

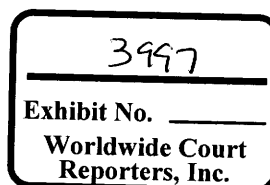
From: Jasen Bradley
Sent: Thu Jun 17 03:03:58 2010
To: Burns, Tim A
Subject: Opticem Simulation for 9 7/8" Liner
Importance: Normal
Attachments: 9.875 inch Liner Opticem Report.doc

Tim,
Jesse called me earlier and asked that I send you the Opticem simulation for the 9 7/8" Liner. Keep in mind this is preliminary and changes to the slurry properties will need to be made.

Jasen Bradley
Halliburton
Technical Advisor
GOM Cementing
Mobile: 713-502-8259

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BP-HZN-2179MDL03131265

BP AMERICA PRODUCTION COMPANY

Macondo Relief #3

Cement Job Design Report

Date: Wednesday, June 16, 2010

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HALLIBURTON

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1.0 DESIGN

1.1 Customer Information

Customer	BP AMERICA PRODUCTION COMPANY
Sales Order	
Job Configuration	Conventional Cement
Well Name	Macondo Relief
Well Number	3
Start Time	Tuesday, June 15, 2010
County	
State	Louisiana
UWI/API	
Country	United States of America
H2S Present	Unknown
CO2 Present	Unknown
Customer Representative	
Service Representative	Rick Goosen
Design Name	MC252_3 Macondo 9.875in Liner v1
Comment	Displacing @ 8bpm
Injection Path	Casing

1.2 Parameters

Fracture Zone Measured Depth	17874.0	ft
Fracture Zone Gradient	0.784	psi/ft
Fracture Zone Density	15.10	lb/gal
Fracture Zone Pressure	13429	psi
Reservoir Measured Depth	16874.0	ft
Reservoir Pore Pressure	11392	psi
Reservoir Zone Gradient	0.707	psi/ft
Reservoir Zone Density	13.60	lb/gal
Back Pressure	0	psi
Height - Mud Line to Mean Sea Level	5159.0	ft
Height - Mean Sea Level to Rotary Kelly Bushing	88.0	ft
Sea Water Density	8.54	lb/gal
Returns To Surface		
Simulator Volume Increment	10.00	bbl
Surface Iron Displacement	0.41	bbl
Shoe Track Length	176.0	ft
Additional Pressure to Seat Plug	500	psi
Static Fluid Density	13.80	lb/gal
Eccentricity Enhanced Calculations	Yes	
Erodibility Enhanced Calculations	Yes	
Mud Erodibility Measured Depth	15936.0	ft
Mud Erodibility Number	30.00	
Mud Required Shear Stress	20.00	lbf/(100*ft ²)
Use Coupling Information	No	

1.3 Wellbore Orientation

Measured Depth	True Vertical Depth	Deviation	Build Angle	Azimuth
ft	ft	°	°/(100*ft)	°
0.0	0.0	0.0		59.0
5300.0	5300.0	0.1	0.00	59.0
5500.0	5500.0	0.6	0.26	59.0
5600.0	5600.0	1.0	0.34	93.2
5700.0	5700.0	0.9	-0.12	106.7
5800.0	5800.0	1.0	0.16	101.7
5900.0	5899.9	1.3	0.32	94.6
6000.0	5999.9	1.1	-0.22	102.0
6100.0	6099.9	1.6	0.45	76.8
6200.0	6199.8	2.0	0.39	83.0
6300.0	6299.8	2.2	0.21	91.8
6400.0	6399.7	2.2	-0.01	90.3
6500.0	6499.6	2.7	0.57	83.4
6700.0	6699.3	3.4	0.35	90.8
6800.0	6799.2	3.4	0.00	93.6
6900.0	6899.0	2.3	-1.13	83.5
7000.0	6999.0	1.9	-0.37	91.5
7100.0	7098.9	1.8	-0.13	85.9
7200.0	7198.9	1.2	-0.53	61.5
7300.0	7298.9	1.1	-0.10	337.3
7400.0	7398.8	0.8	-0.38	306.7
7500.0	7498.8	0.9	0.14	277.4
7700.0	7698.8	1.4	0.27	280.0
7800.0	7798.8	1.6	0.14	275.8
7900.0	7898.7	1.3	-0.25	273.9
8000.0	7998.7	1.0	-0.34	267.4
8100.0	8098.7	0.8	-0.15	269.0
8200.0	8198.7	1.2	0.40	291.0
8300.0	8298.7	0.9	-0.33	294.3
8500.0	8498.6	0.8	-0.07	286.0
8600.0	8598.6	0.7	-0.03	289.9
8700.0	8698.6	1.5	0.72	271.3
8800.0	8798.6	1.5	0.01	271.3
8900.0	8898.5	2.6	1.10	257.2
9000.0	8998.4	3.0	0.38	260.9
9100.0	9098.3	2.8	-0.12	271.2
9200.0	9198.2	2.6	-0.21	283.6
9300.0	9298.0	2.8	0.16	289.5
9400.0	9397.9	2.3	-0.45	292.2
9500.0	9497.9	2.2	-0.15	297.2
9600.0	9597.8	1.9	-0.24	301.0
9700.0	9697.8	1.4	-0.50	303.4
9900.0	9897.7	1.9	0.23	326.8
10000.0	9997.6	1.9	-0.03	339.1
10100.0	10097.6	1.6	-0.24	331.5
10200.0	10197.5	2.2	0.61	289.7
10300.0	10297.4	3.2	0.92	312.8
10400.0	10397.1	5.3	2.19	335.7

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Measured Depth	True Vertical Depth	Deviation	Build Angle	Azimuth
ft	ft	°	°/(100*ft)	°
10600.0	10594.8	11.7	3.19	346.5
10700.0	10692.5	13.3	1.56	343.5
10800.0	10789.2	16.0	2.67	338.7
10900.0	10884.5	19.2	3.22	336.5
11000.0	10978.0	22.5	3.31	335.6
11100.0	11069.4	25.2	2.76	333.7
11200.0	11158.9	27.7	2.50	333.2
11300.0	11246.7	29.5	1.80	334.2
11400.0	11332.8	31.5	1.90	335.1
11492.0	11410.3	33.9	2.63	334.9
11542.5	11452.0	34.8	1.74	335.8
14552.3	13925.0	34.8	0.00	335.8
15564.8	14840.6	14.5	-2.00	335.8
16245.9	15500.0	14.5	0.00	335.8
16970.9	16217.2	0.0	-2.00	0.0
17262.2	16508.6	0.0	0.00	0.0
17490.8	16736.9	4.0	1.75	213.8
19118.0	18360.2	4.0	0.00	213.8

1.4 Surface Lines

Equipment	Length	Elev. Change	OD	ID	Friction Factor	Num-In Parallel
	ft	ft	in	in		
2" 15,000 psi Discharge Iron	120.0	0.0	2.620	1.870	1.00	1

1.5 Wellbore Geometry

MD	Hole Ex.	Hole Dia.	Casing OD	Casing ID	Casing Weight	Inner String OD	Inner String ID	Inner String Weight
ft	%	in	in	in	lb/ft	in	in	lb/ft
5235.0	0.00	19.500	5.875	4.908	28.673			
13269.0	0.00	12.430	5.875	4.908	28.673			
13275.0	0.00	12.430	12.050	8.625	62.800	5.875	4.908	28.673
13440.0	0.00	12.430	9.875	8.625	62.800	5.875	4.908	28.673
15936.0	0.00	10.711	9.875	8.625	62.800			
17748.0	15.00	12.568	9.875	8.625	62.800			
17874.0	15.00	10.767	9.625	8.535	53.500			

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1.6 Pumping Schedule

No.	Description	Density lb/gal	Rate bpm	Volume bbl	Duration min
1	13.8 ppg SBM	13.80	5.00	0.00	0.00
2	14.5 ppg TSIII	14.50	5.00	50.00	10.00
3	Macondo 9.875 Liner	16.40	5.00	90.00	18.00
	Top Plug				
4	14.5 ppg TSIII	14.50	5.00	11.00	2.20
5-1	13.8 ppg SBM	13.80	8.00	590.12	73.76
5-2	13.8 ppg SBM	13.80	3.00	21.08	7.03
	Total			762.20	110.99

1.7 Fluid Rheology - Generalized Herschel Bulkley

Fluid	Temp. °F	m	n	Tau0 lbf/(100*ft²)	MulInf cp	Speed rpm	Dial
13.8 ppg SBM	120	1.00	0.63	23.35	59.59	600	131.00
						300	93.00
						200	77.00
						100	57.00
						6	28.00
						3	26.00
	150	1.00	0.65	24.95	52.79	600	125.00
						300	88.00
						200	73.00
						100	55.00
						6	28.00
						3	27.00
	85	0.74	0.60	9.86	25.64	600	79.00
						300	52.00
						200	41.00
						100	29.00
						6	13.00
						3	11.00
Macondo 9.875 Liner (Class H)	80	0.24	0.21	0.01	160.31	600	390.00
						300	222.00
						200	162.00
						100	96.00
						60	64.00
						30	38.00
						20	28.00
						10	16.00
						6	10.00
						3	6.00
	90	1.00	0.71	0.01	558.80	600	538.00
						300	340.00
						200	252.00
						100	152.00
						60	104.00
						30	62.00
						20	46.00
						10	28.00
						6	18.00
						3	12.00

1.8 Fluid Rheology - Bingham Plastic

Fluid	Temp. °F	PV cp	YP lbf/(100*ft²)	Speed rpm	Dial
14.5 ppg TSIII	80	49.80	28.00		
14.5 ppg TSIII	80	45.18	25.00		

1.9 Temperature Profile, 0.00, Temperatures At Start of Pumping Slurry

Measured Depth ft	Casing Circulating Temperature °F	Annulus Circulating Temperature °F
0.0	80	60
2.0	80	60
8.0	80	60
20.0	80	60
26.0	80	60
40.0	80	59
60.0	80	59
79.0	80	59
80.0	80	59
88.0	80	58
99.0	80	58
113.7	80	58
128.3	80	58
157.6	80	58
216.2	79	57
242.0	79	56
333.3	79	55
500.0	78	54
666.7	78	52
728.0	77	51
1000.0	74	49
1333.3	71	47
1666.7	69	45
2000.0	68	44
2186.0	69	44
2333.3	70	44
2624.5	70	44
2666.7	70	45
3000.0	70	45
3063.0	70	46
3333.3	69	47
3666.7	69	49
4000.0	69	52
4333.3	69	56
4521.0	69	60
4666.7	69	63
5000.0	69	69
5007.0	70	77
5159.0	70	82
5169.0	70	87
5193.0	70	89
5210.0	70	90
5218.5	70	91
5222.8	70	92
5223.0	70	92
5227.0	70	92
5229.0	70	92
5231.8	70	93

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Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
5234.5	70	93
5240.0	70	93
5241.0	70	94
5243.5	70	94
5247.0	70	94
5248.0	70	94
5249.0	70	94
5249.5	70	94
5250.0	70	94
5251.0	70	94
5253.0	70	94
5257.0	70	94
5260.0	70	94
5265.0	70	95
5267.0	70	95
5269.0	70	95
5272.0	70	95
5275.0	70	95
5281.0	70	95
5294.1	70	95
5307.2	71	95
5333.3	71	95
5372.4	71	95
5411.5	71	96
5489.7	71	96
5567.8	72	97
5606.9	72	97
5646.0	72	98
5666.7	72	98
5696.6	73	98
5726.5	73	98
5786.3	73	99
5906.0	74	99
6000.0	75	100
6169.9	77	101
6333.3	78	102
6437.7	79	103
6552.2	80	104
6609.4	81	105
6666.7	82	105
6688.0	82	106
6698.7	82	106
6704.1	82	106
6706.7	82	106
6708.1	82	106
6709.4	82	106
6710.0	82	106
6711.3	82	106
6712.5	83	106

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Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
6715.0	83	106
6720.0	83	106
6730.0	83	106
6750.0	83	106
6779.4	84	107
6808.7	84	107
6867.5	85	107
6926.2	85	108
6955.5	86	108
6984.9	86	108
7000.0	86	108
7033.0	87	109
7066.1	87	109
7132.1	88	109
7264.3	89	110
7333.3	90	111
7431.7	90	112
7480.8	90	112
7505.4	90	112
7530.0	91	113
7538.8	91	113
7543.2	91	113
7547.6	91	113
7550.0	91	113
7555.0	91	113
7560.0	91	113
7570.0	91	113
7594.2	91	113
7618.3	91	113
7666.7	92	114
7750.7	92	114
7834.8	92	115
8000.0	93	116
8058.5	93	117
8087.8	93	117
8102.4	93	117
8117.0	93	117
8125.8	93	117
8137.0	93	117
8157.0	94	118
8201.1	94	118
8245.2	94	118
8289.3	94	119
8333.3	94	119
8352.0	94	119
8362.0	94	119
8372.0	94	120
8396.4	95	120
8420.7	95	120

Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
8451.5	95	120
8482.2	95	120
8543.7	95	121
8666.7	96	122
8719.5	96	123
8742.0	96	123
8762.0	96	123
8782.0	96	123
8809.3	97	123
8836.5	97	124
8891.0	97	124
8945.5	97	125
9000.0	97	125
9022.2	98	126
9060.5	98	126
9098.9	98	126
9175.5	98	127
9252.1	99	128
9290.5	99	128
9309.6	99	128
9319.2	99	128
9328.8	99	129
9333.3	99	129
9342.9	99	129
9352.5	99	129
9371.6	99	129
9409.8	100	129
9486.3	100	130
9562.8	100	131
9601.0	101	131
9639.3	101	132
9666.7	101	132
9734.0	101	132
9801.3	102	133
9868.7	102	134
9902.3	102	134
9936.0	102	135
9944.8	102	135
9949.2	103	135
9953.6	103	135
9956.0	103	135
9961.0	103	135
9966.0	103	135
9976.0	103	135
10000.0	103	135
10034.0	103	136
10068.0	103	136
10135.9	104	137
10271.8	104	138

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Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
10333.3	105	139
10463.6	106	140
10593.9	106	141
10666.7	107	142
10793.3	107	143
10856.6	108	144
10919.9	108	145
10940.5	108	145
10961.0	108	145
10971.0	108	145
10981.0	108	146
11000.0	109	146
11031.2	109	146
11062.4	109	146
11124.9	110	147
11249.7	110	148
11333.3	111	149
11458.4	112	150
11583.4	112	151
11666.7	113	152
11921.0	114	153
11951.0	114	154
11971.0	114	154
11991.0	114	154
12000.0	115	155
12262.5	116	156
12333.3	117	157
12607.9	118	158
12666.7	119	159
12914.0	120	160
12924.0	120	160
12934.0	120	160
12957.2	121	160
12980.0	121	160
13000.0	121	160
13020.0	122	160
13310.3	123	161
13333.3	123	161
13420.0	124	162
13440.0	124	162
13460.0	124	162
13604.0	125	163
13624.0	125	163
13644.0	125	163
13666.7	125	163
13667.3	126	163
13904.0	127	163
13924.0	128	163
13944.0	128	163

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Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
14000.0	128	163
14028.2	129	163
14333.3	128	163
14393.0	128	163
14529.8	127	163
14666.7	126	162
14761.6	125	162
14843.8	125	162
14926.0	124	161
14936.0	124	161
14946.0	124	161
15000.0	124	161
15134.1	124	161
15233.7	124	160
15333.3	124	160
15510.5	125	159
15666.7	125	158
15863.0	125	157
15890.8	125	155
15916.0	125	155
15936.0	125	155
15937.0	125	155
15947.0	125	155
15956.0	125	155
15957.0	125	155
16000.0	125	154
16088.0	126	154
16275.0	126	153
16313.0	126	152
16333.3	126	151
16538.0	126	150
16663.1	126	147
16666.7	126	146
16748.0	126	146
16758.0	126	145
16768.0	126	144
16775.5	126	144
17000.0	126	142
17013.0	126	140
17055.0	126	139
17250.5	126	137
17333.3	125	134
17450.8	125	133
17666.7	124	130
17850.5	124	127
17915.0	124	125
17935.0	124	124
17955.0	124	124
17975.0	123	124

1.10 Fracture Gradient/Pore Pressure Profile

Measured Depth	True Vertical Depth	Pore Pressure	Reservoir Gradient	Reservoir Density	Fracture Gradient	Fracture Density	Fracture Pressure
ft	ft	psi	psi/ft	lb/gal	psi/ft	lb/gal	psi
15936.0	15199.9	10581	0.696	13.40	0.758	14.60	11528
17874.0	17119.2	12272	0.717	13.80	0.784	15.10	13429

1.11 Critical Velocity - Fracture Zone

Stage Description	Critical Rate	Critical Velocity	GHB Effective Reynold's Number
	bpm	ft/s	
13.8 ppg SBM	13.07	24.06	3080.80
14.5 ppg TSIII	13.94	25.68	3152.70
Macondo 9.875 Liner	54.34	100.08	2305.77
14.5 ppg TSIII	12.73	23.44	3162.68
13.8 ppg SBM	13.07	24.06	3080.80

Based on annular segment at fracture zone MD of 17874.0 ft.

1.12 Critical Velocity - Reservoir Zone

Stage Description	Critical Rate	Critical Velocity	GHB Effective Reynold's Number
	bpm	ft/s	
13.8 ppg SBM	39.88	11.32	3594.60
14.5 ppg TSIII	29.86	8.48	3672.99
Macondo 9.875 Liner	106.11	30.12	2439.94
14.5 ppg TSIII	27.82	7.90	3687.55
13.8 ppg SBM	39.88	11.32	3594.60

Based on annular segment at reservoir zone MD of 16874.0 ft.

2.0 TUNED SPACER**2.1 Tuned Spacer Parameters, 2. 14.5 ppg TSIII, Bingham Plastic**

Density	14.50	lb/gal
Calculated YP	28.00	lbf/(100*ft ²)
Calculated PV	49.80	cp
Temperature	190	°F
Use Job Design	Yes	
Zone of Interest		
Measured Depth	17748.0	ft
Displacement Efficiency	100.00	
Hole Dia.	12.568	in
Standoff	65.83	%
Pipe OD	9.875	in
Rate	5.00	bpm
Mud		
Erodibility Number	24.00	
Required Shear Stress	25.00	lbf/(100*ft ²)
Density	13.80	lb/gal
PV	61.02	cp
YP	24.72	lbf/(100*ft ²)
Laboratory Volume	600.00	cm ³
This Tuned Spacer was designed to meet the above conditions. Check pipe OD, hole dia., standoff, rate, erodibility number, density, PV, and YP for any differences in the final job design and simulation.		
Simulated Downhole Rate	7.74	bpm
Simulated Downhole MD	17874.0	ft

2.2 Tuned Spacer Parameters, 4. 14.5 ppg TSIII, Bingham Plastic

Density	14.50	lb/gal
Calculated YP	25.00	lb/(100*ft ²)
Calculated PV	45.18	cp
Temperature	190	°F
Use Job Design	Yes	
Zone of Interest		
Measured Depth	17748.0	ft
Displacement Efficiency	100.00	
Hole Dia.	12.568	in
Standoff	70.00	%
Pipe OD	9.875	in
Rate	5.00	bpm
Mud		
Erodibility Number	24.00	
Required Shear Stress	25.00	lb/(100*ft ²)
Density	13.80	lb/gal
PV	56.09	cp
YP	21.50	lb/(100*ft ²)
Laboratory Volume	600.00	cm ³

This Tuned Spacer was designed to meet the above conditions. Check pipe OD, hole dia., standoff, rate, erodibility number, density, PV, and YP for any differences in the final job design and simulation.

Simulated Downhole Rate	bpm
Simulated Downhole MD	17874.0 ft

2.3 Recipe, 2. 14.5 ppg TSIII

Material	Specific Gravity	State	Conc. Solid	Conc. Liquid	Mass	Volume
	SG		lb/bbl	gal/bbl	g	cm ³
Tuned Spacer III Blend	2.500	Dry	28		47	19
Water	1.000	Liquid		31.619	452	452
Barite	4.200	Dry	318		544	129
Total					1042	600

2.4 Recipe, 4. 14.5 ppg TSIII

Material	Specific Gravity	State	Conc. Solid	Conc. Liquid	Mass	Volume
	SG		lb/bbl	gal/bbl	g	cm ³
Tuned Spacer III Blend	2.500	Dry	26		44	18
Water	1.000	Liquid		31.663	452	452
Barite	4.200	Dry	319		546	130
Total					1042	600

2.5 Loadout Instructions - Materials Required for the Indicated Volume

Fluid Name	14.5 ppg TSIII				
Stage Number	2				
Density	14.50	lb/gal			
Yield Point	28.00	lb/(100*ft ²)			
Plastic Viscosity	49.80	cp			
Volume of Spacer	50.00	bbl			
	Amount Required	Dry-Blend Y/N	Amount Loaded	Unit	
Tuned Spacer III Blend	34			sack	Rounded to the nearest 40 lb sack
Barite	15879			lb	Primary Weighting Material
Solid Additives					
Liquid Additives					
Total Mixing Water	1581			gal	For best results, add D-Air 3 to the mixing water prior to the dry blend
Special Instructions					
Loaded by:					
Date Loaded:					

2.6 Loadout Instructions - Materials Required for the Indicated Volume

Fluid Name	14.5 ppg TSIII				
Stage Number	4				
Density	14.50	lb/gal			
Yield Point	25.00	lb/(100*ft ²)			
Plastic Viscosity	45.18	cp			
Volume of Spacer	11.00	bbl			
	Amount Required	Dry-Blend Y/N	Amount Loaded	Unit	
Tuned Spacer III Blend	7			sack	Rounded to the nearest 40 lb sack
Barite	3508			lb	Primary Weighting Material
Solid Additives					
Liquid Additives					
Total Mixing Water	348			gal	For best results, add D-Air 3 to the mixing water prior to the dry blend
Special Instructions					
Loaded by:					
Date Loaded:					

3.0 CENTRALIZERS

3.1 Centralizer Parameters

Calculated Standoff/Spacing Profile	No
Use Average Joint Lengths	No
Torque and Drag Calculations	No
Fluid Profile During Mud Conditioning	
Mud Density	13.80 lb/gal
Maximum Distance between Centralizers	160.0 ft
Minimum Distance between Centralizers	20.0 ft
Calculate Standoff Above	No
Top of Centralized Interval Standoff	40.00 %

3.2 Centralizer Specifications

Part Number	Type*	COD	Hole Dia.	Nom. Dia.	Min. Dia.	Start Force	Run Force	Rest. Force	Bows
		in	in	in	in	lbf	lbf	lbf	
Model 9.875x12.250	BS	9.875	12.250	13.500	10.375	595	418	1932	6

*BS - Bow Spring, R(S) - Rigid Solid, R(PB) - Rigid Positive Bar

3.3 Constant Spacing/Standoff Centralizer Intervals

Top MD	Bottom MD	Cent. A	Required Standoff	Spacing
ft	ft		%	ft
16332.0	17747.0	Model 9.875x12.250		42.0

3.4 Centralizer Placement

Centralizer Number	Measured Depth ft	Deviation °	Azimuth °	Restoring Force lbf	Tension lbf	Centralizer
1	17747.0	4.0	213.8	83	5347	Model 9 875x12.250
2	17705.0	4.0	213.8	145	7423	Model 9 875x12.250
3	17663.0	4.0	213.8	145	9499	Model 9 875x12.250
4	17621.0	4.0	213.8	145	11574	Model 9 875x12.250
5	17579.0	4.0	213.8	145	13650	Model 9 875x12.250
6	17537.0	4.0	213.8	145	15726	Model 9 875x12.250
7	17495.0	4.0	213.8	385	17802	Model 9 875x12.250
8	17453.0	3.3	178.5	764	19879	Model 9 875x12.250
9	17411.0	2.6	139.2	710	21957	Model 9 875x12.250
10	17369.0	1.9	99.9	590	24037	Model 9 875x12.250
11	17327.0	1.1	60.6	461	26118	Model 9 875x12.250
12	17285.0	0.4	21.3	284	28198	Model 9 875x12.250
13	17243.0	0.0	0.0	105	30279	Model 9 875x12.250
14	17201.0	0.0	0.0	0	32360	Model 9 875x12.250
15	17159.0	0.0	0.0	0	34441	Model 9 875x12.250
16	17117.0	0.0	0.0	0	36522	Model 9 875x12.250
17	17075.0	0.0	0.0	0	38602	Model 9 875x12.250
18	17033.0	0.0	0.0	0	40683	Model 9 875x12.250
19	16991.0	0.0	0.0	164	42764	Model 9 875x12.250
20	16949.0	0.4	10.1	524	44845	Model 9 875x12.250
21	16907.0	1.3	29.6	816	46925	Model 9 875x12.250
22	16865.0	2.1	49.0	1006	49004	Model 9 875x12.250
23	16823.0	3.0	68.5	1240	51082	Model 9 875x12.250
24	16781.0	3.8	87.9	1508	53159	Model 9 875x12.250
25	16739.0	4.6	107.4	1805	55233	Model 9 875x12.250
26	16697.0	5.5	126.8	2129	57304	Model 9 875x12.250
27	16655.0	6.3	146.3	2477	59372	Model 9 875x12.250
28	16613.0	7.2	165.7	2847	61437	Model 9 875x12.250
29	16571.0	8.0	185.2	3239	63497	Model 9 875x12.250
30	16529.0	8.8	204.6	3652	65553	Model 9 875x12.250
31	16487.0	9.7	224.1	4086	67605	Model 9 875x12.250
32	16445.0	10.5	243.5	4539	69650	Model 9 875x12.250
33	16403.0	11.4	263.0	5012	71690	Model 9 875x12.250
34	16361.0	12.2	282.4	83322	73724	Model 9 875x12.250

4.0 SIMULATION

4.1 Volume and Pressure Results

Displacement was completed automatically. An additional 16.76 bbl was required.

Annulus fluid is heavier than casing fluid by 128 psi. Apply appropriate back pressure on casing if floating equipment does not hold properly.

4.2 Volume and Rate Calculations

Time min	Surface Stage In	Surface Stage Out	Liquid Volume In bbl	Total Volume Out bbl	Liquid Rate In bpm	Total Rate Out bpm
0.02	1	1	0.08	0.08	5.00	4.54
18.00	3	1	90.00	90.39	5.00	5.07
29.60	4	1	148.00	149.36	5.00	5.08
38.83	5	1	220.00	220.96	8.00	8.01
51.33	5	1	320.00	320.71	8.00	7.98
63.83	5	1	420.00	420.35	8.00	7.98
76.33	5	1	520.00	520.12	8.00	7.99
88.83	5	1	620.00	619.92	8.00	7.98
101.33	5	1	720.00	716.84	8.00	7.50
110.99	5	1	762.20	760.90	3.00	2.93
116.73	5	1	779.37	777.53	0.00	0.60

4.3 Horsepower, Pressure, Freefall

Time min	Liquid Volume In bbl	Pump Output hp	Surface Pressure In psi	Surface Pressure Out psi	ECD @ TD lb/gal	ECD @ Frac Zone lb/gal	Free Fall Height ft
0.02	0.08	228.9	1854	0	15.65	15.65	0.0
18.00	90.00	244.0	1977	0	15.89	15.89	0.0
29.60	148.00	204.0	1651	0	15.89	15.89	0.0
38.83	220.00	466.1	2364	0	16.43	16.43	0.0
51.33	320.00	516.9	2623	0	16.42	16.42	0.0
63.83	420.00	520.6	2641	0	16.42	16.42	0.0
76.33	520.00	512.3	2599	0	16.42	16.42	0.0
88.83	620.00	510.2	2588	0	16.42	16.42	0.0
101.33	720.00	841.5	4279	0	18.35	18.35	0.0
110.99	762.20	179.1	2422	0	16.48	16.48	0.0
116.73	779.37	0.0	3036	0	14.52	14.52	0.0

4.4 Gas Flow Potential

Gas Flow Potential 1.17
at Reservoir Zone Measured Depth 16874.0 ft

Based on analysis of the above outlined well conditions, this well is considered to have a MINOR gas flow problem. Wells in this category fall into flow condition 1.

4.5 Pressure to Break Circulation - Hydrostatic Pressures

Total Depth 12272 psi
Fracture Zone 12272 psi

4.6 Pressure to Break Circulation

Gel Strength	Surface Pressure	Total Depth Additional Pressure	Fracture Zone Additional Pressure
lb/(100*ft ³)	psi	psi	psi
25.00	752	476	476
50.00	1504	952	952
75.00	2257	1427	1427
100.00	3009	1903	1903
200.00	6018	3806	3806

4.7 Hook Load

	Time	Volume	Hook Load
	min	bbl	lbf
Static	0.02	0.08	502214
Maximum	50.08	310.00	516887
Minimum	116.73	779.37	377143

4.8 Final Position of Stages

Stage Description	Annular Length	Casing Length	Annular Top MD	Casing Top MD
	ft	ft	ft	ft
13.8 ppg SBM	14294.2		0.0	
14.5 ppg TSIII	2027.6		14294.2	
Macondo 9.875 Liner	1552.2	225.4	16321.8	17648.6
14.5 ppg TSIII		152.2		17496.4
13.8 ppg SBM		17496.4		0.0

4.9 Final Annular Fluid Density

Measured Depth ft	Density lb/gal	Quality %	Hydrostatic Gradient lb/gal
0.0	13.84	0.00	13.84
142.0	13.86	0.00	13.85
289.8	13.87	0.00	13.86
437.3	13.89	0.00	13.87
584.8	13.90	0.00	13.87
732.1	13.91	0.00	13.88
879.3	13.92	0.00	13.89
1026.4	13.93	0.00	13.89
1173.3	13.94	0.00	13.90
1320.2	13.95	0.00	13.90
1467.0	13.96	0.00	13.91
1613.7	13.97	0.00	13.91
1760.4	13.98	0.00	13.92
1906.9	13.98	0.00	13.92
2053.4	13.99	0.00	13.93
2199.8	13.99	0.00	13.93
2346.2	14.00	0.00	13.94
2492.5	14.00	0.00	13.94
2638.8	14.01	0.00	13.94
2785.0	14.01	0.00	13.95
2931.2	14.02	0.00	13.95
3077.3	14.02	0.00	13.95
3223.4	14.02	0.00	13.96
3369.5	14.02	0.00	13.96
3515.6	14.03	0.00	13.96
3661.6	14.03	0.00	13.97
3807.7	14.03	0.00	13.97
3953.7	14.03	0.00	13.97
4099.7	14.03	0.00	13.97
4245.8	14.03	0.00	13.97
4391.8	14.03	0.00	13.98
4537.9	14.02	0.00	13.98
4684.1	14.01	0.00	13.98
4830.3	14.01	0.00	13.98
4976.6	14.01	0.00	13.98
5123.1	13.97	0.00	13.98
5251.3	13.93	0.00	13.98
5505.6	13.93	0.00	13.98
5759.8	13.93	0.00	13.98
6000.0	13.93	0.00	13.97
6200.0	13.94	0.00	13.97
6437.6	13.94	0.00	13.97
6700.0	13.94	0.00	13.97
6945.8	13.94	0.00	13.97
7199.9	13.94	0.00	13.97
7381.7	13.94	0.00	13.97
7635.9	13.94	0.00	13.97
7890.0	13.94	0.00	13.97
8100.0	13.94	0.00	13.96

HALLIBURTON

BP AMERICA PRODUCTION COMPANY

Macondo Relief #3

MC252_3 Macondo 9.875in Liner v1

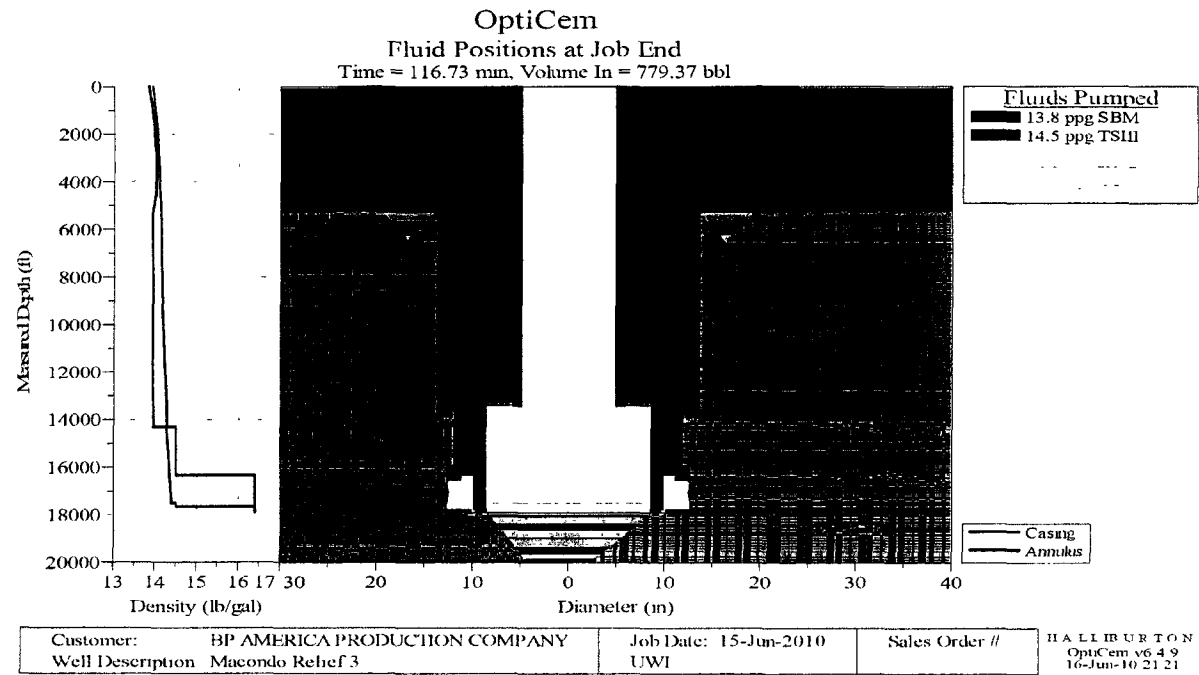
Measured Depth	Density	Quality	Hydrostatic Gradient
ft	lb/gal	%	lb/gal
8300.0	13.95	0.00	13.96
8600.0	13.95	0.00	13.96
8813.2	13.95	0.00	13.96
9067.4	13.95	0.00	13.96
9300.0	13.95	0.00	13.96
9500.0	13.95	0.00	13.96
9744.7	13.94	0.00	13.96
10000.0	13.94	0.00	13.96
10252.7	13.94	0.00	13.96
10506.8	13.94	0.00	13.96
10760.8	13.94	0.00	13.96
11000.0	13.94	0.00	13.96
11200.0	13.94	0.00	13.96
11438.3	13.94	0.00	13.96
11692.4	13.94	0.00	13.96
12115.9	13.94	0.00	13.96
12539.4	13.94	0.00	13.96
12962.7	13.95	0.00	13.96
13275.0	13.95	0.00	13.96
14299.1	14.50	0.00	13.96
15936.0	14.50	0.00	14.01
16321.8	16.40	0.00	14.02
16381.5	16.40	0.00	14.03
16592.0	16.40	0.00	14.06
16959.2	16.40	0.00	14.12
17222.0	16.40	0.00	14.15
17490.8	16.40	0.00	14.19
17874.0	16.40	0.00	14.24
17874.0	16.40	0.00	14.24

4.10 Time of Events

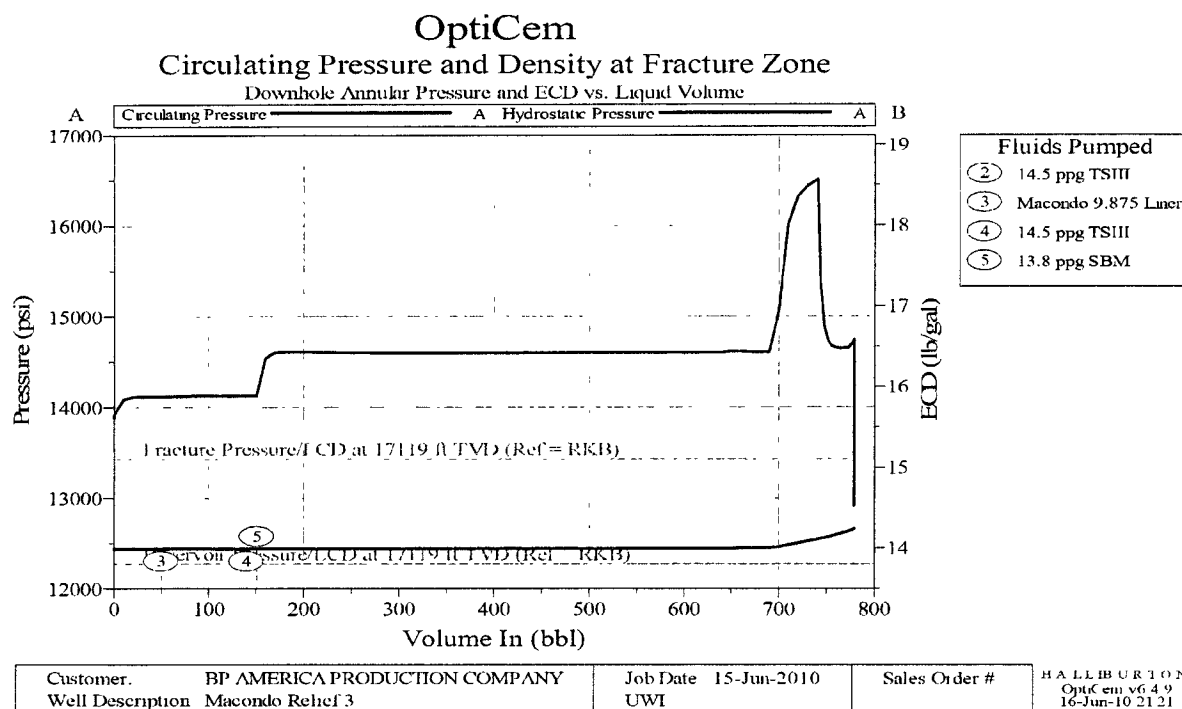
Time	Frac Zone ECD	Res Zone ECD	Stage Starts Pumping	Stage Enters Annulus
min	lb/gal	lb/gal		
2.00	15.84	15.62	2. 14.5 ppg TSIII	
12.00	15.88	15.65	3. Macondo 9.875 Liner	
28.40	15.89	15.66	4. 14.5 ppg TSIII	
31.32	16.35	16.05	5. 13.8 ppg SBM	
92.57	16.44	16.11		2. 14.5 ppg TSIII
98.82	16.94	16.02		3. Macondo 9.875 Liner
116.72	16.58	15.39	Prior to plug landing	
116.73	14.52	14.41	Plug Landed	

5.0 ATTACHMENTS

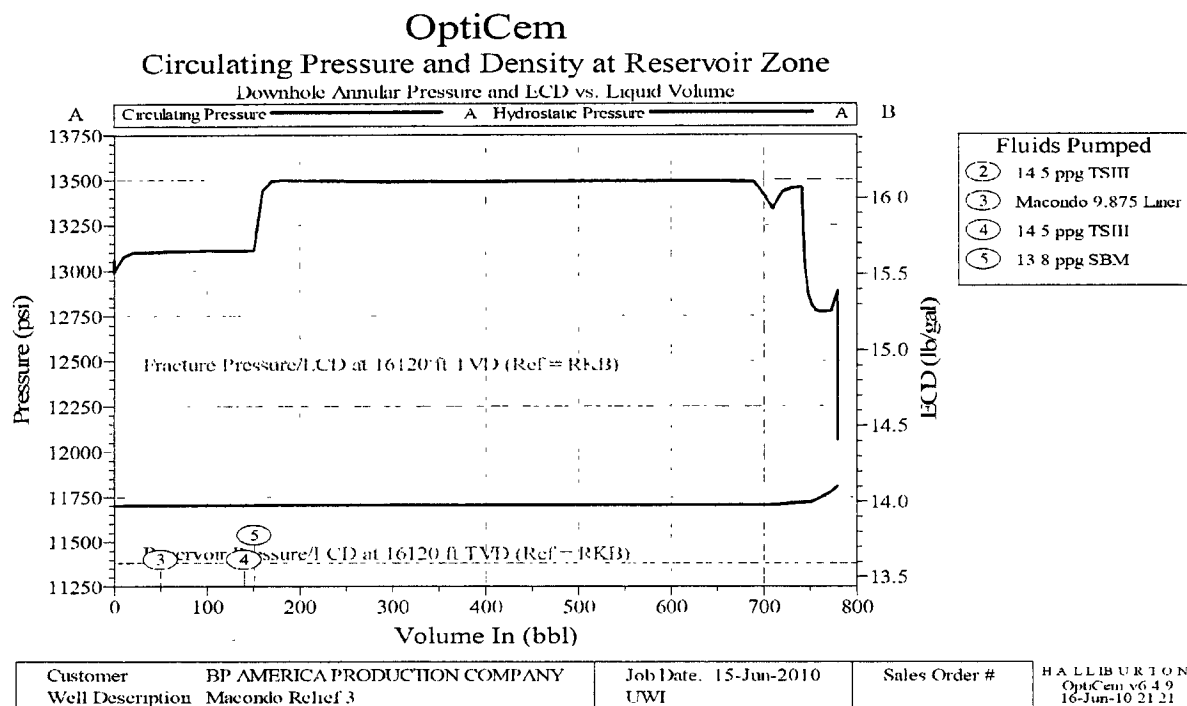
5.1 Fluid Positions (graph)



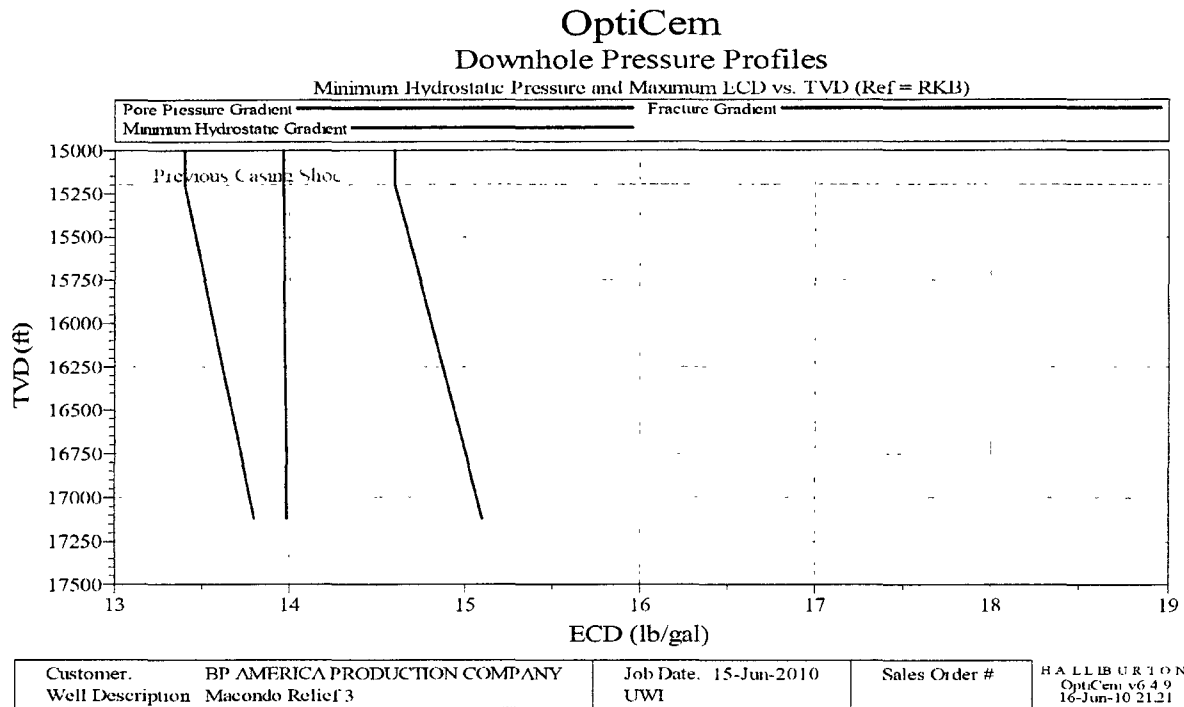
5.2 Circ Pressure & Density - Frac Zone (graph)



5.3 Circ Pressure & Density - Res Zone (graph)



5.4 Downhole Pressure Profiles (graph)



5.5 Calculated Surface Pressure (graph)

