

# Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T4N-R64W (Sandy Hills-Pluss PAD)

Pluss C17-32D - A1

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

19 March, 2012

Well Coordinates: 1,358,690.95 N, 3,255,985.30 E (40° 18' 51.73" N, 104° 34' 55.27" W)

Ground Level: 4,748.00 ft

Local Coordinate Origin:

Centered on Well Pluss C17-32D - Slot A1

Viewing Datum:

KB @ 4761.00ft (Ensign 132)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

**HALLIBURTON**

## Design Report for Pluss C17-32D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
748.00	0.00	0.00	748.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 748.00ft							
763.00	0.41	133.27	763.00	-0.04	0.04	0.01	2.73
First MWD Survey							
794.00	0.48	149.84	794.00	-0.23	0.19	0.11	0.47
824.00	0.54	153.40	824.00	-0.46	0.31	0.26	0.23
855.00	0.80	228.51	855.00	-0.73	0.21	0.55	2.72
885.00	2.21	247.27	884.99	-1.10	-0.48	1.19	4.92
916.00	2.82	253.03	915.96	-1.55	-1.76	2.19	2.13
977.00	2.59	271.69	976.89	-1.95	-4.57	3.84	1.48
1,068.00	4.07	280.91	1,067.73	-1.28	-9.80	5.67	1.72
1,163.00	4.93	276.72	1,162.44	-0.16	-17.16	8.09	0.97
1,258.00	6.36	264.85	1,256.98	-0.15	-26.46	12.38	1.94
1,354.00	7.79	251.09	1,352.25	-2.74	-37.91	19.98	2.30
1,448.00	9.12	236.99	1,445.24	-8.86	-50.18	31.09	2.61
1,543.00	9.62	222.23	1,538.98	-18.85	-61.83	45.33	2.58
1,639.00	10.12	211.76	1,633.57	-31.96	-71.67	61.50	1.94
1,734.00	11.56	204.46	1,726.88	-47.72	-80.00	79.33	2.09
1,828.00	13.20	207.57	1,818.69	-65.81	-88.87	99.47	1.88
1,923.00	15.20	201.00	1,910.79	-87.05	-98.35	122.69	2.70
2,018.00	16.08	200.31	2,002.27	-111.02	-107.38	148.12	0.95
2,115.00	17.38	200.82	2,095.16	-137.16	-117.20	175.83	1.35
2,207.00	17.64	206.52	2,182.91	-162.48	-128.30	203.42	1.88
2,299.00	16.56	208.13	2,270.84	-186.51	-140.71	230.46	1.28
2,392.00	16.45	201.89	2,360.01	-210.42	-151.87	256.82	1.91
2,484.00	16.08	200.14	2,448.33	-234.47	-161.11	282.42	0.67
2,575.00	16.22	198.73	2,535.74	-258.34	-169.53	307.47	0.46
2,668.00	17.87	201.02	2,624.65	-283.96	-178.82	334.49	1.92
2,760.00	18.62	201.67	2,712.03	-310.79	-189.31	363.12	0.84
2,851.00	19.23	200.53	2,798.11	-338.32	-199.93	392.44	0.78
2,944.00	17.78	205.04	2,886.30	-365.53	-211.31	421.83	2.19
3,037.00	16.04	204.51	2,975.28	-390.09	-222.65	448.85	1.88
3,130.00	16.62	204.43	3,064.53	-413.89	-233.48	474.96	0.62
3,223.00	15.10	204.93	3,153.98	-436.99	-244.09	500.34	1.64
3,318.00	14.96	208.20	3,245.74	-459.01	-255.10	524.96	0.90
3,413.00	14.43	207.19	3,337.63	-480.35	-266.30	549.06	0.62
3,508.00	14.64	206.72	3,429.59	-501.60	-277.11	572.90	0.25
3,603.00	16.72	201.03	3,521.05	-525.08	-287.42	598.49	2.72
3,698.00	15.49	205.25	3,612.33	-549.32	-297.73	624.74	1.79
3,793.00	19.18	211.64	3,703.00	-574.09	-311.34	652.99	4.37
3,889.00	18.69	210.10	3,793.81	-600.82	-327.32	684.09	0.73
3,984.00	19.56	209.49	3,883.56	-627.83	-342.78	715.19	0.94
4,079.00	16.78	208.93	3,973.82	-653.68	-357.25	744.80	2.93
4,174.00	15.99	204.25	4,064.96	-677.61	-369.26	771.57	1.62
4,269.00	16.64	205.17	4,156.14	-701.85	-380.42	798.23	0.74
4,364.00	14.60	204.32	4,247.62	-725.08	-391.13	823.77	2.16
4,459.00	12.83	204.02	4,339.91	-745.63	-400.36	846.26	1.86
4,555.00	11.34	202.34	4,433.78	-764.09	-408.29	866.30	1.59
4,650.00	11.05	202.56	4,526.97	-781.14	-415.33	884.67	0.31

## Design Report for Pluss C17-32D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,745.00	8.19	199.22	4,620.63	-795.94	-421.05	900.43	3.07
4,840.00	7.58	193.62	4,714.73	-808.42	-424.75	913.21	1.03
4,935.00	4.88	204.75	4,809.17	-818.18	-427.92	923.33	3.10
5,030.00	2.63	235.65	4,903.96	-823.08	-431.41	929.29	3.11
5,125.00	0.47	3.64	4,998.93	-823.92	-433.19	930.86	3.10
5,220.00	2.52	54.62	5,093.90	-822.32	-431.46	928.64	2.37
5,315.00	1.48	44.27	5,188.84	-820.23	-428.90	925.60	1.15
5,410.00	1.87	2.69	5,283.80	-817.81	-427.97	923.02	1.31
5,506.00	2.09	344.59	5,379.75	-814.56	-428.36	920.32	0.69
5,601.00	2.26	329.48	5,474.68	-811.27	-429.78	918.06	0.63
5,696.00	2.54	339.29	5,569.60	-807.69	-431.47	915.67	0.52
5,791.00	1.50	326.87	5,664.54	-804.68	-432.90	913.66	1.18
5,886.00	1.09	335.61	5,759.51	-802.81	-433.95	912.50	0.48
5,981.00	1.16	347.52	5,854.49	-801.05	-434.53	911.21	0.26
6,076.00	1.14	342.33	5,949.47	-799.21	-435.02	909.80	0.11
6,171.00	1.04	334.79	6,044.46	-797.53	-435.68	908.62	0.18
6,266.00	0.50	122.87	6,139.45	-796.98	-435.70	908.13	1.57
6,361.00	0.03	85.08	6,234.45	-797.20	-435.32	908.16	0.50
6,456.00	0.45	3.50	6,329.45	-796.83	-435.28	907.81	0.47
6,551.00	0.56	324.46	6,424.45	-796.08	-435.52	907.26	0.37
6,646.00	0.88	320.59	6,519.44	-795.13	-436.26	906.76	0.34
6,741.00	0.91	324.54	6,614.43	-793.96	-437.16	906.13	0.07
6,836.00	1.02	310.84	6,709.41	-792.79	-438.23	905.60	0.27
6,931.00	0.81	284.56	6,804.40	-792.07	-439.52	905.55	0.49
7,026.00	1.01	297.51	6,899.39	-791.51	-440.92	905.71	0.30
7,121.00	0.85	296.75	6,994.38	-790.81	-442.29	905.72	0.17
7,216.00	0.89	300.55	7,089.37	-790.12	-443.55	905.69	0.07
7,244.00	1.12	318.20	7,117.36	-789.80	-443.92	905.58	1.37
<b>Final MWD Survey</b>							
7,300.00	1.12	318.20	7,173.35	-788.99	-444.65	905.20	0.00
<b>Survey Projection to TD - Estimated BHL: 2578' FSL, 57' FWL</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
748.00	748.00	0.00	0.00	Surface Casing Assumed Vertical at 748.00ft
763.00	763.00	-0.04	0.04	First MWD Survey
7,244.00	7,117.36	-789.80	-443.92	Final MWD Survey
7,300.00	7,173.35	-788.99	-444.65	Survey Projection to TD
7,300.00	7,173.35	-788.99	-444.65	Estimated BHL: 2578' FSL, 57' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	+N/-S (ft)	+E/-W (ft)	Start TVD (ft)
Target	Pluss C17-32D_PlanA - Rev1_BHL Tgt	207.58	Slot	0.00	0.00	0.00

## Design Report for Pluss C17-32D - MWD Survey

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
748.00	7,300.00	Sperry MWD Surveys	MWD

### Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Pluss C17-32D_Sec.	0.00	0.00	0.00	0.00	0.00	1,358,690.95	3,255,985.30	40° 18' 51.732 N	104° 34' 55.272 W
- actual wellpath hits target center									
- Polygon									
Point 1				-115.00	1,447.00	1,360,137.89	3,255,870.30		
Point 2				4,249.00	1,520.00	1,360,210.88	3,260,234.12		
Point 3				4,280.00	-2,839.00	1,355,852.07	3,260,265.11		
Point 4				-85.00	-2,908.00	1,355,783.07	3,255,900.30		
Point 5				-115.00	1,447.00	1,360,137.89	3,255,870.30		
Pluss C17-32D_Sec.	0.00	0.00	0.00	0.00	0.00	1,358,690.95	3,255,985.30	40° 18' 51.732 N	104° 34' 55.272 W
- actual wellpath hits target center									
- Polygon									
Point 1				-575.00	1,907.00	1,360,597.87	3,255,410.32		
Point 2				4,709.00	1,980.00	1,360,670.86	3,260,694.10		
Point 3				4,740.00	-3,299.00	1,355,392.09	3,260,725.09		
Point 4				-545.00	-3,368.00	1,355,323.09	3,255,440.32		
Point 5				-575.00	1,907.00	1,360,597.87	3,255,410.32		
Pluss	0.00	0.00	5,000.00	-816.86	-426.62	1,357,874.12	3,255,558.69	40° 18' 43.704 N	104° 35' 0.888 W
- actual wellpath misses target center by 9.64ft at 5126.30ft MD (5000.24 TVD, -823.91 N, -433.19 E)									
- Circle (radius 75.00)									
Pluss	0.00	0.00	7,141.00	-816.86	-426.62	1,357,874.12	3,255,558.69	40° 18' 43.704 N	104° 35' 0.888 W
- actual wellpath misses target center by 39.88ft at 7244.00ft MD (7117.36 TVD, -789.80 N, -443.92 E)									
- Point									

## North Reference Sheet for Sec. 17-T4N-R64W (Sandy Hills-Pluss PAD) - Pluss C17-32D

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

Vertical Depths are relative to KB @ 4761.00ft (Ensign 132). Northing and Easting are relative to Pluss C17-32D - 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° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99995746

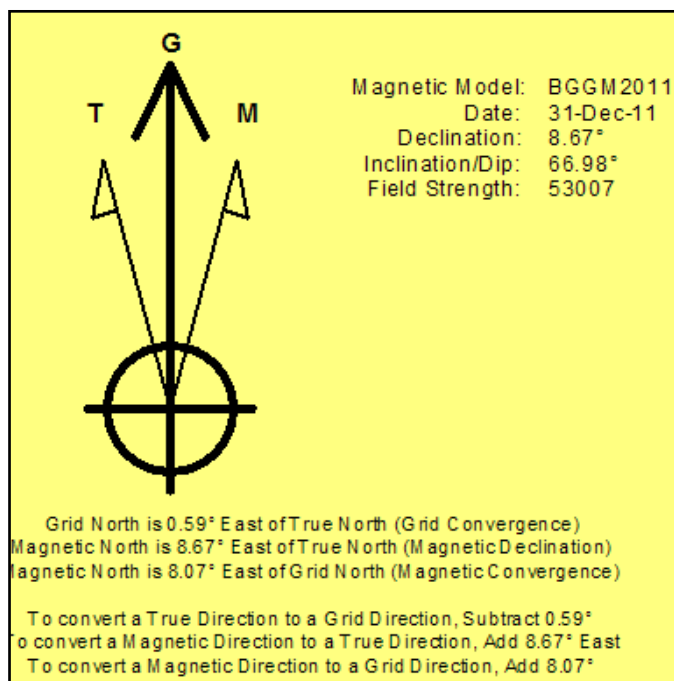
Grid Coordinates of Well: 1,358,690.95 ft N, 3,255,985.30 ft E

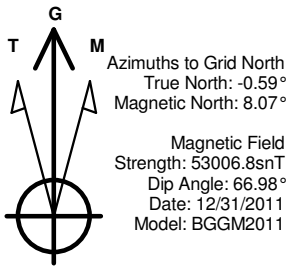
Geographical Coordinates of Well: 40° 18' 51.73" N, 104° 34' 55.27" W

Grid Convergence at Surface is: 0.59°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,300.00ft the Bottom Hole Displacement is 905.66ft in the Direction of 209.40° (Grid).

Magnetic Convergence at surface is: -8.07° (31 December 2011, , BGGM2011)

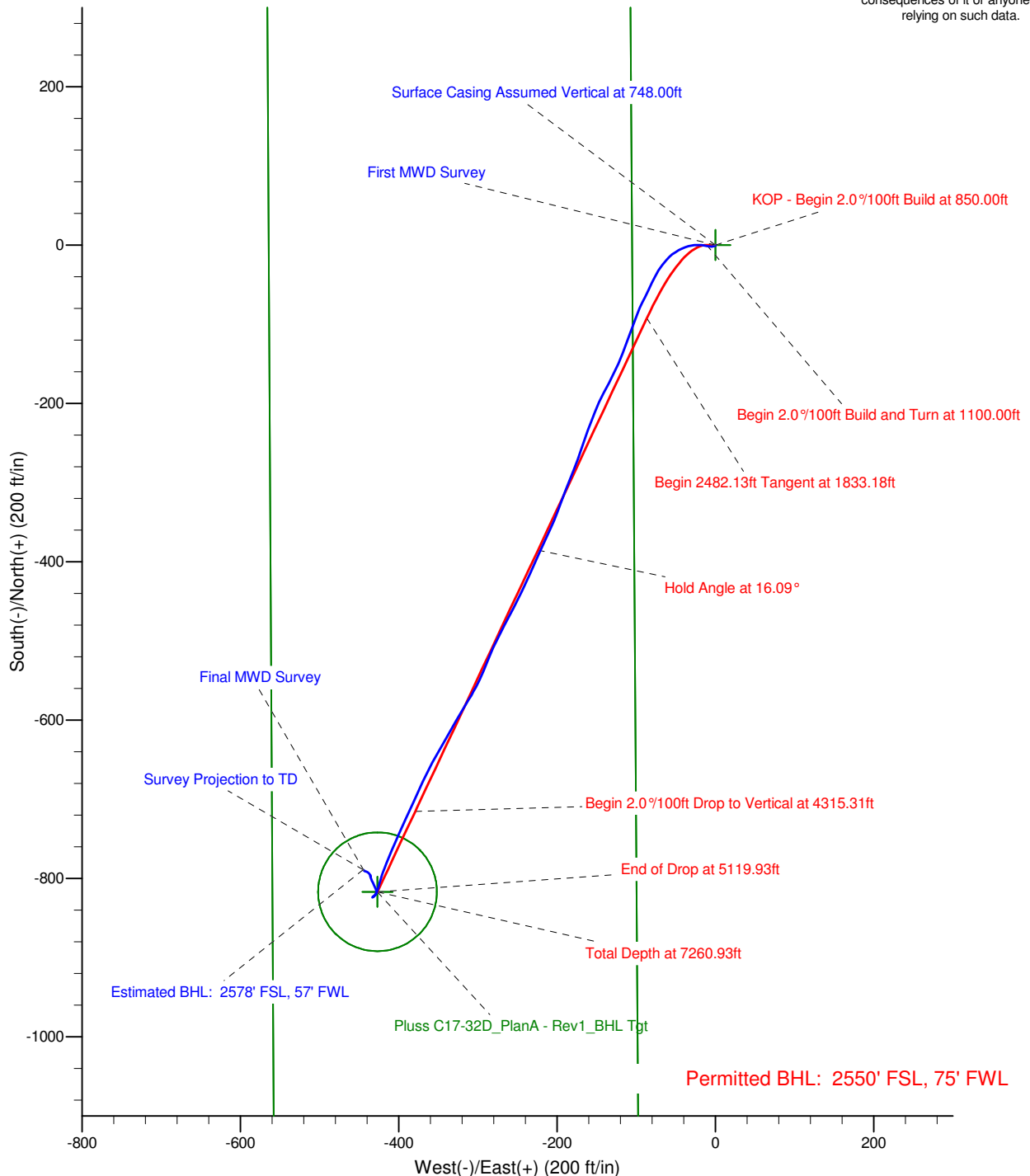




### LEGEND

- Pluss C17-32D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

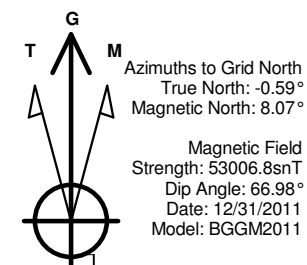
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Pluss C17-32D well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the 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.



# Noble Energy

**HALLIBURTON**

Sperry Drilling



## LEGEND

- Pluss C17-32D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Pluss C17-32D 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.

