

Noble Energy
Weld County, CO (NAD 83)
Sec. 36-T4N-R64W
State D01-30D

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

14 October, 2011

Well Coordinates: 1,341,312.73 N, 3,277,221.46 E (40° 15' 57.74" N, 104° 30' 23.65" W)
Ground Level: 4,737.00 ft

Local Coordinate Origin:	Centered on Well State D01-30D
Viewing Datum:	KB @ 4761.00ft (Rig KB)
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 State D01-30D - 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
697.00	0.58	270.25	696.99	0.02	-3.53	1.34	0.08
First MWD Survey							
789.00	2.32	213.57	788.96	-1.53	-5.02	3.34	2.24
860.00	3.95	200.75	859.85	-5.02	-6.68	7.20	2.49
942.00	6.62	199.72	941.49	-12.11	-9.28	14.74	3.26
1,024.00	9.18	196.58	1,022.71	-22.83	-12.74	25.97	3.16
1,106.00	11.22	204.69	1,103.41	-36.35	-17.94	40.45	3.04
1,187.00	13.20	200.62	1,182.58	-52.17	-24.49	57.57	2.66
1,269.00	14.04	203.94	1,262.27	-70.02	-31.82	76.87	1.40
1,350.00	15.94	201.89	1,340.51	-89.32	-39.96	97.82	2.43
1,432.00	17.54	202.47	1,419.04	-111.19	-48.88	121.44	1.96
1,514.00	18.35	202.25	1,497.05	-134.56	-58.49	146.70	0.99
1,596.00	18.63	199.85	1,574.81	-158.82	-67.83	172.69	0.99
1,677.00	19.48	200.13	1,651.38	-183.67	-76.87	199.11	1.06
1,759.00	20.82	201.21	1,728.36	-210.10	-86.85	227.34	1.70
1,841.00	21.31	201.26	1,804.88	-237.57	-97.52	256.81	0.60
1,923.00	21.35	203.59	1,881.26	-265.14	-108.90	286.63	1.03
2,004.00	22.07	204.58	1,956.51	-292.49	-121.13	316.58	1.00
2,086.00	22.95	203.35	2,032.27	-321.18	-133.87	347.96	1.22
2,168.00	23.88	197.69	2,107.52	-351.67	-145.25	380.49	2.97
2,250.00	25.63	198.36	2,181.98	-384.32	-155.88	414.72	2.16
2,332.00	25.67	200.89	2,255.91	-417.74	-167.80	450.16	1.34
2,413.00	26.34	202.93	2,328.71	-450.69	-181.06	485.67	1.38
2,495.00	27.98	203.75	2,401.66	-485.05	-195.90	523.09	2.05
2,577.00	30.51	202.78	2,473.21	-521.85	-211.71	563.14	3.14
2,658.00	29.58	201.99	2,543.32	-559.35	-227.15	603.70	1.25
2,740.00	27.86	202.20	2,615.23	-595.86	-241.97	643.10	2.10
2,822.00	30.70	204.11	2,686.75	-632.71	-257.77	683.19	3.65
2,903.00	30.68	203.46	2,756.40	-670.54	-274.44	724.52	0.41
2,985.00	29.85	202.53	2,827.23	-708.58	-290.59	765.85	1.16
3,067.00	29.51	202.31	2,898.47	-746.12	-306.07	806.45	0.44
3,149.00	28.20	201.15	2,970.29	-782.87	-320.73	846.02	1.74
3,230.00	27.36	203.65	3,041.95	-817.77	-335.10	883.76	1.77
3,312.00	28.54	203.81	3,114.39	-852.96	-350.57	922.19	1.44
3,394.00	26.66	201.82	3,187.05	-887.96	-365.32	960.17	2.55
3,476.00	26.09	201.71	3,260.52	-921.79	-378.83	996.59	0.70
3,557.00	27.65	203.09	3,332.77	-955.63	-392.79	1,033.20	2.07
3,639.00	28.96	203.65	3,404.97	-991.32	-408.21	1,072.07	1.63
3,721.00	29.28	204.38	3,476.60	-1,027.77	-424.45	1,111.97	0.58
3,802.00	26.50	202.69	3,548.19	-1,062.49	-439.61	1,149.84	3.57
3,884.00	27.16	203.65	3,621.36	-1,096.51	-454.17	1,186.85	0.96
3,966.00	28.43	205.05	3,693.90	-1,131.34	-469.94	1,225.06	1.74
4,048.00	30.06	204.97	3,765.44	-1,167.64	-486.88	1,265.08	1.99
4,129.00	29.90	203.76	3,835.61	-1,204.51	-503.58	1,305.54	0.77
4,211.00	27.95	202.54	3,907.37	-1,240.97	-519.18	1,345.19	2.48
4,293.00	29.51	202.72	3,979.28	-1,277.35	-534.35	1,384.61	1.91
4,375.00	28.07	203.47	4,051.14	-1,313.68	-549.83	1,424.09	1.81
4,456.00	25.79	202.26	4,123.35	-1,347.47	-564.10	1,460.77	2.89
4,538.00	24.52	201.34	4,197.57	-1,379.83	-577.05	1,495.63	1.62

Design Report for State D01-30D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,620.00	22.59	200.90	4,272.74	-1,410.39	-588.86	1,528.38	2.36
4,701.00	20.85	200.99	4,347.98	-1,438.39	-599.57	1,558.35	2.15
4,783.00	21.98	202.28	4,424.32	-1,466.21	-610.62	1,588.28	1.49
4,865.00	19.54	201.05	4,500.99	-1,493.22	-621.36	1,617.34	3.02
4,946.00	17.22	201.58	4,577.86	-1,517.01	-630.64	1,642.87	2.87
5,028.00	15.46	200.80	4,656.54	-1,538.52	-638.99	1,665.93	2.16
5,110.00	13.14	199.52	4,736.00	-1,557.52	-645.98	1,686.17	2.86
5,191.00	10.92	200.76	4,815.21	-1,573.37	-651.78	1,703.03	2.76
5,273.00	10.28	200.14	4,895.81	-1,587.51	-657.05	1,718.11	0.79
5,355.00	9.58	200.94	4,976.58	-1,600.75	-662.01	1,732.24	0.87
5,437.00	8.58	201.49	5,057.55	-1,612.81	-666.69	1,745.18	1.22
5,518.00	6.81	201.96	5,137.82	-1,622.89	-670.70	1,756.02	2.19
5,600.00	5.30	200.82	5,219.36	-1,630.94	-673.86	1,764.67	1.85
5,682.00	4.58	196.38	5,301.06	-1,637.62	-676.13	1,771.71	0.99
5,764.00	3.71	196.47	5,382.84	-1,643.31	-677.81	1,777.60	1.06
5,845.00	3.19	195.36	5,463.69	-1,647.99	-679.15	1,782.44	0.65
5,927.00	2.23	186.48	5,545.60	-1,651.78	-679.93	1,786.24	1.27
6,009.00	2.03	182.07	5,627.55	-1,654.81	-680.17	1,789.13	0.32
6,090.00	1.76	178.07	5,708.50	-1,657.49	-680.18	1,791.61	0.37
6,172.00	1.41	171.90	5,790.47	-1,659.75	-679.99	1,793.62	0.47
6,254.00	0.92	164.91	5,872.45	-1,661.38	-679.68	1,795.01	0.62
6,335.00	0.74	164.83	5,953.44	-1,662.52	-679.37	1,795.94	0.22
6,417.00	0.68	144.20	6,035.44	-1,663.42	-678.95	1,796.62	0.32
6,499.00	0.74	116.32	6,117.43	-1,664.05	-678.19	1,796.91	0.42
6,581.00	0.62	79.63	6,199.43	-1,664.21	-677.28	1,796.70	0.54
6,662.00	0.57	77.84	6,280.42	-1,664.04	-676.45	1,796.23	0.07
6,744.00	0.72	60.46	6,362.42	-1,663.70	-675.61	1,795.60	0.30
6,826.00	0.53	78.84	6,444.41	-1,663.37	-674.79	1,794.98	0.33
6,907.00	0.36	88.86	6,525.41	-1,663.30	-674.16	1,794.67	0.23
6,989.00	0.50	68.78	6,607.41	-1,663.16	-673.57	1,794.32	0.25
7,071.00	0.59	53.91	6,689.40	-1,662.78	-672.90	1,793.71	0.20
7,152.00	0.53	69.20	6,770.40	-1,662.41	-672.21	1,793.10	0.20
7,234.00	0.41	40.50	6,852.40	-1,662.05	-671.67	1,792.56	0.32
7,316.00	0.43	58.92	6,934.40	-1,661.67	-671.21	1,792.03	0.17
7,390.00	0.68	74.27	7,008.39	-1,661.40	-670.55	1,791.54	0.39
Final MWD Survey							
7,445.00	0.68	74.27	7,063.39	-1,661.23	-669.92	1,791.13	0.00

Survey Projection to TD - Estimated BHL: 86' FNL, 60' FEL

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
697.00	696.99	0.02	-3.53	First MWD Survey
7,390.00	7,008.39	-1,661.40	-670.55	Final MWD Survey
7,445.00	7,063.39	-1,661.23	-669.92	Survey Projection to TD
7,445.00	7,063.39	-1,661.23	-669.92	Estimated BHL: 86' FNL, 60' FEL

Design Report for State D01-30D - MWD Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	State D01-30D_PlanA - Rev0_BHL Tgt	202.53	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
697.00	7,445.00	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
State D01-30D_Sec.	0.00	0.00	0.00	0.00	0.00	1,341,312.73	3,277,221.46	40.266040	-104.506570
- actual wellpath hits target center									
- Polygon									
Point 1				-610.00	-1,573.00	1,339,739.80	3,276,611.49		
Point 2				-597.00	-4,229.00	1,337,083.92	3,276,624.49		
Point 3				-610.00	-1,573.00	1,339,739.80	3,276,611.49		
State	0.00	0.00	5,557.00	-1,650.77	-684.86	1,339,662.03	3,276,536.63	40.261530	-104.509090
- actual wellpath misses target center by 5.09ft at 5938.37ft MD (5556.96 TVD, -1652.21 N, -679.98 E)									
- Point									
State	0.00	0.00	2.00	94.31	-37.34	1,341,407.04	3,277,184.12	40.266300	-104.506700
- actual wellpath misses target center by 101.43ft at 2.19ft MD (2.19 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-150.34	-1,113.69	1,340,199.09	3,277,071.13		
Point 2				-167.34	3,242.31	1,344,554.90	3,277,054.13		
Point 3				4,175.66	3,261.31	1,344,573.90	3,281,396.94		
Point 4				4,190.66	-1,064.69	1,340,248.09	3,281,411.94		
Point 5				-150.34	-1,113.69	1,340,199.09	3,277,071.13		
State D01-30D_Sec.	0.00	0.00	0.00	0.00	0.00	1,341,312.73	3,277,221.46	40.266040	-104.506570
- actual wellpath hits target center									
- Polygon									
Point 1				-610.00	-1,573.00	1,339,739.80	3,276,611.49		
Point 2				-3,242.00	-1,599.00	1,339,713.80	3,273,979.60		
Point 3				-610.00	-1,573.00	1,339,739.80	3,276,611.49		
State	0.00	0.00	6,557.00	-1,650.77	-684.86	1,339,662.03	3,276,536.63	40.261530	-104.509090
- actual wellpath misses target center by 16.59ft at 6938.53ft MD (6556.94 TVD, -1663.27 N, -673.95 E)									
- Circle (radius 75.00)									
State	0.00	0.00	2.00	94.31	-37.34	1,341,407.04	3,277,184.12	40.266300	-104.506700
- actual wellpath misses target center by 101.43ft at 2.19ft MD (2.19 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-610.34	-1,573.69	1,339,739.11	3,276,611.15		
Point 2				-627.34	3,702.31	1,345,014.88	3,276,594.15		
Point 3				4,635.66	3,721.31	1,345,033.88	3,281,856.92		
Point 4				4,650.66	-1,524.69	1,339,788.10	3,281,871.92		
Point 5				-610.34	-1,573.69	1,339,739.11	3,276,611.15		
State	0.00	0.00	7,011.00	-1,650.77	-684.86	1,339,662.03	3,276,536.63	40.261530	-104.509090
- actual wellpath misses target center by 18.02ft at 7390.00ft MD (7008.39 TVD, -1661.40 N, -670.55 E)									
- Point									

North Reference Sheet for Sec. 36-T4N-R64W - State D01-30D - Plan A

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 (Rig KB). Northing and Easting are relative to State D01-30D

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: 0.99995688

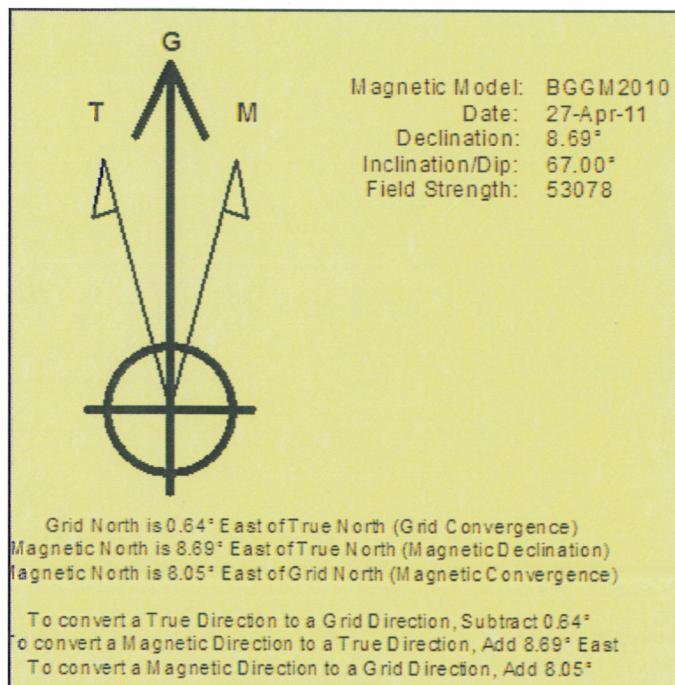
Grid Coordinates of Well: 1,341,312.73 ft N, 3,277,221.46 ft E

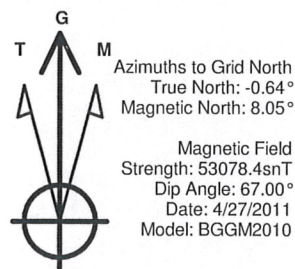
Geographical Coordinates of Well: 40° 15' 57.74" N, 104° 30' 23.65" W

Grid Convergence at Surface is: 0.64°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,445.00ft
the Bottom Hole Displacement is 1,791.22ft in the Direction of 201.96° (Grid).

Magnetic Convergence at surface is: -8.05° (27 April 2011, , BGGM2010)

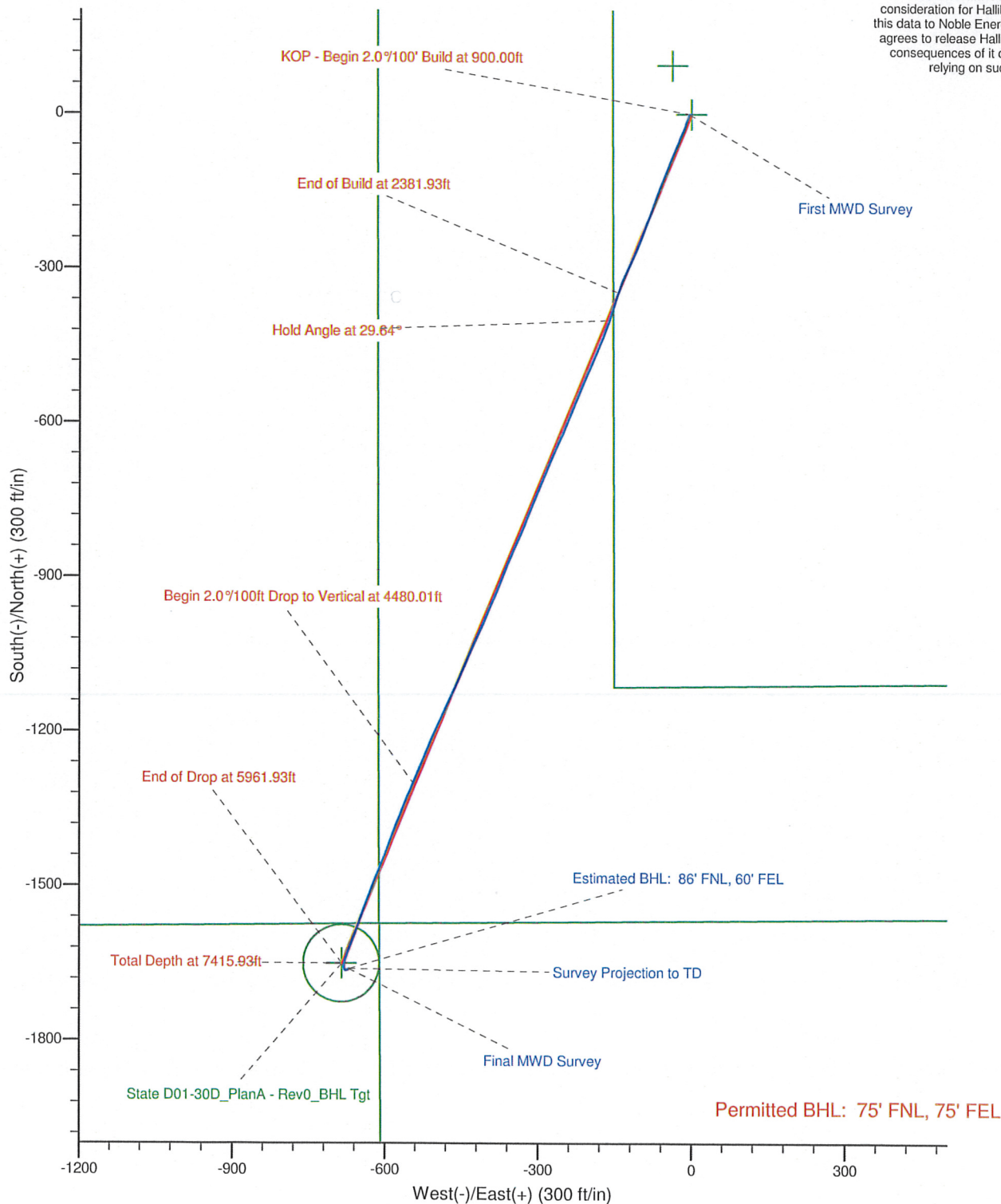




LEGEND

- State D01-30D, Plan A, Plan A - Rev 0 V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the State D01-30D 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.





Azimuths to Grid North
 True North: -0.64°
 Magnetic North: 8.05°

Magnetic Field
 Strength: 53078.4snT
 Dip Angle: 67.00°
 Date: 4/27/2011
 Model: BGGM2010

LEGEND

— State D01-30D, Plan A, Plan A - Rev 0 V0
 — MWD Survey

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