BP AMERICA PRODUCTION COMPANY
PO Box 22024
Tulsa, OK 74121-2024

Macondo #1

9 7/8" X 7" Production Casing Design Report

For: Brian Morel
Date: April 15, 2010

HALLIBURTON

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1.0 DESIGN

1.1 Customer Information

Customer	BP AMERICA PRODUCTION COMPANY
Sales Order	
Job Configuration	N2 Foamed Cement
Well Name	Macondo
Well Number	#1
Start Time	Thursday, April 15, 2010
County	
State	Louisiana
UWI/API	
Country	United States of America
H2S Present	Unknown
CO2 Present	Unknown
Customer Representative	Brian Morel
Service Representative	Jesse Gagliano
Design Name	Macondo Prospect MC 252 #1 - 9.875 X 7 - with 7 bbls Base Oil
Comment	
Injection Path	Casing

1.2 Parameters

Fracture Zone Measured Depth	18300.0	ft
Fracture Zone Gradient	0.779	psi/ft
Fracture Zone Density	15.00	lb/gal
Fracture Zone Pressure	14251	psi
Reservoir Measured Depth	18200.0	ft
Reservoir Pore Pressure	13197	psi
Reservoir Zone Gradient	0.726	psi/ft
Reservoir Zone Density	13.97	lb/gal
Back Pressure	0	psi
Height - Mud Line to Mean Sea Level	4992.0	ft
Height - Mean Sea Level to Rotary Kelly Bushing	75.0	ft
Sea Water Density	8.54	lb/gal
Returns To Surface		
Simulator Volume Increment	5.00	bbl
Surface Iron Displacement	0.41	bbl
Shoe Track Length	200.0	ft
Additional Pressure to Seat Plug	500	psi
Eccentricity Enhanced Calculations	No	
Erodibility Enhanced Calculations	Yes	
Mud Erodibility Measured Depth	17168.0	ft
Mud Erodibility Number	20.69	
Mud Required Shear Stress	29.00	lbf/(100*ft²)
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		0.0
5067.0	5067.0	0.0	0.00	0.0
5526.0	5525.9	2.0	0.43	101.4
5621.0	5620.9	1.6	-0.33	97.2
5719.0	5718.8	1.3	-0.32	96.8
5815.0	5814.8	1.1	-0.22	91.4
5908.0	5907.8	0.9	-0.20	93.4
6004.0	6003.8	0.9	-0.08	92.6
6099.0	6098.8	0.7	-0.15	89.3
6195.0	6194.8	0.6	-0.11	86.6
6304.0	6303.8	0.5	-0.11	83.3
6401.0	6400.8	0.1	-0.41	82.2
6495.0	6494.8	0.0	-0.06	119.7
6590.0	6589.8	0.0	0.00	211.6
6685.0	6684.8	0.0	0.00	318.1
6780.0	6779.8	0.1	0.06	42.6
6873.0	6872.8	0.1	0.01	268.0
6971.0	6970.8	0.1	0.02	300.4
7057.0	7056.8	0.0	-0.10	100.6
7159.0	7158.8	0.0	0.01	240.7
7254.0	7253.8	0.0	-0.01	220.7
7350.0	7349.8	0.0	0.01	273.7
7443.0	7442.8	0.1	0.02	135.0
7538.0	7537.8	0.1	0.00	171.6
7633.0	7632.8	0.0	-0.02	333.4
7727.0	7726.8	0.0	-0.04	359.8
7821.0	7820.8	0.0	0.03	335.2
7921.0	7920.8	0.1	0.09	181.0
8000.0	7999.8	1.1	1.19	20.0
8096.0	8095.7	0.9	-0.13	17.0
8192.0	8191.7	0.0	-0.95	16.1
8289.0	8288.7	0.2	0.21	225.8
8382.0	8381.7	0.1	-0.18	34.1
8477.0	8476.7	0.1	0.00	324.5
8573.0	8572.7	0.1	0.03	9.4
8667.0	8666.7	0.1	0.00	46.6
8762.0	8761.7	0.1	-0.03	86.7
8854.0	8853.7	0.1	0.03	9.4
8917.0	8916.7	0.1	-0.05	46.6
9187.0	9186.6	2.5	0.89	106.3
9327.0	9326.6	0.4	-1.45	96.0
9463.0	9462.6	0.4	-0.04	90.8
9603.0	9602.6	0.5	0.05	125.7
9736.0	9735.6	0.4	-0.05	154.0
9874.0	9873.6	0.4	0.01	141.0
10004.0	10003.6	0.3	-0.11	157.9
10150.0	10149.6	0.4	0.08	162.3
10285.0	10284.6	0.4	0.06	184.5

Measured Depth	True Vertical Depth	Deviation	Build Angle	Azimuth
ft	ft	°	°/(100*ft)	°
10424.0	10423.6	0.5	0.02	182.7
10563.0	10562.6	0.5	0.00	210.6
10701.0	10700.6	0.5	0.00	205.5
10839.0	10838.6	0.5	0.00	208.5
10977.0	10976.6	0.6	0.07	204.1
11114.0	11113.5	0.7	0.08	205.5
11252.0	11251.5	0.6	-0.04	216.2
11390.0	11389.5	0.5	-0.08	220.5
11528.0	11527.5	0.5	-0.04	191.9
11665.0	11664.5	0.4	-0.05	185.2
11796.0	11795.5	3.1	2.11	267.9
11934.0	11933.0	5.6	1.79	264.1
12070.0	12067.9	9.1	2.58	264.3
12209.0	12205.0	9.9	0.58	262.3
12347.0	12341.0	9.2	-0.52	262.5
12484.0	12476.4	8.6	-0.44	263.4
12622.0	12613.1	7.3	-0.99	261.1
12760.0	12750.1	6.0	-0.91	261.6
12896.0	12885.6	4.3	-1.22	262.0
13034.0	13023.4	1.3	-2.20	264.7
13112.0	13101.4	0.7	-0.79	257.8
13172.0	13161.4	0.6	-0.08	261.4
13310.0	13299.4	0.9	0.20	272.4
13448.0	13437.4	0.6	-0.18	276.6
13585.0	13574.4	0.6	-0.01	274.8
13721.0	13710.3	0.7	0.04	267.5
13859.0	13848.3	0.7	0.01	273.8
13998.0	13987.3	0.8	0.08	265.3
14133.0	14122.3	0.6	-0.18	274.2
14273.0	14262.3	0.8	0.17	262.4
14549.0	14538.3	0.5	-0.12	291.1
14684.0	14673.3	0.3	-0.12	268.7
14816.0	14805.3	0.7	0.27	235.4
14950.0	14939.3	0.7	0.03	230.4
15081.0	15070.3	0.6	-0.05	241.4
15264.0	15253.3	0.7	0.02	214.5
15406.0	15395.2	0.7	0.05	228.4
15540.0	15529.2	0.7	-0.04	223.8
15673.0	15662.2	0.6	-0.09	242.8
15805.0	15794.2	0.6	0.02	234.9
15939.0	15928.2	0.8	0.12	246.9
16072.0	16061.2	0.9	0.09	240.6
16204.0	16193.2	0.7	-0.13	235.1
16333.0	16322.2	0.7	-0.02	229.1
16470.0	16459.2	0.8	0.07	235.1
16604.0	16593.1	0.9	0.07	222.2
16729.0	16718.1	0.8	-0.07	224.2
16870.0	16859.1	0.8	0.02	233.9
17004.0	16993.1	0.7	-0.10	206.2

Measured Depth	True Vertical Depth	Deviation	Build Angle	Azimuth
ft	ft	°	°/(100*ft)	°
17136.0	17125.1	0.9	0.19	219.9
17318.0	17307.1	0.6	-0.15	175.5
17455.0	17444.1	0.4	-0.20	187.9
17592.0	17581.1	0.3	-0.04	157.7
17728.0	17717.1	0.4	0.05	70.5
17867.0	17856.1	0.4	0.00	32.2
18003.0	17992.1	0.6	0.18	19.3
18138.0	18127.1	0.7	0.09	35.9
18300.0	18289.0	0.4	-0.22	38.2

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	45.0	2.620	1.870	1.00	1

1.5 Wellbore Geometry

MD	Hole Ex.	Hole Dia.	Casing OD	Casing ID	Casing Weight
ft	%	in	in	in	lb/ft
5067.0	0.00	19.500	6.625	5.426	32.000
5069.0	0.00	14.920	14.300	8.625	62.800
11185.0	0.00	14.920	9.875	8.625	62.800
12600.0	0.00	12.375	9.875	8.625	62.800
12800.0	0.00	12.375	7.000	6.094	32.000
14803.0	0.00	10.711	7.000	6.094	32.000
17168.0	0.00	8.625	7.000	6.094	32.000
17284.5	0.00	9.700	7.000	6.094	32.000
17352.0	0.00	10.139	7.000	6.094	32.000
17579.5	0.00	10.176	7.000	6.094	32.000
17619.5	0.00	10.555	7.000	6.094	32.000
17639.0	0.00	10.660	7.000	6.094	32.000
17680.5	0.00	10.901	7.000	6.094	32.000
17686.0	0.00	11.578	7.000	6.094	32.000
17719.5	0.00	10.601	7.000	6.094	32.000
17774.0	0.00	10.417	7.000	6.094	32.000
17787.0	0.00	11.140	7.000	6.094	32.000
17803.5	0.00	11.180	7.000	6.094	32.000
17810.5	0.00	10.167	7.000	6.094	32.000
17829.5	0.00	11.469	7.000	6.094	32.000
17848.5	0.00	11.474	7.000	6.094	32.000
17864.0	0.00	10.642	7.000	6.094	32.000
17890.5	0.00	10.740	7.000	6.094	32.000
17910.5	0.00	10.601	7.000	6.094	32.000
17935.0	0.00	10.688	7.000	6.094	32.000
18061.0	0.00	10.550	7.000	6.094	32.000
18105.0	0.00	9.502	7.000	6.094	32.000
18107.5	0.00	11.215	7.000	6.094	32.000
18191.5	0.00	8.755	7.000	6.094	32.000
18300.0	0.00	8.998	7.000	6.094	32.000

1.6 Pumping Schedule

No.	Description	Density	Rate	Volume	Duration
		lb/gal	bpm	bbl	min
1	Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	14.17	1.00	0.00	0.00
2	6.7 ppg Base Oil Macondo	6.50	4.00	7.00	1.75
3	Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	14.30	4.00	72.00	18.00
4	Macondo Foamed Slurry - 16.74 ppg	16.74	4.00	5.26	1.32
5-1	Macondo Foamed Slurry - 16.74 ppg	16.74	2.00	15.48	7.74
5-2	Macondo Foamed Slurry - 16.74 ppg	16.74	4.00	23.61	5.90
5-3	Macondo Foamed Slurry - 16.74 ppg	16.74	4.00	7.22	1.80
	Top Plug				
6	Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	14.30	4.00	20.00	5.00
7	Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	14.17	4.00	867.71	216.93
	Total			1018.27	258.44

1.7 Fluid Rheology - Generalized Herschel Bulkley

Fluid	Temp.	Foam Density	m	n	Tau0	MuInf	Speed	Dial
	°F	lb/gal			lbf/(100*ft²)	cp	rpm	
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	40		1.00	0.87	7.38	99.14	600	187.00
							300	106.00
							200	76.00
							100	45.00
							6	10.00
							3	9.00
	100		0.57	0.57	5.25	33.85	600	97.00
							300	57.00
							200	41.00
							100	27.00
							6	8.00
							3	7.00
	150		1.00	0.89	7.22	25.87	600	62.00
							300	37.00
							200	27.00
							100	18.00
							6	8.00
							3	7.00
6.7 ppg Base Oil Macondo	75		1.00	1.00	1.56	3.02	600	8.00
							300	4.00
							200	3.00
							100	2.00
							6	2.00
							3	2.00
	120		1.00	1.00	0.66	2.30	600	5.00
							300	3.00
							200	2.00
							100	1.00
							6	1.00
							3	1.00
	150		1.00	1.00	0.66	2.30	600	4.00
							300	2.00
							200	2.00
							100	1.00
							6	2.00
							3	2.00
Macondo Foamed Slurry - 16.74 ppg (Class H)	80	14.50	1.00	1.00	0.38	117.01	600	22.00
							300	8.00
							200	5.00
							100	3.00

Fluid	Temp.	Foam Density	m	n	Tau0	MuInf	Speed	Dial
	°F	lb/gal			lbf/(100*ft²)	cp	rpm	
							60	2.00
							30	2.00
							6	2.00
							3	1.00
	80		1.00	1.00	0.56	87.92	600	180.00
							300	84.00
							200	56.00
							100	28.00
							60	26.00
							30	8.00
							20	6.00
							10	4.00
							6	2.00
							3	2.00
	135		1.00	1.00	0.85	62.11	600	130.00
							300	56.00
							200	40.00
							100	20.00
							60	12.00
							30	8.00
							20	6.00
							10	4.00
							6	4.00
							3	4.00

1.8 Fluid Rheology - Bingham Plastic

Fluid	Temp.	PV	YP	Speed	Dial
	°F	cp	lbf/(100*ft²)	rpm	
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	80	51.98	30.00		

1.9 Temperature Input

Entered BHCT Method

Surface	80	°F
Outlet	120	°F
BHCT	135	°F
BHST		°F

1.10 Temperature Profile, Temperature Profile 1

Measured Depth	Casing Circulating Temperature	Annulus Circulating Temperature
ft	°F	°F
0.0	80	120
18300.0	135	135

1.11 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
17163.0	17152.1	12304	0.717	13.81	0.753	14.50	12920
17700.0	17689.1	12873	0.728	14.01			
18200.0	18189.1				0.753	14.50	13701
18300.0	18289.0	13262	0.725	13.96	0.779	15.00	14251

1.12 Critical Velocity - Fracture Zone

Stage Description	Critical Rate	Critical Velocity	GHB Effective Reynold's Number
	bpm	ft/s	
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	9.89	5.31	3561.21
6.7 ppg Base Oil Macondo	3.01	1.62	3852.90
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	18.70	10.04	3563.65
Macondo Foamed Slurry - 16.74 ppg	11.55	6.20	3046.64
Macondo Foamed Slurry - 16.74 ppg	11.55	6.20	3046.64
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	18.70	10.04	3563.65
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	9.89	5.31	3561.21

Based on annular segment at fracture zone MD of 18300.0 ft.

1.13 Critical Velocity - Reservoir Zone

Stage Description	Critical Rate	Critical Velocity	GHB Effective Reynold's Number
	bpm	ft/s	
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	9.89	5.31	3560.97
6.7 ppg Base Oil Macondo	3.01	1.62	3852.89
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	18.70	10.04	3563.65
Macondo Foamed Slurry - 16.74 ppg	11.56	6.20	3046.45
Macondo Foamed Slurry - 16.74 ppg	11.56	6.20	3046.45
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	18.70	10.04	3563.65
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	9.89	5.31	3560.97

Based on annular segment at reservoir zone MD of 18200.0 ft.

2.0 TUNED SPACER

2.1 Tuned Spacer Parameters, 3. Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III, Bingham Plastic

Density	14.30	lb/gal
Calculated YP	30.00	lbf/(100*ft²)
Calculated PV	51.98	cp
Temperature	190	°F
Use Job Design	Yes	
Zone of Interest		
Measured Depth	18300.0	ft
Displacement Efficiency	100.00	
Hole Dia.	8.998	in
Standoff	80.73	%
Pipe OD	7.000	in
Rate	4.00	bpm
Mud		
Erodibility Number	20.69	
Required Shear Stress	29.00	lbf/(100*ft²)
Density	14.17	lb/gal
PV	23.83	cp
YP	6.27	lbf/(100*ft²)
Laboratory Volume	600.00	cm³
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	3.99	bpm
Simulated Downhole MD	18300.0	ft

2.2 Tuned Spacer Parameters, 6. Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III, Bingham Plastic

Density	14.30	lb/gal
Calculated YP	30.00	lbf/(100*ft²)
Calculated PV	51.98	cp
Temperature	190	°F
Use Job Design	Yes	
Zone of Interest		
Measured Depth	18300.0	ft
Displacement Efficiency	100.00	
Hole Dia.	8.998	in
Standoff	80.73	%
Pipe OD	7.000	in
Rate	4.00	bpm
Mud		
Erodibility Number	20.69	
Required Shear Stress	29.00	lbf/(100*ft²)
Density	14.17	lb/gal
PV	23.83	cp
YP	6.27	lbf/(100*ft²)
Laboratory Volume	600.00	cm³
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	18300.0	ft

3.0 FOAM

3.1 Foam Design Parameters

Constant or Stages Gas Flow Calculation Method

Foaming Agents in Mix Water (volume based)		
Surfactant	1.50	%
Stabilizer	0.00	%
Fracture Zone		
Measured Depth	18300.0	ft
Fracture Pressure	14251	psi
Fracture Gradient	0.779	psi/ft
Fracture Density	15.00	lb/gal
Calculated Hydrostatic Pressure	13480	psi
Calculated Hydrostatic Pressure Gradient	0.737	psi/ft
Calculated Hydrostatic Density	14.19	lb/gal
Reservoir Zone		
Measured Depth	18200.0	ft
Pore Pressure	13197	psi
Reservoir Gradient	0.726	psi/ft
Reservoir Density	13.97	lb/gal
Calculated Hydrostatic Pressure	13405	psi
Calculated Hydrostatic Pressure Gradient	0.737	psi/ft
Calculated Hydrostatic Density	14.19	lb/gal

3.2 Foam Pumping Schedule for Liquids

Stg	Start Time	Pump Rate	Base Slurry Vol.	Cum. Base Slurry Vol.	Cem. Mix Water Vol.	Cum. Cem. Mix Water Vol.	Foam Agents Rate	Foam Agents Vol.	Foaming Agents Cum. Job Volume
	min	bpm	bbl	bbl	bbl	bbl	gpm	gal	gal
1	0.00	1.00	0.00	0.00	0.00	0.00		0.0	0.0
2	0.00	4.00	7.00	7.00	0.00	0.00	0.0	0.0	0.0
3	1.75	4.00	72.00	72.00	0.00	0.00	0.0	0.0	0.0
4	19.75	4.00	5.26	5.26	2.54	2.54	0.0	0.0	0.0
5-1	21.07	2.00	15.48	15.48	7.46	7.46	0.6	4.7	4.7
5-2	28.80	4.00	23.61	39.09	11.38	18.84	1.2	7.2	11.9
5-3	34.71	4.00	7.22	46.31	3.48	22.32	0.0	0.0	11.9
6	36.51	4.00	20.00	20.00	0.00	0.00	0.0	0.0	11.9
7	41.51	4.00	867.71	867.71	0.00	0.00	0.0	0.0	11.9

3.3 Foam Pumping Schedule for Gas

Stg	Start Time	Pump Rate	Starting Gas Conc.	Starting Gas Rate	Cum. Job Gas Vol.	Exp. Factor
	min	bpm	scf/bbl	scfm	Mscf	
1	0.00	1.00	0.000	0	0.0	1.00
2	0.00	4.00	0.000	0	0.0	1.00
3	1.75	4.00	0.000	0	0.0	1.00
4	19.75	4.00	0.000	0	0.0	1.00
5-1	21.07	2.00	583.406	1167	9.0	1.23
5-2	28.80	4.00	583.406	2334	22.8	1.22
5-3	34.71	4.00	0.000	0	22.8	1.00
6	36.51	4.00	0.000	0	22.8	1.00
7	41.51	4.00	0.000	0	22.8	1.00

3.4 Foam Slurry Data

No.	Description	Base Slurry Vol.	Foam Slurry Vol.	Bulk Cem.	Water Req.	Yield
		bbl	bbl	sk94	gal/sk94	ft³/sk94
1	Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	0.00	0.00			
2	6.7 ppg Base Oil Macondo	7.00	7.00			
3	Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	72.00	72.00			
4	Macondo Foamed Slurry - 16.74 ppg	5.26	5.26	22	4.940	1.3700
5-1	Macondo Foamed Slurry - 16.74 ppg	15.48	18.98	63	4.940	1.3700
5-2		23.61	28.91	97	4.940	1.3700
5-3		7.22	7.22	30	4.940	1.3700
6	Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	20.00	20.00			
7	Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	867.71	867.71			

4.0 CENTRALIZERS

4.1 Centralizer Parameters

Calculated Standoff/Spacing Profile		
Use Average Joint Lengths	No	
Torque and Drag Calculations	No	
Fluid Profile As Top of Plug Lands		
Maximum Distance between Centralizers	183.0	ft
Minimum Distance between Centralizers	20.0	ft
Calculate Standoff Above	No	
Top of Centralized Interval Standoff	70.00	%

4.2 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	
Macondo	BS	7.000	9.875	10.125	8.125	1034	719	485	4
8.5	BS	7.000	8.500	8.622	7.625	1094	774	1191	4

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

4.3 Constant Spacing/Standoff Centralizer Intervals

Top MD	Bottom MD	Cent. A	Required Standoff	Spacing
ft	ft		%	ft
17400.0	18030.0	Macondo		45.0
18030.0	18300.0	8.5		45.0

4.4 Centralizer Placement

Centralizer Number	Measured Depth	Deviation	Azimuth	Restoring Force	Tension	Centralizer
	ft	°	°	lbf	lbf	
1	18300.0	0.4	38.2	4	0	8.5
2	18255.0	0.5	37.4	13	1271	8.5
3	18210.0	0.6	36.7	17	2543	8.5
4	18165.0	0.7	36.1	20	3814	8.5
5	18120.0	0.7	34.0	16	5086	8.5
6	18075.0	0.7	28.8	12	6357	8.5
7	18030.0	0.6	23.0	9	7463	Macondo
8	17985.0	0.6	20.6	1	8569	Macondo
9	17940.0	0.5	23.9	7	9674	Macondo
10	17895.0	0.4	28.4	10	10780	Macondo
11	17850.0	0.4	36.6	14	11886	Macondo
12	17805.0	0.4	49.2	19	12991	Macondo
13	17760.0	0.4	61.8	22	14097	Macondo
14	17715.0	0.3	75.8	33	15203	Macondo
15	17670.0	0.3	101.8	41	16311	Macondo
16	17625.0	0.3	136.4	42	17420	Macondo
17	17580.0	0.3	160.6	34	18528	Macondo
18	17535.0	0.3	170.4	23	19637	Macondo
19	17490.0	0.3	180.3	24	20736	Macondo
20	17445.0	0.4	186.9	31	21836	Macondo
21	17400.0	0.5	182.3	1389	22935	Macondo

5.0 SIMULATION

5.1 Volume and Pressure Results

Annulus fluid is heavier than casing fluid by 18 psi. Apply appropriate back pressure on casing if floating equipment does not hold properly.

5.2 Volume and Rate Calculations

Time	Surface Stage In	Surface Stage Out	Liquid Volume In	Total Volume Out	Liquid Rate In	Total Rate Out
min			bbl	bbl	bpm	bpm
0.02	1	1	0.07	0.07	4.00	4.00
3.75	3	1	15.00	15.00	4.00	4.00
16.25	3	1	65.00	65.00	4.00	4.00
21.07	4	1	84.26	84.26	4.00	4.00
30.12	5	1	105.00	128.88	4.00	5.68
35.87	5	1	128.00	165.10	4.00	3.65
41.51	6	1	150.57	181.25	4.00	2.92
52.62	7	1	195.00	217.19	4.00	3.44
65.12	7	1	245.00	262.68	4.00	3.78
77.62	7	1	295.00	311.04	4.00	3.90
90.12	7	1	345.00	359.96	4.00	3.92
102.62	7	1	395.00	409.08	4.00	3.94
115.12	7	1	445.00	458.35	4.00	3.95
127.62	7	1	495.00	507.75	4.00	3.96
140.12	7	1	545.00	557.23	4.00	3.96
152.62	7	1	595.00	606.79	4.00	3.97
165.12	7	1	645.00	656.40	4.00	3.97
177.62	7	1	695.00	706.03	4.00	3.97
190.12	7	1	745.00	755.73	4.00	3.98
202.62	7	1	795.00	805.42	4.00	3.97
215.12	7	1	845.00	854.99	4.00	3.97
227.62	7	1	895.00	904.68	4.00	3.99
240.12	7	1	945.00	954.35	4.00	3.97
252.62	7	1	995.00	1004.05	4.00	3.98
258.56	7	1	1018.68	1027.79	0.00	1.81

5.3 Horsepower, Pressure, Freefall

Time	Liquid Volume In	Pump Output	Surface Pressure In	Surface Pressure Out	ECD @ TD	ECD @ Frac Zone	Free Fall Height
min	bbl	hp	psi	psi	lb/gal	lb/gal	ft
0.02	0.07	47.9	474	0	14.47	14.47	0.0
3.75	15.00	55.0	546	0	14.42	14.42	0.0
16.25	65.00	56.7	564	0	14.42	14.42	0.0
21.07	84.26	58.6	583	0	14.42	14.42	0.0
30.12	105.00	148.0	1495	0	14.46	14.46	0.0
35.87	128.00	122.7	1238	0	14.41	14.41	0.0
41.51	150.57	98.7	992	0	14.39	14.39	0.0
52.62	195.00	78.1	782	0	14.40	14.40	0.0
65.12	245.00	59.8	596	0	14.41	14.41	0.0
77.62	295.00	52.5	521	0	14.41	14.41	0.0
90.12	345.00	51.4	510	0	14.41	14.41	0.0
102.62	395.00	50.6	501	0	14.41	14.41	0.0
115.12	445.00	49.8	494	0	14.41	14.41	0.0
127.62	495.00	49.2	488	0	14.41	14.41	0.0
140.12	545.00	48.7	482	0	14.41	14.41	0.0
152.62	595.00	48.3	478	0	14.41	14.41	0.0
165.12	645.00	47.8	473	0	14.41	14.41	0.0
177.62	695.00	51.3	509	0	14.41	14.41	0.0
190.12	745.00	52.0	516	0	14.41	14.41	0.0
202.62	795.00	51.9	515	0	14.41	14.41	0.0
215.12	845.00	50.5	501	0	14.41	14.41	0.0
227.62	895.00	33.8	330	0	14.32	14.32	0.0
240.12	945.00	34.8	340	0	14.36	14.36	0.0
252.62	995.00	61.7	615	0	14.63	14.63	0.0
258.56	1018.68	0.0	1148	0	14.52	14.52	0.0

5.4 Gas Flow Potential

Gas Flow Potential	2.56	
at Reservoir Zone Measured Depth	18200.0	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.

5.5 Pressure to Break Circulation - Hydrostatic Pressures

Total Depth	13463	psi
Fracture Zone	13463	psi

5.6 Pressure to Break Circulation

Gel Strength	Surface Pressure	Total Depth Additional Pressure	Fracture Zone Additional Pressure
lbf/(100*ft²)	psi	psi	psi
25.00	617	383	383
50.00	1234	767	767
75.00	1851	1150	1150
100.00	2469	1533	1533
200.00	4937	3066	3066

5.7 Final Position of Stages

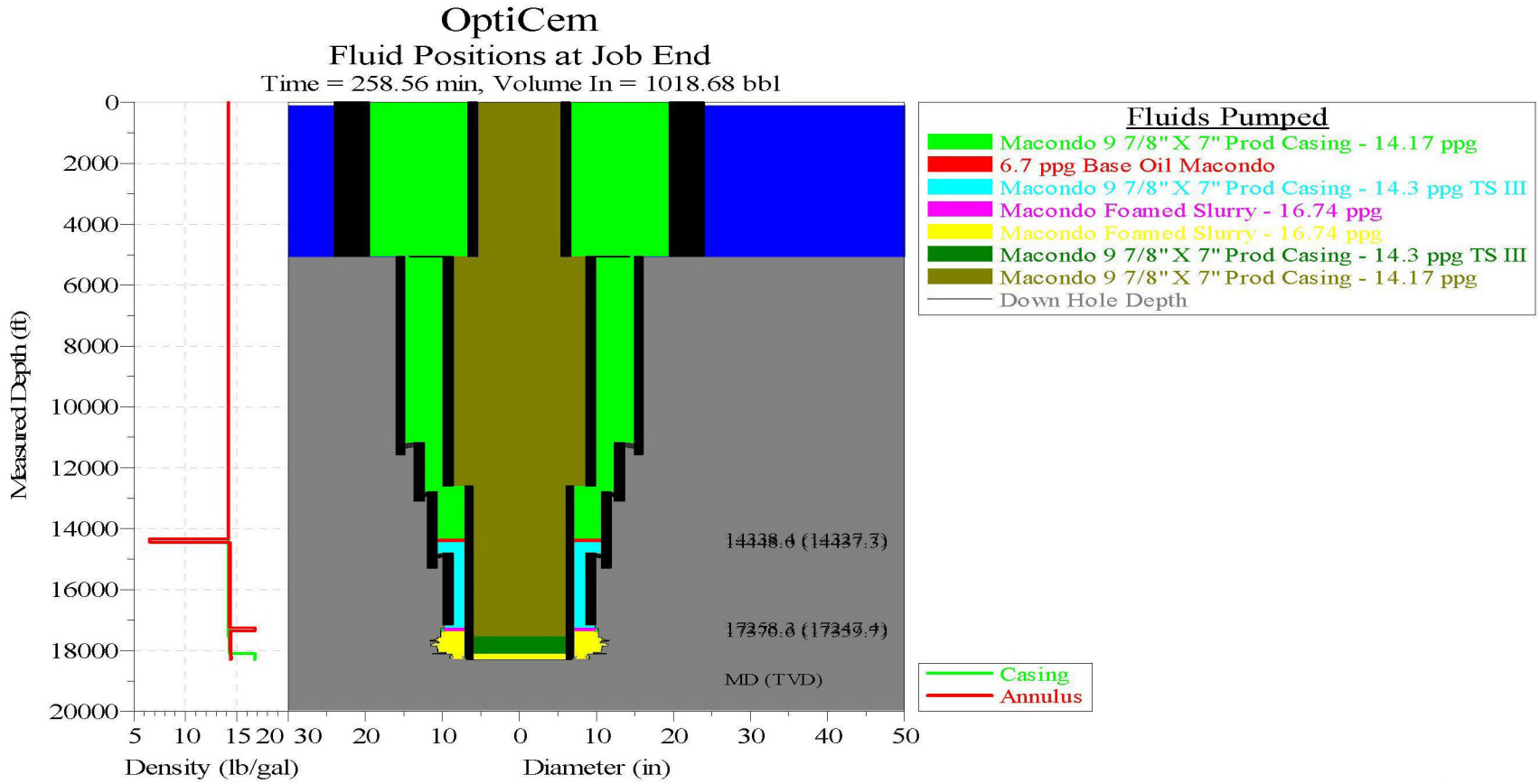
Stage Description	Annular Length	Casing Length	Annular Top MD	Casing Top MD
	ft	ft	ft	ft
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	14338.4		0.0	
6.7 ppg Base Oil Macondo	109.6		14338.4	
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	2810.3		14448.0	
Macondo Foamed Slurry - 16.74 ppg	112.4		17258.3	
Macondo Foamed Slurry - 16.74 ppg	929.4	200.0	17370.6	18100.0
Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III		554.4		17545.6
Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg		17545.6		0.0

5.8 Time of Events

Time	Frac Zone ECD	Res Zone ECD	Stage Starts Pumping	Stage Enters Annulus
min	lb/gal	lb/gal		
0.25	14.42	14.42	2. 6.7 ppg Base Oil Macondo	
2.50	14.42	14.42	3. Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	
20.00	14.42	14.42	4. Macondo Foamed Slurry - 16.74 ppg	
22.43	14.46	14.46	5. Macondo Foamed Slurry - 16.74 ppg	
36.87	14.38	14.38	6. Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III	
42.62	14.39	14.39	7. Macondo 9 7/8" X 7" Prod Casing - 14.17 ppg	
226.37	14.35	14.39		2. 6.7 ppg Base Oil Macondo
227.62	14.32	14.33		3. Macondo 9 7/8" X 7" Prod Casing - 14.3 ppg TS III
246.37	14.46	14.44		4. Macondo Foamed Slurry - 16.74 ppg
247.62	14.49	14.47		5. Macondo Foamed Slurry - 16.74 ppg
258.53	14.66	14.65	Prior to plug landing	
258.55	14.52	14.52	Plug Landed	

6.0 ATTACHMENTS

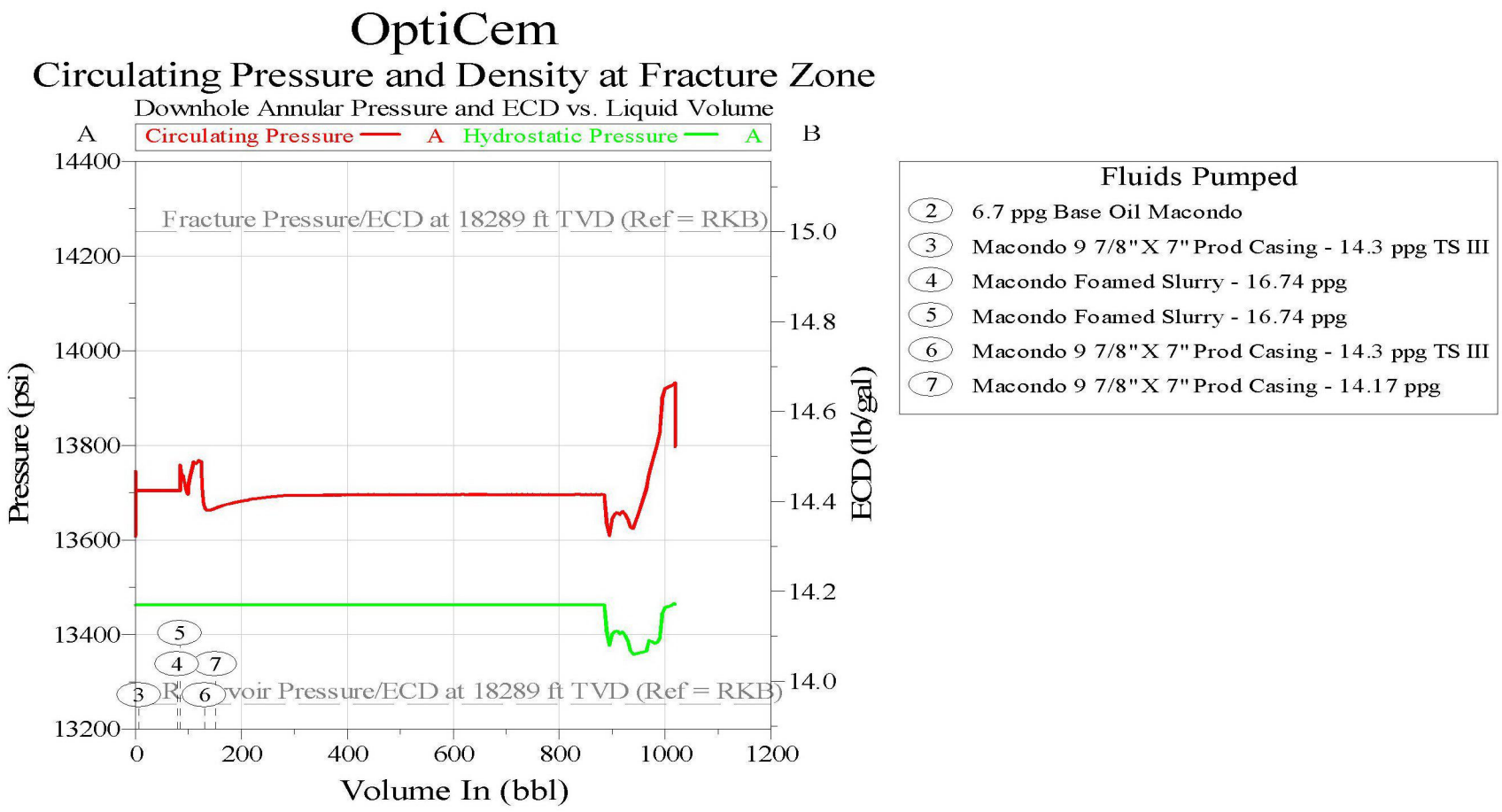
6.1 Fluid Positions (graph)



Customer: BP AMERICA PRODUCTION COMPANY		Job Date: 15-Apr-2010	Sales Order #:
Well Description: Macondo #1		UWI:	

HALLIBURTON
OptiCem v6.4.8
15-Apr-10 17:55

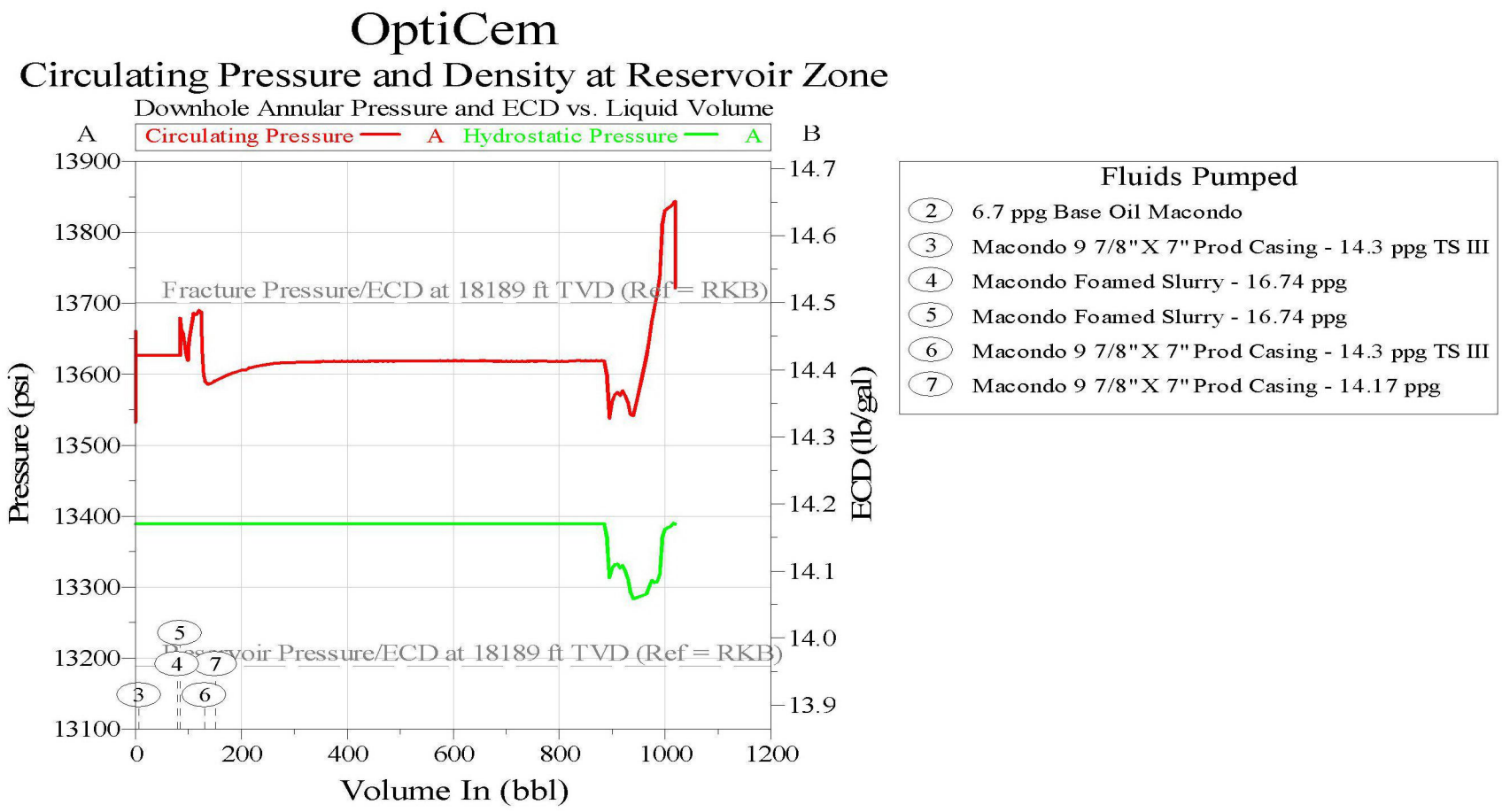
6.2 Circ Pressure & Density - Frac Zone (graph)



Customer: BP AMERICA PRODUCTION COMPANY		Job Date: 15-Apr-2010	Sales Order #:
Well Description: Macondo #1		UWI:	

HALLIBURTON
OptiCem v6.4.8
15-Apr-10 17:55

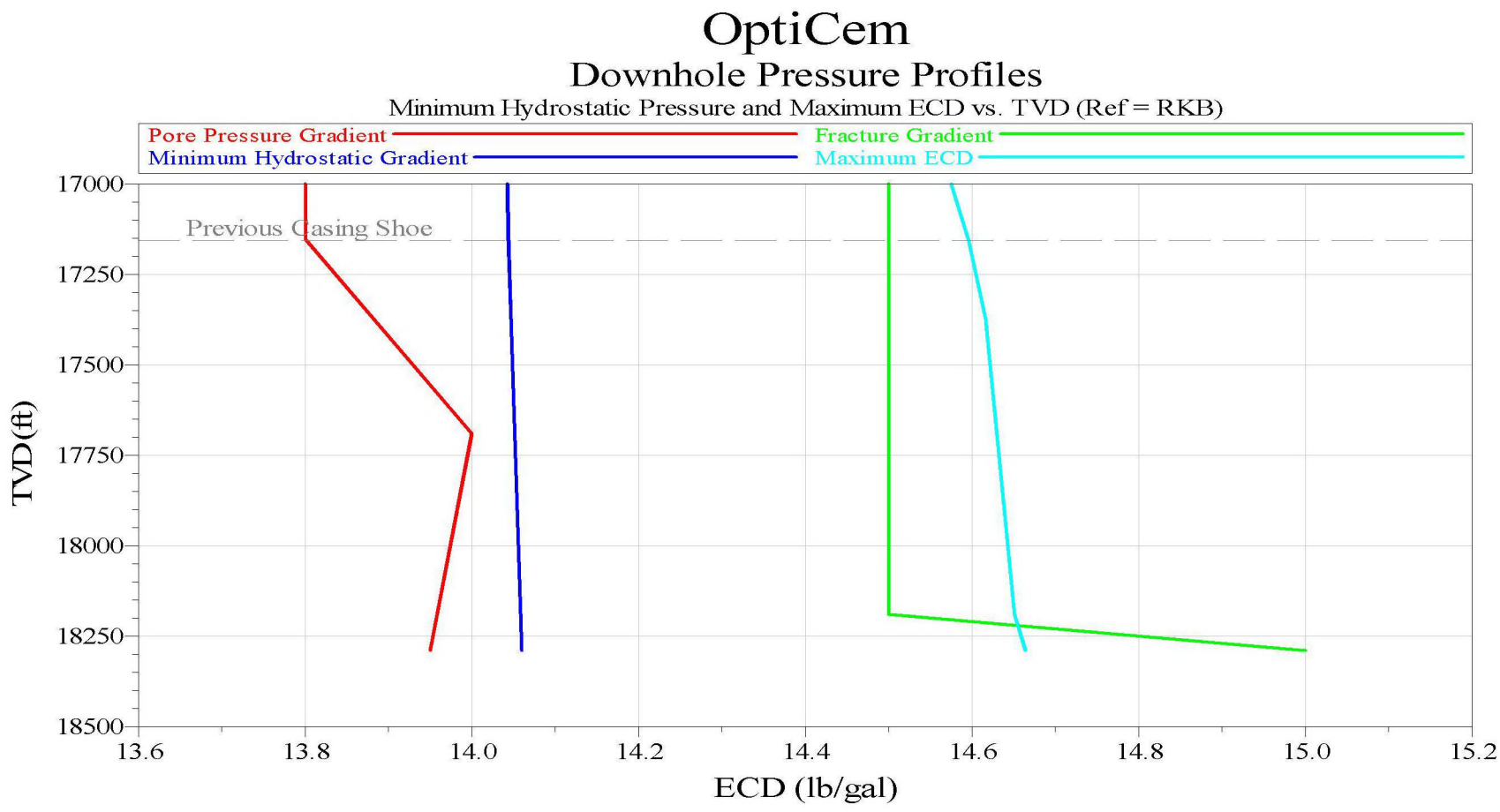
6.3 Circ Pressure & Density - Res Zone (graph)



Customer: BP AMERICA PRODUCTION COMPANY		Job Date: 15-Apr-2010	Sales Order #:
Well Description: Macondo #1		UWI:	

HALLIBURTON
OptiCem v6.4.8
15-Apr-10 17:55

6.4 Downhole Pressure Profiles (graph)



Customer:	BP AMERICA PRODUCTION COMPANY	Job Date: 15-Apr-2010	Sales Order #:	HALLIBURTON
Well Description:	Macondo #1	UWI:		OptiCem v6.4.8 15-Apr-10 17:55