

# Noble Energy

Weld County, CO (NAD 83)

Sec. 12-T6N-R63W (Wells Ranch 12 North PAD)

Wells Ranch AA12-68-1HN

MWD Survey

## Sperry Drilling Services

# Final Survey Report

04 January, 2013

Well Coordinates: 1,429,151.02 N, 3,312,634.08 E (40° 30' 21.53" N, 104° 22' 32.48" W)

Ground Level: 4,893.00 ft

Local Coordinate Origin: Centered on Well Wells Ranch AA12-68-1HN - Slot A

Viewing Datum: KB=24' @ 4917.00ft (H&P 315)

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 Wells Ranch AA12-68-1HN - 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
802.00	0.74	221.75	801.98	-3.86	-3.45	3.59	0.09
<b>Tie On To Surface Casing</b>							
1,080.00	0.47	236.55	1,079.96	-5.83	-5.60	5.81	0.11
<b>First MWD Survey</b>							
1,172.00	1.55	346.66	1,171.95	-4.83	-6.20	6.37	1.92
1,453.00	2.22	13.87	1,452.80	4.15	-5.77	5.61	0.39
1,643.00	0.62	229.11	1,642.76	7.05	-5.66	5.40	1.45
1,927.00	0.93	168.16	1,926.74	3.79	-6.35	6.21	0.29
2,022.00	2.99	144.82	2,021.68	1.01	-4.77	4.73	2.28
2,117.00	4.25	116.58	2,116.50	-2.59	-0.19	0.29	2.26
2,212.00	5.40	128.80	2,211.16	-6.97	6.44	-6.18	1.62
2,307.00	6.77	140.16	2,305.63	-14.07	13.51	-12.99	1.91
2,402.00	8.00	131.34	2,399.84	-22.73	22.06	-21.22	1.76
2,496.00	9.25	138.36	2,492.78	-32.70	32.00	-30.78	1.74
2,591.00	9.63	135.11	2,586.49	-44.04	42.68	-41.04	0.69
2,686.00	10.41	129.15	2,680.04	-55.08	54.94	-52.89	1.36
2,781.00	9.44	125.70	2,773.62	-65.05	67.92	-65.50	1.20
2,876.00	7.99	121.66	2,867.52	-73.06	79.87	-77.14	1.66
2,970.00	7.36	130.35	2,960.68	-80.39	90.02	-87.02	1.40
3,065.00	6.47	132.51	3,054.99	-87.95	98.60	-95.32	0.98
3,160.00	3.64	136.13	3,149.61	-93.74	104.64	-101.14	3.00
3,255.00	3.19	138.29	3,244.44	-97.89	108.49	-104.83	0.49
3,350.00	2.54	133.90	3,339.33	-101.32	111.77	-107.98	0.72
3,445.00	2.11	130.52	3,434.25	-103.91	114.61	-110.73	0.47
3,539.00	1.34	67.31	3,528.21	-104.61	116.94	-113.03	2.05
3,824.00	1.02	95.38	3,813.15	-103.57	122.54	-118.67	0.23
4,109.00	0.64	49.87	4,098.13	-102.78	126.28	-122.43	0.26
4,393.00	0.25	15.63	4,382.12	-101.16	127.66	-123.87	0.16
4,678.00	0.68	214.80	4,667.11	-101.95	126.87	-123.05	0.32
4,963.00	0.49	180.93	4,952.10	-104.56	125.88	-121.97	0.14
5,247.00	0.53	163.21	5,236.09	-107.03	126.24	-122.24	0.06
5,532.00	0.18	270.78	5,521.08	-108.29	126.17	-122.12	0.21
5,816.00	0.23	112.14	5,805.08	-108.49	126.26	-122.20	0.14
5,933.00	0.35	70.99	5,922.08	-108.47	126.81	-122.75	0.20
6,051.00	7.32	257.20	6,039.77	-110.02	119.81	-115.70	6.50
6,098.00	10.12	259.63	6,086.23	-111.42	112.83	-108.67	6.01
6,193.00	16.05	261.03	6,178.72	-114.98	91.63	-87.35	6.25
6,287.00	22.21	262.34	6,267.49	-119.37	61.15	-56.74	6.57
6,382.00	27.88	262.48	6,353.52	-124.68	21.31	-16.72	5.97
6,430.00	31.23	260.25	6,395.27	-128.26	-2.09	6.79	7.34
6,477.00	34.66	258.58	6,434.70	-132.97	-27.21	32.06	7.55
6,525.00	39.46	256.28	6,473.00	-139.29	-55.42	60.49	10.41
6,573.00	43.92	254.92	6,508.84	-147.24	-86.33	91.67	9.48
6,621.00	49.16	254.30	6,541.84	-156.50	-119.91	125.56	10.96
6,667.00	53.92	255.12	6,570.44	-165.98	-154.64	160.62	10.44
6,715.00	60.02	255.90	6,596.59	-176.04	-193.59	199.91	12.78
6,762.00	65.10	259.09	6,618.25	-185.04	-234.30	240.92	12.37
6,810.00	69.03	262.00	6,636.96	-192.28	-277.89	284.75	9.91
6,857.00	73.42	264.58	6,652.08	-197.47	-322.07	329.09	10.69

**Design Report for Wells Ranch AA12-68-1HN - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,905.00	77.24	268.79	6,664.24	-200.14	-368.41	375.49	11.63
6,952.00	80.12	273.13	6,673.47	-199.36	-414.47	421.50	10.93
7,000.00	82.64	274.41	6,680.66	-196.23	-461.82	468.70	5.87
7,070.00	86.05	274.41	6,687.56	-190.88	-531.26	537.90	4.87
7,162.00	91.08	273.88	6,689.86	-184.23	-622.97	629.30	5.50
7,288.00	91.82	272.42	6,686.67	-177.31	-748.73	754.72	1.30
7,383.00	91.17	270.65	6,684.20	-174.77	-843.66	849.50	1.98
7,478.00	90.03	268.83	6,683.20	-175.20	-938.65	944.44	2.26
7,573.00	89.69	268.50	6,683.43	-177.41	-1,033.62	1,039.43	0.50
7,668.00	90.40	268.62	6,683.36	-179.80	-1,128.59	1,134.42	0.76
7,763.00	89.08	269.30	6,683.79	-181.52	-1,223.57	1,229.40	1.56
7,857.00	89.08	269.68	6,685.30	-182.36	-1,317.56	1,323.35	0.40
7,952.00	89.07	270.29	6,686.83	-182.39	-1,412.54	1,418.28	0.64
8,047.00	89.75	270.45	6,687.81	-181.77	-1,507.54	1,513.18	0.74
8,142.00	89.04	269.61	6,688.81	-181.72	-1,602.53	1,608.11	1.16
8,237.00	89.57	271.49	6,689.97	-180.81	-1,697.51	1,703.00	2.06
8,332.00	89.48	271.70	6,690.75	-178.17	-1,792.47	1,797.80	0.24
8,427.00	88.67	271.40	6,692.29	-175.60	-1,887.42	1,892.59	0.91
8,521.00	90.52	271.75	6,692.95	-173.01	-1,981.38	1,986.39	2.00
8,616.00	89.85	270.04	6,692.64	-171.53	-2,076.37	2,081.26	1.93
8,711.00	88.71	270.27	6,693.84	-171.27	-2,171.36	2,176.17	1.22
8,806.00	88.18	268.98	6,696.42	-171.89	-2,266.32	2,271.09	1.47
8,901.00	91.14	269.61	6,696.98	-173.06	-2,361.30	2,366.05	3.19
8,996.00	90.52	269.88	6,695.60	-173.49	-2,456.29	2,460.99	0.71
9,091.00	91.11	268.43	6,694.25	-174.89	-2,551.26	2,555.96	1.65
9,185.00	90.19	267.46	6,693.19	-178.26	-2,645.19	2,649.95	1.42
9,280.00	90.12	269.13	6,692.93	-181.08	-2,740.15	2,744.94	1.76
9,375.00	90.68	269.63	6,692.27	-182.11	-2,835.14	2,839.91	0.79
9,470.00	90.49	270.31	6,691.30	-182.16	-2,930.13	2,934.84	0.74
9,565.00	90.31	270.55	6,690.63	-181.45	-3,025.13	3,029.75	0.32
9,660.00	89.63	269.47	6,690.68	-181.43	-3,120.13	3,124.68	1.34
9,754.00	89.63	269.72	6,691.29	-182.10	-3,214.12	3,218.64	0.27
9,849.00	88.43	269.77	6,692.90	-182.52	-3,309.11	3,313.57	1.26
9,944.00	88.58	268.88	6,695.38	-183.64	-3,404.07	3,408.51	0.95
10,039.00	88.80	268.22	6,697.55	-186.04	-3,499.01	3,503.48	0.73
10,134.00	89.75	270.30	6,698.75	-187.27	-3,593.99	3,598.44	2.41
10,229.00	89.75	270.72	6,699.17	-186.42	-3,688.98	3,693.34	0.44
10,323.00	90.80	271.22	6,698.71	-184.83	-3,782.97	3,787.20	1.24
10,418.00	88.71	271.27	6,699.12	-182.77	-3,877.94	3,882.03	2.20
10,513.00	87.47	270.70	6,702.29	-181.13	-3,972.87	3,976.84	1.44
10,608.00	89.26	270.50	6,705.00	-180.14	-4,067.82	4,071.69	1.90
10,703.00	87.78	269.92	6,707.45	-179.79	-4,162.79	4,166.58	1.67
10,798.00	87.37	270.95	6,711.47	-179.07	-4,257.70	4,261.40	1.17
10,893.00	89.66	271.00	6,713.93	-177.46	-4,352.65	4,356.23	2.41
10,987.00	90.65	272.01	6,713.68	-174.99	-4,446.61	4,450.04	1.50
11,082.00	90.15	274.59	6,713.01	-169.52	-4,541.44	4,544.60	2.77
11,170.00	89.94	276.94	6,712.95	-160.68	-4,628.99	4,631.77	2.68
<b>Final MWD Survey</b>							
11,235.00	89.94	276.94	6,713.01	-152.83	-4,693.52	4,695.96	0.00
<b>Bit Projection - Estimated BHL 971'FNL 533'FWL</b>							

**Design Report for Wells Ranch AA12-68-1HN - MWD Survey**

**Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
802.00	801.98	-3.86	-3.45	Tie On To Surface Casing
1,080.00	1,079.96	-5.83	-5.60	First MWD Survey
11,170.00	6,712.95	-160.68	-4,628.99	Final MWD Survey
11,235.00	6,713.01	-152.83	-4,693.52	Bit Projection
11,235.00	6,713.01	-152.83	-4,693.52	Estimated BHL 971'FNL 533'FWL

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Wells Ranch AA12-68-1HN_PlanA - Rev0_B HL Tgt	267.90	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
802.00	11,235.00	Survey #1	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
Wells Ranch	0.00	0.00	35.00	-3,275.98	-39.12	1,425,875.15	3,312,594.96	40° 29' 49.164 N	104° 22' 33.528 W
- actual wellpath misses target center by 3276.23ft at 50.95ft MD (50.95 TVD, -0.02 N, -0.01 E)									
- Polygon									
Point 1				-298.12	-3,964.98	1,425,186.18	3,312,335.97		
Point 2				-4,632.12	-4,023.98	1,425,127.18	3,308,002.11		
Point 3				-4,798.12	352.02	1,429,503.03	3,307,836.12		
Point 4				-232.12	425.02	1,429,576.03	3,312,401.97		
Point 5				-298.12	-3,964.98	1,425,186.18	3,312,335.97		
Wells Ranch	0.00	0.00	6,693.00	-172.00	-4,692.28	1,428,979.03	3,307,941.96	40° 30' 20.412 N	104° 23' 33.252 W
- actual wellpath misses target center by 27.51ft at 11231.43ft MD (6713.01 TVD, -153.26 N, -4689.97 E)									
- Point									
Wells Ranch	0.00	0.00	35.00	-3,275.98	-39.12	1,425,875.15	3,312,594.96	40° 29' 49.164 N	104° 22' 33.528 W
- actual wellpath misses target center by 3276.23ft at 50.95ft MD (50.95 TVD, -0.02 N, -0.01 E)									
- Polygon									
Point 1				161.88	-4,424.98	1,424,726.19	3,312,795.95		
Point 2				-5,092.12	-4,483.98	1,424,667.19	3,307,542.13		
Point 3				-5,258.12	812.02	1,429,963.02	3,307,376.13		
Point 4				227.88	885.02	1,430,036.01	3,312,861.95		
Point 5				161.88	-4,424.98	1,424,726.19	3,312,795.95		
Wells Ranch	0.00	0.00	5,976.80	-106.00	120.00	1,429,045.02	3,312,754.08	40° 30' 20.466 N	104° 22' 30.948 W
- actual wellpath misses target center by 6.11ft at 5988.03ft MD (5977.09 TVD, -108.75 N, 125.46 E)									
- Circle (radius 35.00)									
Wells Ranch	90.00	89.21	6,693.00	-115.82	-596.13	1,429,035.20	3,312,037.97	40° 30' 20.458 N	104° 22' 40.220 W
- actual wellpath misses target center by 70.16ft at 7140.26ft MD (6690.05 TVD, -185.73 N, -601.28 E)									
- Rectangle (sides W70.00 H16.00 D4,096.53)									

**North Reference Sheet for Sec. 12-T6N-R63W (Wells Ranch 12 North PAD) - Wells Ranch AA12-68-1HN**

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

Vertical Depths are relative to KB=24' @ 4917.00ft (H&P 315). Northing and Easting are relative to Wells Ranch AA12-68-1HN - 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: 0.99996674

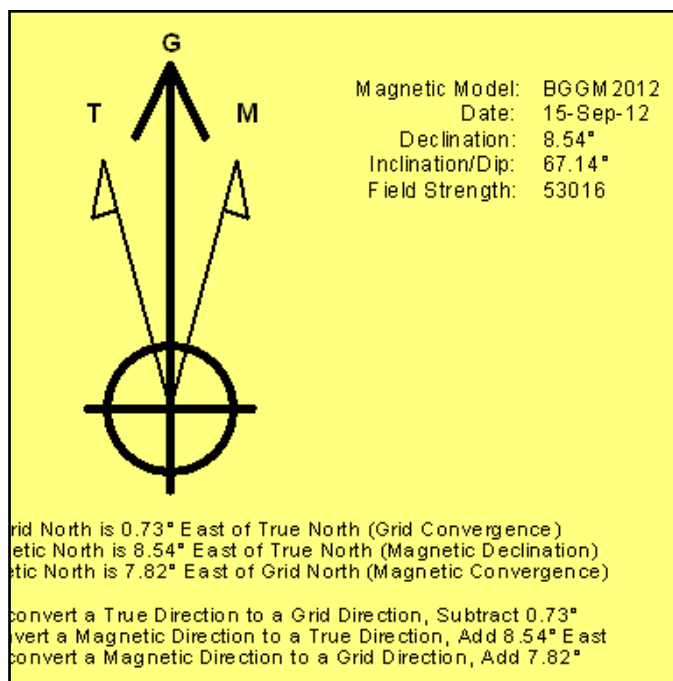
Grid Coordinates of Well: 1,429,151.02 ft N, 3,312,634.08 ft E

Geographical Coordinates of Well: 40° 30' 21.53" N, 104° 22' 32.48" W

Grid Convergence at Surface is: 0.73°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,235.00ft the Bottom Hole Displacement is 4,696.00ft in the Direction of 268.14° (Grid).

Magnetic Convergence at surface is: -7.82° (15 September 2012, , BGGM2012)



Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AA12-68-1HN 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.



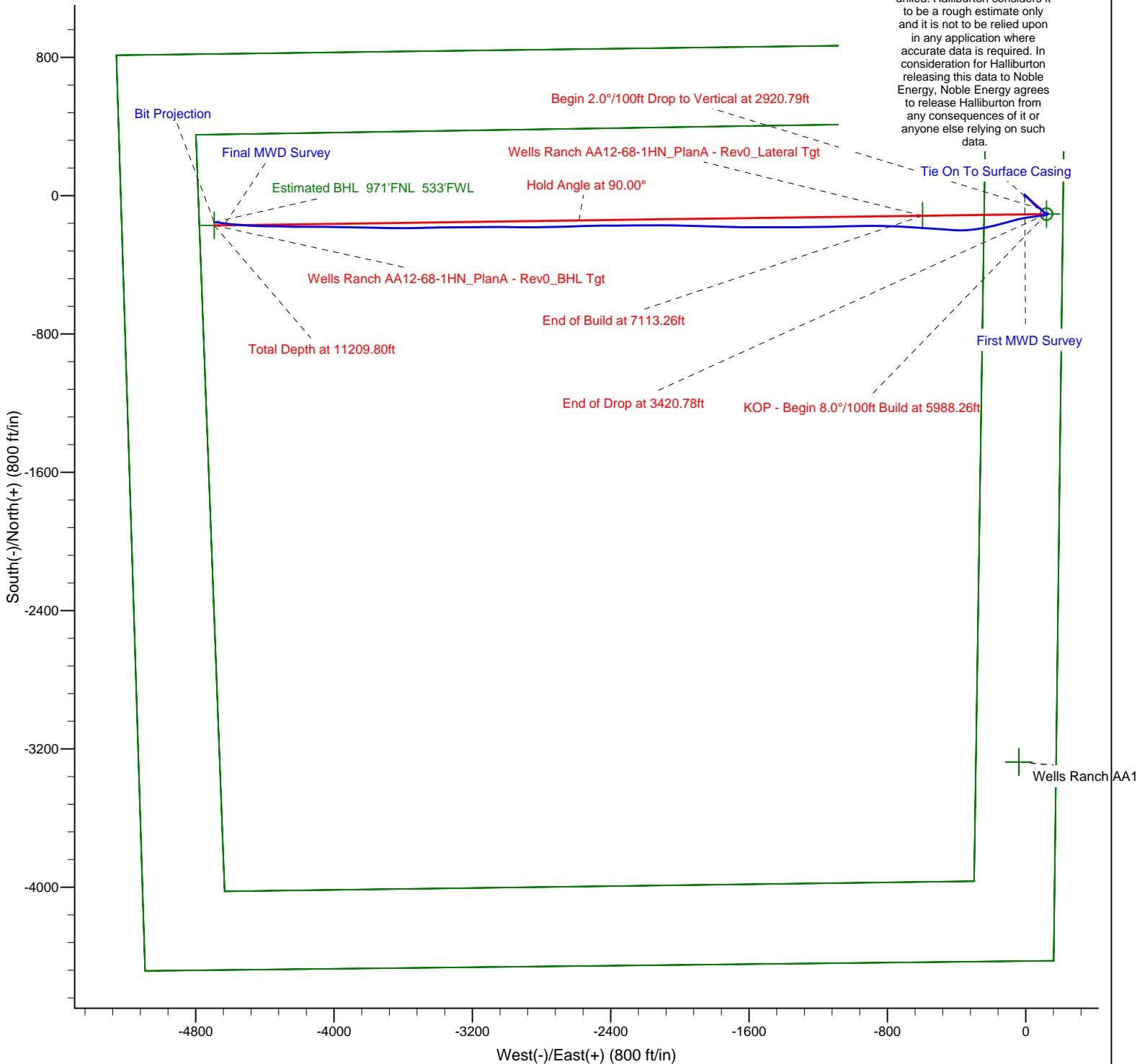
Azimuths to Grid North  
 True North: -0.73°  
 Magnetic North: 7.82°

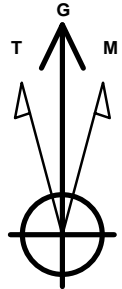
Magnetic Field  
 Strength: 53016.2snT  
 Dip Angle: 67.13°  
 Date: 9/15/2012  
 Model: BGGM2012

### LEGEND

- Wells Ranch AA12-68-1HN, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 990' FNL, 535' FWL





Azimuths to Grid North  
 True North:  $-0.73^\circ$   
 Magnetic North:  $7.82^\circ$

Magnetic Field  
 Strength: 53016.2snT  
 Dip Angle:  $67.13^\circ$   
 Date: 9/15/2012  
 Model: BGGM2012

### LEGEND

- Wells Ranch AA12-68-1HN, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AA12-68-1HN 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.

