

# Noble Energy

Weld County, CO (NAD 83)  
Sec. 2-T4N-R64W (Hoffman 2 PAD)  
Hoffman C02-20D - A5

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

16 August, 2012

Well Coordinates: 1,368,486.25 N, 3,273,574.55 E (40° 20' 26.66" N, 104° 31' 06.82" W)  
Ground Level: 4,620.00 ft

Local Coordinate Origin:	Centered on Well Hoffman C02-20D - Slot A5
Viewing Datum:	KB @ 4633.00ft (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 Hoffman C02-20D - 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
710.00	0.00	0.00	710.00	0.00	0.00	0.00	0.00
<b>Surface Casing Assumed Vertical at 710.00ft</b>							
729.00	0.85	29.58	729.00	0.12	0.07	-0.03	4.47
<b>First MWD Survey</b>							
919.00	0.84	53.26	918.98	2.18	1.88	-1.15	0.18
1,014.00	2.60	326.13	1,013.94	4.39	1.24	0.12	2.83
1,109.00	4.13	298.30	1,108.78	7.80	-2.98	5.16	2.31
1,204.00	7.02	291.53	1,203.32	11.55	-11.39	14.31	3.11
1,298.00	7.71	275.95	1,296.56	14.31	-23.01	26.22	2.24
1,391.00	9.36	278.01	1,388.52	16.01	-36.70	39.80	1.80
1,484.00	10.43	283.98	1,480.14	19.10	-52.36	55.67	1.59
1,576.00	12.31	287.34	1,570.33	24.04	-69.80	73.79	2.17
1,667.00	15.05	289.69	1,658.74	30.91	-90.19	95.30	3.07
1,759.00	16.56	289.24	1,747.26	39.26	-113.82	120.34	1.65
1,851.00	14.90	283.79	1,835.82	46.40	-137.69	145.25	2.41
1,943.00	12.63	278.84	1,925.17	50.76	-159.11	167.01	2.78
2,036.00	14.02	282.95	2,015.67	54.85	-180.14	188.30	1.81
2,128.00	14.10	280.33	2,104.92	59.36	-202.03	210.54	0.70
2,220.00	14.16	278.72	2,194.13	63.07	-224.17	232.79	0.43
2,315.00	14.70	281.55	2,286.14	67.25	-247.47	256.27	0.93
2,410.00	12.55	288.61	2,378.46	72.96	-269.06	278.59	2.86
2,505.00	12.32	290.68	2,471.24	79.83	-288.33	299.02	0.53
2,600.00	13.92	290.71	2,563.75	87.45	-308.50	320.55	1.68
2,695.00	16.08	291.58	2,655.51	96.33	-331.43	345.08	2.29
2,790.00	16.46	291.45	2,746.71	106.09	-356.19	371.62	0.40
2,885.00	13.88	289.17	2,838.39	114.76	-379.48	396.44	2.79
2,981.00	13.79	288.73	2,931.60	122.21	-401.19	419.39	0.14
3,076.00	14.00	290.41	3,023.82	129.85	-422.69	442.18	0.48
3,171.00	12.70	303.09	3,116.27	139.57	-442.21	463.71	3.36
3,266.00	12.91	303.50	3,208.91	151.12	-459.81	483.95	0.24
3,361.00	13.25	304.03	3,301.45	163.07	-477.68	504.57	0.38
3,456.00	14.48	304.50	3,393.68	175.89	-496.49	526.34	1.30
3,551.00	13.39	291.84	3,485.90	186.72	-516.50	548.66	3.40
3,646.00	16.74	287.06	3,577.63	194.83	-539.79	573.32	3.76
3,741.00	18.85	283.84	3,668.08	202.51	-567.78	602.32	2.45
3,835.00	19.36	283.79	3,756.90	209.86	-597.65	633.03	0.54
3,931.00	16.49	281.90	3,848.23	216.46	-626.45	662.48	3.05
4,026.00	15.51	283.33	3,939.55	222.17	-652.00	688.58	1.11
4,121.00	14.94	284.34	4,031.22	228.13	-676.22	713.48	0.66
4,216.00	13.57	286.88	4,123.29	234.40	-698.75	736.85	1.58
4,312.00	15.34	284.13	4,216.25	240.77	-721.85	760.79	1.98
4,407.00	15.53	285.10	4,307.82	247.15	-746.31	786.05	0.34
4,502.00	12.78	287.06	4,399.93	253.55	-768.64	809.27	2.94
4,598.00	11.61	280.33	4,493.77	258.40	-788.30	829.48	1.92
4,693.00	11.90	286.56	4,586.78	262.90	-807.09	848.76	1.37
4,788.00	13.45	280.92	4,679.46	267.79	-827.33	869.54	2.09
4,883.00	13.46	280.37	4,771.86	271.87	-849.05	891.49	0.14
4,978.00	16.56	278.58	4,863.60	275.88	-873.32	915.85	3.30
5,073.00	15.05	279.40	4,955.01	279.92	-898.88	941.45	1.61

## Design Report for Hoffman C02-20D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,168.00	10.73	280.16	5,047.59	283.49	-919.76	962.45	4.55
5,263.00	7.66	277.57	5,141.36	285.89	-934.75	977.47	3.26
5,358.00	5.63	279.36	5,235.72	287.48	-945.62	988.33	2.15
5,453.00	3.42	280.93	5,330.42	288.78	-953.00	995.76	2.33
5,548.00	2.01	288.31	5,425.31	289.84	-957.37	1,000.24	1.53
5,643.00	1.51	316.99	5,520.27	291.28	-959.80	1,003.00	1.05
5,928.00	0.71	332.22	5,805.21	295.58	-963.19	1,007.51	0.30
6,213.00	1.65	303.30	6,090.15	299.40	-967.44	1,012.71	0.38
6,498.00	1.55	305.24	6,375.04	303.88	-974.02	1,020.32	0.04
6,783.00	0.94	309.39	6,659.97	307.58	-978.97	1,026.15	0.22
7,000.00	0.59	326.55	6,876.95	309.64	-980.96	1,028.67	0.19
<b>Final MWD Survey</b>							
7,055.00	0.59	326.55	6,931.95	310.12	-981.27	1,029.10	0.00
<b>Survey Projection to TD - Estimated BHL: 2548' FNL, 1384' FWL</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
710.00	710.00	0.00	0.00	Surface Casing Assumed Vertical at 710.00ft
729.00	729.00	0.12	0.07	First MWD Survey
7,000.00	6,876.95	309.64	-980.96	Final MWD Survey
7,055.00	6,931.95	310.12	-981.27	Survey Projection to TD
7,055.00	6,931.95	310.12	-981.27	Estimated BHL: 2548' FNL, 1384' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Hoffman C02-20D_PlanA - Rev1_BHL Tgt	287.31	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
710.00	7,055.00	Sperry MWD Surveys	MWD

## Design Report for Hoffman C02-20D - 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
Hoffman	0.00	0.00	1.00	0.90	80.84	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath misses target center by 80.84ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-2,349.16	-2,416.10	1,366,070.25	3,271,225.49		
Point 2				-2,367.16	2,837.90	1,371,324.03	3,271,207.49		
Point 3				2,874.84	2,913.90	1,371,400.02	3,276,449.27		
Point 4				2,900.84	-2,358.10	1,366,128.24	3,276,475.27		
Point 5				-2,349.16	-2,416.10	1,366,070.25	3,271,225.49		
Hoffman	0.00	0.00	6,903.00	302.60	-970.71	1,368,788.84	3,272,603.88	40° 20' 29.760 N	104° 31' 19.308 W
- actual wellpath misses target center by 28.87ft at 7000.00ft MD (6876.95 TVD, 309.64 N, -980.96 E)									
- Point									
Hoffman	0.00	0.00	5,500.00	302.60	-970.71	1,368,788.84	3,272,603.88	40° 20' 29.760 N	104° 31' 19.308 W
- actual wellpath misses target center by 16.26ft at 5623.19ft MD (5500.47 TVD, 290.91 N, -959.41 E)									
- Circle (radius 75.00)									
Hoffman	0.00	0.00	1.00	0.90	80.84	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath misses target center by 80.84ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-1,889.16	-1,956.10	1,366,530.23	3,271,685.47		
Point 2				-1,907.16	2,377.90	1,370,864.05	3,271,667.47		
Point 3				2,414.84	2,453.90	1,370,940.04	3,275,989.29		
Point 4				2,440.84	-1,898.10	1,366,588.23	3,276,015.29		
Point 5				-1,889.16	-1,956.10	1,366,530.23	3,271,685.47		

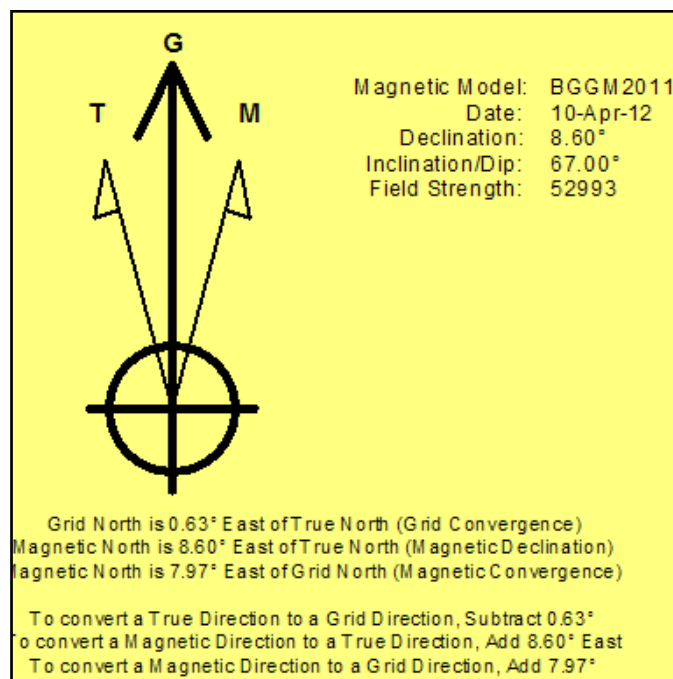
# North Reference Sheet for Sec. 2-T4N-R64W (Hoffman 2 PAD) - Hoffman C02-20D

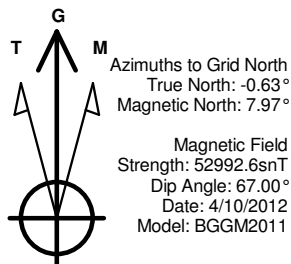
All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.  
Vertical Depths are relative to KB @ 4633.00ft (Ensign 132). Northing and Easting are relative to Hoffman C02-20D - Slot A5  
Coordinate System is US State Plane 1983, Colorado Northern 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: 0.99995808

Grid Coordinates of Well: 1,368,486.25 ft N, 3,273,574.55 ft E  
Geographical Coordinates of Well: 40° 20' 26.66" N, 104° 31' 06.82" W  
Grid Convergence at Surface is: 0.63°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,055.00ft  
the Bottom Hole Displacement is 1,029.11ft in the Direction of 287.54° (Grid).

Magnetic Convergence at surface is: -7.97° (10 April 2012, , BGGM2011)



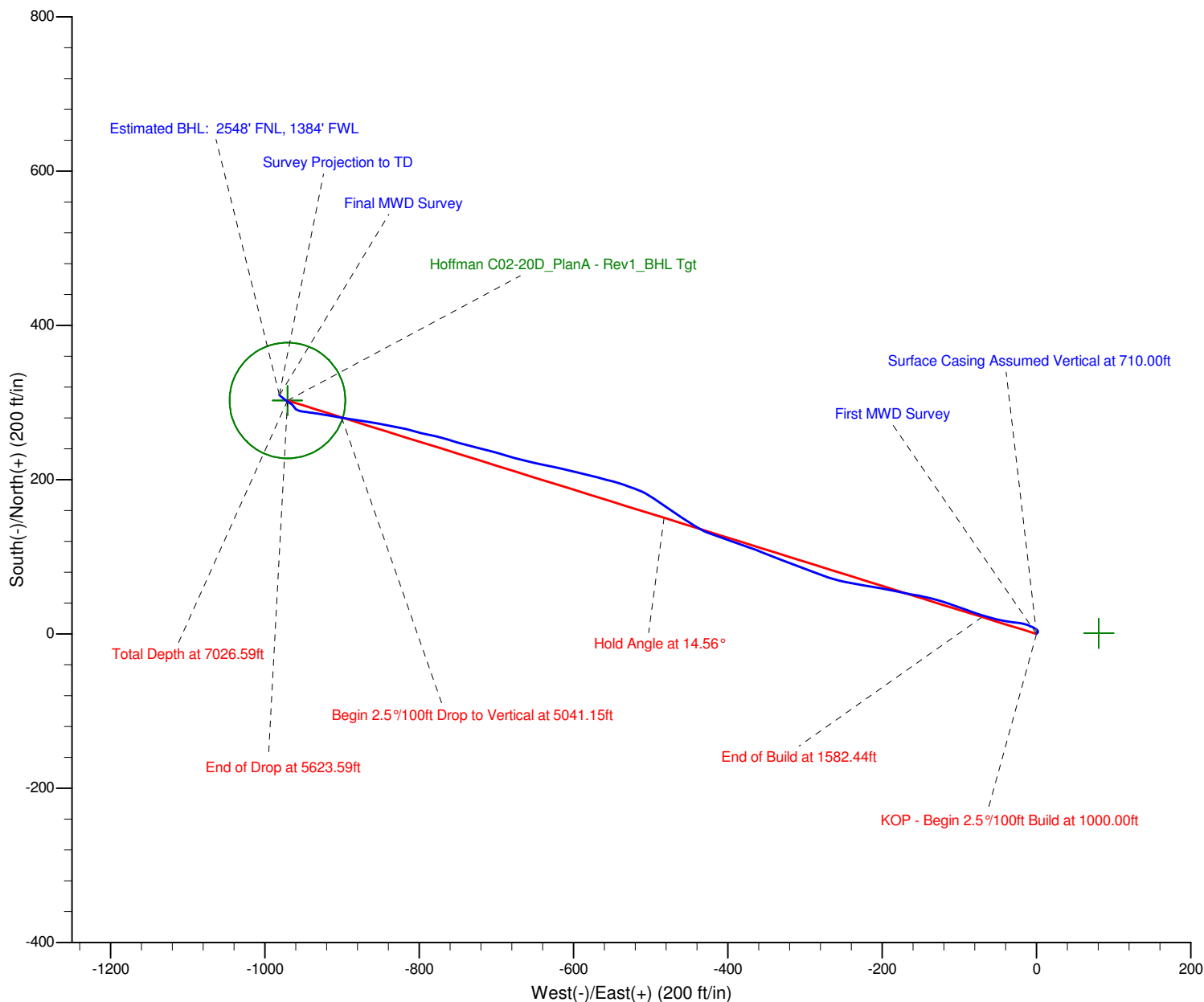


### LEGEND

- Hoffman C02-20D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hoffman C02-20D 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.

Permitted BHL: 2555' FNL, 1395' FWL



# Noble Energy

**HALLIBURTON**

Sperry Drilling

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hoffman C02-20D 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.

