

Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R63W (Wells Ranch 24 North PAD)

Bob AA24-67-1HC

MWD Survey

Sperry Drilling Services

Final Survey Report

06 January, 2013

Well Coordinates: 1,418,256.64 N, 3,307,936.76 E (40° 28' 34.46" N, 104° 23' 35.05" W)

Ground Level: 4,795.00 ft

Local Coordinate Origin:

Centered on Well Bob AA24-67-1HC - Slot A1

Viewing Datum:

KB @ 4819.00ft (H&P 321)

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 Bob AA24-67-1HC - 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
624.00	0.00	0.00	624.00	0.00	0.00	0.00	0.00
Tie On To Surface Casing Assumed Vertical							
633.00	0.13	321.04	633.00	0.01	-0.01	-0.01	1.44
First MWD Survey							
916.00	0.33	3.97	916.00	1.07	-0.15	-0.26	0.09
1,202.00	0.25	313.96	1,201.99	2.33	-0.54	-0.78	0.09
1,294.00	1.27	198.99	1,293.99	1.50	-1.02	-1.17	1.52
1,386.00	2.82	212.30	1,385.93	-1.38	-2.56	-2.41	1.75
1,478.00	4.66	209.24	1,477.73	-6.55	-5.60	-4.90	2.01
1,570.00	7.38	203.32	1,569.21	-15.24	-9.76	-8.17	3.03
1,662.00	10.27	205.98	1,660.11	-28.04	-15.69	-12.77	3.17
1,754.00	11.39	204.10	1,750.47	-43.71	-23.00	-18.45	1.28
1,847.00	12.53	206.60	1,841.45	-61.11	-31.26	-24.91	1.35
1,939.00	14.90	207.96	1,930.82	-80.48	-41.28	-32.91	2.60
2,031.00	17.28	212.26	2,019.22	-102.49	-54.12	-43.46	2.89
2,123.00	15.53	210.17	2,107.47	-124.69	-67.61	-54.62	2.01
2,215.00	15.81	211.54	2,196.05	-146.02	-80.35	-65.14	0.50
2,307.00	16.35	213.33	2,284.45	-167.52	-94.02	-76.56	0.80
2,399.00	15.54	210.37	2,372.91	-188.98	-107.37	-87.67	1.25
2,491.00	14.91	214.02	2,461.68	-209.42	-120.22	-98.38	1.25
2,586.00	16.34	214.67	2,553.17	-230.54	-134.66	-110.61	1.52
2,681.00	15.05	208.69	2,644.63	-252.36	-148.19	-121.86	2.18
2,776.00	15.73	215.53	2,736.23	-273.66	-161.59	-133.03	2.04
2,871.00	16.36	214.81	2,827.53	-295.12	-176.71	-145.90	0.70
2,965.00	16.68	212.26	2,917.65	-317.40	-191.47	-158.33	0.84
3,060.00	18.46	212.63	3,008.22	-341.60	-206.86	-171.19	1.88
3,155.00	15.58	213.72	3,099.05	-364.88	-222.06	-183.94	3.05
3,250.00	14.60	214.64	3,190.77	-385.34	-235.94	-195.69	1.06
3,345.00	13.72	212.14	3,282.89	-404.73	-248.74	-206.46	1.13
3,440.00	11.87	211.48	3,375.52	-422.61	-259.84	-215.69	1.95
3,535.00	10.94	204.44	3,468.65	-439.15	-268.67	-222.80	1.76
3,630.00	10.76	200.99	3,561.95	-455.63	-275.58	-228.00	0.71
3,724.00	11.20	197.50	3,654.23	-472.53	-281.47	-232.14	0.85
3,819.00	11.30	200.88	3,747.41	-490.03	-287.56	-236.43	0.70
3,914.00	10.58	210.36	3,840.69	-506.25	-295.28	-242.47	2.04
4,009.00	8.60	226.59	3,934.37	-518.66	-304.86	-250.74	3.51
4,104.00	4.42	242.97	4,028.75	-525.21	-313.28	-258.46	4.77
4,199.00	1.26	281.41	4,123.62	-526.67	-317.57	-262.57	3.71
4,294.00	0.83	339.91	4,218.61	-525.82	-318.83	-263.91	1.15
4,388.00	1.49	5.00	4,312.59	-523.96	-318.95	-264.23	0.87
4,673.00	2.44	101.35	4,597.48	-521.46	-312.68	-258.24	1.05
4,768.00	1.50	121.63	4,692.42	-522.51	-309.64	-255.11	1.22
4,863.00	0.62	175.73	4,787.41	-523.68	-308.54	-253.90	1.31
4,958.00	1.21	295.74	4,882.40	-523.75	-309.41	-254.75	1.70
5,052.00	1.09	292.05	4,976.38	-522.99	-311.13	-256.54	0.15
5,337.00	0.76	99.02	5,261.37	-522.26	-311.78	-257.26	0.65
5,432.00	0.58	117.99	5,356.36	-522.59	-310.73	-256.18	0.30
5,717.00	1.14	109.85	5,641.33	-524.23	-306.79	-252.10	0.20
5,991.00	0.86	105.61	5,915.29	-525.71	-302.25	-247.43	0.11

Design Report for Bob AA24-67-1HC - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,096.00	2.05	93.85	6,020.25	-526.05	-299.61	-244.77	1.16
6,144.00	5.67	76.77	6,068.14	-525.56	-296.45	-241.67	7.83
6,191.00	9.06	72.52	6,114.74	-523.92	-290.66	-236.08	7.30
6,239.00	11.04	76.60	6,162.00	-521.72	-282.58	-228.27	4.38
6,286.00	14.22	77.26	6,207.86	-519.40	-272.57	-218.54	6.77
6,334.00	18.57	84.74	6,253.90	-517.40	-259.20	-205.44	10.06
6,380.00	24.40	85.42	6,296.69	-515.97	-242.42	-188.90	12.69
6,428.00	29.92	87.10	6,339.38	-514.57	-220.56	-167.29	11.61
6,475.00	32.03	87.04	6,379.67	-513.33	-196.41	-143.39	4.49
6,523.00	34.20	85.79	6,419.88	-511.68	-170.24	-117.52	4.74
6,570.00	37.30	84.53	6,458.02	-509.36	-142.88	-90.54	6.78
6,618.00	41.34	84.58	6,495.14	-506.47	-112.61	-60.72	8.42
6,665.00	44.94	84.27	6,529.43	-503.35	-80.63	-29.22	7.67
6,713.00	49.20	85.94	6,562.12	-500.37	-45.62	5.31	9.23
6,760.00	52.75	87.67	6,591.71	-498.34	-9.17	41.36	8.08
6,808.00	57.51	88.42	6,619.14	-497.01	30.17	80.37	10.00
6,855.00	61.38	89.27	6,643.03	-496.20	70.63	120.54	8.38
6,903.00	64.54	89.04	6,664.85	-495.57	113.37	163.00	6.60
6,950.00	67.54	87.96	6,683.94	-494.44	156.30	205.59	6.72
6,998.00	71.82	87.80	6,700.60	-492.77	201.27	250.16	8.92
7,045.00	75.23	88.04	6,713.93	-491.14	246.31	294.80	7.27
7,093.00	77.91	89.02	6,725.07	-489.94	292.98	341.11	5.93
7,139.00	82.89	89.56	6,732.74	-489.38	338.31	386.16	10.89
7,214.00	88.09	89.90	6,738.64	-489.03	413.05	460.48	6.95
7,309.00	90.25	89.42	6,740.02	-488.47	508.04	554.91	2.33
7,404.00	86.89	89.01	6,742.39	-487.17	602.98	649.24	3.56
7,499.00	89.44	88.31	6,745.43	-484.95	697.90	743.44	2.78
7,594.00	91.33	87.72	6,744.79	-481.66	792.84	837.56	2.08
7,689.00	90.37	88.55	6,743.38	-478.57	887.77	931.69	1.34
7,784.00	90.22	91.92	6,742.89	-478.95	982.76	1,026.23	3.55
7,878.00	89.85	90.22	6,742.83	-480.71	1,076.74	1,119.90	1.85
7,973.00	90.15	90.25	6,742.83	-481.10	1,171.74	1,214.45	0.32
8,068.00	90.86	86.86	6,742.00	-478.70	1,266.69	1,308.67	3.65
8,163.00	90.74	85.90	6,740.67	-472.71	1,361.49	1,402.38	1.02
8,258.00	90.12	85.63	6,739.96	-465.69	1,456.23	1,495.92	0.71
8,353.00	89.57	80.35	6,740.21	-454.10	1,550.48	1,588.51	5.59
8,448.00	89.88	77.63	6,740.67	-435.96	1,643.72	1,679.44	2.88
8,543.00	93.05	80.95	6,738.24	-418.31	1,737.01	1,770.46	4.83
8,637.00	95.34	90.18	6,731.35	-411.06	1,830.37	1,862.60	10.09
8,732.00	91.08	91.04	6,726.03	-412.07	1,925.19	1,957.04	4.57
8,827.00	88.95	91.64	6,726.01	-414.30	2,020.16	2,051.74	2.33
8,922.00	88.52	93.00	6,728.10	-418.14	2,115.06	2,146.54	1.50
9,017.00	89.78	93.76	6,729.51	-423.74	2,209.88	2,241.44	1.55
9,112.00	89.11	92.88	6,730.43	-429.24	2,304.72	2,336.35	1.16
9,207.00	89.72	92.21	6,731.40	-433.46	2,399.62	2,431.19	0.95
9,302.00	88.86	91.79	6,732.58	-436.77	2,494.55	2,525.97	1.01
9,397.00	84.13	90.69	6,738.39	-438.83	2,589.32	2,620.46	5.11
9,491.00	84.32	87.71	6,747.85	-437.52	2,682.82	2,713.35	3.16
9,586.00	86.20	87.40	6,755.70	-433.48	2,777.41	2,807.04	2.01
9,681.00	90.09	87.02	6,758.77	-428.86	2,872.23	2,900.90	4.11
9,776.00	91.23	88.83	6,757.68	-425.42	2,967.15	2,994.99	2.25

Design Report for Bob AA24-67-1HC - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,871.00	90.86	90.95	6,755.95	-425.24	3,062.13	3,089.46	2.26
9,966.00	90.31	91.26	6,754.98	-427.07	3,157.11	3,184.13	0.66
10,061.00	90.99	90.78	6,753.90	-428.76	3,252.09	3,278.79	0.88
10,156.00	90.49	91.85	6,752.67	-430.94	3,347.05	3,373.49	1.24
10,251.00	91.26	91.23	6,751.22	-433.50	3,442.01	3,468.22	1.04
10,345.00	89.63	90.29	6,750.49	-434.74	3,535.99	3,561.84	2.00
10,440.00	89.97	89.80	6,750.82	-434.82	3,630.99	3,656.36	0.63
10,535.00	90.71	89.11	6,750.26	-433.91	3,725.98	3,750.77	1.07
10,630.00	90.03	87.54	6,749.64	-431.14	3,820.94	3,844.96	1.80
10,725.00	89.82	90.47	6,749.77	-429.49	3,915.91	3,939.28	3.09
10,820.00	90.06	90.19	6,749.87	-430.03	4,010.91	4,033.84	0.39
10,915.00	89.94	90.41	6,749.87	-430.53	4,105.91	4,128.40	0.26
11,010.00	90.09	88.33	6,749.84	-429.49	4,200.90	4,222.80	2.20
11,105.00	93.02	89.65	6,747.27	-427.81	4,295.84	4,317.07	3.38
Final Survey							
11,170.00	93.02	89.65	6,743.84	-427.42	4,360.74	4,381.61	0.00
Bit Projection - Estimated BHL 1584'FNL 538'FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
624.00	624.00	0.00	0.00	Tie On To Surface Casing Assumed Vertical
633.00	633.00	0.01	-0.01	First MWD Survey
11,105.00	6,747.27	-427.81	4,295.84	Final Survey
11,170.00	6,743.84	-427.42	4,360.74	Bit Projection
11,170.00	6,743.84	-427.42	4,360.74	Estimated BHL 1584'FNL 538'FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Bob	95.82	Slot	0.00	0.00	0.00
	AA24-67-1HC_PlanA - Rev0_B					

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
624.00	11,170.00	Sperry MWD Surveys from DD	MWD

Design Report for Bob AA24-67-1HC - 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
Bob	0.00	0.00	0.00	0.00	0.00	1,418,256.64	3,307,936.76	40° 28' 34.464 N	104° 23' 35.052 W
- actual wellpath hits target center									
- Polygon									
Point 1				-367.00	1,107.00	1,419,363.60	3,307,569.78		
Point 2				4,890.00	1,162.00	1,419,418.60	3,312,826.59		
Point 3				4,919.00	-4,139.00	1,414,117.79	3,312,855.59		
Point 4				-373.00	-4,195.00	1,414,061.79	3,307,563.78		
Point 5				-367.00	1,107.00	1,419,363.60	3,307,569.78		
Bob	0.00	0.00	6,761.26	-444.30	4,362.70	1,417,812.35	3,312,299.31	40° 28' 29.532 N	104° 22' 38.676 W
- actual wellpath misses target center by 24.34ft at 11170.00ft MD (6743.84 TVD, -427.42 N, 4360.74 E)									
- Point									
Bob	0.00	0.00	0.00	0.00	0.00	1,418,256.64	3,307,936.76	40° 28' 34.464 N	104° 23' 35.052 W
- actual wellpath hits target center									
- Polygon									
Point 1				93.00	647.00	1,418,903.62	3,308,029.76		
Point 2				4,430.00	702.00	1,418,958.62	3,312,366.61		
Point 3				4,459.00	-3,679.00	1,414,577.77	3,312,395.61		
Point 4				87.00	-3,735.00	1,414,521.77	3,308,023.76		
Point 5				93.00	647.00	1,418,903.62	3,308,029.76		

North Reference Sheet for Sec. 24-T6N-R63W (Wells Ranch 24 North PAD) - Bob AA24-67-1HC

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

Vertical Depths are relative to KB @ 4819.00ft (H&P 321). Northing and Easting are relative to Bob AA24-67-1HC - 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: 0.99996457

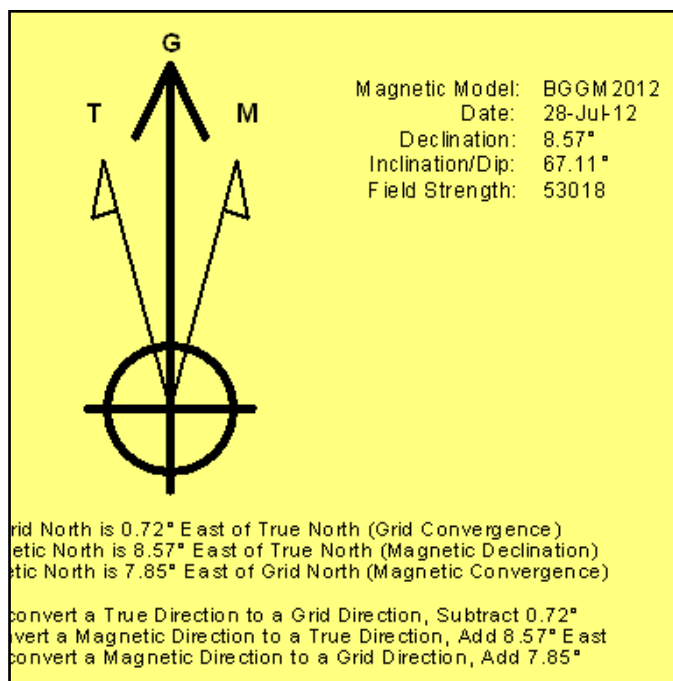
Grid Coordinates of Well: 1,418,256.64 ft N, 3,307,936.76 ft E

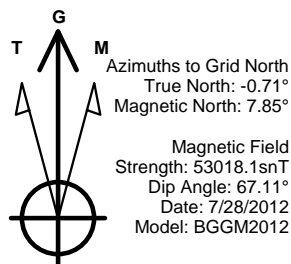
Geographical Coordinates of Well: 40° 28' 34.46" N, 104° 23' 35.05" W

Grid Convergence at Surface is: 0.72°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,170.00ft the Bottom Hole Displacement is 4,381.64ft in the Direction of 95.60° (Grid).

Magnetic Convergence at surface is: -7.85° (28 July 2012, , BGGM2012)



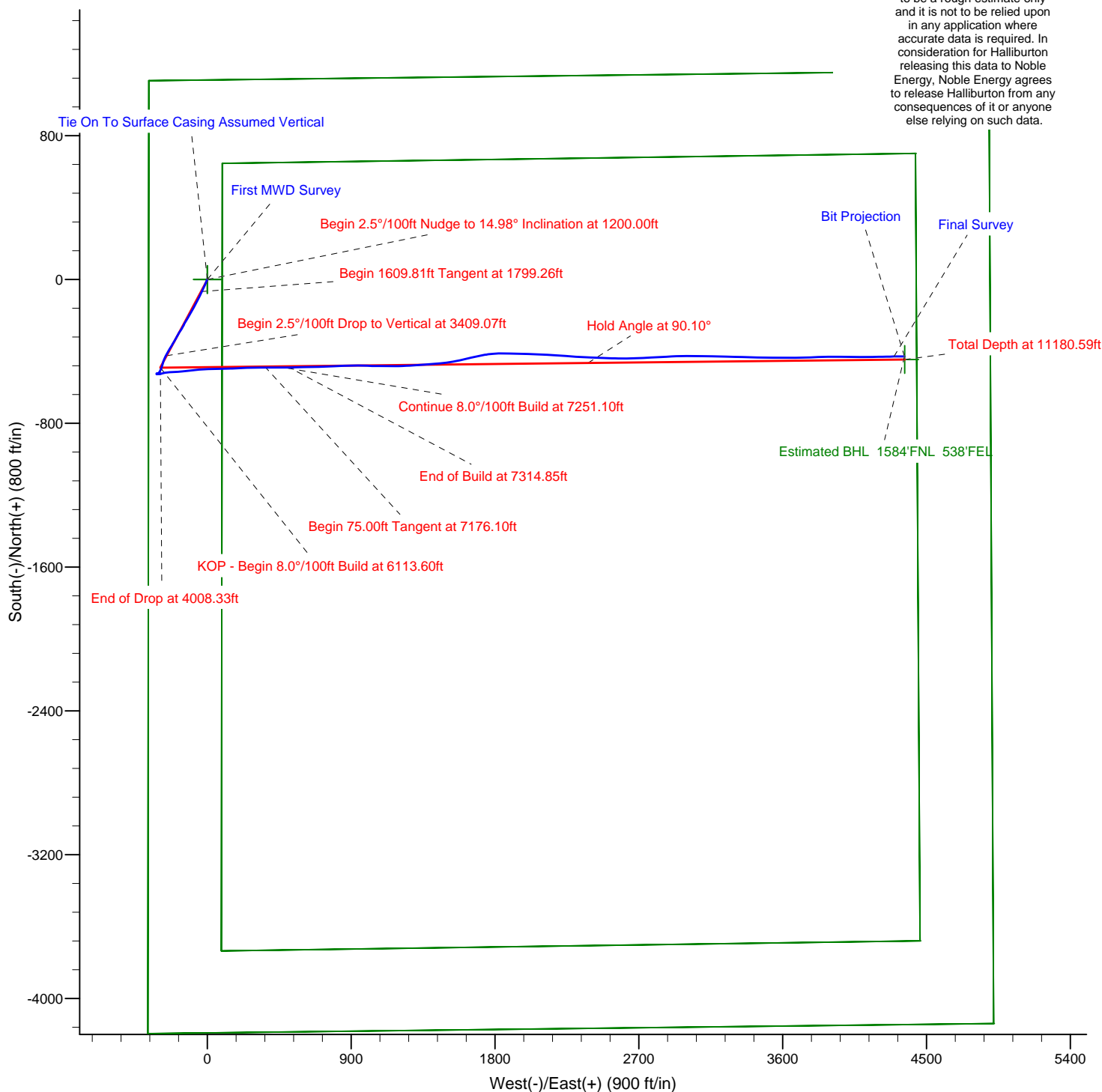


LEGEND

- Bob AA24-67-1HC, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 1600' FNL,
 535' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Bob AA24-67-1HC 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. 24-T6N-R63W (Wells Ranch 24 North PAD)
Well: Bob AA24-67-1HC

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.71°
Magnetic North: 7.85°

Magnetic Field
Strength: 53018.1nT
Dip Angle: 67.11°
Date: 7/28/2012
Model: BGGM2012

LEGEND

— Bob AA24-67-1HC, Plan A, Plan A - Rev 0 Proposal V0
— MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Bob AA24-67-1HC 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.

