

Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R63W (Wells Ranch USX AA23 PAD)

Wells Ranch USX AA23-64-1HN

Design: Vaughn ESS and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

08 October, 2013

Well Coordinates: 1,414,955.93 N, 3,307,655.19 E (40° 28' 01.88" N, 104° 23' 39.23" W)

Ground Level: 4,836.00 ft

Local Coordinate Origin: Centered on Well Wells Ranch USX AA23-64-1HN -

Viewing Datum: RKB 24 ft. @ 4860.00ft (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: 431

HALLIBURTON

Design Report for Wells Ranch USX AA23-64-1HN - Vaughn ESS and Sperry 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
366.00	1.00	184.40	365.98	-3.18	-0.25	-0.23	0.27
Surveys from 366.00ft to 639.00ft are Vaughn ESS Surveys							
639.00	0.60	277.00	638.96	-5.39	-1.85	1.03	0.44
Tie-On to Vaughn ESS Survey							
713.00	0.36	303.21	712.96	-5.21	-2.43	1.63	0.43
First Sperry MWD Survey							
806.00	0.57	263.79	805.96	-5.10	-3.13	2.34	0.40
898.00	0.92	275.15	897.95	-5.08	-4.32	3.52	0.41
990.00	0.46	11.35	989.94	-4.66	-4.98	4.24	1.17
1,082.00	0.72	253.29	1,081.94	-4.46	-5.46	4.75	1.11
1,176.00	0.37	299.38	1,175.94	-4.48	-6.29	5.57	0.57
1,270.00	0.62	303.64	1,269.93	-4.05	-6.98	6.31	0.27
1,363.00	0.50	330.03	1,362.93	-3.42	-7.60	7.02	0.30
1,457.00	1.12	261.89	1,456.92	-3.19	-8.72	8.15	1.11
1,552.00	2.38	346.52	1,551.89	-1.41	-10.10	9.78	2.67
1,646.00	4.58	359.04	1,645.71	4.24	-10.62	11.13	2.46
1,741.00	8.42	346.18	1,740.09	14.80	-12.34	14.39	4.30
1,836.00	9.14	346.02	1,833.97	28.87	-15.83	19.91	0.76
1,931.00	12.07	349.07	1,927.34	45.95	-19.53	26.09	3.14
2,026.00	15.20	347.95	2,019.65	67.89	-24.02	33.76	3.31
2,121.00	15.61	348.27	2,111.24	92.58	-29.22	42.53	0.44
2,216.00	15.83	347.10	2,202.68	117.73	-34.71	51.67	0.41
2,310.00	14.91	345.92	2,293.32	141.95	-40.51	60.98	1.03
2,405.00	16.64	352.73	2,384.75	167.31	-45.21	69.36	2.66
2,500.00	15.24	352.19	2,476.09	193.17	-48.62	76.55	1.48
2,595.00	16.36	352.02	2,567.50	218.79	-52.18	83.84	1.18
2,690.00	15.03	349.19	2,658.96	244.14	-56.35	91.70	1.61
2,785.00	16.74	350.38	2,750.33	269.73	-60.94	100.01	1.83
2,880.00	14.99	349.45	2,841.71	295.30	-65.48	108.27	1.86
2,975.00	16.98	348.89	2,933.03	320.99	-70.40	116.92	2.10
3,070.00	17.06	347.49	3,023.87	348.21	-76.09	126.56	0.44
3,165.00	15.93	346.65	3,114.96	374.50	-82.12	136.39	1.22
3,260.00	15.03	346.68	3,206.51	399.17	-87.97	145.81	0.95
3,354.00	13.49	347.07	3,297.61	421.72	-93.23	154.34	1.64
3,449.00	14.19	345.72	3,389.85	443.80	-98.58	162.89	0.81
3,544.00	12.84	343.65	3,482.22	465.22	-104.43	171.82	1.51
3,639.00	12.68	349.45	3,574.88	485.60	-109.31	179.65	1.36
3,734.00	14.36	351.74	3,667.24	507.51	-112.91	186.44	1.86
3,829.00	15.57	352.49	3,759.02	531.81	-116.27	193.34	1.29
3,924.00	15.95	352.99	3,850.45	557.40	-119.53	200.34	0.42
4,019.00	17.55	350.38	3,941.42	584.48	-123.52	208.27	1.86
4,114.00	16.09	349.14	4,032.35	611.53	-128.39	217.07	1.58
4,208.00	14.64	349.28	4,122.99	636.00	-133.05	225.29	1.54
4,303.00	15.56	350.93	4,214.71	660.38	-137.30	233.08	1.07
4,398.00	13.52	342.89	4,306.67	683.58	-142.57	241.71	3.02
4,493.00	11.30	343.06	4,399.44	703.10	-148.55	250.50	2.34
4,587.00	10.89	341.61	4,491.69	720.34	-154.04	258.47	0.53
4,682.00	8.71	343.68	4,585.29	735.76	-158.89	265.54	2.32
4,778.00	5.79	340.80	4,680.52	747.31	-162.53	270.84	3.06

Design Report for Wells Ranch USX AA23-64-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,873.00	3.64	349.58	4,775.19	754.80	-164.65	274.04	2.38
4,968.00	1.62	303.04	4,870.10	758.50	-166.32	276.24	2.93
5,062.00	1.67	305.64	4,964.06	760.02	-168.55	278.67	0.10
5,157.00	0.46	328.78	5,059.04	761.15	-169.87	280.14	1.33
5,253.00	0.36	308.88	5,155.04	761.67	-170.30	280.65	0.18
5,347.00	0.76	334.72	5,249.03	762.42	-170.80	281.25	0.49
5,443.00	0.43	115.45	5,345.03	762.84	-170.75	281.26	1.17
5,538.00	1.00	61.13	5,440.02	763.09	-169.70	280.26	0.87
5,633.00	1.17	82.50	5,535.01	763.62	-168.01	278.67	0.46
5,728.00	1.05	83.63	5,629.99	763.84	-166.18	276.89	0.13
5,823.00	1.03	77.16	5,724.97	764.13	-164.49	275.25	0.13
5,918.00	0.57	105.21	5,819.96	764.19	-163.20	273.99	0.62
6,012.00	0.14	116.06	5,913.96	764.02	-162.64	273.42	0.46
6,060.00	4.83	241.60	5,961.90	763.03	-164.37	274.98	10.23
6,107.00	10.50	244.63	6,008.47	760.25	-169.98	280.12	12.09
6,155.00	15.03	248.38	6,055.27	756.08	-179.73	289.14	9.59
6,202.00	19.36	255.19	6,100.16	751.84	-192.93	301.58	10.14
6,250.00	23.33	253.17	6,144.86	747.06	-209.73	317.49	8.41
6,297.00	25.80	256.12	6,187.61	741.91	-228.57	335.36	5.87
6,345.00	26.37	262.16	6,230.72	737.95	-249.27	355.26	5.66
6,392.00	28.87	264.56	6,272.37	735.45	-270.91	376.30	5.82
6,440.00	32.04	267.17	6,313.74	733.72	-295.17	400.04	7.15
6,487.00	36.46	272.37	6,352.59	733.68	-321.60	426.17	11.27
6,535.00	41.19	275.07	6,389.97	735.67	-351.61	456.14	10.46
6,582.00	45.71	275.50	6,424.09	738.65	-383.79	488.41	9.64
6,630.00	49.26	273.77	6,456.52	741.49	-419.05	523.70	7.86
6,677.00	51.59	271.86	6,486.46	743.26	-455.22	559.75	5.86
6,725.00	53.50	270.54	6,515.65	744.05	-493.32	597.54	4.54
6,772.00	55.27	270.57	6,543.02	744.43	-531.52	635.38	3.77
6,820.00	57.35	269.82	6,569.65	744.56	-571.46	674.90	4.52
6,867.00	60.93	269.59	6,593.75	744.35	-611.80	714.77	7.63
6,915.00	65.65	268.94	6,615.32	743.79	-654.66	757.08	9.91
6,962.00	71.53	268.09	6,632.47	742.65	-698.38	800.16	12.62
7,010.00	77.58	266.89	6,645.25	740.62	-744.58	845.56	12.83
7,057.00	83.44	267.11	6,652.99	738.20	-790.85	890.97	12.48
7,075.00	86.05	267.10	6,654.64	737.29	-808.75	908.54	14.50
7,120.00	87.18	268.05	6,657.30	735.39	-853.63	952.65	3.29
Estimated 7" Casing Point: 1635' FSL, 764' FEL (Not a Survey Station)							
7,248.00	90.40	270.76	6,660.00	734.07	-981.57	1,078.99	3.29
7,343.00	88.74	274.37	6,660.71	738.32	-1,076.45	1,173.47	4.18
7,438.00	86.64	273.85	6,664.54	745.12	-1,171.12	1,268.11	2.28
7,533.00	87.75	273.35	6,669.19	751.08	-1,265.82	1,362.65	1.28
7,628.00	88.21	271.08	6,672.54	754.75	-1,360.68	1,457.02	2.44
7,723.00	89.04	269.35	6,674.82	755.11	-1,455.65	1,551.01	2.02
7,818.00	90.86	268.90	6,674.90	753.66	-1,550.64	1,644.74	1.97
7,913.00	92.40	269.01	6,672.20	751.92	-1,645.58	1,738.39	1.63
8,008.00	87.81	268.65	6,672.03	749.99	-1,740.53	1,832.03	4.85
8,103.00	88.18	269.02	6,675.35	748.05	-1,835.46	1,925.63	0.55
8,198.00	89.17	267.69	6,677.55	745.33	-1,930.39	2,019.12	1.74
8,293.00	88.98	267.61	6,679.08	741.43	-2,025.30	2,112.42	0.22
8,388.00	89.63	267.20	6,680.23	737.13	-2,120.19	2,205.65	0.81

Design Report for Wells Ranch USX AA23-64-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,483.00	89.01	268.23	6,681.36	733.35	-2,215.11	2,298.97	1.27
8,578.00	90.15	268.62	6,682.06	730.73	-2,310.07	2,392.51	1.27
8,673.00	91.23	269.82	6,680.91	729.44	-2,405.05	2,486.26	1.70
8,768.00	91.51	270.90	6,678.64	730.04	-2,500.02	2,580.28	1.17
8,863.00	90.96	267.79	6,676.59	728.95	-2,594.98	2,674.05	3.32
8,958.00	89.20	268.48	6,676.46	725.86	-2,689.92	2,767.50	1.99
9,053.00	87.78	269.51	6,678.96	724.19	-2,784.87	2,861.17	1.85
9,148.00	86.24	268.49	6,683.92	722.54	-2,879.72	2,954.74	1.94
9,243.00	87.47	269.18	6,689.13	720.61	-2,974.56	3,048.26	1.48
9,338.00	87.47	269.54	6,693.33	719.55	-3,069.46	3,141.97	0.38
9,433.00	89.63	270.13	6,695.73	719.28	-3,164.42	3,235.86	2.36
9,528.00	87.75	268.38	6,697.90	718.04	-3,259.38	3,329.60	2.70
9,623.00	90.95	269.95	6,698.98	716.66	-3,354.35	3,423.33	3.75
9,671.00	91.02	269.67	6,698.15	716.50	-3,402.34	3,470.77	0.60
9,718.00	92.28	270.53	6,696.80	716.58	-3,449.32	3,517.25	3.25
9,766.00	91.97	270.40	6,695.02	716.97	-3,497.29	3,564.75	0.70
9,813.00	92.55	271.06	6,693.17	717.57	-3,544.25	3,611.28	1.87
9,861.00	92.13	270.32	6,691.21	718.15	-3,592.20	3,658.80	1.77
9,908.00	92.04	270.64	6,689.50	718.54	-3,639.17	3,705.32	0.71
10,002.00	90.52	268.83	6,687.40	718.11	-3,733.14	3,798.20	2.51
10,097.00	89.48	269.25	6,687.40	716.51	-3,828.12	3,891.91	1.18
10,192.00	91.42	266.52	6,686.65	713.01	-3,923.04	3,985.28	3.53
10,287.00	92.43	268.54	6,683.46	708.92	-4,017.89	4,078.49	2.38
10,382.00	92.37	269.82	6,679.48	707.56	-4,112.80	4,172.16	1.35
10,477.00	92.56	270.33	6,675.40	707.68	-4,207.71	4,266.06	0.57
10,572.00	89.97	270.54	6,673.30	708.40	-4,302.68	4,360.09	2.74
10,667.00	89.11	269.37	6,674.06	708.33	-4,397.67	4,454.04	1.53
10,762.00	88.98	271.02	6,675.64	708.65	-4,492.65	4,548.03	1.74
10,857.00	89.66	272.57	6,676.77	711.63	-4,587.60	4,642.38	1.78
10,952.00	90.31	274.13	6,676.80	717.18	-4,682.43	4,737.00	1.78
11,059.00	88.49	274.61	6,677.92	725.33	-4,789.11	4,843.71	1.76
Final Sperry MWD Survey							
11,126.00	88.49	274.61	6,679.68	730.71	-4,855.87	4,910.54	0.00
Survey Projection to TD - Estimated BHL: 1657' FSL, 535' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
366.00	365.98	-3.18	-0.25	Surveys from 366.00ft to 639.00ft are Vaughn ESS Surveys
639.00	638.96	-5.39	-1.85	Tie-On to Vaughn ESS Survey
713.00	712.96	-5.21	-2.43	First Sperry MWD Survey
7,120.00	6,657.30	735.39	-853.63	Estimated 7" Casing Point: 1635' FSL, 764' FEL (Not a Survey Station)
11,059.00	6,677.92	725.33	-4,789.11	Final Sperry MWD Survey
11,126.00	6,679.68	730.71	-4,855.87	Survey Projection to TD
11,126.00	6,679.68	730.71	-4,855.87	Estimated BHL: 1657' FSL, 535' FWL

Design Report for Wells Ranch USX AA23-64-1HN - Vaughn ESS and Sperry MWD Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Wells Ranch USX AA23-64-1HN (PAR0) BHL	278.47	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
366.00	639.00	Vaughn ESS Surveys	Flexi-Shot
713.00	7,120.00	Sperry MWD Surveys	MWD
7,120.00	11,126.00	Sperry MWD Surveys	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
629.00	628.96	9 5/8" Csg	9-5/8	13-3/4
7,120.00	6,657.30	7" Csg	7	8-3/4

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 USX - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,414,955.93	3,307,655.19	40° 28' 1.884 N	104° 23' 39.228 W
Wells Ranch USX - actual wellpath misses target center by 15.93ft at 11126.00ft MD (6679.68 TVD, 730.71 N, -4855.87 E) - Point	0.00	0.00	6,693.75	723.26	-4,856.26	1,415,679.16	3,302,799.11	40° 28' 9.624 N	104° 24' 41.940 W
Wells Ranch USX - actual wellpath misses target center by 15.85ft at 7108.61ft MD (6656.71 TVD, 735.80 N, -842.27 E) - Point	0.00	0.00	6,660.85	751.09	-842.67	1,415,707.00	3,306,812.56	40° 28' 9.409 N	104° 23' 50.009 W
Wells Ranch USX - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,414,955.93	3,307,655.19	40° 28' 1.884 N	104° 23' 39.228 W
Point 1				-4,924.39	-468.01	1,414,487.94	3,302,730.98		
Point 2				-553.82	-434.79	1,414,521.16	3,307,101.39		
Point 3				-545.57	3,942.50	1,418,898.29	3,307,109.64		
Point 4				-4,952.85	3,897.50	1,418,853.29	3,302,702.52		
Point 5				-4,924.39	-468.01	1,414,487.94	3,302,730.98		
Wells Ranch USX - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,414,955.93	3,307,655.19	40° 28' 1.884 N	104° 23' 39.228 W
Point 1				-5,381.39	-930.01	1,414,025.95	3,302,274.00		
Point 2				-91.82	-893.79	1,414,062.17	3,307,563.38		
Point 3				5,200.30	-838.18	1,414,117.78	3,312,855.31		
Point 4				-91.82	-893.79	1,414,062.17	3,307,563.38		
Point 5				-85.57	4,407.50	1,419,363.27	3,307,569.63		
Point 6				5,172.03	4,462.69	1,419,418.46	3,312,827.04		
Point 7				-85.57	4,407.50	1,419,363.27	3,307,569.63		
Point 8				-5,415.50	4,352.55	1,419,308.32	3,302,239.89		
Point 9				-5,381.39	-930.01	1,414,025.95	3,302,274.00		

North Reference Sheet for Sec. 24-T6N-R63W (Wells Ranch USX AA23 PAD) - Wells Ranch USX AA23-64-1HN

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

Vertical Depths are relative to RKB 24 ft. @ 4860.00ft (H&P 343). Northing and Easting are relative to Wells Ranch USX AA23-64-1HN - 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: 0.99996396

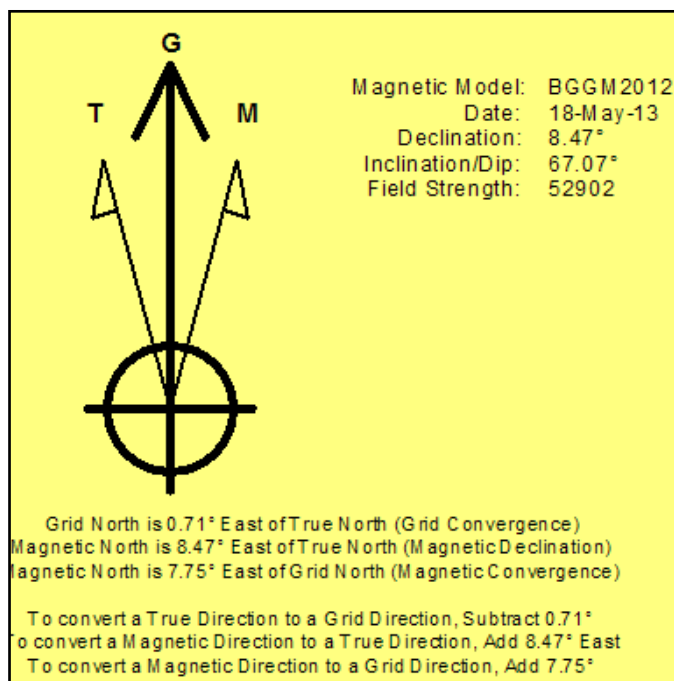
Grid Coordinates of Well: 1,414,955.93 ft N, 3,307,655.19 ft E

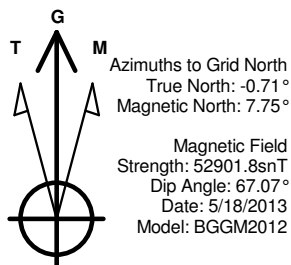
Geographical Coordinates of Well: 40° 28' 01.88" N, 104° 23' 39.23" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,126.00ft the Bottom Hole Displacement is 4,910.54ft in the Direction of 278.56° (Grid).

Magnetic Convergence at surface is: -7.75° (18 May 2013, , BGGM2012)



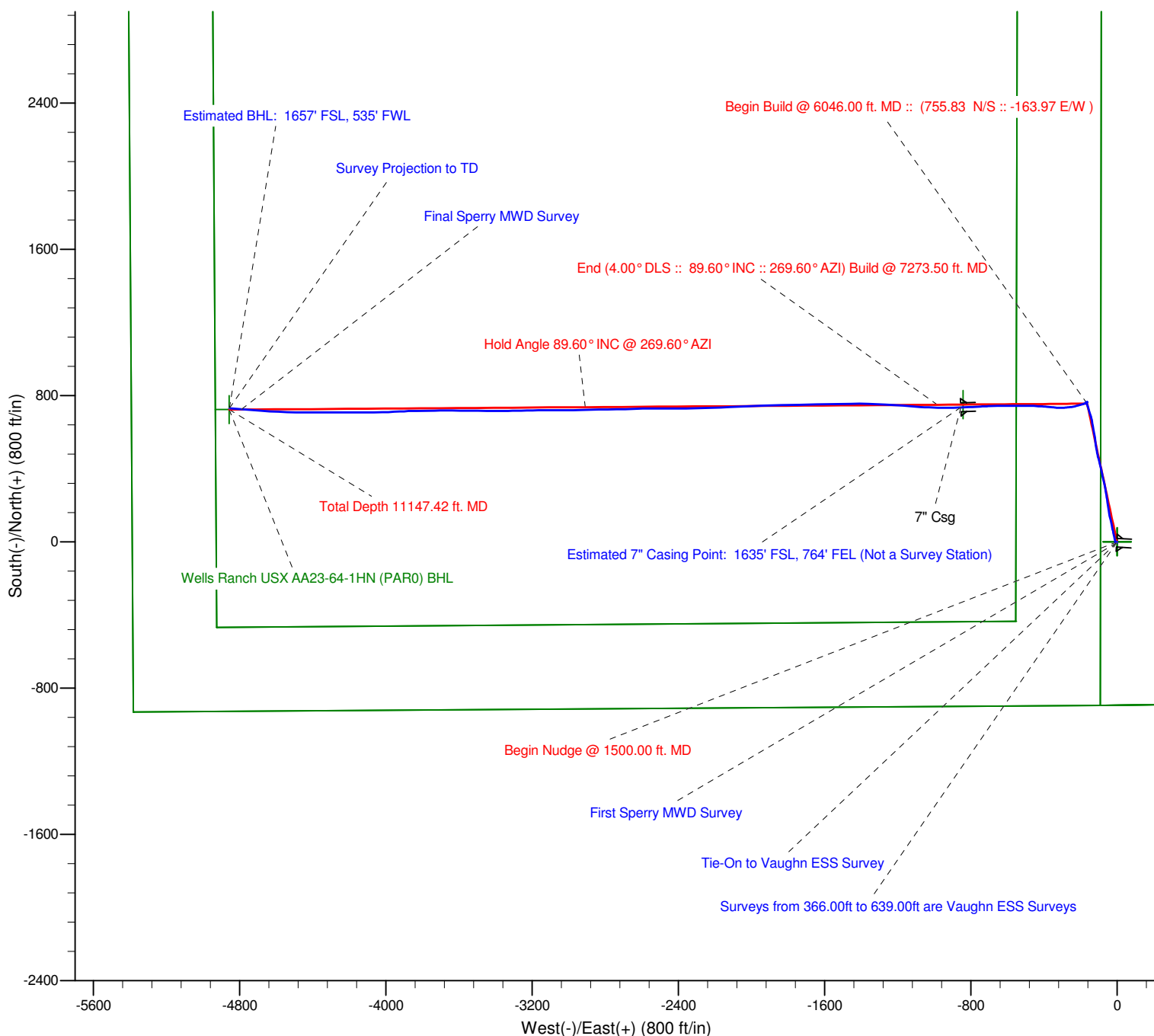


LEGEND

- Wells Ranch USX AA23-64-1HN, Plan A Rev 0, PAR0 Proposal V
- Vaughn ESS and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch USX AA23-64-1HN 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.

Permitted BHL: 1650' FSL, 535' FWL

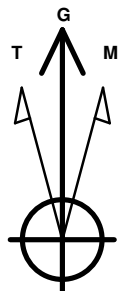


Project: Weld County, CO (NAD 83)
 Site: Sec. 24-T6N-R63W (Wells Ranch USX AA23 PAD)
 Well: Wells Ranch USX AA23-64-1HN

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
 True North: -0.71°
 Magnetic North: 7.75°

Magnetic Field
 Strength: 52901.8snT
 Dip Angle: 67.07°
 Date: 5/18/2013
 Model: BGGM2012

LEGEND

- Wells Ranch USX AA23-64-1HN, Plan A Rev 0, PAR0 Proposal V0
- Vaughn ESS and Sperry MWD Survey

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