

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.



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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	ID Number	46428
Type	SEMISUBMERSIBLE	Constructed Year	2001
Function	DRILLING	Refurbished Year	
Shipyard	HYUNDAI		
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	
	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
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Required Attachments

pdf	Drilling prognosis and summary of drilling, cementing, and mud processes	Attached
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Optional/Supplemental Attachments

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

Contacts Information

Name	Heather Powell
Company	02481 BP Exploration & Production Inc.
Phone Number	[REDACTED]
E-mail Address	heather.powell@bp.com
Contact Description	Regulatory
Name	Scherie Douglas
Company	02481 BP Exploration & Production Inc.
Phone Number	[REDACTED]
E-mail Address	scherie.douglas@bp.com
Contact Description	Regulatory

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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	TVD	Pore Pressure (ppg)
	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	Pore Pressure (ppg) TVD
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	Pore Pressure (ppg) TVD
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	Pore Pressure (ppg) TVD
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 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 TVD	Pore Pressure (ppg)
						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 originally 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 well 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.

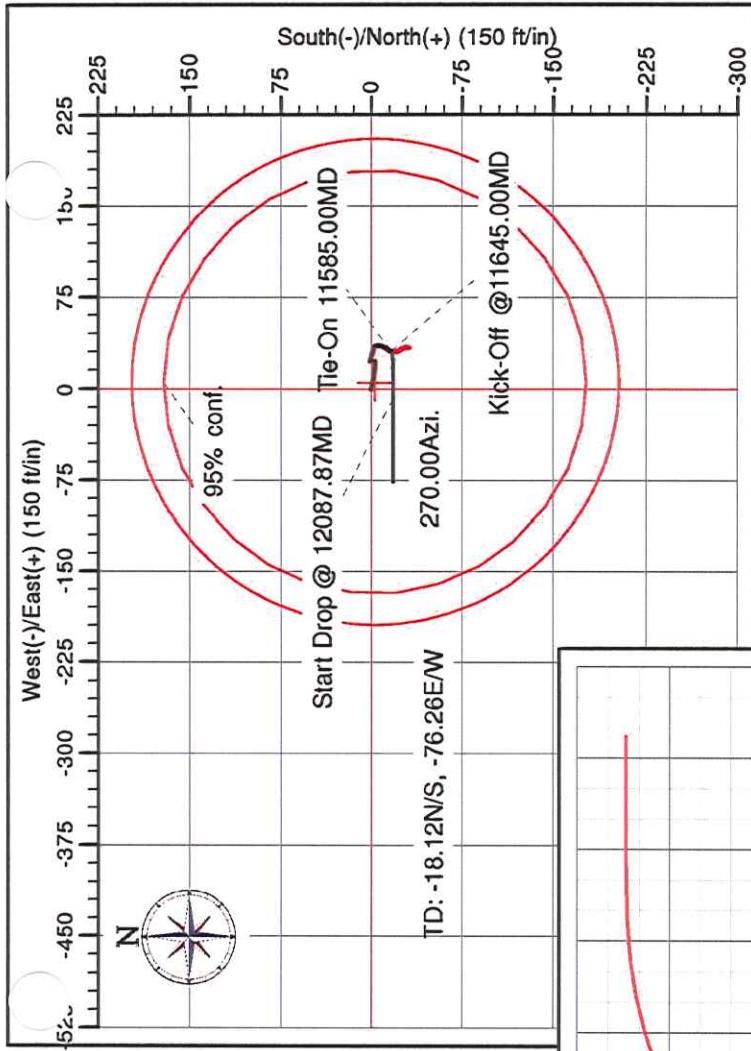
A 10-5/8" x 12-1/4" hole will be drilled to 20,200 ft md/tvd at well TD. The need for wireline evaluation of this interval will be determined by real time LWD data. A decision on the way forward will be made following evaluation of the open hole interval. The well will either be P&A'd or temporarily 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.

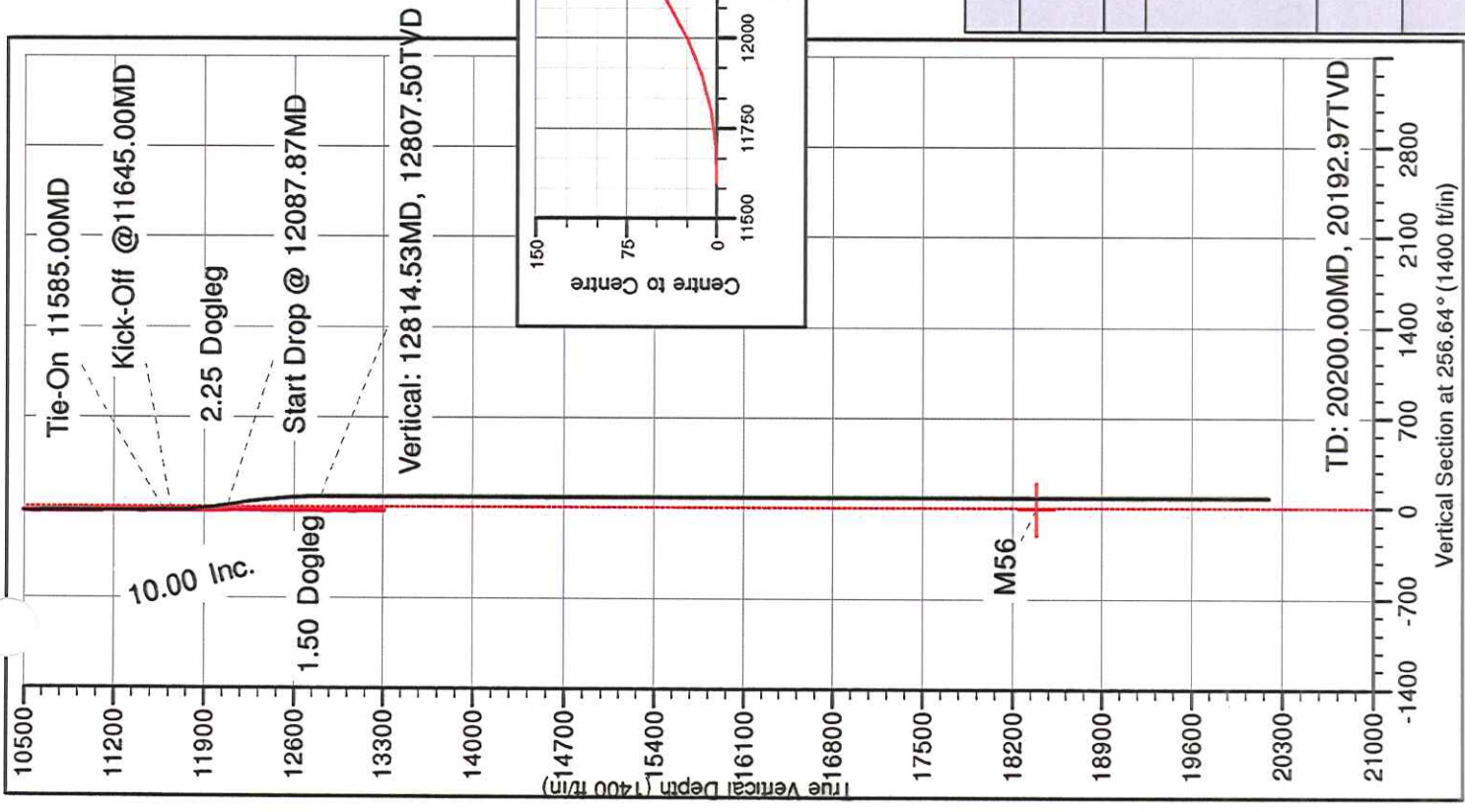
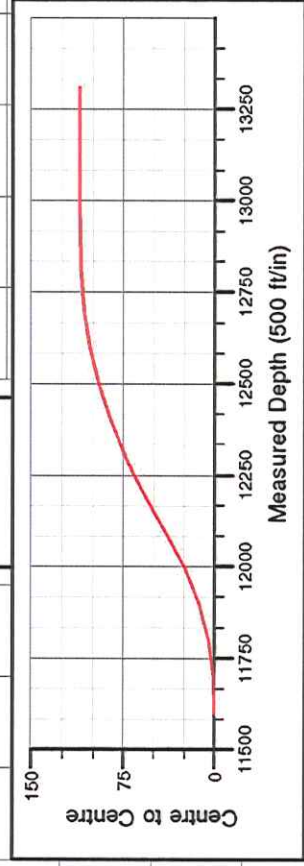
All intervals below the 22" casing include optional wireline evaluation programs. Execution of these evaluation programs will be based on real time LWD, paleo and pore pressure data.

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 | Energy Drilling

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		Latitude		Longitude	
Northing		28.738		-88.366	
Easting		1202798.33		4992.00	
R-K-B @ 75.00ft (Deepwater Horizon)		Water Depth:			
Sec	MD	Inc	Azi	TVD	
1	11585.00	0.42	189.40	11584.52	
2	11645.00	0.39	186.32	11644.52	
3	12087.87	10.00	270.00	12085.13	
4	12147.87	10.00	270.00	12144.22	
5	12814.53	0.00	0.00	12807.51	
6	20200.00	0.00	0.00	20192.97	
Name		Target Data			
M56		+N/-S		+E/-W	
		18386.00		5.55	
		TVD		Northing	
		18386.00		1202803.88	
				Easting	
				1202803.88	
				Shape	
				Circle (Radius: 200.00)	
NAD 1927 (NADCON CONUS)		Grid		To convert a Magnetic Direction to a Grid Direction, Subtract 0.30°	
Zone 16N (60 W to 84 W)				15-Mar-10	



BP Gulf of Mexico - MMS APD Worksheet

MC 252 #1 - Macondo Prospect
13.625" Liner
Page 1

MASP - Frac Gradient Method

The frac pressure at the 13.625" Liner shoe is:

$$P @ \text{shoe} = 13,100' \times 13.8 \text{ppg} \times 0.052 = 9,401 \text{ psi}$$

A column of 0.15 psi/ft gas yields:

$$P @ \text{ML} = 9,401 - 0.15 \times 8,033' = 8,196 \text{ psi}$$

$$P @ \text{surf} = 9,401 - 0.15 \times 13,100' = 7,436 \text{ psi}$$

MASP - Bottom Hole Pressure Method

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

$$P @ \text{TD} = 16,000' \times 13.1 \text{ppg} \times 0.052 = 10,899 \text{ psi}$$

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

$$P @ \text{surf} = 10,899 - 0.5 \times 16,000' \times 0.15 \text{ psi/ft}$$

$$- 0.5 \times 16,000' \times 13.3 \text{ppg} \times 0.052 = 4,166 \text{ psi}$$

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

$$P @ \text{ML} = 4,166 + 0.5 \times 5,067' \times 0.15 \text{ psi/ft}$$

$$+ 0.5 \times 5,067' \times 13.3 \text{ppg} \times 0.052 = 6,299 \text{ psi}$$

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:

$$P @ \text{ML} = 6,299 + 500 = 6,799 \text{ psi}$$

The maximum test pressure with 11.9 ppg mud is:

$$P @ \text{surf} = 6,799 - 5,067' \times 11.9 \text{ppg} \times 0.052 = 3,663 \text{ psi}$$

At the casing shoe, external pressure is:

$$P_o @ \text{shoe} = 13,100' \times 9.0 \text{ppg} \times 0.052 = 6,131 \text{ psi}$$

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

$$P @ \text{surf} = 0.7 \times 10,030 + 6,131 - 13,100' \times 11.9 \text{ppg} \times 0.052 = 5,046 \text{ psi}$$

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

$$P @ \text{surf} = 0.7 \times 6,660 - 11,385' \times (11.9 \text{ppg} - 9.0 \text{ppg}) \times 0.052 = 2,945 \text{ psi}$$

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

MC 252 #1 - Macondo Prospect
13.625 Liner
Page 2

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 ppg 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

MC 252 #1 - Macondo Prospect
11,875 Liner
Page 1

MASP - Frac Gradient Method

The frac pressure at the 11,875 Liner shoe is:

$$P @ \text{shoe} = 16,000' \times 14.9 \text{ppg} \times 0.052 = 12,397 \text{ psi}$$

A column of 0.15 psi/ft gas yields:

$$P @ \text{ML} = 12,397 - 0.15 \times 10,933' = 10,757 \text{ psi}$$

$$P @ \text{surf} = 12,397 - 0.15 \times 16,000' = 9,997 \text{ psi}$$

MASP - Bottom Hole Pressure Method

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

$$P @ \text{TD} = 20,200' \times 14.4 \text{ppg} \times 0.052 = 15,126 \text{ psi}$$

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

$$P @ \text{surf} = 15,126 - 0.5 \times 20,200' \times 0.15 \text{ psi/ft}$$

$$- 0.5 \times 20,200' \times 14.2 \text{ppg} \times 0.052 = 6,153 \text{ psi}$$

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

$$P @ \text{ML} = 6,153 + 0.5 \times 5,067' \times 0.15 \text{ psi/ft}$$

$$+ 0.5 \times 5,067' \times 14.2 \text{ppg} \times 0.052 = 8,404 \text{ psi}$$

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:

$$P @ \text{ML} = 8,404 + 500 = 8,904 \text{ psi}$$

The maximum test pressure with 13.3 ppg mud is:

$$P @ \text{surf} = 8,904 - 5,067' \times 13.3 \text{ ppg} \times 0.052 = 5,399 \text{ psi}$$

At the casing shoe, external pressure is:

$$P_o @ \text{shoe} = 16,000' \times 9.0 \text{ ppg} \times 0.052 = 7,488 \text{ psi}$$

The test pressure is limited to 70% of the 11,875" MIYP:

$$P @ \text{surf} = 0.7 \times 10,720 + 7,488 - 16,000' \times 13.3 \text{ppg} \times 0.052 = 3,926 \text{ psi}$$

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

$$P @ \text{surf} = 0.7 \times 6,660 - 11,385' \times (13.3 \text{ppg} - 9.0 \text{ppg}) \times 0.052 = 2,116 \text{ psi}$$

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

MC 252 #1 - Macondo Prospect
11,875 Liner
Page 2

Minimum Design Factors

The burst design factor is calculated as follows:

$DF = MIYP / \text{load}$, 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 $[0.5 \times 14.2 \text{ ppg} \times 0.052 + 0.5 \times 0.15 \text{ psi/ft}] = 11,883 \text{ psi}$

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 $[0.5 \times 14.2 \text{ ppg} \times 0.052 + 0.5 \times 0.15 \text{ psi/ft}] = 13,260 \text{ psi}$

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:

$DF = \text{Collapse Rating} / \text{load}$, 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 $[1 - 2 / (11,875 / 0.582)] = 1,991 \text{ psi}$

$DF = 5,630 / 1,991 = 2.83$

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 $[1 - 2 / (11,875 / 0.582)] = 2,202 \text{ psi}$

$DF = 5,630 / 2,202 = 2.56$

The minimum collapse design factor = 2.56

The tension design factor is calculated as follows:

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

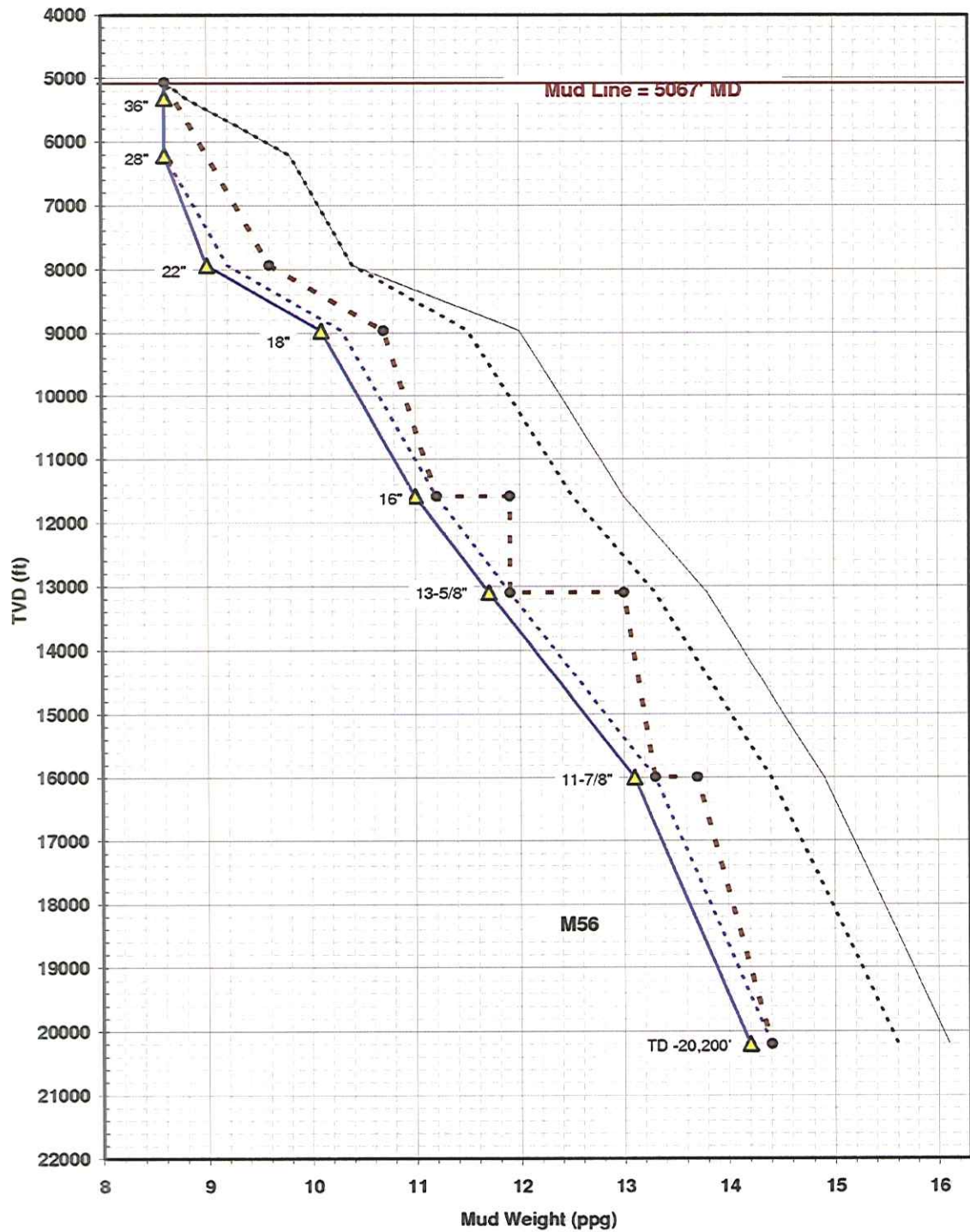
This simplified tension uses the TVD hanging weight and a buoyancy factor of $(65.5 - 13.3) / 65.5 = 0.797$ for 13.3 ppg mud

Tension = $(16,000' - 12,900') \times 71.8 \text{ ppt} \times 0.797 = 177.4 \text{ kips}$

$DF = 1,595.0 / (177.4 + 100 \text{ kips overpull}) = 5.75$

The tension design factor is 5.75

MC 252 #1 - Macondo Prospect



Macondo - MC252#1

MC 252 #1
OCS-G-32306
Attachment 3

Brian Morel
3/15/10

