U.S. Department of the Interior
Minerals Management Service (MMS)

OMB Control Number 1010-0141
OMB Approval Expires 11/30/2011

Form MMS 123A/123S - Electronic Version

Application for Bypass

Lease G32306 **Area/Block** MC 252 **Well Name** 001 **ST** 00 **BP** 01 **Well Type** Exploration
Application Status Approved **Operator** 02481 BP Exploration & Production Inc.

Pay.gov Amount: $1,959 **Agency Tracking ID:** EWL-ABP-9391 **Pay.gov Tracking ID:** 250HEKHB

General Well Information

API Number 608174116901	**Approval Date** 03/15/2010	**Approved By** Frank Patton
Date of Request 03/15/2010	**Req Spud Date** 03/16/2010	**Kickoff Point**
Water Depth (ft.) 4992	**Drive Size (in)** 36	**Mineral Code** Hydrocarbon
RKB Elevation 75	**Drive Depth (ft.)** 5361	**Subsea BOP** Yes
Verbal Approval Date	**Verbal Approval By**	

Proposed Well Location

Surface Location

LEASE (OCS) G32306	**Area/Block** MC 252	**Authority** Federal Lease

Entered NAD 27 Data	Calculated NAD 27 Departures	Calculated NAD 27 X-Y Coordinates
Lat: 28.73836889	N 6857	**X** 1202802.892336
Lon: -88.36593389	E 1037	**Y** 10431702.916855

Surface Plan **Plan Lease (OCS)** **Area/Block**

Bottom Location

LEASE (OCS) G32306	**Area/Block** MC 252

Entered NAD 27 Data	Calculated NAD 27 Departures	Calculated NAD 27 X-Y Coordinates
Lat: 28.73836889	N 6857	**X** 1202802.892336
Lon: -88.36593389	E 1037	**Y** 10431702.916855

Bottom Plan **Plan Lease (OCS)** **Area/Block**

Approval Comments All cautions/conditions of approval for the original APD should be observed.

EXHIBIT # 1554
WIT:

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Geologic Information

H2S Designation Absent	**H2S TVD**

Anticipated Geologic Markers

Name	Top MD
Catinaster coalitus	13145
Discoaster kugleri	14153
Cyclicargolithus floridanus	17481
Globorotalia peripheroronda	18400
Sphenolithus heteromorphus	19120
Discoaster petaliformis	19594

Rig Information

RIG SPECIFICATIONS		**ANCHORS**	No
Rig Name	T.O. DEEPWATER HORIZON		
Type	SEMISUBMERSIBLE	**ID Number**	46428
Function	DRILLING	**Constucted Year**	2001
Shipyard	HYUNDAI	**Refurbished Year**	
RATED DEPTHS			
Water Depth	10000	**Drill Depth**	35000
CERTIFICATES			
ABS/DNV	02/28/2011	**Coast Guard**	07/27/2011
SAFE WELDING AREA			
Approval Date	09/26/2001	**District**	1
Remarks			

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Number	Question	Response	Response Text
1	Will you maintain quantities of mud and mud material (including weight materials and additives) sufficient to raise the entire system mud weight 1/2	YES	
2	If hydrocarbon-based drilling fluids were used, is the drilling rig outfitted for zero discharge, and will zero discharge procedures be followed?	N/A	
3	If drilling the shallow casings strings riserless, will you maintain kill weight mud on the rig and monitor the wellbore with an ROV to ensure that it i	N/A	
4	If requesting a waiver of the conductor casing, have you submitted a log to MMS G&G that is with in 500 feet of the proposed bottom hole location for th	N/A	
5	Will the proposed operation be covered by an EPA Discharge Permit? (please provide permit number in comments for this question)	YES	Number not yet assigned
6	Will all wells in the well bay and related production equipment be shut-in when moving on to or off of an offshore platform, or from well to well on the plat	N/A	

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Permit Attachments

File Type	File Description	Status

Required Attachments

pdf	Drilling prognosis and summary of drilling, cementing, and mud processes	Attached

Optional/Supplemental Attachments

pdf	Directional Plan	Attached
pdf	Wellbore Diagram	Attached
pdf	Pore Pressure Graph	Attached
pdf	Engineering Calculations	Attached

Contacts Information

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Well Design Information

Interval Number 1 **Type** Casing **Name** Conductor

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	28.000	218.0	X-52	2437	952	6217	6217	8.6

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	32.500	Type	No Preventers	Annular Test (psi)	0
Mud Weight (ppg)	8.6	Size (in)	N/A	BOP/Diverter Test (psi)	0
Mud Type Code	Gelled Sea Water	Wellhead Rating (psi)	0	Test Fluid Weight (ppg)	0.0
Fracture Gradient (ppg)	9.8	Annular Rating (psi)	0	Casing/Liner Test (psi)	0
Liner Top Depth (ft)		BOP/Diverter Rating (psi)	0	Formation Test (ppg)	0.0
Cement Volume (cu ft)	4636				

Interval Number 2 **Type** Casing **Name** Surface

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	22.000	277.0	X-80	7955	6670	5227	5227	8.6
2	22.000	224.0	X-80	6363	3876	7937	7937	9.3

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	26.000	Type	Blowout	Annular Test (psi)	5000
Mud Weight (ppg)	9.5	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Water Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	8.6
Fracture Gradient (ppg)	10.5	Annular Rating (psi)	10000	Casing/Liner Test (psi)	3400
Liner Top Depth (ft)		BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	10.5
Cement Volume (cu ft)	6301				

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Interval Number 3 **Type** Liner **Name** Intermediate

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	18.000	117.0	P-110	6680	2110	8969	8969	10.1

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	22.000	Type	Blowout	Annular Test (psi)	3500
Mud Weight (ppg)	10.2	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Synthetic Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	10.2
Fracture Gradient (ppg)	11.8	Annular Rating (psi)	10000	Casing/Liner Test (psi)	3000
Liner Top Depth (ft)	7489.0	BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	11.8
Cement Volume (cu ft)	993				

Interval Number 4 **Type** Casing **Name** Intermediate

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	16.000	97.0	P-110	6920	2340	11585	11585	11.0

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	20.000	Type	Blowout	Annular Test (psi)	3500
Mud Weight (ppg)	11.2	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Synthetic Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	11.6
Fracture Gradient (ppg)	13.0	Annular Rating (psi)	10000	Casing/Liner Test (psi)	3600
Liner Top Depth (ft)		BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	13.0
Cement Volume (cu ft)	1120				

Interval Number 5 **Type** Liner **Name** Intermediate

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	13.625	88.2	Q-125	10030	4800	13100	13100	11.7

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	16.000	Type	Blowout	Annular Test (psi)	3500
Mud Weight (ppg)	11.9	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Synthetic Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	11.9
Fracture Gradient (ppg)	13.8	Annular Rating (psi)	10000	Casing/Liner Test (psi)	2700
Liner Top Depth (ft)	11385.0	BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	14.9
Cement Volume (cu ft)	410				

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Interval Number 6 **Type** Liner **Name** Intermediate

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1	11.875	71.8	Q-125	10720	5630	16000	16000	13.1

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	14.500	Type	Blowout	Annular Test (psi)	3500
Mud Weight (ppg)	13.3	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Synthetic Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	13.3
Fracture Gradient (ppg)	14.9	Annular Rating (psi)	10000	Casing/Liner Test (psi)	1800
Liner Top Depth (ft)	12900.0	BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	14.9
Cement Volume (cu ft)	340				

Interval Number 7 **Type** Open Hole **Name** Open Hole

Section Number	Casing Size (in)	Casing Weight (lb/ft)	Casing Grade	Burst Rating	Collapse Rating (psi)	Depth (ft) MD	Depth (ft) TVD	Pore Pressure (ppg)
1						20200	20200	14.0

GENERAL INFORMATION		PREVENTER INFORMATION		TEST INFORMATION	
Hole Size (in)	12.250	Type	Blowout	Annular Test (psi)	3500
Mud Weight (ppg)	14.4	Size (in)	18.75	BOP/Diverter Test (psi)	6500
Mud Type Code	Synthetic Base	Wellhead Rating (psi)	15000	Test Fluid Weight (ppg)	0.0
Fracture Gradient (ppg)	16.1	Annular Rating (psi)	10000	Casing/Liner Test (psi)	0
Liner Top Depth (ft)		BOP/Diverter Rating (psi)	15000	Formation Test (ppg)	0.0
Cement Volume (cu ft)					

PAPERWORK REDUCTION ACT OF 1995 (PRA) STATEMENT: The PRA (44 U.S.C. 3501 et seq. Requires us to inform you that we collect this information to obtain knowledge of equipment and procedures to be used in drilling operations. MMS uses the information to evaluate and approve or disapprove the adequacy of the equipment and/or procedures to safely perform the proposed drilling operation. Responses are mandatory (43 U.S.C. 1334). Proprietary data are covered under 30 CFR 250.196. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. Public reporting burden for this form is estimated to average 27 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form for the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1849

Prospect Overview

Macondo is a moderate depth Miocene prospect in the Mississippi Canyon area. The prospect is located entirely outside of any salt body. It is located approximately 24 miles north of BP's Isabela discovery which was drilled in MC 562 during 2006. The primary target for the Macondo prospect is the M56, which was the same as Isabela. The target depth for Macondo is approximately 18,400'. The well will be drilled to a TD of 20,200' to test the older Miocene section below the targeted M56. Seismic data quality over this prospect is very good since there is no salt involved. The well will be drilled as a vertical hole from the "A" location as permitted in the approved Exploration Plan for MC 252.

Drilling Plan Summary

The Macondo well was orginally drilled to 9090' with the Transocean Marianas rig to a depth of 9090 ft md/tvd and 18" liner was set at 8,983 ft md/tvd depths referenced to Marianas rig.

The Transocean Deepwater Horizon was then mobilized to finish drilling the well. The Deepwater Horizon drilled to a total depth of 12,350 ft md/tvd when lost circulation began and the 16" casing was then set off bottom at 11,585 md/tvd. The 13-5/8" interval was then drilled to 13,305 ft md/tvd where a kick was taken and the BHA became packed off and stuck and could not be removed. The BHA was severed at 12,100 ft md/tvd and wel kill operations commenced.

The plan forward is to cement the original hole from 12,100 ft md/tvd up to the 16" casing shoe at 11,585 ft md/tvd so that a bypass operation can be commenced without incurring the hole problems that were in the original hole. The well will be bypassed at the 16" shoe depth and will be approximately 100 ft distance from the original well at total depth.

A 14-3/4" x 16" hole will be used to bypass and drill with SOBM to 13,100' md/tvd. After POOH, the 13-5/8" liner will be run and cemented in place with Halliburton Class-H lead and tail slurries. A Leak-off Test (LOT) will be performed after drilling out. The estimated fracture gradient is ~13.8 ppg EMW. This setting depth should give sufficient fracture gradient to achieve drilling to the next liner setting depth of 16,000 ft md/tvd.

A 12-1/4"x 14-1/2" hole will be drilled to 16,000' md/tvd. After POOH, the 11-7/8" liner will be run and cemented in place with Halliburton Class-H lead and tail slurries. A Leak-off Test (LOT) will be performed after drilling out. The estimated fracture gradient is ~14.9 ppg EMW. This setting depth should give sufficient fracture gradient to achieve drilling to total well depth of 20,200' md/tvd.

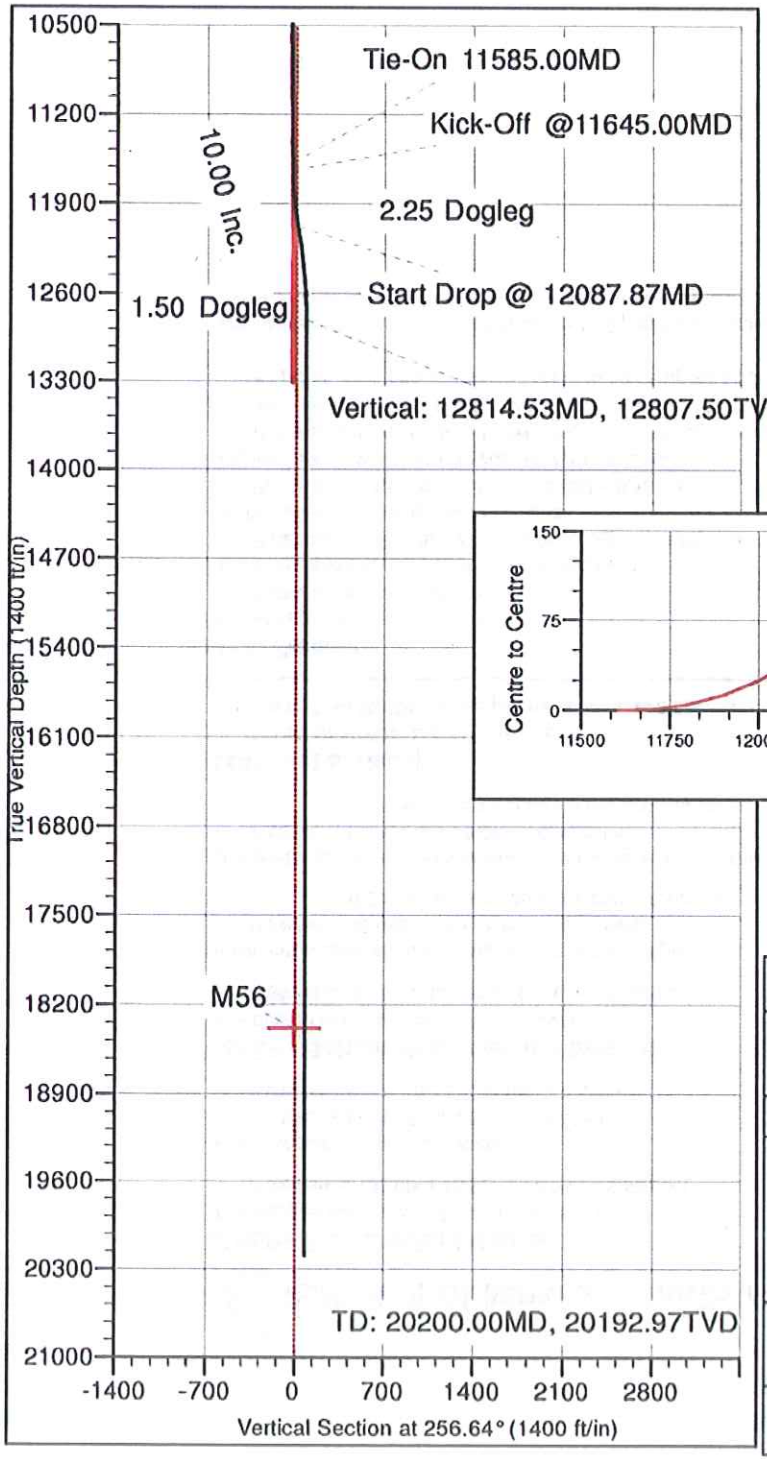
A 10-5/8" x 12-1/4" hole will be drilled to 20,200 ft md/tvd at well TD. The need for wireline evaluation of this interval will be determined by real time LWD data. A decision on the way forward will be made following evaluation of the open hole interval. The well will either be P&A'd or temporarily abandoned for future completion. Once the final evaluation program is complete, a decision will be made as to whether to sidetrack, TA well, or PA the well.

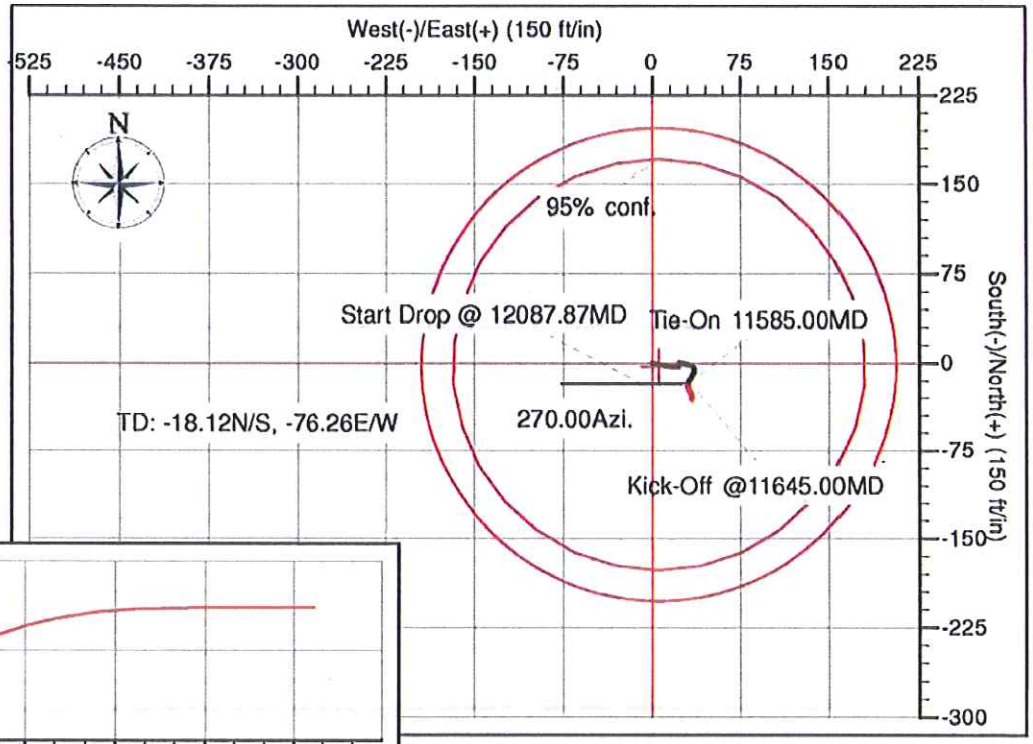
Notes:

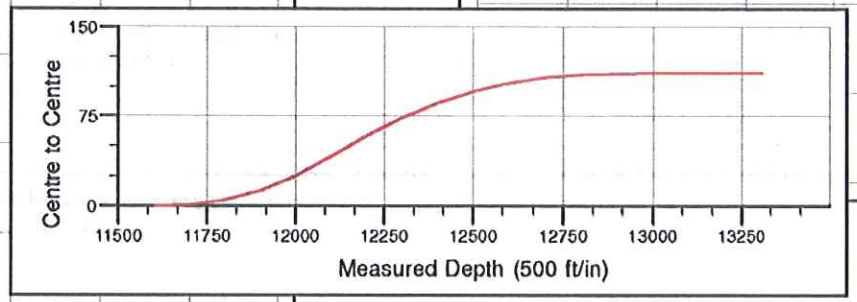
MWD and LWD will be used in all intervals to assist with directional control, formation evaluation and pore pressure detection. Additionally, PWD will be utilized to monitor downhole static mud weights, equivalent circulating densities as well as assist in optimizing downhole hydraulics.

All intervals below the 22" casing include optional wireline evaluation programs. Execution of these evaluation programs will be based on real time LWD, paleo and pore pressure data.

During the drilling of all hole sections, the rig shall maintain a minimum inventory of 1000 sx of barite and 200 sx of gel/poly at all times.







HALLIBURTON

bp

Project:	MACONDO
Site:	MC252
Well:	OCS-G32306 MC252 #1
Wellbore:	OCS-G 32306 MC252 #1ST01
Design:	WP#1

WP#1 — 11:13, March 15 2010 — Wayne Courville

Surface Location

Northing	Easting	Latitude	Longitude
10431619.79	1202798.33	28.738	-88.366

R-K-B @ 75.00ft (Deepwater Horizon) — Water Depth: 4992.00

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	11585.00	0.42	169.40	11584.52	-16.19	30.96	0.00	0.00	-26.38	
2	11645.00	0.39	186.32	11644.52	-16.61	30.90	0.06	-145.74	-26.22	
3	12087.87	10.00	270.00	12085.13	-18.12	-7.81	2.25	85.69	11.79	
4	12147.87	10.00	270.00	12144.22	-18.12	-18.23	0.00	0.00	21.93	
5	12814.53	0.00	0.00	12807.51	-18.12	-76.26	1.50	180.00	78.39	
6	20200.00	0.00	0.00	20192.97	-18.12	-76.26	0.00	0.00	78.39	

Target Data

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
M56	18386.00	-2.79	5.55	10431617.00	1202803.88	Circle (Radius: 200.00)

NAD 1927 (NADCON CONUS) — Zone 16N (90 W to 84 W) — Grid

To convert a Magnetic Direction to a Grid Direction, Subtract 0.30°
15-Mar-10

BP Gulf of Mexico - MMS APD Worksheet

MASP - Frac Gradient Method

The frac pressure at the 13.625 Liner shoe is:

P @ shoe = 13,100' x 13.8ppg x 0.052 = 9,401 psi

A column of 0.15 psi/ft gas yields:

P @ ML = 9,401 - 0.15 x 8,033' = 8,196 psi

P @ surf = 9,401 - 0.15 x 13,100' = 7,436 psi

MASP - Bottom Hole Pressure Method

The bottom hole pressure at 16,000' TVD is:

P @ TD = 16,000' x 13.1ppg x 0.052 = 10,899 psi

A column of 50% gas & 50% liquid back to surface gives:

P @ surf = 10,899 - 0.5 x 16,000' x 0.15 psi/ft
- 0.5 x 16,000' x 13.3ppg x 0.052 = 4,166 psi

Using 50% gas and 50% liquid from ML to surface, the mudline pressure is:

P @ ML = 4,166 + 0.5 x 5,067' x 0.15 psi/ft
+ 0.5 x 5,067' x 13.3ppg x 0.052 = 6,299 psi

MASP (at surface)

MASP for 13.625 Liner = 4,166 psi

Worst Case MASP = 4,166 psi, rounded up to 4,200 psi

Test Pressure

MASP at the wellhead + 500 psi is:

P @ ML = 6,299 + 500 = 6,799 psi

The maximum test pressure with 11.9 ppg mud is:

P @ surf = 6,799 - 5,067' x 11.9 ppg x 0.052 = 3,663 psi

At the casing shoe, external pressure is:

Po @ shoe = 13,100' x 9.0 ppg x 0.052 = 6,131 psi

The test pressure is limited to 70% of the 13.625" MIYP:

P @ surf = 0.7 x 10,030 + 6,131 - 13,100' x 11.9ppg x 0.052 = 5,046 psi

The test pressure is also limited by the 16 Casing at 11,385'

P @ surf = 0.7 x 6,660 - 11,385' x (11.9ppg - 9.0ppg) x 0.052 = 2,945 psi

The highest test pressure is 2,945 psi on 11.9 ppg mud, rounded up to 3,000 psi.

BP Gulf of Mexico - MMS APD Worksheet

Minimum Design Factors

The burst design factor is calculated as follows:

DF = MIYP / load, where the load is the differential pressure at either the top of the string or at the shoe

At the TOL, the internal pressure is the MASP at the wellhead + 6,318' of 50% gas / 50% mud

Internal pressure at 11,385' = 6,299 psi + 6,318' x [0.5 x 13.3 ppg x 0.052 + 0.5 x 0.15 psi/ft] = 8,957 psi

External pressure at 11,385' = 11,385' x 9.0 ppg x 0.052 = 5,328 psi

DF = 10,030 / (8,957 - 5,328) = 2.76

At the shoe, the internal pressure is the MASP at the wellhead + 8,033' of 50% gas and 50% mud

Internal pressure at 13,100' = 6,299 psi + 8,033' x [0.5 x 13.3 ppg x 0.052 + 0.5 x 0.15 psi/ft] = 9,679 psi

External pressure at 13,100' = 13,100' x 9.0 ppg x 0.052 = 6,131 psi

DF = 10,030 / (9,679 - 6,131) = 2.83

The minimum burst design factor = 2.76

The collapse design factor is calculated as follows:

DF = Collapse Rating / load, where the load is defined by replacing the lightest internal mud weight with seawater down to the mudline

At the TOL, the internal pressure is 5,067' of 8.6 ppg sea water + 6,318' of 11.9 ppg mud

Internal pressure at 11,385' = 5,067' x 8.6 ppg x 0.052 + 6,318' x 11.9 ppg x 0.052 = 6,176 psi

External pressure at 11,385' = 11,385' x 11.9 ppg x 0.052 = 7,045 psi

The API collapse pressure is 7,045 - 6,176 x [1 - 2 / (13.625 / 0.625)] = 1,436 psi

DF = 4,800 / 1,436 = 3.34

At the shoe, the internal pressure is 5,067' of 8.6 ppg sea water + 8,033' of 11.9 ppg mud

Internal pressure at 13,100' = 5,067' x 8.6 ppg x 0.052 + 8,033' x 11.9 ppg x 0.052 = 7,237 psi

External pressure at 13,100' = 13,100' x 11.9 ppg x 0.052 = 8,106 psi

The API collapse pressure is 8,106 - 7,237 x [1 - 2 / (13.625 / 0.625)] = 1,533 psi

DF = 4,800 / 1,533 = 3.13

The minimum collapse design factor = 3.13

The tension design factor is calculated as follows:

DF = Tension Rating / load, where the load is the hanging weight of the string in mud plus 100 kips overpull

This simplified tension uses the TVD hanging weight and a buoyancy factor of (65.5 - 11.9) / 65.5 = 0.818 for 11.9 ppg mud

Tension = (13,100' - 11,385') x 88.7 ppf x 0.818 = 124.5 kips

DF = 2,393.0 / (124.5 + 100 kips overpull) = 10.66

The tension design factor is 10.66

BP Gulf of Mexico - MMS APD Worksheet

MASP - Frac Gradient Method

The frac pressure at the 11.875 Liner shoe is:

P @ shoe = 16,000' x 14.9ppg x 0.052 = 12,397 psi

A column of 0.15 psi/ft gas yields:

P @ ML = 12,397 - 0.15 x 10,933' = 10,757 psi

P @ surf = 12,397 - 0.15 x 16,000' = 9,997 psi

MASP - Bottom Hole Pressure Method

The bottom hole pressure at 20,200' TVD is:

P @ TD = 20,200' x 14.4ppg x 0.052 = 15,126 psi

A column of 50% gas & 50% liquid back to surface gives:

P @ surf = 15,126 - 0.5 x 20,200' x 0.15 psi/ft
- 0.5 x 20,200' x 14.2ppg x 0.052 = 6,153 psi

Using 50% gas and 50% liquid from ML to surface, the mudline pressure is:

P @ ML = 6,153 + 0.5 x 5,067' x 0.15 psi/ft
+ 0.5 x 5,067' x 14.2ppg x 0.052 = 8,404 psi

MASP (at surface)

MASP for 11.875 Liner = 6,153 psi

Worst Case MASP = 6,153 psi, rounded up to 6,200 psi

Test Pressure

MASP at the wellhead + 500 psi is:

P @ ML = 8,404 + 500 = 8,904 psi

The maximum test pressure with 13.3 ppg mud is:

P @ surf = 8,904 - 5,067' x 13.3 ppg x 0.052 = 5,399 psi

At the casing shoe, external pressure is:

Po @ shoe = 16,000' x 9.0 ppg x 0.052 = 7,488 psi

The test pressure is limited to 70% of the 11.875" MIYP:

P @ surf = 0.7 x 10,720 + 7,488 - 16,000' x 13.3ppg x 0.052 = 3,926 psi

The test pressure is also limited by the 16 Casing at 11,385'

P @ surf = 0.7 x 6,660 - 11,385' x (13.3ppg - 9.0ppg) x 0.052 = 2,116 psi

The highest test pressure is 2,116 psi on 13.3 ppg mud, rounded up to 2,200 psi.

BP Gulf of Mexico - MMS APD Worksheet

Minimum Design Factors

The burst design factor is calculated as follows:

DF = MIYP / load, where the load is the differential pressure at either the top of the string or at the shoe

At the TOL, the internal pressure is the MASP at the wellhead + 7,833' of 50% gas / 50% mud

Internal pressure at 12,900' = 8,404 psi + 7,833' x [0.5 x 14.2 ppg x 0.052 + 0.5 x 0.15 psi/ft] = 11,883 psi

External pressure at 12,900' = 12,900' x 9.0 ppg x 0.052 = 6,037 psi

DF = 10,720 / (11,883 - 6,037) = 1.83

At the shoe, the internal pressure is the MASP at the wellhead + 10,933' of 50% gas and 50% mud

Internal pressure at 16,000' = 8,404 psi + 10,933' x [0.5 x 14.2 ppg x 0.052 + 0.5 x 0.15 psi/ft] = 13,260 psi

External pressure at 16,000' = 16,000' x 9.0 ppg x 0.052 = 7,488 psi

DF = 10,720 / (13,260 - 7,488) = 1.86

The minimum burst design factor = 1.83

The collapse design factor is calculated as follows:

DF = Collapse Rating / load, where the load is defined by replacing the lightest internal mud weight with seawater down to the mudline

At the TOL, the internal pressure is 5,067' of 8.6 ppg sea water + 7,833' of 13.3 ppg mud

Internal pressure at 12,900' = 5,067' x 8.6 ppg x 0.052 + 7,833' x 13.3 ppg x 0.052 = 7,683 psi

External pressure at 12,900' = 12,900' x 13.3 ppg x 0.052 = 8,922 psi

The API collapse pressure is 8,922 - 7,683 x [1 - 2 / (11.875 / 0.582)] = 1,991 psi

DF = 5,630 / 1,991 = 2.83

At the shoe, the internal pressure is 5,067' of 8.6 ppg sea water + 10,933' of 13.3 ppg mud

Internal pressure at 16,000' = 5,067' x 8.6 ppg x 0.052 + 10,933' x 13.3 ppg x 0.052 = 9,827 psi

External pressure at 16,000' = 16,000' x 13.3 ppg x 0.052 = 11,066 psi

The API collapse pressure is 11,066 - 9,827 x [1 - 2 / (11.875 / 0.582)] = 2,202 psi

DF = 5,630 / 2,202 = 2.56

The minimum collapse design factor = 2.56

The tension design factor is calculated as follows:

DF = Tension Rating / load, where the load is the hanging weight of the string in mud plus 100 kips overpull

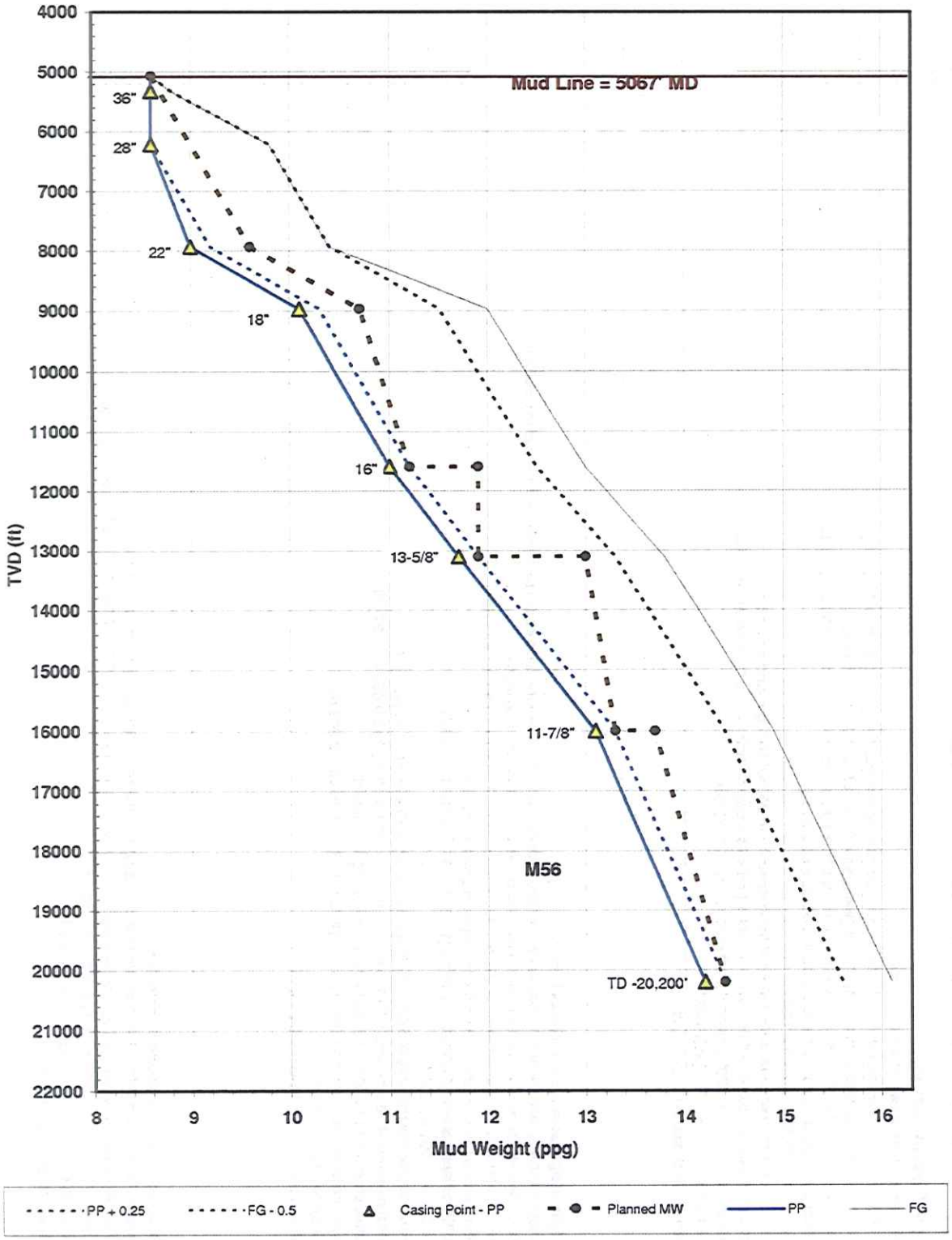
This simplified tension uses the TVD hanging weight and a buoyancy factor of (65.5 - 13.3) / 65.5 = 0.797 for 13.3 ppg mud

Tension = (16,000' - 12,900') x 71.8 ppf x 0.797 = 177.4 kips

DF = 1,595.0 / (177.4 + 100 kips overpull) = 5.75

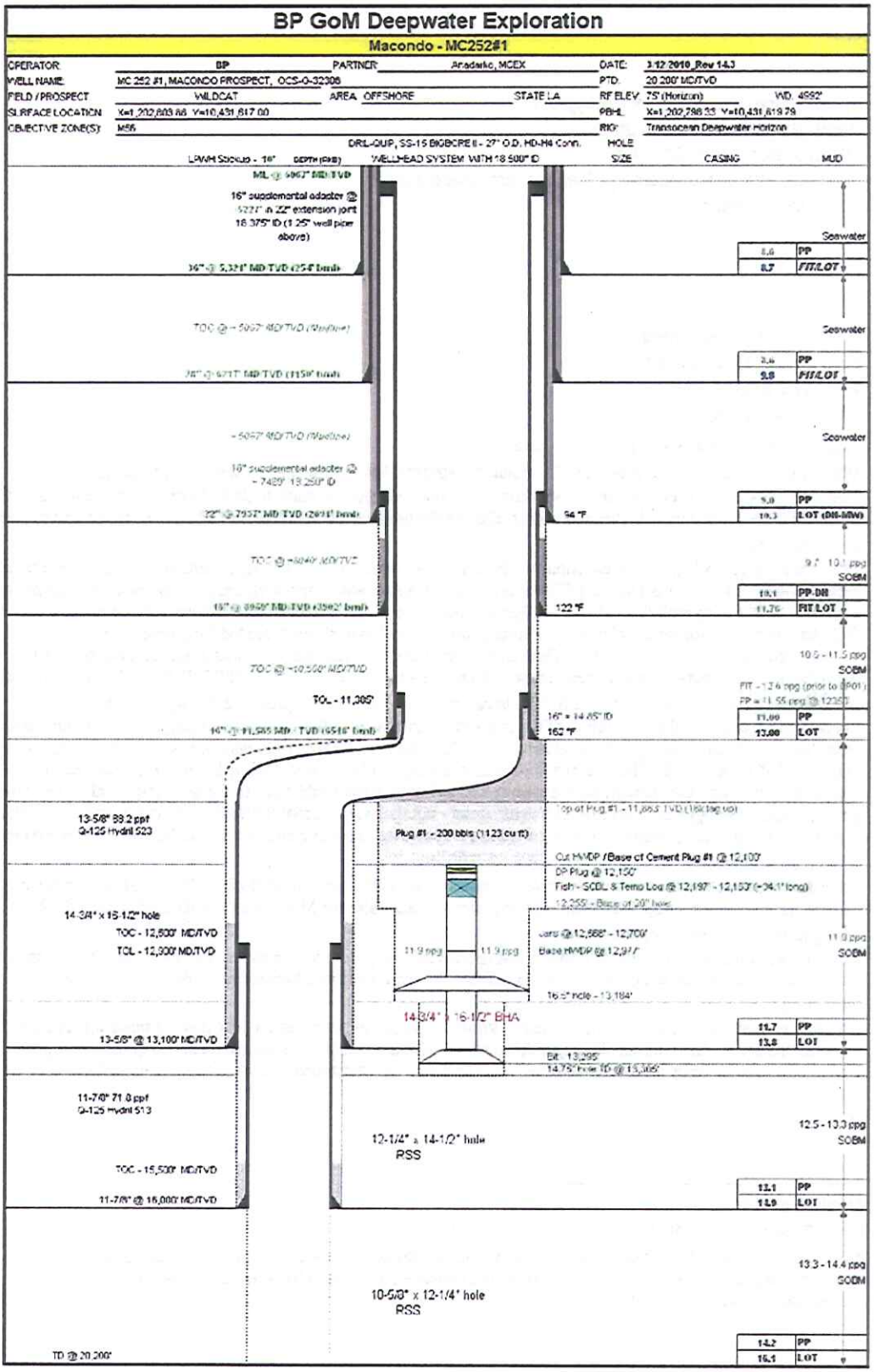
The tension design factor is 5.75

MC 252 #1 - Macondo Prospect



MC 252 #1
OCS-G-32306
Attachment 2

Brian Morel
3/15/10



MC 252 #1
OCS-G-32306
Attachment 3

Brian Morel
3/15/10

From: Paine, Kate (QuaDril Energy LT)
Sent: Fri Mar 19 05:06:10 2010
To: Brannen, John (QO Inc.)
Subject: FW: Lesson learned - Plan forward: Macondo
Importance: Normal

From: Paine, Kate (QuaDril Energy LT)

Sent: Thursday, March 18, 2010 8:45 PM

To: Bodek, Robert

Cc: Bennett, Gord (QO Inc.)

Subject: RE: Lesson learned - Plan forward: Macondo

What is the normalized gas equation? I'm unable to perform that service until I know how you do it.
The high gas we had at 12035 - once it was controlled the decision was made to drill ahead. Everyone was aware of the gas but we decided to drill ahead to stay as close to the prog-casing points as possible. The "prize" was to skip the contingency liner.
After deciding to drill ahead, we encountered the losses. We were aware of the upper limit of the ECD and exceeded it because we didn't believe the MWD LOT values. I'm not sure it was a lack of communication or awareness as much as a "we can get away with this" attitude - after all, the surface LOT provided an additional 0.5 ppg of window. The ECD had already exceeded the closure and propagation values having been exceeded for a long time before we encountered the losses. Given that the MWD LOT value wasn't trusted because it was lower than the surface value, I don't think this is going to be a learned lesson. (Example - our current FIT is 12.55/12.67 but we're justifying raising the MW to 12.3 and drilling with a 12.6 ECD because the shoe saw higher pressures during the kick)
I'm uncomfortable with the declaration of the connection gasses being the 150 over 50 background. In retrospect I'll grant there are 2 connection gasses at 12933 and 13070. But I'd call them 140u max over 125u background and 150 max over 135 background. They weren't apparent on the log while we were drilling but are in 20/20 hindsight. The resistivity and sonic were showing an increasing trend - but they were calibrated to the seismic-predrill based on the previous section's high gas. There weren't drilling parameters and the resistivity/sonic weren't deviating from the most likely trend. Additionally, at the rate we were drilling, we had 1 to 2 connections in the hole, so connection gas is not readily apparent.
Prior to the kick, it was an active decision on the part of the drilling team to drill with a high ROP and let the cuttings take up the mudweight rather than drill at a moderate rate and raise the MW. We then planned to raise the MW at casing point to replace the cuttings load.
At the onset of the well, we were discussing that there would be gas present in the well and we weren't to be spooked into thinking we were underbalanced by its existence. As such, I've looked for second indicators to verify my pp estimation.
I'm sorry to push back on the lessons learned. I know you've got to get something out there to make it look like we wont do this again. But without obvious indicators and with the real push to make hole and skip the contingency liner, I don't see us really learning. The best bet is to hedge the "most likely" to have some centroid built in to the plan initially.
Kate

From: Bodek, Robert

Sent: Thursday, March 18, 2010 11:12 AM

To: Bellow, Jonathan M.; Lacy, Stuart C (QO Inc.); 'Gord Bennett'; 'John Brannen'; Brannen, John (QO Inc.); Paine, Kate (QuaDril Energy LT); 'katepaine@aol.com'; Deepwater Horizon, Sperry Sun; Deepwater Horizon, MWD Directional Guids; John; Hafle, Mark E; Morel, Brian P; Bondurant, Charles H