

# Noble Energy

Weld County, CO (NAD 83)  
Sec. 2-T4N-R64W (Hoffman 2 PAD)  
Hoffman C02-65HN

MWD Survey

## Sperry Drilling Services Final Survey Report

08 January, 2013

Well Coordinates: 1,368,487.15 N, 3,273,655.39 E (40° 20' 26.66" N, 104° 31' 05.77" W)  
Ground Level: 4,619.00 ft

Local Coordinate Origin:	Centered on Well Hoffman C02-65HN - Slot A1
Viewing Datum:	KB @ 4632.00ft (Ensign 132)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom
Geodetic Scale Factor Applied	
Version: 2003.16 Build: 431	

**HALLIBURTON**

## Design Report for Hoffman C02-65HN - 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
706.00	0.00	0.00	706.00	0.00	0.00	0.00	0.00
Tie On To Surface Casing Assumed Vertical							
823.00	0.24	210.65	823.00	-0.21	-0.13	-0.14	0.21
First MWD Survey							
1,108.00	0.78	208.47	1,107.99	-2.43	-1.36	-1.50	0.19
1,391.00	1.06	224.05	1,390.95	-6.01	-4.10	-4.44	0.13
1,667.00	0.77	257.00	1,666.92	-8.26	-7.68	-8.15	0.21
1,943.00	0.69	280.10	1,942.90	-8.39	-11.13	-11.61	0.11
2,220.00	1.81	127.56	2,219.86	-10.77	-9.31	-9.93	0.88
2,410.00	1.25	140.53	2,409.79	-14.20	-5.61	-6.43	0.34
2,695.00	0.90	144.06	2,694.74	-18.43	-2.31	-3.38	0.13
2,790.00	0.36	192.33	2,789.73	-19.33	-1.93	-3.06	0.75
2,980.00	0.93	308.79	2,979.73	-18.95	-3.26	-4.36	0.60
3,266.00	1.82	274.24	3,265.64	-17.17	-9.58	-10.57	0.41
3,550.00	2.74	257.33	3,549.42	-18.32	-20.70	-21.74	0.40
3,645.00	2.01	279.01	3,644.34	-18.56	-24.56	-25.61	1.21
3,740.00	1.03	318.23	3,739.31	-17.66	-26.77	-27.76	1.45
3,835.00	0.96	315.57	3,834.29	-16.46	-27.90	-28.81	0.08
4,121.00	1.60	327.71	4,120.22	-11.37	-31.72	-32.33	0.24
4,216.00	1.47	357.82	4,215.19	-9.03	-32.47	-32.94	0.85
4,312.00	1.54	359.87	4,311.15	-6.50	-32.52	-32.84	0.09
4,407.00	1.67	7.39	4,406.12	-3.85	-32.35	-32.52	0.26
4,502.00	1.78	1.24	4,501.07	-1.00	-32.14	-32.14	0.23
4,597.00	1.27	357.94	4,596.04	1.53	-32.14	-32.00	0.54
4,692.00	0.28	211.41	4,691.03	2.39	-32.30	-32.11	1.59
4,978.00	0.52	203.99	4,977.03	0.61	-33.19	-33.10	0.09
5,263.00	0.62	316.76	5,262.02	0.55	-34.77	-34.67	0.33
5,358.00	0.90	87.42	5,357.01	0.96	-34.37	-34.26	1.45
5,548.00	0.92	79.01	5,546.99	1.32	-31.39	-31.26	0.07
5,643.00	1.08	90.68	5,641.98	1.45	-29.74	-29.61	0.27
5,738.00	0.75	80.63	5,736.96	1.54	-28.24	-28.10	0.38
5,786.00	3.84	94.36	5,784.92	1.47	-26.33	-26.20	6.49
5,833.00	6.67	90.68	5,831.72	1.32	-22.03	-21.92	6.07
5,881.00	10.12	84.79	5,879.20	1.67	-15.04	-14.92	7.39
5,927.00	12.98	83.45	5,924.26	2.62	-5.88	-5.72	6.26
6,023.00	20.12	88.04	6,016.23	4.42	21.37	21.59	7.56
6,118.00	26.62	90.98	6,103.39	4.62	59.02	59.19	6.94
6,213.00	33.32	85.68	6,185.66	6.22	106.38	106.56	7.58
6,308.00	39.32	85.32	6,262.17	10.64	162.45	162.79	6.32
6,356.00	43.93	85.14	6,298.04	13.30	194.21	194.66	9.60
6,403.00	48.87	83.94	6,330.44	16.55	228.08	228.66	10.67
6,451.00	55.61	86.34	6,359.82	19.72	265.87	266.56	14.59
6,498.00	62.05	87.69	6,384.14	21.80	306.00	306.76	13.91
6,546.00	65.76	88.19	6,405.25	23.35	349.07	349.84	7.79
6,594.00	67.54	88.16	6,424.27	24.76	393.12	393.89	3.72
6,642.00	69.26	88.12	6,441.94	26.21	437.72	438.51	3.58
6,688.00	70.98	86.90	6,457.59	28.09	480.94	481.76	4.51
6,736.00	74.27	85.59	6,471.92	31.09	526.64	527.56	7.33
6,783.00	77.58	85.35	6,483.35	34.69	572.08	573.13	7.06



## Design Report for Hoffman C02-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,826.00	80.55	85.13	6,491.50	38.19	614.15	615.33	6.92
6,916.00	84.35	85.35	6,503.33	45.59	703.05	704.51	4.23
6,947.00	84.26	85.45	6,506.41	48.07	733.79	735.35	0.44
7,043.00	85.90	86.06	6,514.65	55.14	829.17	830.98	1.82
7,138.00	87.47	86.12	6,520.14	61.61	923.79	925.81	1.66
7,233.00	89.07	86.41	6,523.01	67.80	1,018.54	1,020.76	1.72
7,328.00	89.54	86.39	6,524.16	73.77	1,113.35	1,115.76	0.49
7,423.00	89.72	86.27	6,524.77	79.85	1,208.15	1,210.75	0.23
7,518.00	89.91	85.93	6,525.08	86.32	1,302.93	1,305.75	0.41
7,613.00	89.94	87.27	6,525.21	91.95	1,397.76	1,400.74	1.42
7,708.00	89.94	86.96	6,525.31	96.73	1,492.64	1,495.74	0.32
7,803.00	90.37	86.56	6,525.05	102.09	1,587.49	1,590.74	0.62
7,899.00	90.89	86.51	6,523.99	107.89	1,683.31	1,686.73	0.55
7,992.00	89.11	86.65	6,523.99	113.44	1,776.14	1,779.73	1.93
8,085.00	88.95	88.04	6,525.57	117.75	1,869.02	1,872.71	1.49
8,178.00	90.28	89.21	6,526.19	119.99	1,961.99	1,965.65	1.90
8,271.00	91.39	88.94	6,524.85	121.49	2,054.96	2,058.55	1.23
8,363.00	89.66	88.62	6,524.00	123.45	2,146.94	2,150.48	1.91
8,455.00	89.41	87.25	6,524.75	126.76	2,238.87	2,242.45	1.51
8,546.00	89.72	88.68	6,525.43	130.00	2,329.81	2,333.42	1.60
8,639.00	90.56	86.38	6,525.21	134.01	2,422.71	2,426.41	2.63
8,731.00	88.95	86.72	6,525.60	139.55	2,514.54	2,518.40	1.78
8,823.00	89.78	85.21	6,526.62	146.02	2,606.31	2,610.39	1.88
8,916.00	90.12	86.58	6,526.69	152.68	2,699.07	2,703.38	1.52
9,008.00	90.15	89.69	6,526.47	155.67	2,791.01	2,795.33	3.38
9,102.00	90.89	91.28	6,525.61	154.88	2,884.99	2,889.11	1.86
9,197.00	90.00	89.63	6,524.87	154.12	2,979.98	2,983.90	1.97
9,293.00	89.23	88.79	6,525.51	155.44	3,075.97	3,079.80	1.19
9,387.00	88.42	87.42	6,527.44	158.55	3,169.90	3,173.74	1.69
9,482.00	88.52	85.52	6,529.98	164.40	3,264.68	3,268.71	1.99
9,577.00	88.59	85.21	6,532.38	172.07	3,359.34	3,363.65	0.34
9,672.00	89.85	85.68	6,533.68	179.61	3,454.03	3,458.62	1.42
9,768.00	90.93	85.47	6,533.03	187.02	3,549.74	3,554.60	1.15
9,862.00	88.58	85.74	6,533.43	194.22	3,643.45	3,648.58	2.51
9,957.00	89.04	85.01	6,535.40	201.88	3,738.12	3,743.53	0.90
10,053.00	90.59	85.08	6,535.71	210.17	3,833.76	3,839.49	1.61
10,148.00	90.19	85.85	6,535.07	217.69	3,928.46	3,934.47	0.92
10,243.00	91.05	85.58	6,534.05	224.79	4,023.19	4,029.45	0.95
10,339.00	90.77	85.66	6,532.52	232.12	4,118.89	4,125.42	0.30
10,434.00	90.37	86.94	6,531.58	238.25	4,213.69	4,220.41	1.41
10,529.00	90.22	87.82	6,531.09	242.60	4,308.59	4,315.40	0.94
10,624.00	90.40	87.77	6,530.58	246.25	4,403.52	4,410.38	0.20
10,720.00	90.09	86.33	6,530.17	251.19	4,499.39	4,506.38	1.53
10,815.00	90.62	85.80	6,529.58	257.71	4,594.16	4,601.37	0.79
10,910.00	91.20	85.89	6,528.07	264.59	4,688.90	4,696.35	0.62
11,005.00	91.76	86.18	6,525.62	271.16	4,783.64	4,791.31	0.66
11,100.00	91.30	85.91	6,523.09	277.70	4,878.38	4,886.27	0.56
11,195.00	88.67	85.72	6,523.12	284.63	4,973.12	4,981.25	2.77
11,290.00	88.61	85.56	6,525.37	291.86	5,067.81	5,076.21	0.18
11,385.00	89.32	86.10	6,527.08	298.77	5,162.55	5,171.18	0.94
11,480.00	90.28	85.19	6,527.41	305.98	5,257.27	5,266.17	1.39



## Design Report for Hoffman C02-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
11,575.00	89.85	84.53	6,527.31	314.49	5,351.89	5,361.12	0.83
11,670.00	90.40	86.60	6,527.10	321.83	5,446.60	5,456.10	2.25
11,765.00	90.49	87.08	6,526.36	327.07	5,541.45	5,551.09	0.51
11,860.00	89.97	86.35	6,525.98	332.52	5,636.29	5,646.09	0.95
11,954.00	90.28	87.65	6,525.77	337.44	5,730.16	5,740.09	1.42
12,050.00	90.12	84.34	6,525.44	344.15	5,825.91	5,836.07	3.45
12,145.00	90.19	83.93	6,525.18	353.87	5,920.41	5,930.97	0.44
12,240.00	89.88	85.04	6,525.13	363.00	6,014.97	6,025.90	1.21
12,335.00	89.78	86.04	6,525.41	370.39	6,109.68	6,120.89	1.06
12,430.00	91.82	89.56	6,524.08	374.03	6,204.58	6,215.84	4.28
12,525.00	90.77	89.12	6,521.94	375.13	6,299.55	6,310.71	1.19
12,621.00	90.43	89.42	6,520.93	376.36	6,395.54	6,406.60	0.47
12,716.00	90.31	90.35	6,520.32	376.55	6,490.53	6,501.45	0.99
12,811.00	90.68	89.32	6,519.50	376.82	6,585.53	6,596.29	1.15
12,906.00	90.68	86.59	6,518.37	380.21	6,680.45	6,691.25	2.87
13,001.00	91.82	86.79	6,516.30	385.69	6,775.27	6,786.23	1.22
13,096.00	91.73	86.28	6,513.36	391.42	6,870.05	6,881.18	0.55
13,191.00	90.80	84.54	6,511.26	399.02	6,964.72	6,976.13	2.07
13,286.00	91.72	85.19	6,509.17	407.52	7,059.31	7,071.06	1.18
13,381.00	91.67	85.87	6,506.36	414.93	7,153.98	7,166.00	0.72
13,476.00	91.88	86.57	6,503.42	421.18	7,248.73	7,260.95	0.77
13,571.00	91.23	86.81	6,500.83	426.66	7,343.53	7,355.92	0.73
13,622.00	92.10	87.58	6,499.35	429.15	7,394.45	7,406.89	2.28
Final MWD Survey							
13,691.00	92.10	87.58	6,496.82	432.06	7,463.34	7,475.84	0.01
Bit Projection - Estimated BHL 2545'FNL 536'FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
706.00	706.00	0.00	0.00	Tie On To Surface Casing Assumed Vertical
823.00	823.00	-0.21	-0.13	First MWD Survey
13,622.00	6,499.35	429.15	7,394.45	Final MWD Survey
13,691.00	6,496.82	432.06	7,463.34	Bit Projection
13,691.00	6,496.82	432.06	7,463.34	Estimated BHL 2545'FNL 536'FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Hoffman C02-65HN_PlanA - Rev1_BHL	86.65	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
706.00	13,691.00	Sperry MWD Surveys	MWD

## Design Report for Hoffman C02-65HN - 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	0.00	0.00	0.00	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath hits target center									
- Polygon									
Point 1				-2,430.00	-2,417.00	1,366,070.25	3,271,225.49		
Point 2				-2,448.00	2,837.00	1,371,324.03	3,271,207.49		
Point 3				2,794.00	2,913.00	1,371,400.02	3,276,449.27		
Point 4				2,820.00	-2,359.00	1,366,128.24	3,276,475.27		
Point 5				-2,430.00	-2,417.00	1,366,070.25	3,271,225.49		
Hoffman	0.00	0.00	0.00	0.00	0.00	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath hits target center									
- Polygon									
Point 1				2,794.00	2,913.00	1,371,400.02	3,276,449.27		
Point 2				7,987.00	2,986.00	1,371,473.02	3,281,642.05		
Point 3				8,024.00	-2,307.00	1,366,180.24	3,281,679.05		
Point 4				2,820.00	-2,359.00	1,366,128.24	3,276,475.27		
Point 5				2,794.00	2,913.00	1,371,400.02	3,276,449.27		
Hoffman	0.00	0.00	6,517.00	437.16	7,463.64	1,368,924.29	3,281,118.71	40° 20' 30.156 N	104° 29' 29.328 W
- actual wellpath misses target center by 20.81ft at 13690.77ft MD (6496.83 TVD, 432.05 N, 7463.11 E)									
- Point									
Hoffman	0.00	0.00	0.00	0.00	0.00	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath hits target center									
- Polygon									
Point 1				3,254.00	2,453.00	1,370,940.04	3,276,909.25		
Point 2				7,527.00	2,526.00	1,371,013.04	3,281,182.07		
Point 3				7,564.00	-1,847.00	1,366,640.22	3,281,219.07		
Point 4				3,280.00	-1,899.00	1,366,588.23	3,276,935.25		
Point 5				3,254.00	2,453.00	1,370,940.04	3,276,909.25		
Hoffman	0.00	0.00	0.00	0.00	0.00	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath hits target center									
- Polygon									
Point 1				-1,970.00	-1,957.00	1,366,530.23	3,271,685.47		
Point 2				-1,988.00	2,377.00	1,370,864.05	3,271,667.47		
Point 3				2,334.00	2,453.00	1,370,940.04	3,275,989.29		
Point 4				2,360.00	-1,899.00	1,366,588.23	3,276,015.29		
Point 5				-1,970.00	-1,957.00	1,366,530.23	3,271,685.47		



**North Reference Sheet for Sec. 2-T4N-R64W (Hoffman 2 PAD) - Hoffman C02-65HN**

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

Vertical Depths are relative to KB @ 4632.00ft (Ensign 132). Northing and Easting are relative to Hoffman C02-65HN - 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° 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

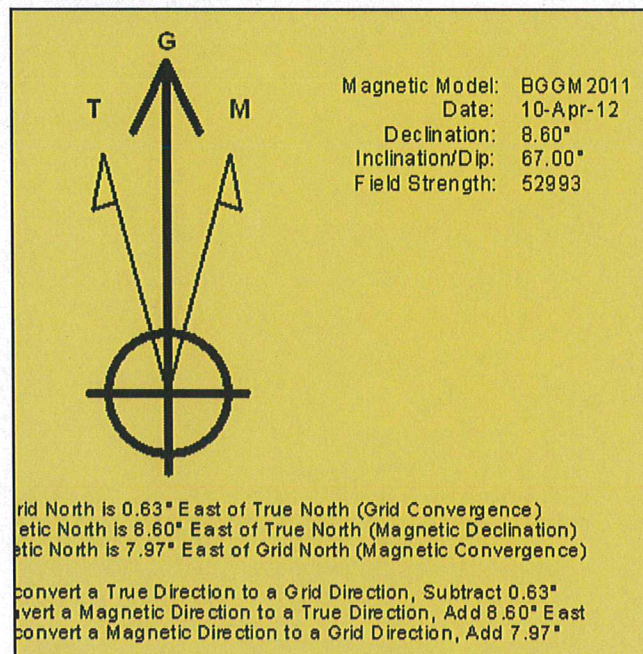
Grid Coordinates of Well: 1,368,487.15 ft N, 3,273,655.39 ft E

Geographical Coordinates of Well: 40° 20' 26.66" N, 104° 31' 05.77" W

Grid Convergence at Surface is: 0.63°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,691.00ft  
the Bottom Hole Displacement is 7,475.84ft in the Direction of 86.69° (Grid).

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

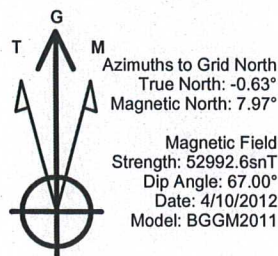


Project: Weld County, CO (NAD 83)  
 Site: Sec. 2-T4N-R64W (Hoffman 2 PAD)  
 Well: Hoffman C02-65HN

# Noble Energy

**HALLIBURTON**

Sperry Drilling

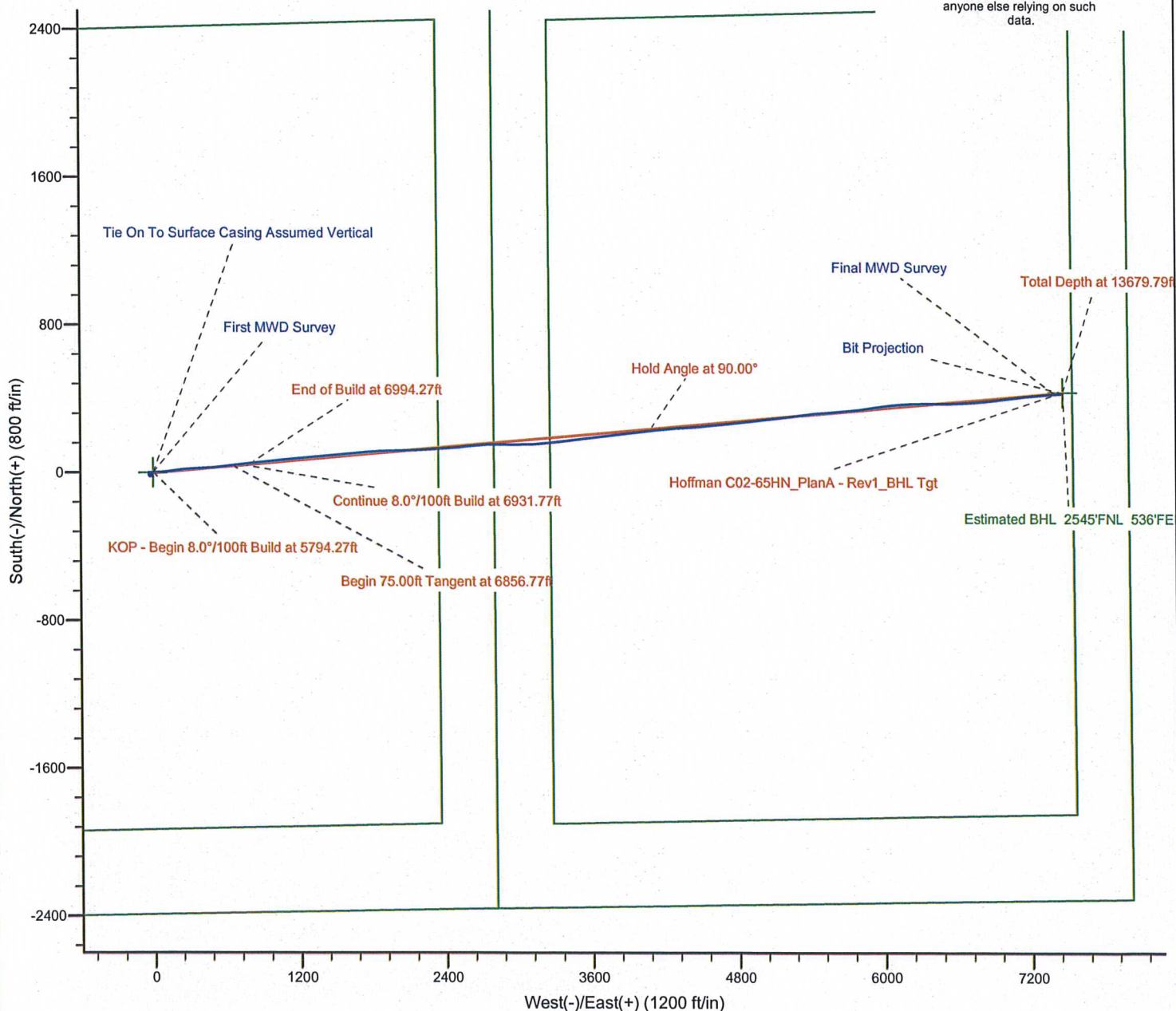


## LEGEND

- Hoffman C02-65HN, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Permitted BHL: 2540' FNL,  
 535' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hoffman C02-65HN 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.



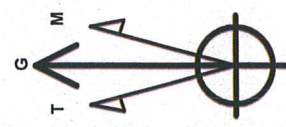


# Noble Energy

HALLIBURTON

Sperry Drilling

Project: Weld County, CO (NAD 83)  
Site: Sec. 2-T4N-R64W (Hoffman 2 PAD)  
Well: Hoffman C02-65HN



Azimuths to Grid North  
True North: -0.63°  
Magnetic North: 7.97°  
  
Magnetic Field  
Strength: 52992.6snT  
Dip Angle: 67.00°  
Date: 4/10/2012  
Model: BGGM2011

## LEGEND

- Hoffman C02-65HN, 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 C02-65HN 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.

