton frac boats).
24. Confirm with all field Team Leaders that all teams are ready to commence.

    All teams **MUST** report their vessel's completion of preparatory activities, including muster drills, true safety stand downs, and reviews of egress plans.
25. Inform HOS Centerline Cementer to begin mixing cement spacers. 2 to 4-hours will be required to mix 2 spacers and have ready to commence cementing operations as soon as Momentum Kill is completed.
26. Apply 500-psi surface pressure to pressurize the surface/subsea system to 500-psi over the hydrostatic column of 16.4-ppg mud. (Confirm the current pressure with pressure gauge PTB (below the BOP Lower Pipe Rams).

Note: During a recent Gamma Ray survey of the BOP stack, the results were inconclusive as to whether the BOP Rams were actually closed. As a result, Steps 27 through 33 are subject to change based on the results of the prior Diagnostics tests.

27. Open the BOP **Test Rams** at this time.
28. Confirm Test Rams are **OPEN**.
29. Confirm all pump operators are ready to begin the pumping operations.

Note: A full column of 16.4-ppg provides approximately 4,310-psi hydrostatic at the BOPs.

30. Prepare to bring the first pump online with the primary pumping vessel, once the pressure on drill pipe starts falling. Target injection of 2-bpm, with 16.4-ppg WBM, to ensure all lines are clear.
31. **OPEN** Outer Lower Choke valve with function 95-0. Confirm valve is open with ROV.
32. **OPEN** Outer Lower Kill valve with function 87-0. Confirm valve is open with ROV.

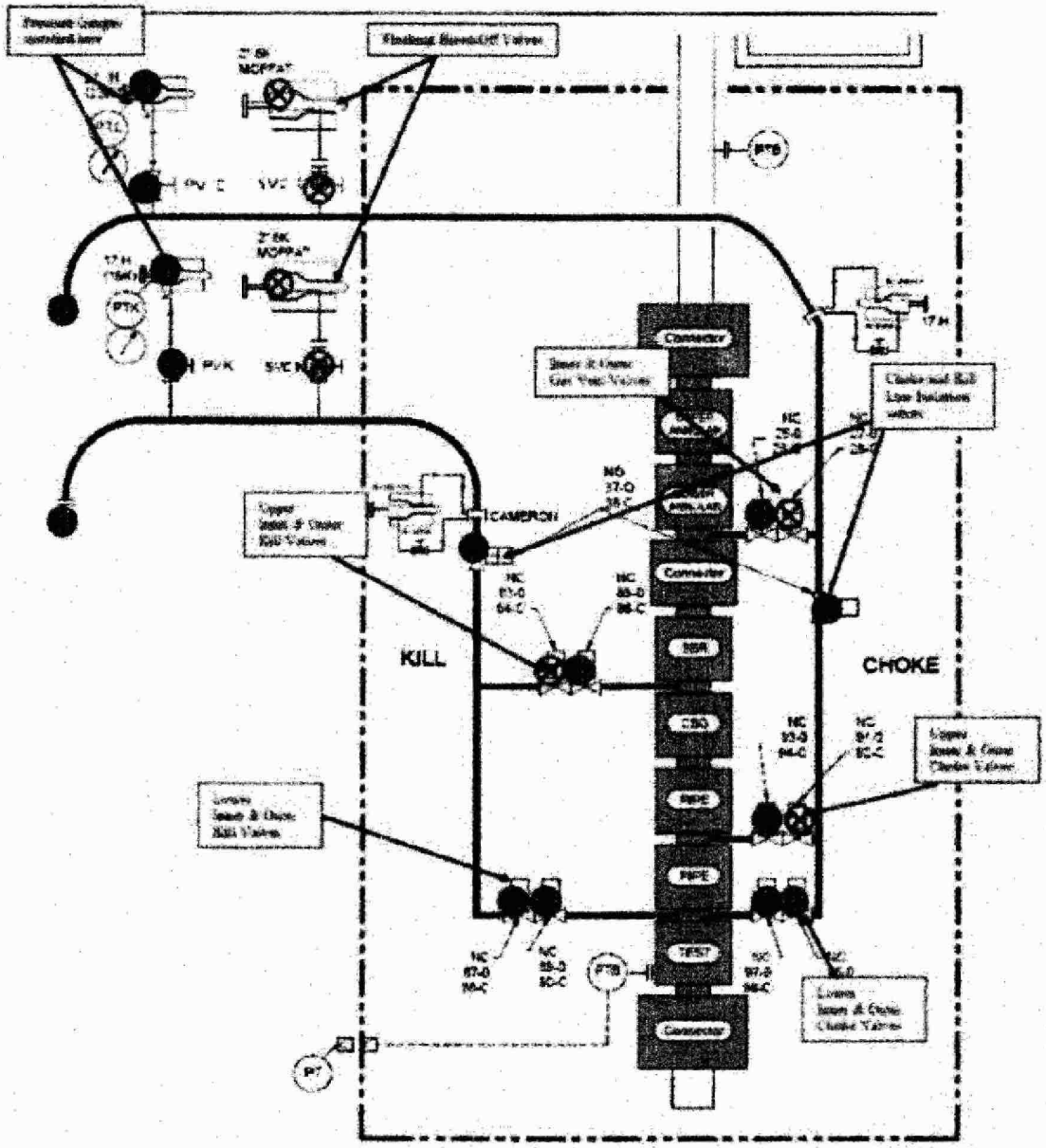


Figure 3: BOP Configuration during kill operations (pending Diagnostic results)

33. Ramp up to the highest possible rate (target rate 50-BPM) within 2 to 3-minutes. **DO NOT exceed the BOP stack pressures identified in Attachment 3.**

    Utilize surface-readout pressure data from PTB, and acoustic relayed pressure data from PTC and PTK gauges. Utilize the analogue gauges, during the high-rate pumping operations, to protect against "system lock-up".

34. Pump 16.4-ppg WBM (See **Attachment 3** regarding volume pumped vs. BOP pressure limit prepared by Pattillo and Miller)

35. **Maintain BOP pressure at, or below, pressure ramp chart seen in Attachment 3.**

36. Utilize surface-readout pressure data from PTB, and acoustic relayed pressure data from PTC and PTK gauges.

37. Slow pump rate as required to **keep BOP pressure at, or below levels seen in Attachment 3 pump pressure schedule.**

    Utilize surface-readout pressure data from PTB, and acoustic relayed pressure data from PTC and PTK gauges. Utilize the analogue gauges, during the high-rate pumping operations, to protect against "system lock-up".

38. Watch for the following during kill pumping:

    a. Pressure and flow at riser kink - check for possible erosion at the BOP restriction. **Watch for unfolding, or mechanical failure of the riser. Be prepared to quickly egress ROVs to protect from impact / crushing.**

    b. Be prepared to immediately shut down pumping, due to rapidly increasing pressures when:

       - The gas phase in the well is compressed and reverts to a liquid phase.
       - The kill mud enters the 9 7/8-in x 7-in annulus.
       - The mud reaches a down-hole restriction.

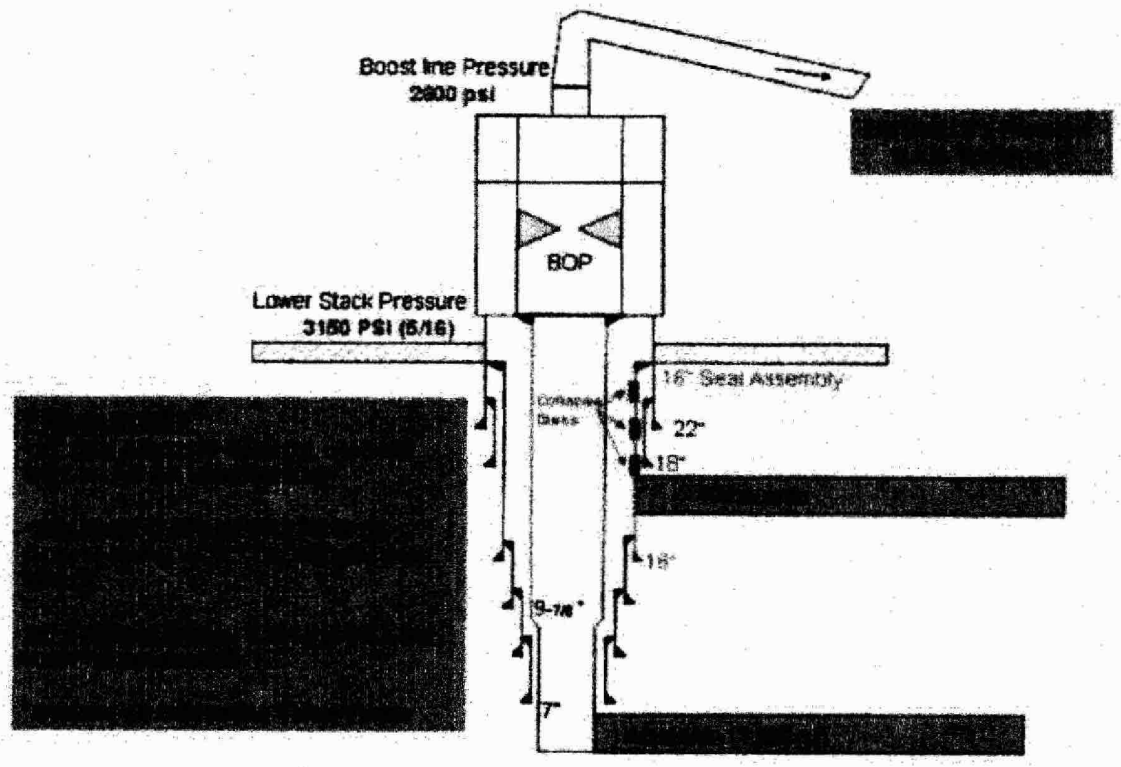
    c. During the kill pumping, identify the point at which the gain in hydrostatic pressures begins to exceed the formation pressure and initiate fracturing.

    d. If, during the kill, it becomes apparent that burst disks have failed and an underground exchange has occurred, be prepared to pump 14.2-ppg mud into the well for an extended period.

39. Once the 16.4-ppg WBM has reached well TD, reduce the pump rate to 20-bpm, maintaining positive surface pressure to prevent the kill fluid from running away.

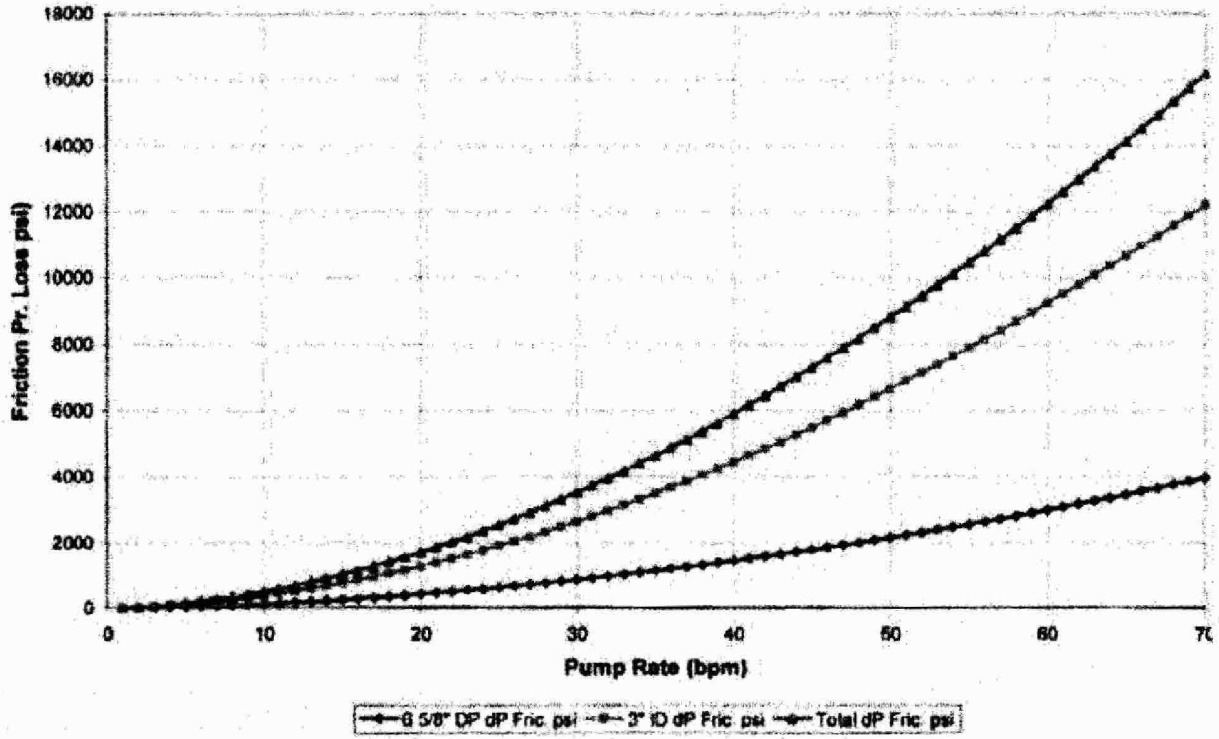
40. If Kill fluid (16.4-ppg mud) begins to run away (returns at BOPs stop) at any time during the kill operations be prepared to switch to 14.2-ppg mud and pump as required to kill well. If the switch to 14.2-ppg mud occurs inform cementing team of the switch to 14.2-ppg mud.

Attachment 1: MC 252 System Pressure Limitations

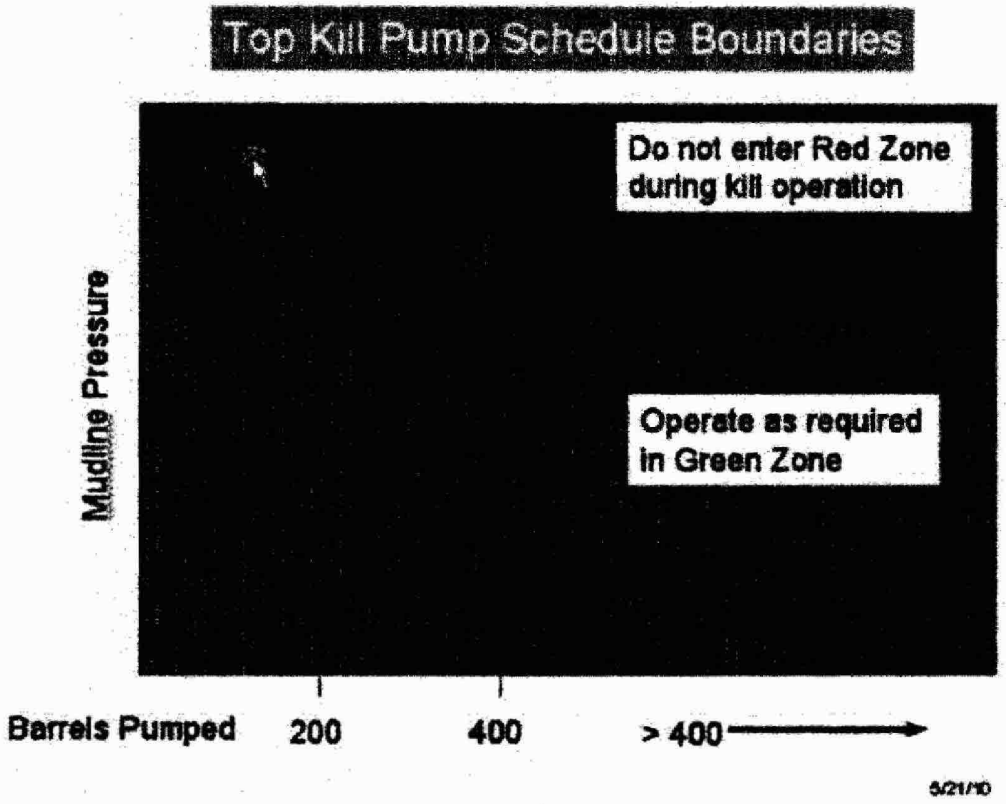


Attachment 2: Friction Pressure Losses Through Subsea System to BOP's

dP Friction v. Pump Rate - 16.4 ppg Mud - 1 Hose



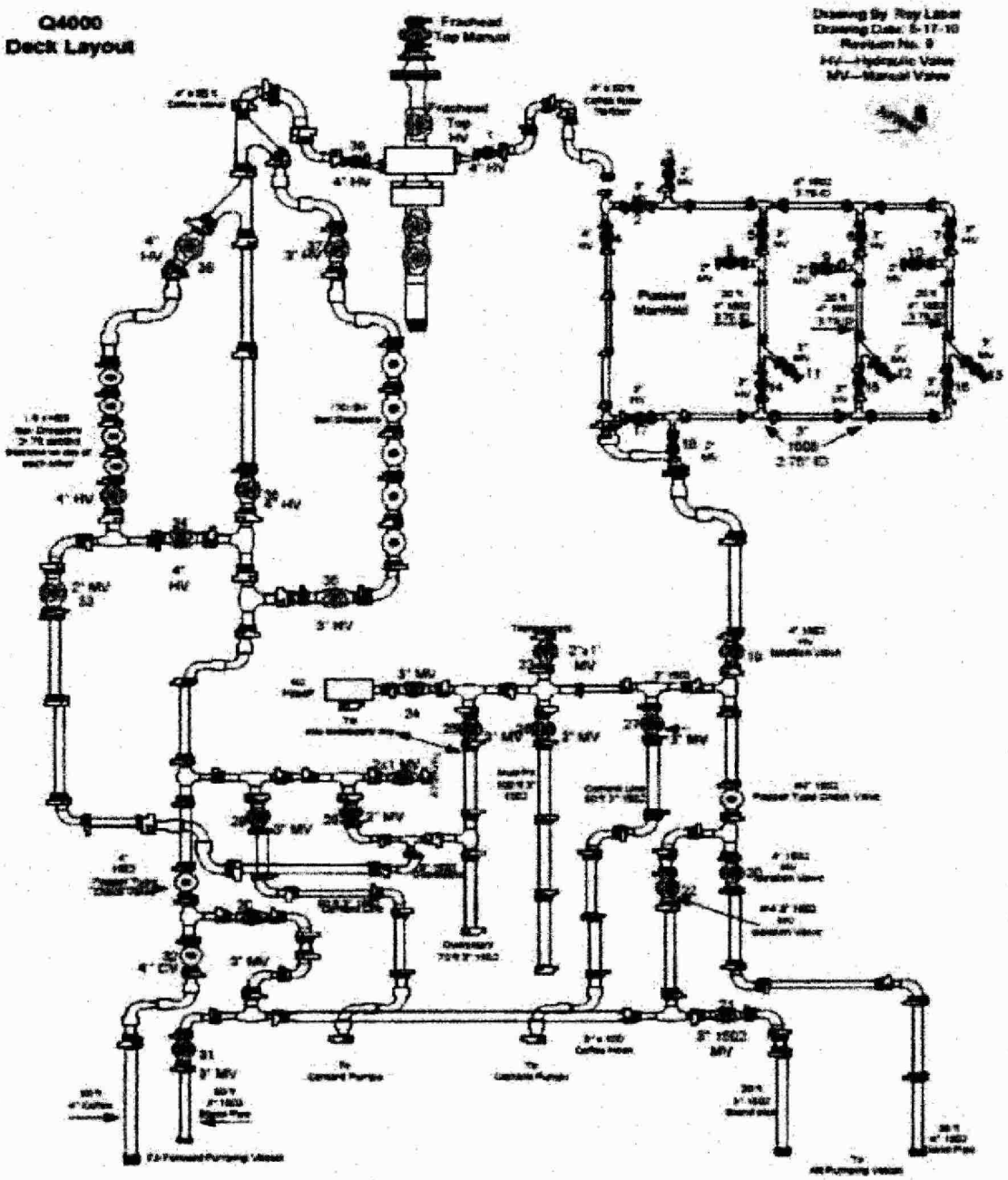
Attachment 3: Maximum Mudline Pressure for Momentum Kill (16.4-ppg mud only)



Actual pressures must take into account gauge accuracies for above chart

Gulf of Mexico SPU	MC252-1 Top Kill Procedure Momentum Kill Pumping Operations	bp

Attachment 4: Supreme Rig Up Iron



Attachment 5: Halliburton Ball Drop Loading Sequence

Ball Dropping and Loading Sequence

	Company	Tube	Quantity Loaded	Quantity Dropped	Ball Size	Quantity Dropped	Ball Size
Small Drop 1st Drop		1	1	1	1.75		
		2	1	1	1.75		
		3	1	1	1.75		
		4	1	1	1.75		
		5	1	1	1.75		
		6	1	1	1.75		
		7					
		8					
		1	150	0	1		
		2	150	0	0.875		
		3	150	0	0.625		

Reload Halliburton ball droppers

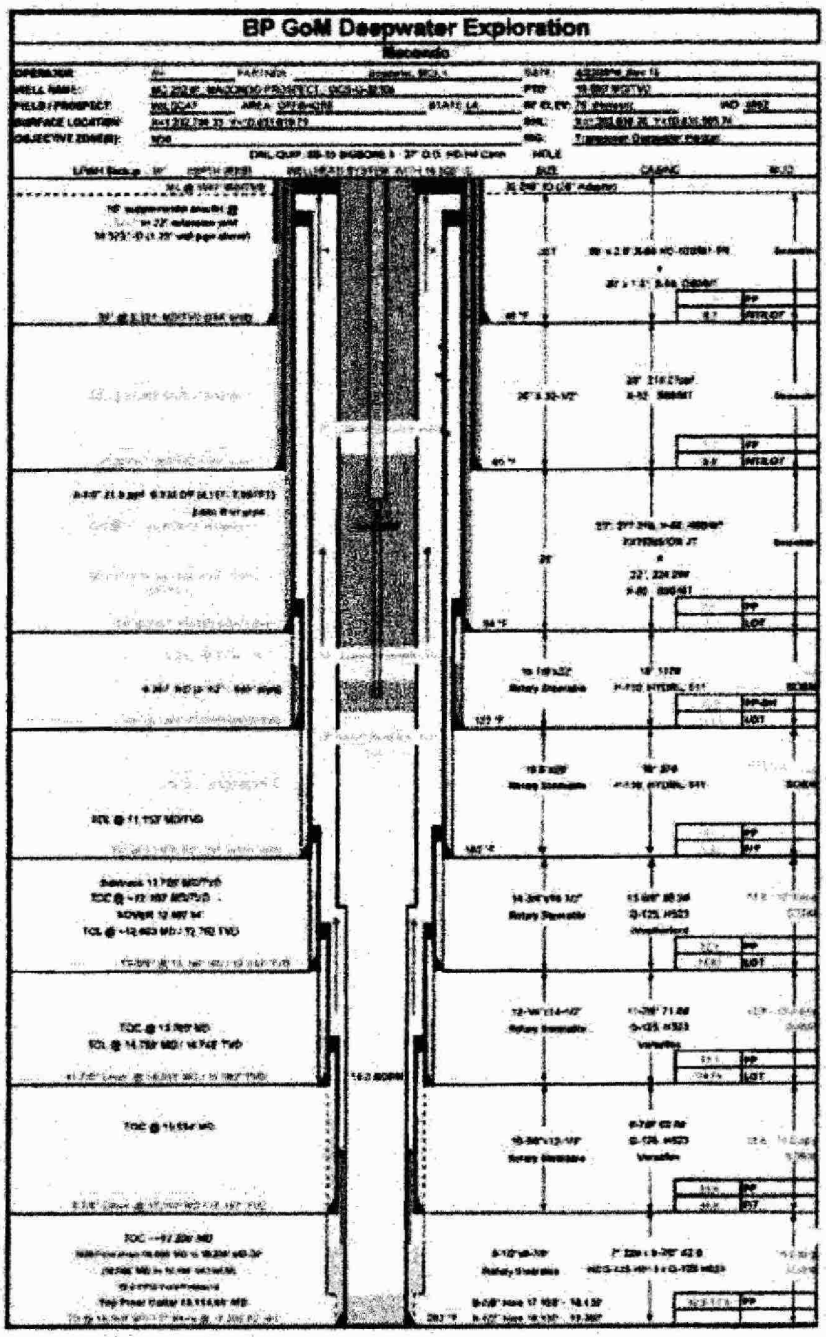
Medium Drop 2nd Drop		1	2	1	1.25	1	1.75
		2	2	1	1.25	1	1.75
		3	2	1	1.25	1	1.75
		4	2	1	1.25	1	1.75
		5	2	1	1.25	1	1.75
		6	2	1	1.25	1	1.75
		7	3	3	1.25		
		8	3	3	1.25		
		1	150	0	1		
		2	150	24	0.875		
		3	150	0	0.625		

Reload Halliburton Ball Droppers

Large Drop 3rd Drop		1	3	3	1.75		
		2	3	3	1.75		
		3	3	3	1.75		
		4	3	3	1.75		
		5	6	6	1.25		
		6	6	6	1.25		
		7	6	6	1.25		
		8	6	6	1.25		
		1	150	0	1		
		2	126	96	0.875		
		3	150	0	0.625		

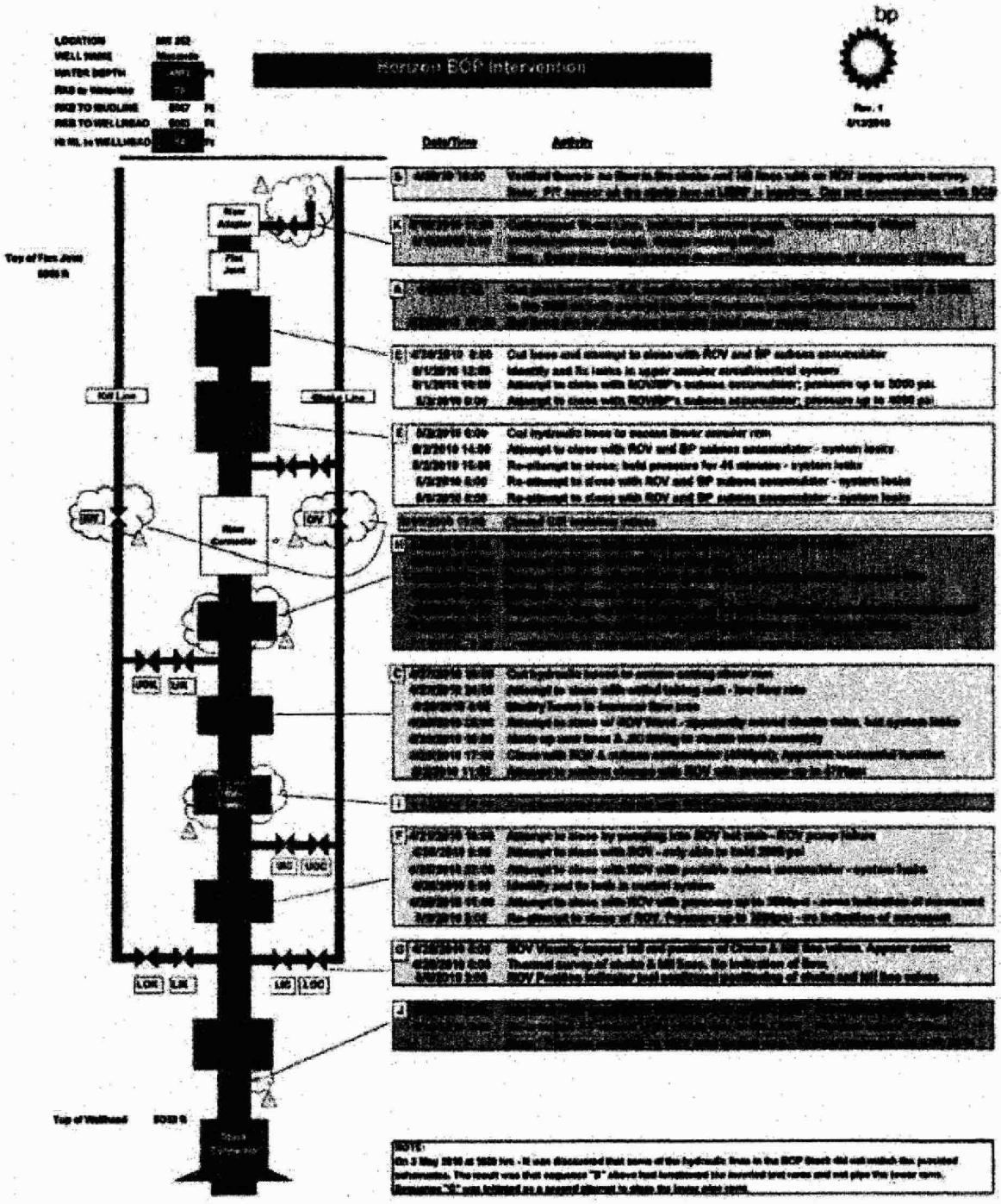
Gulf of Mexico SPU	MC252-1 Top Kill Procedure Momentum Kill Pumping Operations	bp

Attachment 6: MC 252 31 - Wellbore Schematic



Gulf of Mexico SPU	MC252-1 Top Kill Procedure Momentum Kill Pumping Operations	bp

Attachment 7: MC 252 #1 - Horizon BOP Stack Status



Attachment 8: Contingency Fiber LCM Pill Formulation

Tech Note: Contingency Fiber LCM Pill Formulation

- 10-bbl pill Formulation.
- 8-bbls of 14.2-ppg Mud
- 15-ppb Magma Fiber 3 sacks.
- 15-ppb Vinseal C 3 sacks.
- 10-ppb Super sweep 2 sacks.
- 5-gals Hyposeal 528b 1 can.

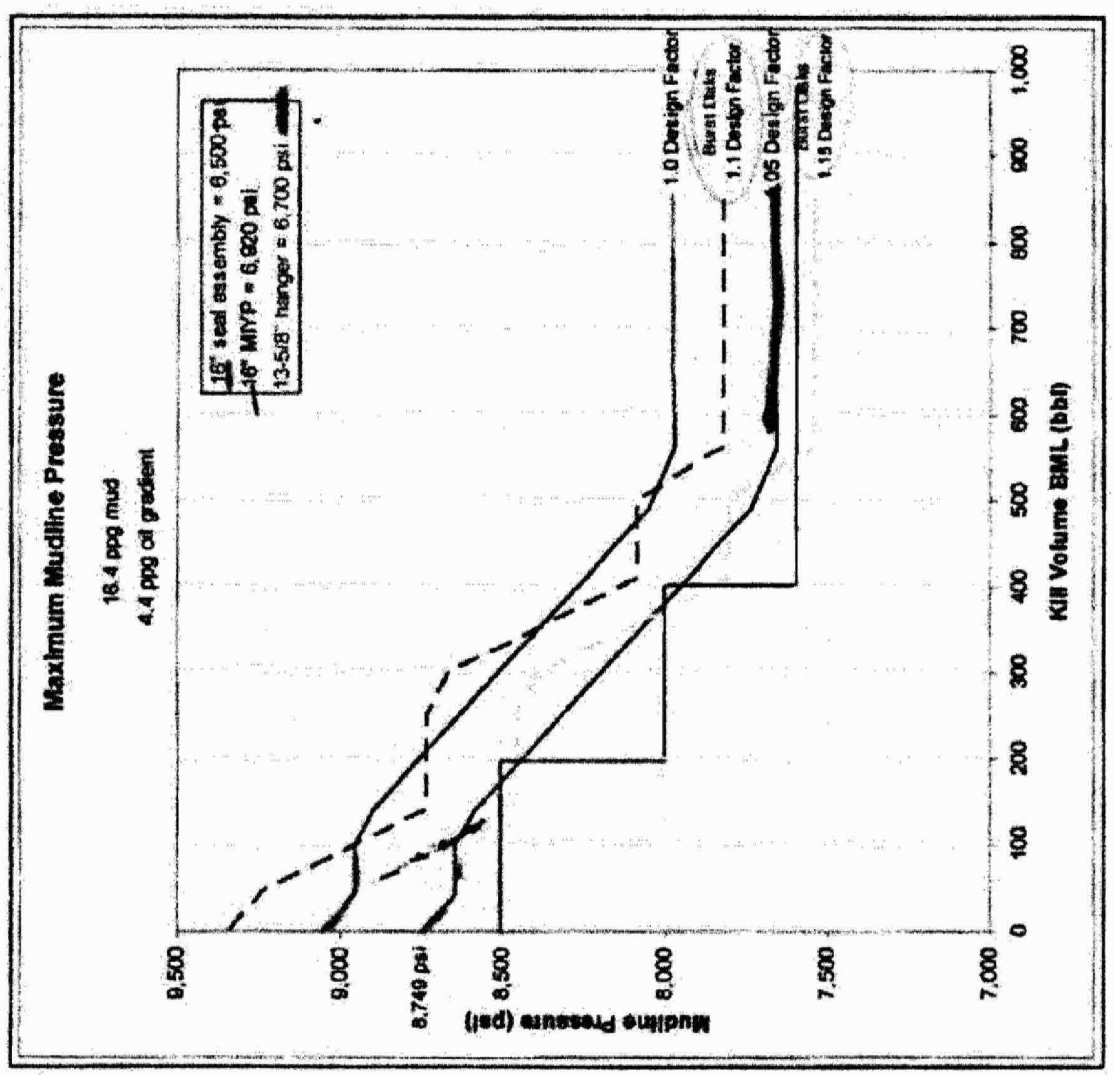
Attachment 9: Formulation and Properties of Mud

Formulation 1 – 14.2-ppg WBM
Formulation 2 – 16.4-ppg WBM

Page 2
ID Code No. 100513F 001
Lab Master No. 20101479

Fluid Formulation	1	2
10 ppg brine, bbl	0.632	0.584
Caustic Soda, ppb	0.50	0.50
DUOVIS, ppb	1.50	1.25
Ethylene glycol, ppb	63.0	74.50
MI BAR, ppb	247.29	376.56

Mud Properties	1	2
Mud Weight, ppg	14.2	16.4
Rheo Temp, °F	120	120
600 rpm	59	98
300 rpm	45	70
200 rpm	34	55
100 rpm	25	38
6 rpm	15	25
3 rpm	14	24
PV, cps	14	28
YP, lbs/100 ft²	31	42
10 Second Gel	12	30
10 Minute Gel	47	74


Maximum Mudline Pressure
18.4 ppg mud
4.4 ppg oil gradient
16" seal assembly = 6,500 psi
16" MIYP = 6,920 psi
13-5/8" hanger = 6,700 psi
1.0 Design Factor
Burst Disk
1.1 Design Factor
.05 Design Factor
Burst Disk
1.18 Design Factor
8,749 psi
Mudline Pressure (psi)
Kill Volume BML (bbl)
9,500
9,000
8,500
8,000
7,500
7,000
0
100
200
300
400
500
600
700
800
900
1,000

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Special Instructions	MC-252 Incident				
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Document Number	2200-T2-DO-PR-4100		Revision 2		
Ref. Hazid Doc. Number	LS-RP-4100		Revision		
Document Title	Momentum Kill Pumping Operations				
Final Review Date	May 2010				
Reason for Issue (check as applicable)	New Document	Revised Document	Obsolete Document		
		X			
Document Sign Off					
	Print Name/Title	Signature	Date		
Custodian/Owner(s)	Mike Mullen/Keith R. Powell		25-MAY-10		
Reviewer(s)	Mike Fowler/John Sharadin Pumping Team Lead		25 May 2010		
	George Gray Operations Superintendent		25 May 2010		
	Bill Kelly or John Smart TKPT Team Lead		25MAY10		
	Mike Byrd or John Hughes Manager BOP/ROV ops		25 May 10		
	Charlie Holt Operations Manager		25MAY10		
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Authorizer	Mark Patteson Project Manager		25/5/10		
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