

Noble Energy

Weld County, CO (NAD 83)

Sec. 23-T4N-R67W (Brandon-Sebastyen 23 PAD)

Brandon PC O23-65HN

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

15 April, 2013

Well Coordinates: 1,351,223.16 N, 3,176,959.90 E (40°17' 44.77" N, 104°51' 56.12" W)

Ground Level: 4,915.00 ft

Local Coordinate Origin: Centered on Well Brandon PC O23-65HN - Slot A1

Viewing Datum: KB=16' @ 4931.00ft (Precision 829)

TVDs to System: N

North Reference: Grid

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

HALLIBURTON

Design Report for Brandon PC O23-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
576.00	0.00	0.00	576.00	0.00	0.00	0.00	0.00
Tie On To Surface Casing Assumed Vertical							
643.00	0.20	280.61	643.00	0.02	-0.11	-0.11	0.30
First MWD Survey							
925.00	0.13	199.83	925.00	-0.19	-0.71	-0.73	0.08
1,208.00	0.07	16.45	1,208.00	-0.33	-0.77	-0.81	0.07
1,432.00	0.11	47.63	1,432.00	-0.05	-0.57	-0.57	0.03
1,521.00	1.88	336.67	1,520.98	1.35	-1.08	-0.87	2.08
1,566.00	2.57	330.40	1,565.95	2.90	-1.88	-1.43	1.62
1,611.00	3.06	341.46	1,610.89	4.92	-2.76	-2.00	1.62
1,656.00	4.05	334.79	1,655.81	7.50	-3.81	-2.67	2.38
1,701.00	4.52	333.22	1,700.68	10.52	-5.29	-3.69	1.08
1,745.00	5.52	330.68	1,744.51	13.91	-7.11	-4.99	2.33
1,790.00	6.68	330.29	1,789.26	18.07	-9.46	-6.71	2.58
1,835.00	7.93	328.65	1,833.89	23.00	-12.38	-8.86	2.82
1,880.00	8.43	325.12	1,878.43	28.35	-15.88	-11.54	1.57
1,925.00	8.58	325.52	1,922.94	33.83	-19.67	-14.48	0.36
1,970.00	9.03	327.50	1,967.41	39.57	-23.46	-17.39	1.21
2,014.00	10.34	326.32	2,010.78	45.77	-27.51	-20.48	3.01
2,059.00	11.64	328.53	2,054.95	53.00	-32.12	-23.98	3.04
2,104.00	12.29	326.33	2,098.98	60.86	-37.14	-27.79	1.76
2,149.00	11.75	326.42	2,142.99	68.66	-42.33	-31.78	1.20
2,194.00	13.18	329.95	2,186.93	76.92	-47.44	-35.61	3.60
2,238.00	14.18	326.23	2,229.68	85.74	-52.94	-39.76	3.03
2,283.00	14.22	326.71	2,273.30	94.95	-59.04	-44.44	0.28
2,328.00	14.56	325.86	2,316.89	104.25	-65.25	-49.22	0.89
2,373.00	15.58	328.06	2,360.35	114.06	-71.62	-54.08	2.60
2,418.00	16.42	328.17	2,403.60	124.59	-78.17	-59.01	1.87
2,462.00	15.35	326.86	2,445.92	134.75	-84.64	-63.91	2.56
2,507.00	14.65	325.96	2,489.39	144.45	-91.08	-68.85	1.64
2,552.00	15.21	329.00	2,532.87	154.23	-97.30	-73.58	2.14
2,597.00	15.45	331.80	2,576.27	164.57	-103.18	-77.86	1.73
2,776.00	16.48	332.40	2,748.36	208.09	-126.21	-94.25	0.58
2,866.00	14.68	326.14	2,835.06	228.87	-138.48	-103.33	2.73
2,955.00	13.94	325.96	2,921.30	247.12	-150.76	-112.80	0.83
3,045.00	14.34	326.10	3,008.57	265.35	-163.05	-122.27	0.45
3,134.00	14.72	328.58	3,094.72	284.15	-175.09	-131.42	0.82
3,224.00	12.80	326.15	3,182.14	302.19	-186.60	-140.16	2.23
3,314.00	12.60	326.71	3,269.93	318.68	-197.54	-148.55	0.26
3,403.00	12.77	331.98	3,356.76	335.47	-207.49	-155.93	1.31
3,493.00	12.73	332.47	3,444.55	353.05	-216.75	-162.50	0.13
3,583.00	12.90	334.02	3,532.30	370.87	-225.73	-168.77	0.43
3,672.00	13.40	333.96	3,618.97	389.07	-234.61	-174.87	0.56
3,717.00	14.37	337.20	3,662.66	398.90	-239.07	-177.83	2.76
3,762.00	15.62	333.88	3,706.12	409.49	-243.90	-181.06	3.37
3,807.00	17.80	330.06	3,749.22	420.89	-250.00	-185.41	5.42
3,851.00	18.87	328.88	3,790.99	432.81	-257.03	-190.62	2.57
3,896.00	18.95	327.77	3,833.56	445.22	-264.69	-196.37	0.82
3,986.00	19.36	328.33	3,918.58	470.28	-280.32	-208.14	0.50

Design Report for Brandon PC O23-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,031.00	19.52	328.34	3,961.01	483.03	-288.18	-214.05	0.36
4,075.00	18.27	327.10	4,002.64	495.08	-295.78	-219.80	2.98
4,120.00	17.01	325.21	4,045.52	506.40	-303.37	-225.64	3.08
4,165.00	16.04	325.07	4,088.66	516.91	-310.69	-231.33	2.16
4,254.00	14.53	325.45	4,174.51	536.18	-324.06	-241.72	1.70
4,344.00	15.89	328.64	4,261.36	556.01	-336.87	-251.49	1.77
4,434.00	15.43	330.09	4,348.02	576.90	-349.26	-260.66	0.67
4,523.00	13.75	328.84	4,434.15	596.22	-360.63	-269.08	1.92
4,613.00	14.69	325.63	4,521.39	614.79	-372.61	-278.19	1.36
4,702.00	14.86	328.39	4,607.45	633.83	-384.96	-287.61	0.81
4,792.00	14.52	324.44	4,694.51	652.83	-397.57	-297.29	1.18
4,882.00	14.02	323.15	4,781.73	670.74	-410.67	-307.62	0.66
4,971.00	14.25	323.98	4,868.04	688.22	-423.58	-317.81	0.34
5,061.00	11.98	323.39	4,955.68	704.68	-435.67	-327.35	2.53
5,150.00	9.15	324.19	5,043.16	717.84	-445.32	-334.96	3.18
5,240.00	7.18	328.59	5,132.25	728.44	-452.44	-340.44	2.29
5,330.00	4.62	330.36	5,221.76	736.39	-457.16	-343.95	2.85
5,419.00	3.15	326.52	5,310.56	741.55	-460.28	-346.28	1.68
5,509.00	1.32	322.44	5,400.49	744.43	-462.28	-347.83	2.04
5,599.00	1.43	315.22	5,490.46	746.05	-463.70	-349.00	0.23
5,643.00	1.50	330.74	5,534.45	746.94	-464.37	-349.53	0.91
5,733.00	1.32	223.27	5,624.43	747.22	-465.66	-350.76	2.53
5,778.00	1.84	241.86	5,669.41	746.50	-466.65	-351.85	1.61
5,866.00	2.09	247.87	5,757.36	745.23	-469.38	-354.74	0.37
5,956.00	1.03	359.51	5,847.34	745.42	-470.91	-356.22	2.94
6,046.00	1.21	348.90	5,937.32	747.16	-471.10	-356.15	0.30
6,135.00	0.99	312.05	6,026.31	748.60	-471.85	-356.68	0.82
6,225.00	0.93	317.99	6,116.29	749.66	-472.92	-357.58	0.13
6,315.00	0.73	304.62	6,206.29	750.53	-473.88	-358.40	0.31
6,404.00	0.80	280.29	6,295.28	750.96	-474.95	-359.41	0.37
6,494.00	0.88	296.12	6,385.27	751.38	-476.19	-360.57	0.27
6,539.00	0.95	63.38	6,430.27	751.70	-476.17	-360.50	3.64
6,583.00	5.64	86.65	6,474.18	751.99	-473.68	-358.00	10.87
6,628.00	9.88	92.39	6,518.76	751.96	-467.62	-352.00	9.57
6,673.00	13.32	98.27	6,562.84	751.05	-458.63	-343.24	8.07
6,718.00	16.36	99.60	6,606.33	749.25	-447.25	-332.25	6.80
6,763.00	20.34	95.53	6,649.03	747.43	-433.21	-318.63	9.29
6,807.00	24.95	94.19	6,689.63	746.02	-416.33	-302.15	10.54
6,852.00	28.05	91.82	6,729.90	744.99	-396.28	-282.47	7.28
6,897.00	31.78	90.39	6,768.90	744.57	-373.85	-260.34	8.44
6,942.00	36.26	90.46	6,806.19	744.38	-348.68	-235.47	9.96
6,987.00	39.79	94.23	6,841.63	743.22	-321.00	-208.26	9.39
7,031.00	44.08	96.97	6,874.36	740.32	-291.75	-179.76	10.60
7,076.00	48.25	96.48	6,905.52	736.52	-259.52	-148.44	9.30
7,121.00	50.94	94.90	6,934.69	733.13	-225.43	-115.21	6.55
7,166.00	52.03	93.53	6,962.71	730.55	-190.32	-80.86	3.40
7,211.00	55.35	91.99	6,989.35	728.81	-154.10	-45.30	7.88
7,256.00	59.09	91.57	7,013.71	727.64	-116.29	-8.07	8.35
7,300.00	62.25	92.61	7,035.26	726.24	-77.96	29.64	7.47
7,345.00	62.87	93.37	7,056.00	724.15	-38.08	68.78	2.04
7,390.00	65.34	92.49	7,075.65	722.09	2.34	108.46	5.76

Design Report for Brandon PC O23-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
7,435.00	67.85	91.85	7,093.53	720.53	43.61	149.05	5.73
7,480.00	68.93	92.10	7,110.10	719.09	85.42	190.19	2.45
7,524.00	71.35	92.15	7,125.05	717.55	126.77	230.87	5.50
7,569.00	73.93	91.07	7,138.47	716.35	169.70	273.16	6.17
7,614.00	77.95	89.49	7,149.40	716.14	213.34	316.29	9.56
7,641.00	80.78	89.84	7,154.39	716.29	239.87	342.56	10.56
7,682.00	84.93	88.78	7,159.48	716.79	280.54	382.86	10.44
7" Casing Point Estimated from section lines 2628' FSL 831' FWL (Not a survey point)							
7,691.00	85.84	88.55	7,160.21	716.99	289.51	391.76	10.44
7,736.00	88.00	87.84	7,162.63	718.41	334.42	436.39	5.05
7,781.00	90.34	88.20	7,163.28	719.96	379.39	481.10	5.26
7,826.00	90.43	88.40	7,162.98	721.30	424.36	525.78	0.49
7,871.00	90.25	88.80	7,162.71	722.40	469.35	570.44	0.97
7,915.00	87.96	89.27	7,163.40	723.14	513.34	614.06	5.31
7,960.00	85.21	88.80	7,166.08	723.90	558.25	658.59	6.20
8,050.00	83.79	88.97	7,174.70	725.64	647.81	747.44	1.59
8,139.00	84.60	92.69	7,183.71	724.35	736.33	834.81	4.26
8,229.00	91.02	92.31	7,187.14	720.43	826.13	923.06	7.15
8,318.00	90.71	91.93	7,185.80	717.14	915.06	1,010.54	0.55
8,408.00	90.43	91.06	7,184.91	714.79	1,005.02	1,099.18	1.02
8,498.00	88.99	90.58	7,185.36	713.51	1,095.01	1,188.00	1.69
8,587.00	90.37	93.29	7,185.86	710.50	1,183.95	1,275.53	3.42
8,677.00	87.78	92.40	7,187.31	706.04	1,273.82	1,363.76	3.04
8,767.00	89.48	93.36	7,189.46	701.51	1,363.67	1,451.98	2.17
8,856.00	88.39	91.90	7,191.12	697.43	1,452.56	1,539.30	2.05
8,946.00	89.97	91.94	7,192.40	694.42	1,542.50	1,627.82	1.76
9,035.00	86.55	89.27	7,195.11	693.48	1,631.43	1,715.65	4.87
9,125.00	85.27	88.82	7,201.53	694.97	1,721.19	1,804.65	1.51
9,215.00	86.16	89.39	7,208.25	696.37	1,810.92	1,893.61	1.17
9,304.00	88.21	89.98	7,212.62	696.86	1,899.81	1,981.61	2.40
9,394.00	90.34	91.16	7,213.76	695.97	1,989.79	2,070.48	2.71
9,483.00	88.06	89.64	7,215.00	695.34	2,078.77	2,158.40	3.08
9,573.00	90.52	90.04	7,216.12	695.60	2,168.76	2,247.45	2.77
9,663.00	89.20	89.46	7,216.34	695.99	2,258.75	2,336.52	1.60
9,752.00	89.94	91.46	7,217.01	695.27	2,347.74	2,424.44	2.40
9,842.00	90.89	92.24	7,216.35	692.37	2,437.69	2,512.99	1.37
9,932.00	89.29	91.25	7,216.21	689.63	2,527.65	2,601.56	2.09
10,021.00	89.17	94.13	7,217.41	685.45	2,616.53	2,688.87	3.24
10,111.00	88.21	93.88	7,219.47	679.17	2,706.29	2,776.72	1.10
10,200.00	87.72	93.01	7,222.63	673.82	2,795.07	2,863.75	1.12
10,290.00	87.10	93.21	7,226.69	668.95	2,884.84	2,951.84	0.72
10,380.00	87.53	93.95	7,230.91	663.33	2,974.57	3,039.76	0.95
10,469.00	89.48	92.74	7,233.23	658.14	3,063.38	3,126.85	2.58
10,559.00	89.91	91.51	7,233.71	654.80	3,153.32	3,215.31	1.45
10,648.00	91.51	89.87	7,232.61	653.73	3,242.30	3,303.17	2.57
10,738.00	87.25	89.63	7,233.58	654.12	3,332.27	3,392.22	4.74
10,828.00	86.52	89.57	7,238.47	654.75	3,422.13	3,481.20	0.81
10,917.00	86.67	89.22	7,243.76	655.69	3,510.97	3,569.22	0.43
11,007.00	85.80	89.71	7,249.67	656.53	3,600.77	3,658.16	1.11
11,097.00	88.09	94.22	7,254.47	653.44	3,690.56	3,746.52	5.61
11,186.00	90.89	94.06	7,255.26	647.02	3,779.32	3,833.37	3.15

Design Report for Brandon PC O23-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
11,276.00	90.64	93.66	7,254.06	640.96	3,869.10	3,921.29	0.52
11,366.00	89.94	93.40	7,253.60	635.42	3,958.93	4,009.33	0.83
11,455.00	89.35	93.44	7,254.15	630.11	4,047.77	4,096.42	0.66
11,531.00	87.84	93.11	7,256.02	625.77	4,123.62	4,170.81	2.03
Final MWD Survey							
11,595.00	87.84	93.11	7,258.43	622.30	4,187.48	4,233.47	0.00
Bit Projection at TD - Estimated BHL 2626' FSL 531' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
576.00	576.00	0.00	0.00	Tie On To Surface Casing Assumed Vertical
643.00	643.00	0.02	-0.11	First MWD Survey
7,682.00	7,159.48	716.79	280.54	7" Casing Point Estimated from section lines 2628' FSL 831' FWL (Not a survey point)
11,531.00	7,256.02	625.77	4,123.62	Final MWD Survey
11,595.00	7,258.43	622.30	4,187.48	Bit Projection at TD
11,595.00	7,258.43	622.30	4,187.48	Estimated BHL 2626' FSL 531' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
TD	No Target (Freehand)	81.55	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
576.00	7,682.00	Sperry MWD Surveys	MWD
7,682.00	11,595.00	Sperry MWD Surveys	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,682.00	7,159.48	7"	7	7-1/2

Design Report for Brandon PC O23-65HN - MWD Survey

Targets

Target Name - hit/miss target - Shane	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Brandon PC	0.00	0.00	0.00	0.00	0.00	1,351,223.16	3,176,959.90	40.295770	-104.865590
- actual wellpath hits target center									
- Polygon									
Point 1				-26.00	-1,423.00	1,349,800.22	3,176,933.90		
Point 2				-138.00	2,880.00	1,354,103.03	3,176,821.90		
Point 3				4,222.00	2,809.00	1,354,032.04	3,181,181.72		
Point 4				4,300.00	-1,560.00	1,349,663.22	3,181,259.71		
Point 5				-26.00	-1,423.00	1,349,800.22	3,176,933.90		
Brandon PC	0.00	0.00	7,260.00	635.06	4,185.30	1,351,858.19	3,181,145.02	40.297430	-104.850570
- actual wellpath misses target center by 12.73ft at 11592.19ft MD (7258.32 TVD, 622.45 N, 4184.68 E)									
- Point									
Brandon PC	0.00	0.00	0.00	0.00	0.00	1,351,223.16	3,176,959.90	40.295770	-104.865590
- actual wellpath hits target center									
- Polygon									
Point 1				-486.00	-1,883.00	1,349,340.24	3,176,473.92		
Point 2				-598.00	3,340.00	1,354,563.01	3,176,361.92		
Point 3				4,682.00	3,269.00	1,354,492.02	3,181,641.70		
Point 4				4,760.00	-2,020.00	1,349,203.24	3,181,719.69		
Point 5				-486.00	-1,883.00	1,349,340.24	3,176,473.92		

North Reference Sheet for Sec. 23-T4N-R67W (Brandon-Sebastyen 23 PAD) - Brandon PC O23-65HN

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB=16' @ 4931.00ft (Precision 829). Northing and Easting are relative to Brandon PC O23-65HN - Slot A1

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°; Longitude Origin: 0.000000°; Latitude Origin: 40.783333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99995715

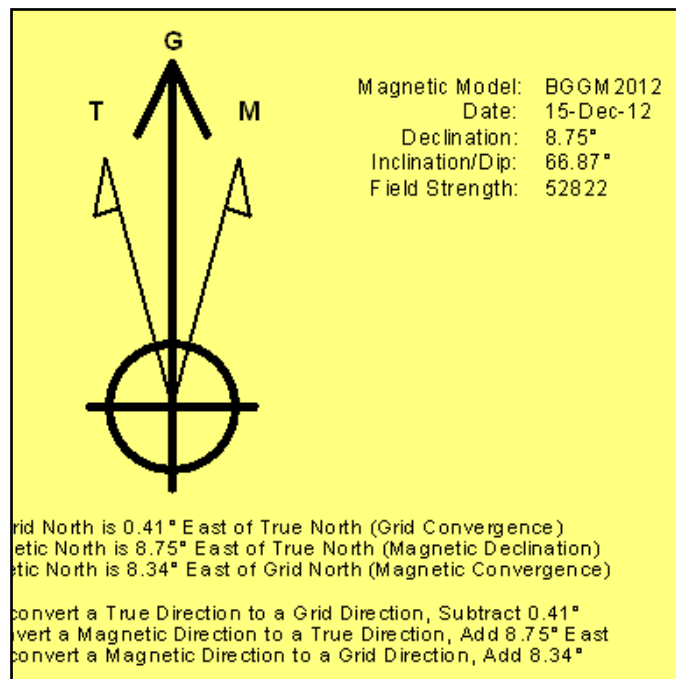
Grid Coordinates of Well: 1,351,223.16 ft N, 3,176,959.90 ft E

Geographical Coordinates of Well: 40°17' 44.77" N, 104°51' 56.12" W

Grid Convergence at Surface is: 0.41°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,595.00ft the Bottom Hole Displacement is 4,233.47ft in the Direction of 81.55°(Grid).

Magnetic Convergence at surface is: -8.34°(15 December 2012, , BGGM2012)



Project: Weld County, CO (NAD 83)
Site: Sec. 23-T4N-R67W (Brandon-Sebastyen 23 PAD)
Well: Brandon PC O23-65HN

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Sperry Drilling



Azimuths to Grid North
True North: -0.41°
Magnetic North: 8.34°

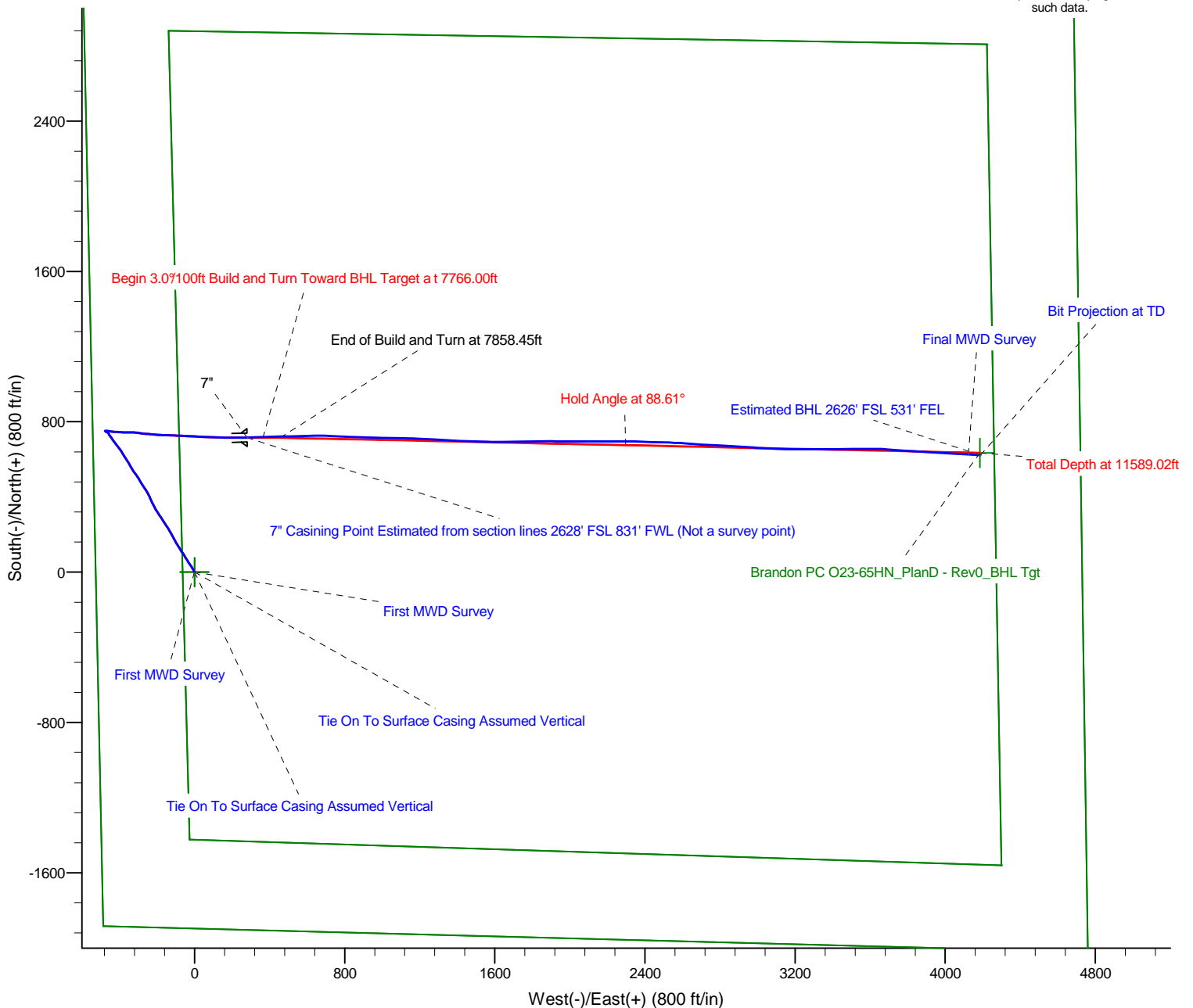
Magnetic Field
Strength: 52821.7snT
Dip Angle: 66.87°
Date: 12/15/2012
Model: BGGM2012

LEGEND

- Brandon PC O23-65HN, Plan D, Plan D - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 2640' FSL, 535' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Brandon PC O23-65HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

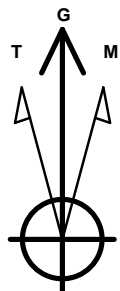


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Azimuths to Grid North
 True North: -0.41°
 Magnetic North: 8.34°

Magnetic Field
 Strength: 52821.7snT
 Dip Angle: 66.87°
 Date: 12/15/2012
 Model: BGGM2012

LEGEND

- Brandon PC O23-65HN, Plan D, Plan D - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Brandon PC O23-65HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

