

Noble Energy

Weld County, CO (NAD 83)

Sec. 6-T6N-R62W (Wells Ranch 5 Middle PAD)

Wells Ranch AE05-66HN

Design: Vaughn ESS and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

12 June, 2013

Well Coordinates: 1,433,638.85 N, 3,317,985.20 E (40° 31' 05.20" N, 104° 21' 22.46" W)

Ground Level: 4,946.00 ft

Local Coordinate Origin:

Centered on Well Wells Ranch AE05-66HN

Viewing Datum:

KB=30' @ 4976.00ft (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 Wells Ranch AE05-66HN - 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
279.00	0.50	107.47	279.00	-0.37	1.16	1.17	0.18
Surveys from 279.00ft to 631.00ft are Vaughn ESS Surveys							
466.00	0.70	289.70	465.99	-0.23	0.86	0.87	0.64
631.00	0.60	29.07	630.99	0.87	0.33	0.32	0.60
Tie-On to Vaughn ESS Survey							
720.00	0.15	306.67	719.98	1.35	0.47	0.44	0.67
First Sperry MWD Survey							
813.00	0.13	196.44	812.98	1.32	0.34	0.31	0.25
905.00	0.57	237.30	904.98	0.98	-0.08	-0.09	0.52
997.00	0.62	221.56	996.98	0.37	-0.79	-0.79	0.18
1,089.00	0.48	126.56	1,088.97	-0.23	-0.80	-0.80	0.88
1,181.00	0.44	117.74	1,180.97	-0.63	-0.18	-0.17	0.09
1,273.00	3.89	125.86	1,272.89	-2.63	2.67	2.71	3.76
1,365.00	2.86	125.53	1,364.73	-5.79	7.07	7.16	1.13
1,457.00	3.54	122.70	1,456.59	-8.66	11.32	11.47	0.76
1,551.00	3.60	128.32	1,550.41	-12.05	16.08	16.28	0.38
1,646.00	3.13	125.72	1,645.24	-15.42	20.53	20.78	0.52
1,741.00	4.39	130.44	1,740.04	-19.29	25.40	25.71	1.36
1,836.00	4.09	125.94	1,834.78	-23.64	30.91	31.30	0.47
1,931.00	6.12	125.77	1,929.39	-28.59	37.77	38.24	2.14
2,025.00	7.51	130.65	2,022.73	-35.53	46.50	47.08	1.60
2,120.00	7.26	145.04	2,116.95	-44.49	54.65	55.38	1.96
2,215.00	7.71	154.93	2,211.14	-55.19	60.79	61.70	1.43
2,310.00	7.72	156.58	2,305.28	-66.82	66.03	67.12	0.23
2,405.00	10.31	151.05	2,399.10	-80.12	72.69	74.00	2.88
2,500.00	10.32	144.42	2,492.57	-94.48	81.75	83.30	1.25
2,595.00	10.74	142.02	2,585.97	-108.38	92.15	93.93	0.64
2,689.00	11.72	141.87	2,678.16	-122.80	103.44	105.45	1.04
2,784.00	11.19	152.95	2,771.28	-138.60	113.59	115.86	2.38
2,879.00	11.24	145.46	2,864.48	-154.43	123.03	125.56	1.53
2,974.00	10.15	155.28	2,957.83	-169.66	131.78	134.56	2.23
3,069.00	8.10	160.71	3,051.63	-183.58	137.49	140.50	2.34
3,164.00	6.55	158.90	3,145.85	-194.96	141.65	144.85	1.65
3,258.00	3.80	169.86	3,239.46	-203.03	144.13	147.46	3.10
3,353.00	2.17	165.64	3,334.33	-207.88	145.14	148.54	1.73
3,448.00	0.25	58.88	3,429.30	-209.52	145.76	149.19	2.38
3,543.00	0.03	100.40	3,524.30	-209.42	145.96	149.39	0.24
3,733.00	0.40	197.61	3,714.30	-210.07	145.81	149.25	0.22
3,922.00	1.12	123.34	3,903.29	-211.72	147.15	150.62	0.57
4,017.00	1.21	116.68	3,998.27	-212.68	148.82	152.31	0.17
4,111.00	1.40	13.81	4,092.25	-212.01	149.98	153.45	2.18
4,395.00	1.14	103.12	4,376.21	-209.28	153.55	156.98	0.63
4,490.00	0.87	192.05	4,471.20	-210.20	154.32	157.77	1.49
4,585.00	1.17	199.17	4,566.18	-211.82	153.85	157.32	0.34
4,680.00	0.42	147.41	4,661.17	-213.03	153.72	157.21	1.02
4,774.00	1.11	215.62	4,755.16	-214.06	153.38	156.88	1.10
4,869.00	0.92	292.11	4,850.15	-214.52	152.14	155.65	1.33
4,964.00	1.10	333.44	4,945.14	-213.42	151.02	154.52	0.77
5,059.00	0.78	351.47	5,040.13	-211.96	150.52	153.99	0.46

Design Report for Wells Ranch AE05-66HN - 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)
5,154.00	1.12	354.18	5,135.11	-210.40	150.33	153.78	0.36
5,249.00	1.26	347.08	5,230.09	-208.46	150.00	153.42	0.22
5,344.00	1.37	2.85	5,325.07	-206.30	149.83	153.21	0.40
5,438.00	0.68	327.13	5,419.05	-204.70	149.58	152.93	0.97
5,533.00	0.88	336.47	5,514.04	-203.56	148.98	152.32	0.25
5,628.00	1.43	299.99	5,609.03	-202.30	147.67	150.98	0.93
5,723.00	0.91	292.19	5,704.01	-201.42	145.94	149.24	0.57
5,817.00	0.77	284.41	5,798.00	-200.99	144.64	147.93	0.19
5,912.00	1.25	312.75	5,892.98	-200.12	143.26	146.54	0.71
5,981.00	1.29	300.51	5,961.96	-199.22	142.04	145.31	0.40
6,043.00	0.74	324.10	6,023.95	-198.54	141.21	144.46	1.09
6,102.00	1.28	61.53	6,082.95	-197.92	141.56	144.80	2.64
6,149.00	7.72	84.90	6,129.78	-197.39	145.17	148.40	13.97
6,197.00	14.34	86.40	6,176.87	-196.73	154.32	157.54	13.80
6,245.00	19.07	87.16	6,222.83	-195.97	168.09	171.30	9.87
6,291.00	21.06	86.96	6,266.04	-195.16	183.85	187.05	4.32
6,339.00	21.61	86.48	6,310.75	-194.16	201.29	204.46	1.20
6,386.00	23.94	87.09	6,354.08	-193.14	219.45	222.61	4.99
6,434.00	27.24	90.77	6,397.37	-192.79	240.17	243.31	7.62
6,481.00	30.46	94.91	6,438.53	-193.96	262.80	265.96	8.06
6,529.00	34.55	92.86	6,479.01	-195.68	288.53	291.71	8.82
6,576.00	39.74	89.15	6,516.47	-196.12	316.88	320.07	12.03
6,624.00	44.18	86.95	6,552.15	-195.00	348.94	352.11	9.74
6,671.00	46.81	86.13	6,585.10	-192.98	382.40	385.52	5.73
6,719.00	49.36	86.24	6,617.16	-190.60	418.03	421.12	5.32
6,765.00	50.95	86.91	6,646.63	-188.49	453.29	456.33	3.62
6,813.00	53.12	89.14	6,676.16	-187.20	491.10	494.12	5.82
6,860.00	59.14	91.13	6,702.34	-187.31	530.10	533.12	13.27
6,908.00	66.99	92.17	6,724.07	-188.56	572.84	575.87	16.47
6,955.00	71.24	91.84	6,740.83	-190.10	616.72	619.77	9.06
7,003.00	74.68	91.51	6,754.89	-191.44	662.58	665.65	7.21
7,050.00	77.02	91.11	6,766.38	-192.48	708.14	711.22	5.04
7,081.00	78.89	90.92	6,772.84	-193.02	738.45	741.53	6.07
7,113.00	80.51	90.80	6,778.56	-193.49	769.93	773.02	5.05
7,141.00	81.89	90.63	6,782.85	-193.83	797.60	800.69	4.99
7,187.00	83.38	90.46	6,788.74	-194.27	843.22	846.31	3.25
Estimated 7" Casing Point: 1993' FNL, 775' FWL (Not a Survey Station)							
7,226.00	84.64	90.32	6,792.81	-194.53	882.00	885.09	3.25
7,312.00	85.78	89.38	6,800.00	-194.31	967.70	970.77	1.71
7,406.00	88.67	86.44	6,804.55	-190.89	1,061.51	1,064.51	4.39
7,500.00	89.97	84.95	6,805.67	-183.83	1,155.23	1,158.10	2.10
7,595.00	88.64	85.52	6,806.82	-175.94	1,249.89	1,252.62	1.52
7,690.00	89.23	86.30	6,808.58	-169.17	1,344.63	1,347.24	1.04
7,785.00	90.95	87.97	6,808.43	-164.42	1,439.51	1,442.02	2.52
7,879.00	92.49	89.56	6,805.61	-162.40	1,533.44	1,535.91	2.36
7,974.00	90.65	89.09	6,803.01	-161.27	1,628.39	1,630.83	2.00
8,069.00	92.24	89.23	6,800.61	-159.88	1,723.35	1,725.75	1.69
8,164.00	90.22	88.72	6,798.57	-158.17	1,818.31	1,820.67	2.20
8,259.00	89.78	89.18	6,798.57	-156.43	1,913.29	1,915.61	0.67
8,354.00	88.37	90.13	6,800.10	-155.87	2,008.27	2,010.57	1.80
8,449.00	88.49	88.71	6,802.71	-154.91	2,103.23	2,105.50	1.50

Design Report for Wells Ranch AE05-66HN - 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)
8,543.00	88.71	88.01	6,805.01	-152.22	2,197.16	2,199.37	0.78
8,638.00	90.77	87.25	6,805.44	-148.29	2,292.07	2,294.21	2.32
8,733.00	90.49	87.49	6,804.39	-143.93	2,386.97	2,389.01	0.39
8,828.00	91.63	88.61	6,802.63	-140.69	2,481.89	2,483.87	1.68
8,922.00	91.26	88.87	6,800.26	-138.63	2,575.84	2,577.77	0.48
9,017.00	88.92	88.43	6,800.11	-136.38	2,670.81	2,672.69	2.51
9,112.00	89.48	86.82	6,801.44	-132.45	2,765.71	2,767.52	1.79
9,206.00	90.62	87.53	6,801.36	-127.82	2,859.60	2,861.31	1.43
9,301.00	91.11	88.65	6,799.94	-124.65	2,954.53	2,956.18	1.28
9,396.00	91.26	89.42	6,797.97	-123.04	3,049.50	3,051.11	0.83
9,491.00	91.26	88.82	6,795.88	-121.59	3,144.46	3,146.04	0.63
9,586.00	91.85	87.80	6,793.29	-118.79	3,239.38	3,240.90	1.24
9,680.00	92.68	89.31	6,789.58	-116.42	3,333.28	3,334.74	1.83
9,775.00	90.95	89.41	6,786.56	-115.36	3,428.22	3,429.65	1.82
9,870.00	89.17	88.83	6,786.46	-113.90	3,523.20	3,524.60	1.98
9,965.00	88.43	88.28	6,788.45	-111.50	3,618.15	3,619.50	0.97
10,059.00	90.71	87.48	6,789.16	-108.02	3,712.08	3,713.35	2.57
10,154.00	91.02	87.24	6,787.73	-103.65	3,806.96	3,808.16	0.41
10,249.00	90.65	88.83	6,786.35	-100.39	3,901.90	3,903.02	1.72
10,344.00	89.41	89.53	6,786.30	-99.03	3,996.88	3,997.97	1.49
10,438.00	89.78	88.89	6,786.96	-97.73	4,090.87	4,091.93	0.79
10,533.00	90.56	87.74	6,786.68	-94.94	4,185.83	4,186.82	1.45
10,627.00	89.85	89.51	6,786.35	-92.69	4,279.80	4,280.74	2.03
10,722.00	87.32	87.17	6,788.70	-89.94	4,374.71	4,375.60	3.63
10,817.00	89.38	88.43	6,791.43	-86.29	4,469.60	4,470.41	2.55
10,912.00	91.94	89.56	6,790.33	-84.63	4,564.57	4,565.34	2.95
11,007.00	88.21	88.69	6,790.20	-83.17	4,659.54	4,660.27	4.04
11,101.00	88.21	86.90	6,793.14	-79.55	4,753.42	4,754.08	1.90
Final Sperry MWD Survey							
11,166.00	88.21	86.90	6,795.17	-76.04	4,818.29	4,818.89	0.01
Estimated BHL: 1977' FNL, 537' FEL - Survey Projection to TD							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
279.00	279.00	-0.37	1.16	Surveys from 279.00ft to 631.00ft are Vaughn ESS Surveys
631.00	630.99	0.87	0.33	Tie-On to Vaughn ESS Survey
720.00	719.98	1.35	0.47	First Sperry MWD Survey
7,187.00	6,788.74	-194.27	843.22	Estimated 7" Casing Point: 1993' FNL, 775' FWL (Not a Survey Station)
11,101.00	6,793.14	-79.55	4,753.42	Final Sperry MWD Survey
11,166.00	6,795.17	-76.04	4,818.29	Estimated BHL: 1977' FNL, 537' FEL
11,166.00	6,795.17	-76.04	4,818.29	Survey Projection to TD

Design Report for Wells Ranch AE05-66HN - 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 AE05-66HN_PlanA - Rev0_BH L Tgt	90.94	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
279.00	631.00	Vaughn ESS Surveys	EMS
720.00	7,187.00	Sperry MWD Surveys	MWD
7,187.00	11,166.00	Sperry MWD Surveys	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,187.00	6,788.74	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	0.00	0.00	3,350.00	-203.00	140.00	1,433,435.86	3,318,125.20	40.517548	-104.355746
- actual wellpath misses target center by 7.55ft at 3368.55ft MD (3349.87 TVD, -208.40 N, 145.27 E)									
- Point									
Wells Ranch	0.00	0.00	7.00	-2,171.51	0.20	1,431,467.41	3,317,985.40	40.512150	-104.356340
- actual wellpath misses target center by 2171.51ft at 9.85ft MD (9.85 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			589.12	-3,068.56		1,430,570.39	3,318,574.31		
Point 2			492.51	1,318.44		1,434,957.25	3,318,477.69		
Point 3			4,862.52	1,452.06		1,435,090.87	3,322,847.56		
Point 4			4,945.14	-2,898.94		1,430,740.00	3,322,930.18		
Point 5			589.12	-3,068.56		1,430,570.39	3,318,574.31		
Wells Ranch	0.00	0.00	6,784.74	-79.45	4,819.78	1,433,559.40	3,322,804.83	40.517720	-104.338910
- actual wellpath misses target center by 11.07ft at 11166.00ft MD (6795.17 TVD, -76.04 N, 4818.29 E)									
- Point									
Wells Ranch	0.00	0.00	7.00	-2,171.51	0.20	1,431,467.41	3,317,985.40	40.512150	-104.356340
- actual wellpath misses target center by 2171.51ft at 9.85ft MD (9.85 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			129.08	-3,528.52		1,430,110.44	3,318,114.28		
Point 2			32.55	1,778.48		1,435,417.28	3,318,017.75		
Point 3			5,322.56	1,912.02		1,435,550.81	3,323,307.59		
Point 4			5,405.10	-3,358.98		1,430,279.98	3,323,390.13		
Point 5			129.08	-3,528.52		1,430,110.44	3,318,114.28		

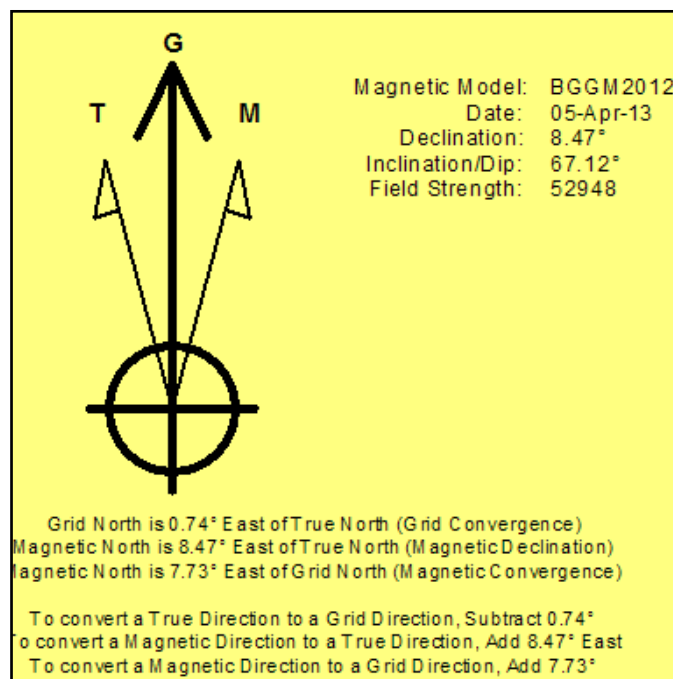
North Reference Sheet for Sec. 6-T6N-R62W (Wells Ranch 5 Middle PAD) - Wells Ranch AE05-66HN

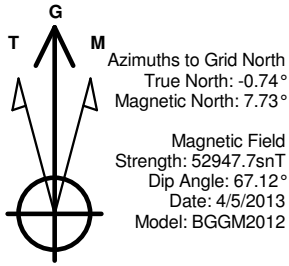
All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.
Vertical Depths are relative to KB=30' @ 4976.00ft (H&P 321). Northing and Easting are relative to Wells Ranch AE05-66HN
Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980
Projection method is Lambert Conformal Conic (2 parallel)
Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996771

Grid Coordinates of Well: 1,433,638.85 ft N, 3,317,985.20 ft E
Geographical Coordinates of Well: 40° 31' 05.20" N, 104° 21' 22.46" W
Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,166.00ft
the Bottom Hole Displacement is 4,818.89ft in the Direction of 90.90° (Grid).

Magnetic Convergence at surface is: -7.73° (5 April 2013, , BGGM2012)



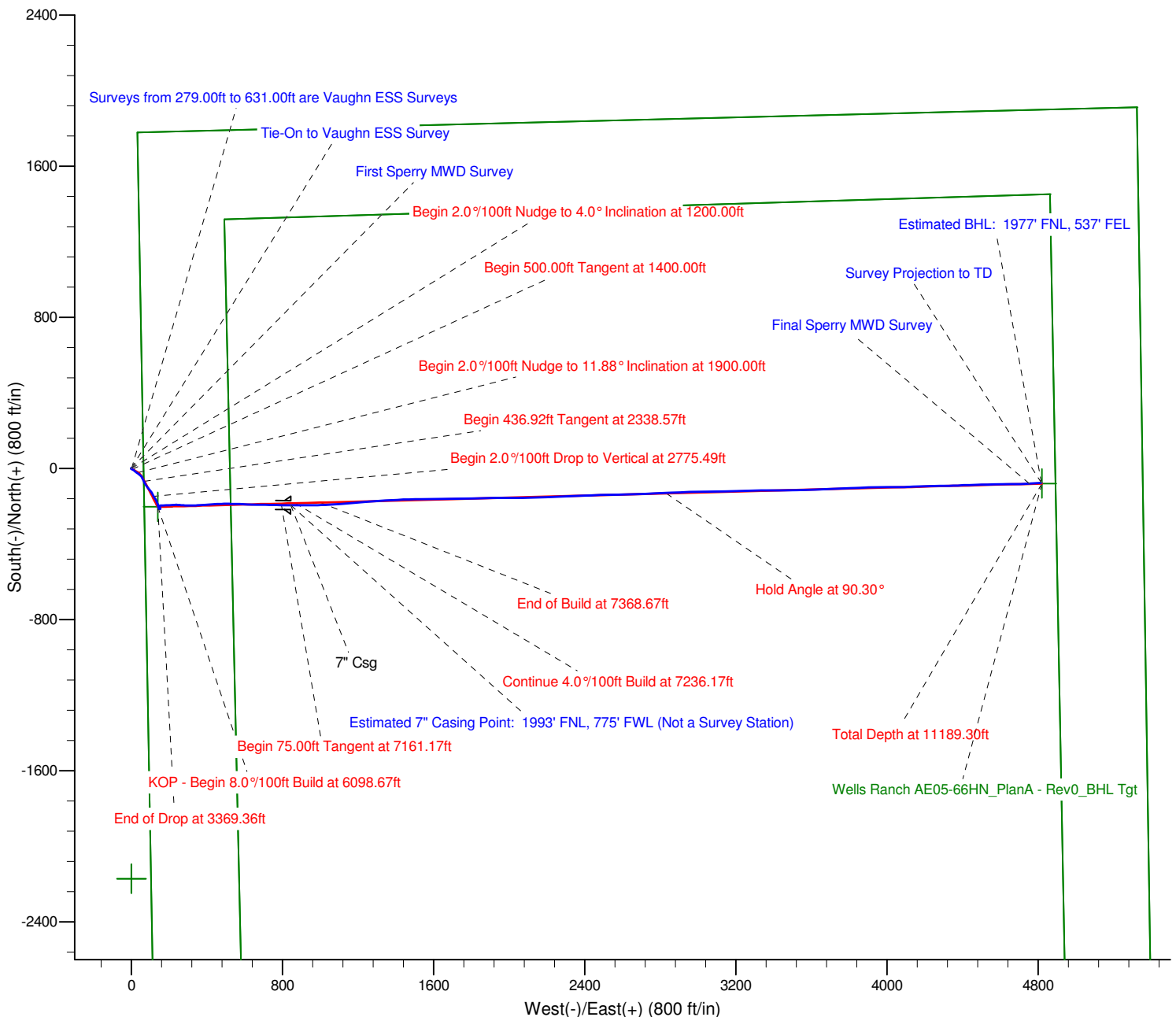


LEGEND

- Wells Ranch AE05-66HN, Plan A, Plan A - Rev 0 Proposal V0
- Vaughn ESS and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AE05-66HN 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: 1980' FNL, 535' FEL

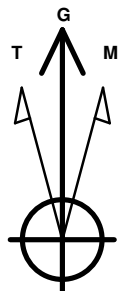


Project: Weld County, CO (NAD 83)
Site: Sec. 6-T6N-R62W (Wells Ranch 5 Middle PAD)
Well: Wells Ranch AE05-66HN

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.74°
Magnetic North: 7.73°

Magnetic Field
Strength: 52947.7snT
Dip Angle: 67.12°
Date: 4/5/2013
Model: BGGM2012

LEGEND

- Wells Ranch AE05-66HN, Plan A, Plan A - Rev 0 Proposal V0
- Vaughn ESS and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AE05-66HN 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.

