

Noble Energy

Weld County, CO (NAD 83)
Sec. 2-T4N-R64W (Hoffman 2 PAD)
Hoffman C02-33D - A4

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

28 July, 2012

Well Coordinates: 1,368,486.47 N, 3,273,594.06 E (40° 20' 26.66" N, 104° 31' 06.56" W)
Ground Level: 4,620.00 ft

Local Coordinate Origin:	Centered on Well Hoffman C02-33D - Slot A4
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 C02-33D - 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
721.00	0.00	0.00	721.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 721.00ft							
823.00	0.42	56.89	823.00	0.20	0.31	-0.37	0.41
First MWD Survey							
918.00	0.58	93.60	918.00	0.36	1.08	-1.14	0.37
1,013.00	3.99	274.78	1,012.93	0.61	-1.73	1.33	4.81
1,109.00	6.83	248.28	1,108.50	-1.23	-10.37	9.96	3.87
1,204.00	8.86	251.48	1,202.61	-5.64	-22.55	22.89	2.18
1,297.00	11.30	247.56	1,294.17	-11.39	-37.77	39.12	2.72
1,390.00	13.66	243.30	1,384.97	-19.81	-56.00	59.21	2.72
1,483.00	15.39	242.75	1,474.99	-30.39	-76.78	82.50	1.87
1,575.00	17.17	241.66	1,563.30	-42.43	-99.59	108.23	1.96
1,667.00	19.11	245.39	1,650.73	-55.15	-125.24	136.84	2.46
1,758.00	21.02	245.70	1,736.20	-68.07	-153.66	168.06	2.10
1,851.00	22.38	245.59	1,822.61	-82.25	-184.98	202.44	1.46
1,943.00	24.50	246.39	1,907.01	-97.13	-218.42	239.04	2.33
2,035.00	27.93	251.14	1,989.54	-111.74	-256.30	279.59	4.37
2,128.00	29.45	252.13	2,071.12	-125.80	-298.67	324.00	1.71
2,220.00	30.75	249.44	2,150.72	-141.00	-342.22	369.96	2.04
2,315.00	33.18	247.09	2,231.31	-159.65	-388.92	420.20	2.87
2,410.00	35.61	245.00	2,309.70	-181.46	-437.94	473.86	2.84
2,505.00	39.08	245.49	2,385.21	-205.58	-490.26	531.47	3.67
2,600.00	40.21	241.94	2,458.37	-232.43	-544.58	592.02	2.66
2,695.00	40.78	244.71	2,530.62	-260.12	-599.70	653.63	1.99
2,790.00	42.98	244.80	2,601.35	-287.16	-657.06	717.04	2.32
2,885.00	42.91	244.22	2,670.89	-315.01	-715.48	781.74	0.42
2,980.00	42.77	243.40	2,740.55	-343.52	-773.44	846.29	0.61
3,075.00	38.56	245.25	2,812.60	-370.37	-829.20	908.16	4.61
3,170.00	37.92	244.69	2,887.21	-395.25	-882.48	966.95	0.77
3,265.00	37.01	244.71	2,962.62	-419.95	-934.72	1,024.72	0.96
3,360.00	34.97	244.31	3,039.48	-443.96	-985.11	1,080.53	2.16
3,455.00	35.49	243.73	3,117.08	-467.97	-1,034.38	1,135.30	0.65
3,550.00	37.34	245.87	3,193.53	-491.96	-1,085.40	1,191.68	2.36
3,645.00	38.62	246.85	3,268.41	-515.39	-1,138.96	1,250.13	1.49
3,740.00	39.50	246.22	3,342.17	-539.23	-1,193.87	1,309.99	1.02
3,835.00	41.49	246.96	3,414.42	-563.73	-1,250.48	1,371.67	2.15
3,930.00	39.33	246.77	3,486.75	-587.93	-1,307.11	1,433.25	2.28
4,026.00	41.76	246.22	3,559.69	-612.82	-1,364.33	1,495.64	2.56
4,121.00	42.06	245.95	3,630.39	-638.54	-1,422.34	1,559.10	0.37
4,216.00	41.84	245.52	3,701.04	-664.64	-1,480.23	1,622.60	0.38
4,311.00	38.49	245.90	3,773.63	-689.85	-1,536.07	1,683.87	3.54
4,407.00	35.54	246.32	3,850.28	-713.26	-1,588.91	1,741.65	3.08
4,502.00	36.88	244.65	3,926.93	-736.56	-1,639.96	1,797.77	1.75
4,597.00	38.30	246.34	4,002.21	-760.58	-1,692.69	1,855.71	1.85
4,692.00	38.78	247.52	4,076.51	-783.77	-1,747.14	1,914.89	0.92
4,787.00	38.33	248.75	4,150.81	-805.82	-1,802.09	1,974.05	0.94
4,883.00	35.73	247.51	4,227.44	-827.34	-1,855.74	2,031.81	2.82
4,978.00	32.35	247.73	4,306.15	-847.58	-1,904.91	2,084.96	3.56
5,073.00	30.95	245.51	4,387.02	-867.34	-1,950.66	2,134.79	1.92

Design Report for Hoffman C02-33D - 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	31.49	248.81	4,468.27	-886.44	-1,996.03	2,184.01	1.89
5,263.00	33.18	246.73	4,548.54	-905.68	-2,043.05	2,234.78	2.13
5,358.00	32.89	247.84	4,628.18	-925.68	-2,090.82	2,286.55	0.71
5,453.00	29.72	245.79	4,709.34	-945.07	-2,136.20	2,335.90	3.52
5,548.00	27.96	248.11	4,792.56	-963.03	-2,178.35	2,381.70	2.20
5,643.00	26.84	246.93	4,876.90	-979.74	-2,218.75	2,425.40	1.31
5,738.00	25.71	245.93	4,962.08	-996.55	-2,257.29	2,467.45	1.28
5,832.00	22.83	245.99	5,047.77	-1,012.29	-2,292.57	2,506.08	3.06
5,929.00	20.15	245.02	5,138.01	-1,027.01	-2,324.92	2,541.61	2.79
6,023.00	17.94	245.24	5,226.86	-1,039.91	-2,352.74	2,572.28	2.35
6,118.00	15.80	246.12	5,317.77	-1,051.27	-2,377.86	2,599.85	2.27
6,213.00	13.77	246.44	5,409.62	-1,061.03	-2,400.05	2,624.09	2.14
6,308.00	11.95	247.90	5,502.23	-1,069.25	-2,419.53	2,645.23	1.95
6,403.00	10.33	244.33	5,595.44	-1,076.64	-2,436.32	2,663.57	1.85
6,498.00	9.18	246.48	5,689.07	-1,083.35	-2,450.94	2,679.67	1.27
6,593.00	6.93	245.35	5,783.12	-1,088.77	-2,463.10	2,692.98	2.37
6,688.00	4.41	242.02	5,877.65	-1,092.87	-2,471.54	2,702.35	2.67
6,782.00	4.77	251.55	5,971.35	-1,095.81	-2,478.44	2,709.85	0.90
6,877.00	4.73	244.16	6,066.03	-1,098.76	-2,485.71	2,717.69	0.65
6,974.00	4.03	252.66	6,162.74	-1,101.52	-2,492.56	2,725.08	0.98
7,068.00	4.09	260.92	6,256.51	-1,103.04	-2,499.03	2,731.59	0.62
7,163.00	3.18	263.00	6,351.32	-1,103.89	-2,504.99	2,737.38	0.97
7,259.00	2.59	247.35	6,447.20	-1,105.05	-2,509.63	2,742.10	1.02
7,353.00	2.22	252.75	6,541.11	-1,106.41	-2,513.33	2,746.03	0.46
7,448.00	1.80	252.37	6,636.05	-1,107.41	-2,516.51	2,749.34	0.44
7,543.00	1.74	251.43	6,731.01	-1,108.32	-2,519.30	2,752.25	0.07
7,638.00	1.31	255.89	6,825.97	-1,109.04	-2,521.72	2,754.76	0.47
7,662.00	1.27	259.14	6,849.97	-1,109.16	-2,522.25	2,755.29	0.35
Final MWD Survey							
7,718.00	1.27	259.14	6,905.95	-1,109.39	-2,523.46	2,756.50	0.00
Survey Projection to TD - Estimated BHL: 1309' FSL, 146' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
721.00	721.00	0.00	0.00	Surface Casing Assumed Vertical at 721.00ft
823.00	823.00	0.20	0.31	First MWD Survey
7,662.00	6,849.97	-1,109.16	-2,522.25	Final MWD Survey
7,718.00	6,905.95	-1,109.39	-2,523.46	Survey Projection to TD
7,718.00	6,905.95	-1,109.39	-2,523.46	Estimated BHL: 1309' FSL, 146' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	+N/-S (ft)	+E/-W (ft)	Start TVD (ft)
Target	Hoffman C02-33D_PlanA - Rev1_BHL Tgt	245.88	Slot	0.00	0.00	0.00

Design Report for Hoffman C02-33D - MWD Survey

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
721.00	7,718.00	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
Hoffman	0.00	0.00	6,933.00	-1,098.16	-2,452.38	1,367,388.36	3,271,141.78	40° 20' 16.080 N	104° 31' 38.388 W
- actual wellpath misses target center by 76.88ft at 7718.00ft MD (6905.95 TVD, -1109.39 N, -2523.46 E)									
- Point									
Hoffman	0.00	0.00	1.00	0.68	61.33	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath misses target center by 61.33ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-2,368.67	-2,416.32	1,366,070.25	3,271,225.49		
Point 2				-2,386.67	2,837.68	1,371,324.03	3,271,207.49		
Point 3				2,855.33	2,913.68	1,371,400.02	3,276,449.27		
Point 4				2,881.33	-2,358.32	1,366,128.24	3,276,475.27		
Point 5				-2,368.67	-2,416.32	1,366,070.25	3,271,225.49		
Hoffman	0.00	0.00	1.00	0.68	61.33	1,368,487.15	3,273,655.39	40° 20' 26.664 N	104° 31' 5.772 W
- actual wellpath misses target center by 61.33ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-1,908.67	-1,956.32	1,366,530.23	3,271,685.47		
Point 2				-1,926.67	2,377.68	1,370,864.05	3,271,667.47		
Point 3				2,395.33	2,453.68	1,370,940.04	3,275,989.29		
Point 4				2,421.33	-1,898.32	1,366,588.23	3,276,015.29		
Point 5				-1,908.67	-1,956.32	1,366,530.23	3,271,685.47		
Hoffman	0.00	0.00	5,850.00	-1,098.16	-2,452.38	1,367,388.36	3,271,141.78	40° 20' 16.080 N	104° 31' 38.388 W
- actual wellpath misses target center by 18.20ft at 6659.01ft MD (5848.76 TVD, -1091.76 N, -2469.38 E)									
- Circle (radius 75.00)									

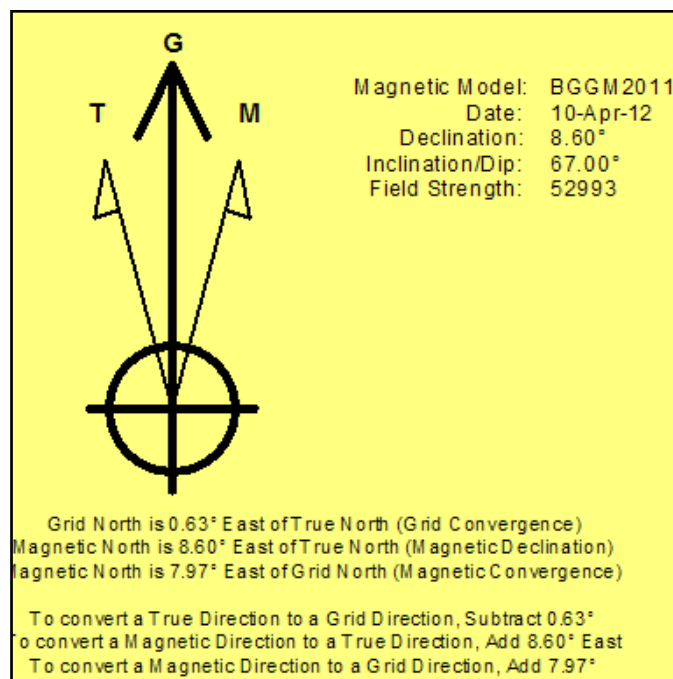
North Reference Sheet for Sec. 2-T4N-R64W (Hoffman 2 PAD) - Hoffman C02-33D

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 C02-33D - Slot A4
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: 1,368,486.47 ft N, 3,273,594.06 ft E
Geographical Coordinates of Well: 40° 20' 26.66" N, 104° 31' 06.56" W
Grid Convergence at Surface is: 0.63°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,718.00ft
the Bottom Hole Displacement is 2,756.56ft in the Direction of 246.27° (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 C02-33D

Noble Energy

HALLIBURTON

Sperry Drilling



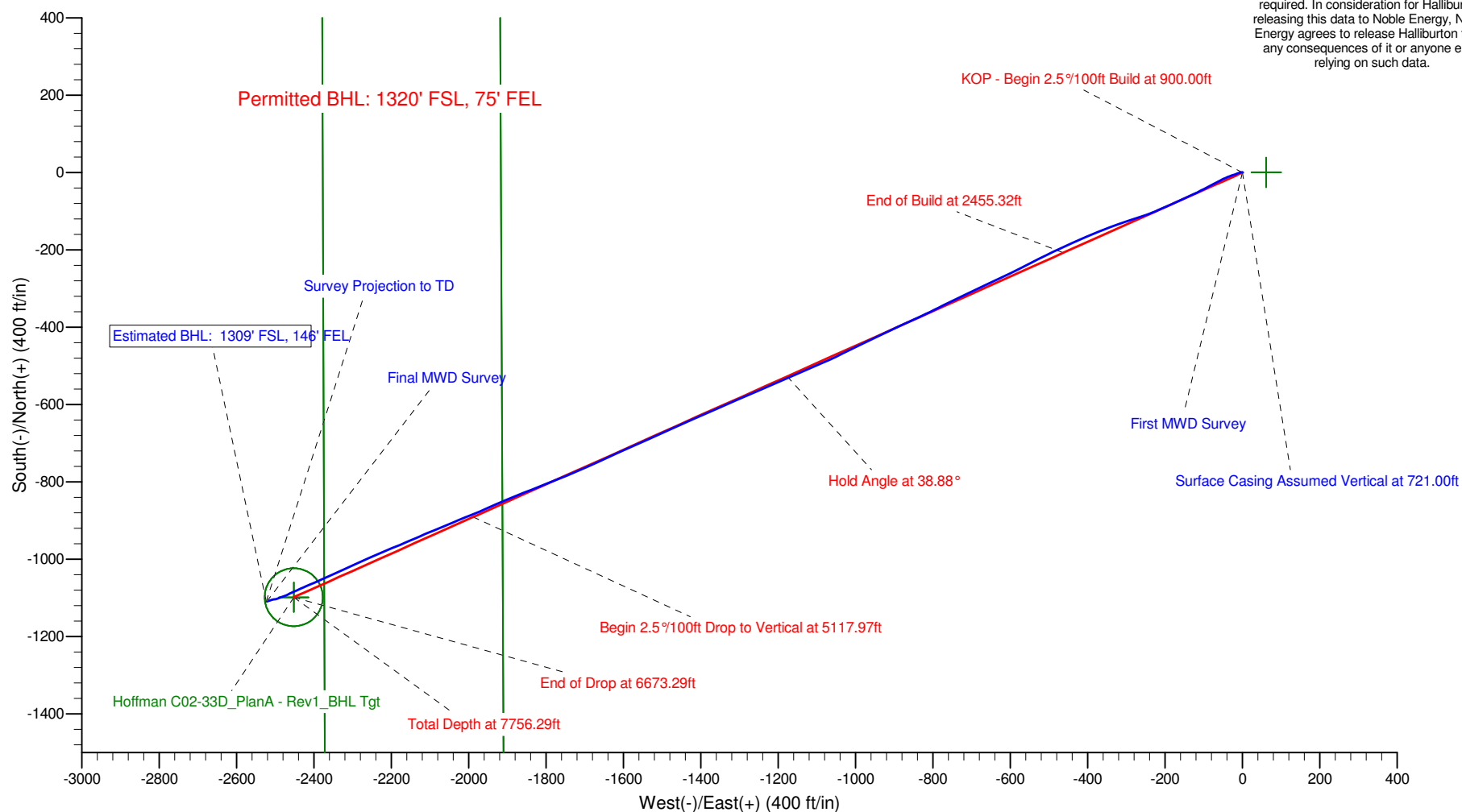
Azimuths to Grid North
True North: -0.63°
Magnetic North: 7.97°

Magnetic Field
Strength: 52992.6snT
Dip Angle: 67.00°
Date: 4/10/2012
Model: BGGM2011

LEGEND

- Hoffman C02-33D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

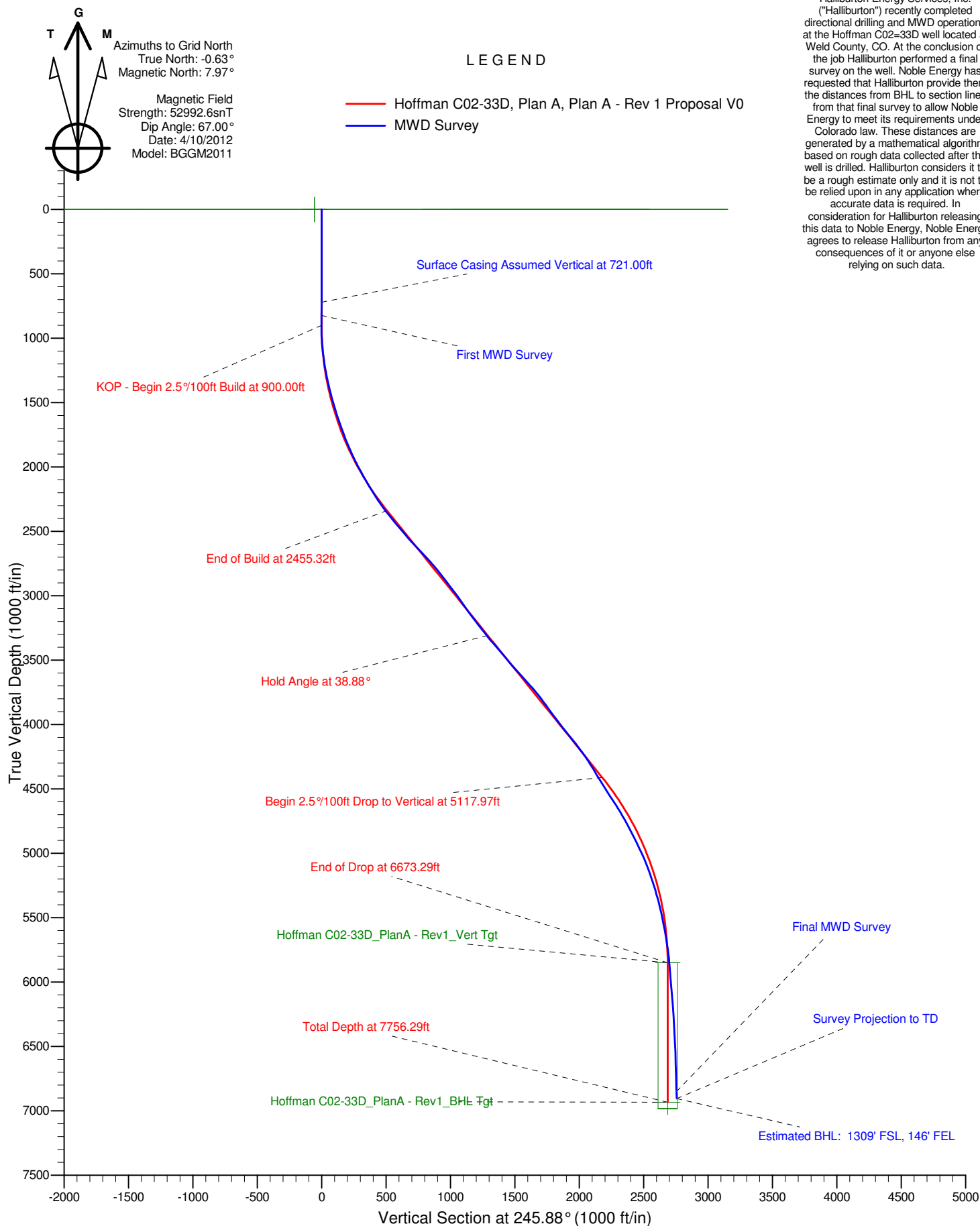
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hoffman C02-33D well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them 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



Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hoffman C02-33D 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.