

# Noble Energy

Weld County, CO (NAD 83)  
Sec. 16-T5N-R64W (Klein 16 PAD)  
Klein B15-13D - A1

Design: MWD Survey

## Sperry Drilling Services Final Survey Report

24 March, 2011

Well Coordinates: 1,387,418.24 N, 3,265,080.74 E (40° 23' 34.66" N, 104° 32' 53.88" W)  
Ground Level: 4,608.00 ft

Local Coordinate Origin:	Centered on Well Klein B15-13D - Slot A1
Viewing Datum:	KB @ 4632.00ft (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 Klein B15-13D - 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
870.00	0.29	180.89	870.00	-2.20	-0.03	-0.57	0.03
<b>First MWD Survey</b>							
962.00	1.18	134.50	961.99	-3.10	0.64	-0.14	1.09
1,054.00	3.42	113.17	1,053.91	-4.84	3.84	2.54	2.57
1,180.00	5.65	102.24	1,179.51	-7.64	13.35	11.10	1.89
1,274.00	6.92	89.67	1,272.95	-8.58	23.54	20.74	1.98
1,369.00	8.76	78.41	1,367.06	-7.10	36.35	33.53	2.51
1,464.00	11.21	71.88	1,460.62	-2.77	52.22	49.97	2.84
1,558.00	12.48	71.80	1,552.61	3.24	70.55	69.22	1.35
1,653.00	15.69	73.00	1,644.75	10.21	92.59	92.29	3.39
1,748.00	17.70	73.82	1,735.74	17.99	118.75	119.56	2.13
1,842.00	19.52	74.06	1,824.82	26.28	147.57	149.53	1.94
1,937.00	21.13	73.88	1,913.90	35.40	179.29	182.51	1.70
2,032.00	22.86	74.83	2,001.98	44.98	213.55	218.08	1.86
2,127.00	23.12	75.45	2,089.44	54.49	249.41	255.18	0.37
2,225.00	23.63	74.50	2,179.39	64.58	286.96	294.05	0.65
2,320.00	20.88	75.18	2,267.31	74.00	321.68	330.02	2.91
2,416.00	21.80	77.14	2,356.73	82.34	355.60	364.95	1.21
2,511.00	22.97	75.51	2,444.57	90.90	390.75	401.12	1.39
2,607.00	22.68	74.41	2,533.05	100.57	426.71	438.36	0.54
2,702.00	24.57	74.94	2,620.09	110.62	463.43	476.42	2.00
2,798.00	25.77	74.93	2,706.97	121.23	502.85	517.24	1.25
2,893.00	23.70	74.13	2,793.25	131.82	541.16	556.98	2.21
2,989.00	24.09	74.02	2,881.02	142.49	578.56	595.84	0.41
3,084.00	23.11	73.86	2,968.07	153.01	615.11	633.85	1.03
3,180.00	21.55	77.88	3,056.88	161.95	650.45	670.30	2.27
3,370.00	21.37	76.33	3,233.71	177.46	718.20	739.79	0.31
3,466.00	21.53	77.27	3,323.06	185.48	752.38	774.90	0.39
3,561.00	21.67	76.31	3,411.39	193.47	786.42	809.86	0.40
3,656.00	23.19	77.46	3,499.20	201.68	821.72	846.10	1.67
3,752.00	25.29	75.22	3,586.73	211.02	860.01	885.51	2.39
3,847.00	26.65	75.72	3,672.13	221.45	900.28	927.10	1.45
3,943.00	27.38	74.81	3,757.66	232.55	942.45	970.71	0.87
4,038.00	25.62	74.69	3,842.68	243.69	983.34	1,013.08	1.85
4,134.00	22.15	73.97	3,930.44	254.17	1,020.76	1,051.93	3.63
4,229.00	21.62	76.01	4,018.60	263.35	1,054.96	1,087.33	0.98
4,325.00	20.97	77.28	4,108.04	271.41	1,088.88	1,122.19	0.83
4,420.00	20.27	78.30	4,196.95	278.49	1,121.58	1,155.63	0.83
4,515.00	19.96	76.45	4,286.16	285.63	1,153.45	1,188.29	0.74
4,611.00	21.49	72.74	4,375.95	294.68	1,186.18	1,222.23	2.10
4,706.00	20.54	73.81	4,464.63	304.49	1,218.80	1,256.26	1.08
4,802.00	18.52	77.27	4,555.11	312.55	1,249.85	1,288.34	2.42
4,897.00	18.81	80.53	4,645.11	318.39	1,279.68	1,318.69	1.14
4,993.00	18.23	80.14	4,736.14	323.51	1,309.74	1,349.09	0.62
5,088.00	17.65	74.45	4,826.53	329.92	1,338.25	1,378.31	1.94
5,184.00	15.99	73.91	4,918.42	337.49	1,364.98	1,406.08	1.74
5,279.00	13.45	74.58	5,010.29	344.05	1,388.21	1,430.20	2.68
5,375.00	9.37	74.85	5,104.37	349.06	1,406.52	1,449.18	4.25
5,470.00	7.21	74.89	5,198.38	352.64	1,419.74	1,462.88	2.27

## Design Report for Klein B15-13D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,566.00	5.54	76.22	5,293.78	355.31	1,430.06	1,473.54	1.75
5,661.00	3.98	82.43	5,388.45	356.84	1,437.78	1,481.40	1.73
5,757.00	3.59	94.51	5,484.24	357.04	1,444.08	1,487.56	0.92
5,852.00	3.11	106.77	5,579.08	356.07	1,449.51	1,492.59	0.90
5,947.00	2.80	113.50	5,673.95	354.40	1,454.11	1,496.64	0.49
6,043.00	2.78	126.93	5,769.84	352.06	1,458.12	1,499.96	0.68
6,138.00	2.96	142.37	5,864.72	348.74	1,461.46	1,502.39	0.83
6,233.00	1.53	142.21	5,959.65	345.79	1,463.74	1,503.88	1.51
6,424.00	2.66	158.09	6,150.52	339.66	1,466.95	1,505.51	0.66
6,520.00	2.60	161.50	6,246.42	335.53	1,468.47	1,505.98	0.17
6,615.00	2.64	160.08	6,341.32	331.43	1,469.90	1,506.37	0.08
6,710.00	2.85	163.78	6,436.21	327.11	1,471.31	1,506.68	0.29
6,806.00	3.02	168.77	6,532.08	322.33	1,472.47	1,506.65	0.32
6,901.00	2.06	169.95	6,626.99	318.20	1,473.25	1,506.40	1.01
6,997.00	1.14	150.98	6,722.95	315.66	1,474.02	1,506.53	1.09
7,154.00	0.59	125.91	6,879.93	313.82	1,475.43	1,507.45	0.42
Final MWD Survey							
7,231.00	0.59	125.91	6,956.93	313.36	1,476.07	1,507.96	0.00
Survey Projection to TD - Estimated BHL: 612' FSL, 694' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
870.00	870.00	-2.20	-0.03	First MWD Survey
7,154.00	6,879.93	313.82	1,475.43	Final MWD Survey
7,231.00	6,956.93	313.36	1,476.07	Survey Projection to TD
7,231.00	6,956.93	313.36	1,476.07	Estimated BHL: 612' FSL, 694' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Klein B15-13D_Rev0_BHL Tgt	75.92	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
870.00	7,231.00	Sperry MWD Surveys	MWD



## Design Report for Klein B15-13D - MWD Survey

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
Klein B15-13D_Sec.	0.00	0.00	0.00	0.00	0.00	1,387,418.24	3,265,080.74	40° 23' 34.656 N	104° 32' 53.880 W
- actual wellpath hits target center									
- Polygon									
Point 1				792.00	-301.00	1,387,117.25	3,265,872.71		
Point 2				-4,478.00	-376.00	1,387,042.26	3,260,602.92		
Point 3				-4,559.00	4,903.00	1,392,321.05	3,260,521.93		
Point 4				704.00	4,970.00	1,392,388.04	3,265,784.71		
Point 5				792.00	-301.00	1,387,117.25	3,265,872.71		
Klein	0.00	0.00	6,925.00	361.63	1,441.86	1,387,779.86	3,266,522.54	40° 23' 38.076 N	104° 32' 35.196 W
- actual wellpath misses target center by 58.85ft at 7198.50ft MD (6924.43 TVD, 313.56 N, 1475.80 E)									
- Point									
Klein B15-13D_Sec.	0.00	0.00	0.00	0.00	0.00	1,387,418.24	3,265,080.74	40° 23' 34.656 N	104° 32' 53.880 W
- actual wellpath hits target center									
- Polygon									
Point 1				332.00	159.00	1,387,577.24	3,265,412.73		
Point 2				-4,018.00	84.00	1,387,502.24	3,261,062.90		
Point 3				-4,099.00	4,443.00	1,391,861.06	3,260,981.91		
Point 4				244.00	4,510.00	1,391,928.06	3,265,324.73		
Point 5				332.00	159.00	1,387,577.24	3,265,412.73		
Klein B15-13D_Sec.	0.00	0.00	0.00	0.00	0.00	1,387,418.24	3,265,080.74	40° 23' 34.656 N	104° 32' 53.880 W
- actual wellpath hits target center									
- Polygon									
Point 1				792.00	-301.00	1,387,117.25	3,265,872.71		
Point 2				704.00	4,970.00	1,392,388.04	3,265,784.71		
Point 3				3,283.00	4,976.00	1,392,394.04	3,268,363.61		
Point 4				3,460.00	-280.00	1,387,138.25	3,268,540.60		
Point 5				792.00	-301.00	1,387,117.25	3,265,872.71		
Klein	0.00	0.00	6,471.00	361.63	1,441.86	1,387,779.86	3,266,522.54	40° 23' 38.076 N	104° 32' 35.196 W
- actual wellpath misses target center by 46.92ft at 6742.67ft MD (6468.84 TVD, 325.53 N, 1471.74 E)									
- Circle (radius 75.00)									
Klein B15-13D_Sec.	0.00	0.00	0.00	0.00	0.00	1,387,418.24	3,265,080.74	40° 23' 34.656 N	104° 32' 53.880 W
- actual wellpath hits target center									
- Polygon									
Point 1				1,252.00	159.00	1,387,577.24	3,266,332.69		
Point 2				1,164.00	4,510.00	1,391,928.06	3,266,244.70		
Point 3				2,823.00	4,516.00	1,391,934.06	3,267,903.63		
Point 4				3,000.00	180.00	1,387,598.24	3,268,080.62		
Point 5				1,252.00	159.00	1,387,577.24	3,266,332.69		
Klein	0.00	0.00	5,471.00	361.63	1,441.86	1,387,779.86	3,266,522.54	40° 23' 38.076 N	104° 32' 35.196 W
- actual wellpath misses target center by 4.74ft at 5743.65ft MD (5470.92 TVD, 357.10 N, 1443.24 E)									
- Point									

## North Reference Sheet for Sec. 16-T5N-R64W (Klein 16 PAD) - Klein B15-13D

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

Vertical Depths are relative to KB @ 4632.00ft (Rig KB). Northing and Easting are relative to Klein B15-13D - 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: 0.99995992

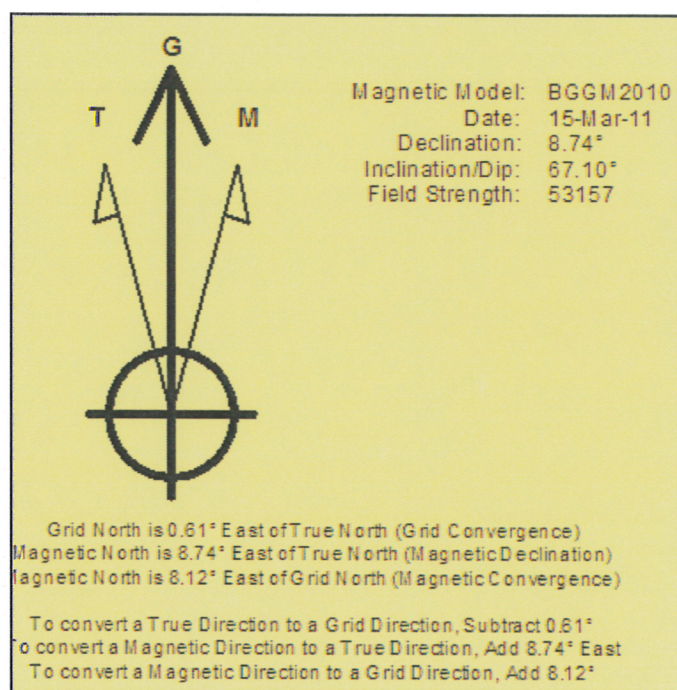
Grid Coordinates of Well: 1,387,418.24 ft N, 3,265,080.74 ft E

Geographical Coordinates of Well: 40° 23' 34.66" N, 104° 32' 53.88" W

Grid Convergence at Surface is: 0.61°

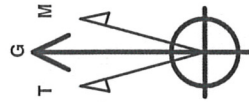
Based upon Minimum Curvature type calculations, at a Measured Depth of 7,231.00ft  
the Bottom Hole Displacement is 1,508.97ft in the Direction of 78.01° (Grid).

Magnetic Convergence at surface is: -8.12° (15 March 2011, , BGGM2010)



Project: Weld County, CO (NAD 83)  
 Site: Sec. 16-T5N-R64W (Klein 16 PAD)  
 Well: Klein B15-13D

# Noble Energy

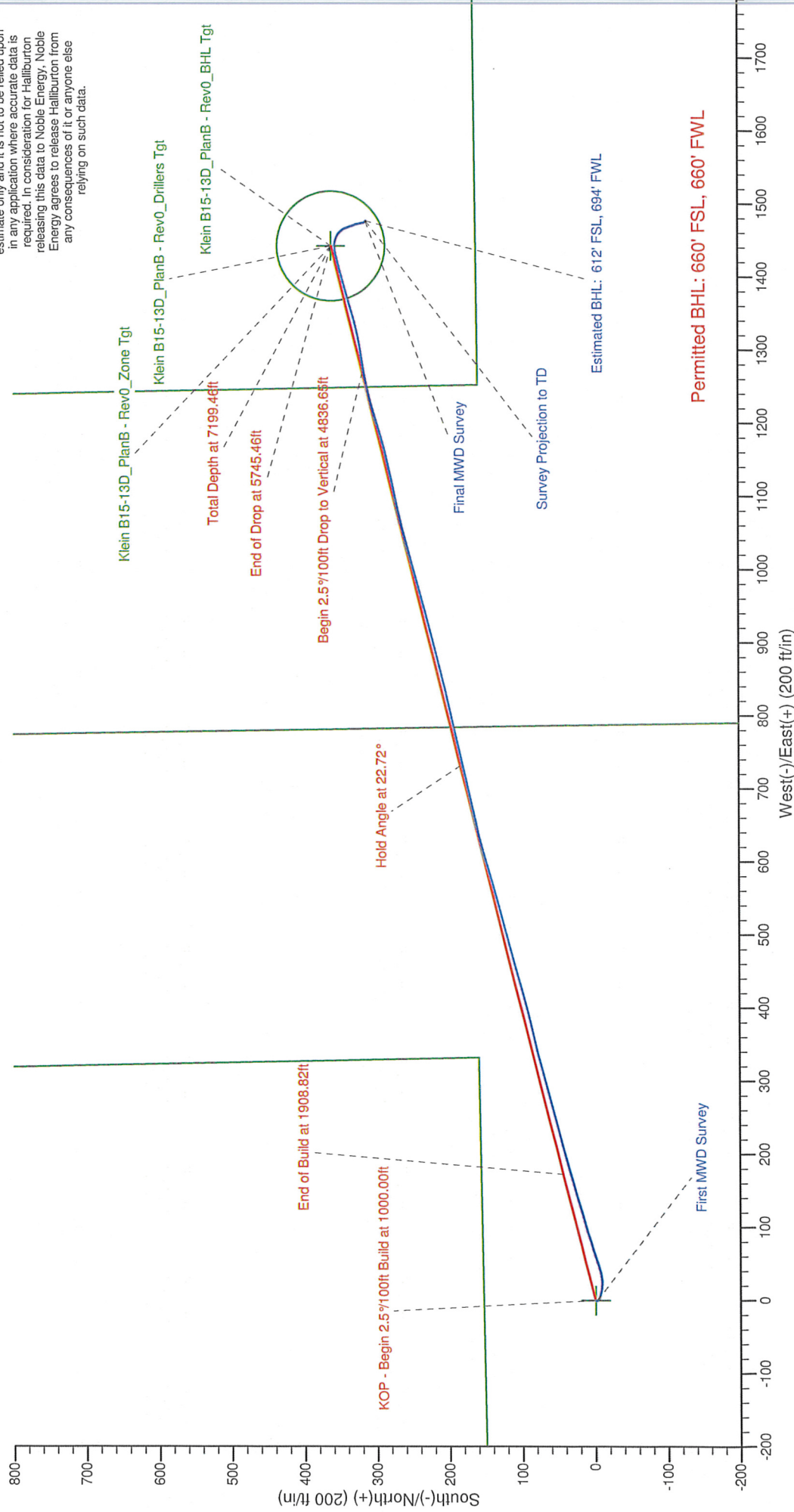


Azimuths to Grid North  
 True North: -0.61°  
 Magnetic North: 8.12°  
 Magnetic Field  
 Strength: 53157.2snT  
 Dip Angle: 67.10°  
 Date: 3/15/2011  
 Model: BGGM2010

## LEGEND

— Klein B15-13D,  
 — MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Klein B15-13D 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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