Noble Energy

Weld County, CO (NAD 83)
Sec. 1-T6N-R64W (Cecil 1 North PAD)
Cecil USX A01-65HN - A2

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

27 December, 2012

Well Coordinates: 1,432,776.65 N, 3,280,895.74 E (40° 31' 01.13" N, 104° 29' 22.81" W)
Ground Level: 4,737.00 ft

Local Coordinate Origin:	Centered on Well Cecil USX A01-65HN - Slot A2
Viewing Datum:	KB @ 4761.00ft (H&P 343)
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 Cecil USX A01-65HN - 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
916.00	0.00	0.00	916.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 916.00ft							
1,008.00	0.19	110.16	1,008.00	-0.05	0.14	-0.15	0.21
First MWD Survey							
1,103.00	3.05	23.99	1,102.95	2.20	1.32	-1.14	3.20
1,195.00	4.98	8.12	1,194.73	8.39	2.88	-2.21	2.40
1,287.00	6.25	16.41	1,286.29	17.15	4.86	-3.50	1.63
1,380.00	9.73	25.97	1,378.37	29.08	9.73	-7.42	3.99
1,472.00	12.26	22.77	1,468.68	45.07	16.92	-13.33	2.83
1,564.00	13.68	19.97	1,558.33	64.31	24.41	-19.29	1.69
1,656.00	16.10	19.98	1,647.23	86.52	32.49	-25.60	2.63
1,748.00	14.73	17.61	1,735.92	109.66	40.39	-31.66	1.64
1,840.00	14.32	19.75	1,824.98	131.52	47.77	-37.31	0.73
1,933.00	15.96	22.46	1,914.75	154.16	56.54	-44.28	1.92
2,032.00	14.35	21.32	2,010.31	178.17	66.20	-52.02	1.65
2,127.00	14.94	21.27	2,102.22	200.55	74.92	-58.96	0.62
2,223.00	16.80	21.53	2,194.56	224.99	84.51	-66.60	1.94
2,319.00	15.52	20.45	2,286.76	249.93	94.09	-74.19	1.37
2,414.00	14.60	28.24	2,378.51	272.39	104.19	-82.51	2.34
2,509.00	13.75	22.77	2,470.62	293.35	114.23	-90.87	1.67
2,700.00	16.03	24.74	2,655.19	338.24	134.05	-107.11	1.22
2,796.00	15.79	22.77	2,747.52	362.32	144.66	-115.79	0.62
2,891.00	12.83	21.82	2,839.56	384.03	153.58	-122.99	3.13
2,987.00	10.56	24.82	2,933.56	401.91	161.24	-129.22	2.45
3,082.00	8.97	27.36	3,027.18	416.39	168.29	-135.12	1.73
3,178.00	5.57	28.05	3,122.40	427.16	173.93	-139.89	3.54
3,273.00	3.29	35.93	3,217.11	433.43	177.69	-143.15	2.48
3,369.00	0.93	75.34	3,313.04	435.86	180.06	-145.32	2.75
3,464.00	0.71	59.43	3,408.03	436.36	181.32	-146.53	0.33
3,559.00	0.37	32.70	3,503.02	436.91	181.99	-147.16	0.44
3,655.00	0.25	54.26	3,599.02	437.30	182.33	-147.47	0.17
3,750.00	0.50	59.93	3,694.02	437.62	182.85	-147.97	0.27
4,036.00	1.35	73.34	3,979.98	439.22	187.16	-152.14	0.30
4,131.00	1.25	62.38	4,074.96	440.02	189.15	-154.06	0.28
4,227.00	1.93	46.58	4,170.92	441.61	191.25	-156.03	0.84
4,322.00	1.93	50.00	4,265.87	443.74	193.64	-158.24	0.12
4,418.00	2.37	46.00	4,361.80	446.16	196.31	-160.71	0.48
4,513.00	2.16	45.68	4,456.72	448.77	199.00	-163.19	0.22
4,609.00	2.42	39.76	4,552.65	451.60	201.59	-165.55	0.37
4,704.00	2.91	30.97	4,647.54	455.21	204.12	-167.78	0.67
4,799.00	2.63	24.43	4,742.43	459.26	206.26	-169.60	0.44
4,895.00	0.89	48.48	4,838.39	461.76	207.73	-170.87	1.93
4,990.00	1.02	32.30	4,933.37	462.96	208.73	-171.78	0.31
5,086.00	0.96	13.61	5,029.36	464.47	209.38	-172.30	0.34
5,372.00	0.88	66.05	5,315.33	467.69	211.95	-174.61	0.29
5,658.00	1.03	80.31	5,601.29	469.01	216.49	-179.04	0.10
5,944.00	0.66	121.26	5,887.26	468.59	220.43	-183.00	0.24
6,039.00	0.54	52.69	5,982.25	468.58	221.26	-183.82	0.72
6,134.00	4.74	248.07	6,077.16	467.38	217.97	-180.64	5.54

Design Report for Cecil USX A01-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,182.00	7.26	248.79	6,124.89	465.54	213.30	-176.13	5.25
6,230.00	10.93	249.67	6,172.28	462.86	206.20	-169.26	7.65
6,278.00	13.95	250.37	6,219.15	459.34	196.48	-159.85	6.30
6,325.00	16.72	250.16	6,264.47	455.14	184.79	-148.52	5.89
6,373.00	20.25	250.30	6,309.98	449.99	170.47	-134.65	7.35
6,421.00	23.97	246.80	6,354.45	443.35	153.68	-118.43	8.22
6,469.00	28.29	248.24	6,397.53	435.29	134.14	-99.59	9.10
6,516.00	31.79	249.27	6,438.21	426.77	112.21	-78.39	7.53
6,564.00	36.53	251.28	6,477.92	417.71	86.84	-53.81	10.15
6,612.00	40.42	256.68	6,515.50	409.53	58.15	-25.85	10.70
6,660.00	44.52	262.72	6,550.92	403.81	26.29	5.46	12.04
6,707.00	47.71	267.26	6,583.50	400.89	-7.44	38.86	9.72
6,755.00	52.43	268.61	6,614.30	399.58	-44.21	75.41	10.07
6,803.00	56.84	271.45	6,642.08	399.63	-83.34	114.42	10.38
6,851.00	61.28	272.45	6,666.76	401.04	-124.47	155.54	9.42
6,899.00	65.91	273.47	6,688.10	403.26	-167.39	198.51	9.83
6,947.00	69.78	272.69	6,706.19	405.65	-211.78	242.94	8.20
6,994.00	72.42	272.35	6,721.42	407.60	-256.20	287.38	5.66
7,042.00	75.53	270.82	6,734.67	408.87	-302.31	333.44	7.17
7,089.00	78.31	269.25	6,745.30	408.90	-348.08	379.08	6.75
7,116.00	81.07	268.73	6,750.14	408.43	-374.64	405.52	10.40
7,243.00	88.49	269.71	6,761.68	406.71	-501.01	531.37	5.89
7,339.00	90.25	268.59	6,762.74	405.29	-596.99	626.94	2.17
7,434.00	90.56	270.22	6,762.07	404.30	-691.98	721.56	1.75
7,530.00	89.08	270.06	6,762.37	404.54	-787.97	817.27	1.55
7,625.00	88.46	270.53	6,764.41	405.03	-882.95	912.00	0.82
7,720.00	88.52	271.03	6,766.91	406.32	-977.91	1,006.76	0.53
7,816.00	91.20	272.98	6,767.14	409.68	-1,073.83	1,102.66	3.45
7,911.00	90.74	271.46	6,765.54	413.36	-1,168.75	1,197.57	1.67
8,006.00	88.73	269.20	6,765.98	413.90	-1,263.73	1,292.30	3.18
8,102.00	87.75	268.30	6,768.92	411.81	-1,359.66	1,387.77	1.39
8,197.00	87.59	268.10	6,772.79	408.83	-1,454.54	1,482.12	0.27
8,293.00	89.75	268.32	6,775.01	405.83	-1,550.46	1,577.51	2.26
8,388.00	87.93	268.00	6,776.94	402.78	-1,645.39	1,671.91	1.95
8,484.00	89.07	268.00	6,779.45	399.43	-1,741.29	1,767.26	1.19
8,579.00	89.01	267.46	6,781.04	395.67	-1,836.21	1,861.58	0.57
8,675.00	88.80	267.48	6,782.88	391.43	-1,932.09	1,956.84	0.22
8,770.00	89.35	267.65	6,784.41	387.40	-2,027.00	2,051.14	0.61
8,866.00	90.03	269.85	6,784.93	385.30	-2,122.96	2,146.65	2.40
8,961.00	89.32	269.58	6,785.47	384.83	-2,217.96	2,241.31	0.80
9,057.00	89.17	266.70	6,786.73	381.72	-2,313.89	2,336.70	3.00
9,152.00	88.59	267.68	6,788.59	377.06	-2,408.76	2,430.91	1.20
9,248.00	89.94	269.68	6,789.82	374.85	-2,504.72	2,526.40	2.51
9,343.00	90.03	271.83	6,789.85	376.10	-2,599.70	2,621.19	2.27
9,438.00	89.72	270.02	6,790.05	377.63	-2,694.69	2,716.01	1.93
9,534.00	88.89	269.64	6,791.22	377.35	-2,790.68	2,811.68	0.95
9,629.00	90.00	269.61	6,792.14	376.73	-2,885.67	2,906.33	1.17
9,725.00	86.97	267.20	6,794.68	374.06	-2,981.58	3,001.74	4.03
9,820.00	87.54	269.19	6,799.23	371.07	-3,076.42	3,096.05	2.18
9,916.00	88.83	269.42	6,802.27	369.91	-3,172.36	3,191.60	1.36
10,011.00	89.07	269.31	6,804.01	368.85	-3,267.34	3,286.21	0.28

Design Report for Cecil USX A01-65HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
10,107.00	90.59	269.29	6,804.29	367.68	-3,363.33	3,381.81	1.58
10,202.00	89.81	268.99	6,803.96	366.25	-3,458.32	3,476.39	0.88
10,298.00	89.85	269.46	6,804.25	364.96	-3,554.31	3,571.98	0.49
10,393.00	88.92	269.29	6,805.27	363.92	-3,649.30	3,666.60	1.00
10,489.00	89.26	268.46	6,806.79	362.04	-3,745.27	3,762.12	0.93
10,584.00	88.86	268.84	6,808.35	359.80	-3,840.23	3,856.62	0.58
10,679.00	90.09	269.56	6,809.22	358.47	-3,935.21	3,951.20	1.50
10,775.00	90.00	269.62	6,809.15	357.78	-4,031.21	4,046.85	0.11
10,870.00	88.70	269.26	6,810.22	356.86	-4,126.20	4,141.47	1.42
10,966.00	87.60	269.30	6,813.32	355.65	-4,222.14	4,237.02	1.15
11,061.00	88.98	269.12	6,816.16	354.34	-4,317.08	4,331.58	1.46
11,157.00	90.65	269.04	6,816.47	352.80	-4,413.07	4,427.14	1.74
11,181.00	90.96	268.77	6,816.13	352.34	-4,437.06	4,451.03	1.71
Final MWD Survey							
11,238.00	90.96	268.77	6,815.17	351.12	-4,494.04	4,507.73	0.00

Estimated BHL: 1652' FNL, 536' FWL - Survey Projection to TD

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
916.00	916.00	0.00	0.00	Surface Casing Assumed Vertical at 916.00ft
1,008.00	1,008.00	-0.05	0.14	First MWD Survey
11,181.00	6,816.13	352.34	-4,437.06	Final MWD Survey
11,238.00	6,815.17	351.12	-4,494.04	Estimated BHL: 1652' FNL, 536' FWL
11,238.00	6,815.17	351.12	-4,494.04	Survey Projection to TD

Vertical Section Information

	Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target		Cecil USX A01-65HN_PlanA - Rev1_BHL	274.50	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
916.00	11,238.00	Sperry MWD Surveys	MWD

Design Report for Cecil USX A01-65HN - 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
Cecil USX	0.00	0.00	0.00	36.43	-0.42	1,432,813.08	3,280,895.32	40° 31' 1.488 N	104° 29' 22.812 W
- actual wellpath misses target center by 36.43ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-236.42	1,626.43	1,434,403.02	3,280,659.33		
Point 2				-178.42	-2,801.57	1,429,975.17	3,280,717.33		
Point 3				-4,546.42	-2,850.57	1,429,926.17	3,276,349.47		
Point 4				-4,589.42	1,534.43	1,434,311.03	3,276,306.47		
Point 5				-236.42	1,626.43	1,434,403.02	3,280,659.33		
Cecil USX	0.00	0.00	6,804.45	353.61	-4,494.57	1,433,130.25	3,276,401.31	40° 31' 5.124 N	104° 30' 20.952 W
- actual wellpath misses target center by 11.02ft at 11238.00ft MD (6815.17 TVD, 351.12 N, -4494.04 E)									
- Point									
Cecil USX	0.00	0.00	0.00	36.43	-0.42	1,432,813.08	3,280,895.32	40° 31' 1.488 N	104° 29' 22.812 W
- actual wellpath misses target center by 36.43ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				223.58	2,086.43	1,434,863.01	3,281,119.32		
Point 2				281.58	-3,261.57	1,429,515.18	3,281,177.31		
Point 3				-5,006.42	-3,310.57	1,429,466.18	3,275,889.49		
Point 4				-5,049.42	1,994.43	1,434,771.01	3,275,846.49		
Point 5				223.58	2,086.43	1,434,863.01	3,281,119.32		

North Reference Sheet for Sec. 1-T6N-R64W (Cecil 1 North PAD) - Cecil USX A01-65HN

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

Vertical Depths are relative to KB @ 4761.00ft (H&P 343). Northing and Easting are relative to Cecil USX A01-65HN - Slot A2

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: 0.99996762

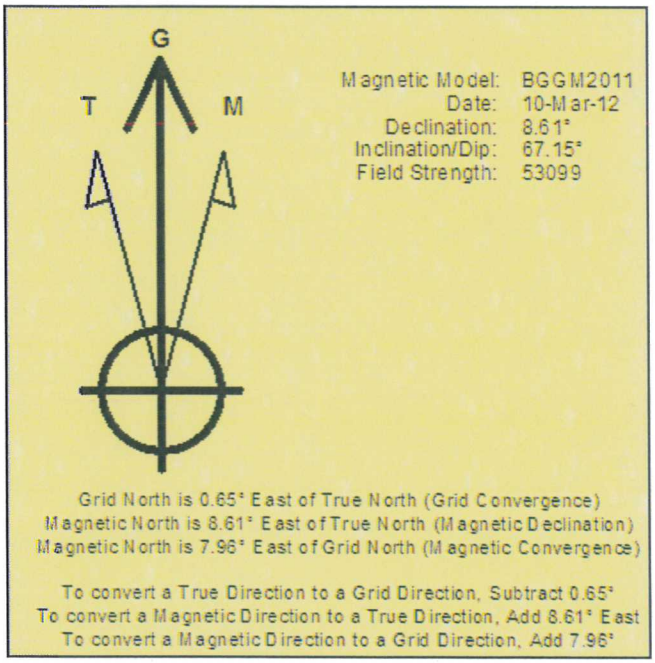
Grid Coordinates of Well: 1,432,776.65 ft N, 3,280,895.74 ft E

Geographical Coordinates of Well: 40° 31' 01.13" N, 104° 29' 22.81" W

Grid Convergence at Surface is: 0.65°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,238.00ft
the Bottom Hole Displacement is 4,507.73ft in the Direction of 274.47° (Grid).

Magnetic Convergence at surface is: -7.96° (10 March 2012, , BGGM2011)



Project: Weld County, CO (NAD 83)
Site: Sec. 1-T6N-R64W (Cecil 1 North PAD)
Well: Cecil USX A01-65HN

Noble Energy

HALLIBURTON
Sperry Drilling

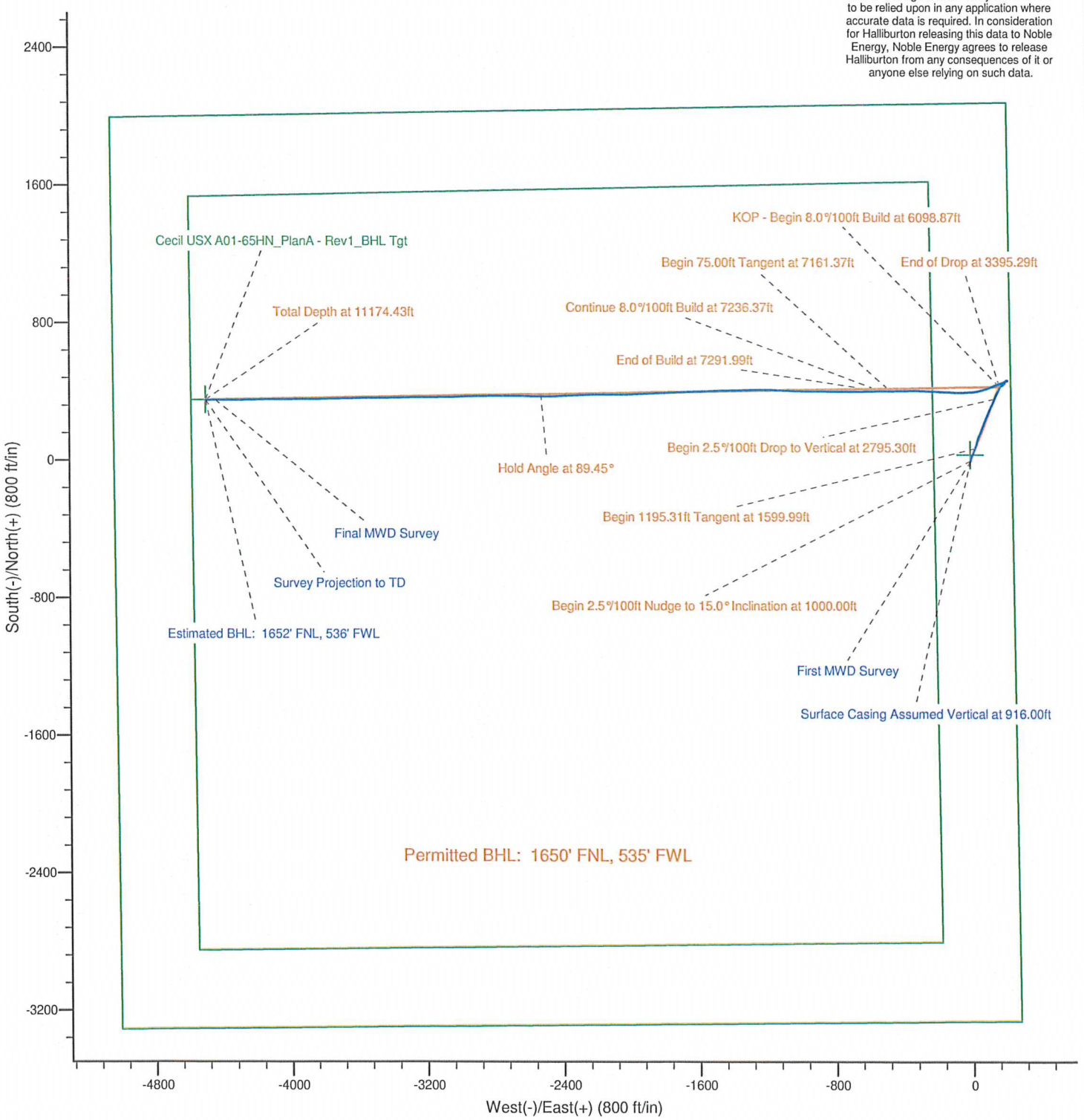
Azimuths to Grid North
True North: -0.65°
Magnetic North: 7.96°

Magnetic Field
Strength: 53099.1snT
Dip Angle: 67.15°
Date: 3/10/2012
Model: BGGM2011

LEGEND

Cecil USX A01-65HN, Plan A, Plan A - Rev 2 Proposal V0
MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Cecil USX A01-65HN 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.



Project: Weld County, CO (NAD 83)
Site: Sec. 1-T6N-R64W (Cecil 1 North PAD)
Well: Cecil USX A01-65HN

Noble Energy

HALLIBURTON
Sperry Drilling

Azimuths to Grid North
True North: -0.65°
Magnetic North: 7.96°

Magnetic Field
Strength: 53099.1snT
Dip Angle: 67.15°
Date: 3/10/2012
Model: BGGM2011

LEGEND

Cecil USX A01-65HN, Plan A, Plan A - Rev 2 Proposal V0
MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Cecil USX A01-65HN 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.