

Noble Energy

Weld County, CO (NAD 83)

Sec. 8-T1N-R65W

English Farms XX08-72HN

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

14 April, 2013

Well Coordinates: 1,270,359.65 N, 3,229,668.38 E (40°04' 21.40" N, 104°40' 45.55" W)

Ground Level: 4,931.00 ft

Local Coordinate Origin:

Centered on Well English Farms XX08-72HN

Viewing Datum:

KB=30' @ 4961.00ft (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 English Farms XX08-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
1,168.00	0.00	0.00	1,168.00	0.00	0.00	0.00	0.00
1,270.00	0.39	47.71	1,270.00	0.23	0.26	-0.26	0.38
First MWD Survey							
1,549.00	1.11	3.82	1,548.98	3.57	1.14	-3.66	0.31
1,738.00	0.88	9.75	1,737.95	6.84	1.51	-6.94	0.13
1,832.00	2.23	306.18	1,831.91	8.63	0.16	-8.61	2.13
1,927.00	3.84	295.17	1,926.78	11.08	-4.21	-10.68	1.79
2,022.00	6.36	295.73	2,021.40	14.71	-11.84	-13.66	2.66
2,117.00	8.30	286.43	2,115.62	18.94	-23.16	-16.91	2.39
2,211.00	9.81	285.92	2,208.44	23.05	-37.37	-19.81	1.61
2,306.00	11.54	286.70	2,301.80	28.00	-54.25	-23.31	1.83
2,400.00	12.81	288.72	2,393.68	34.05	-73.12	-27.74	1.43
2,495.00	13.16	293.78	2,486.25	41.79	-92.99	-33.77	1.25
2,590.00	11.60	293.33	2,579.04	49.93	-111.66	-40.31	1.64
2,685.00	11.27	288.00	2,672.16	56.59	-129.26	-45.44	1.17
2,780.00	12.19	293.01	2,765.18	63.38	-147.32	-50.68	1.44
2,875.00	12.83	291.75	2,857.92	71.20	-166.34	-56.87	0.74
2,970.00	14.01	294.56	2,950.33	79.89	-186.60	-63.82	1.42
3,064.00	12.61	293.17	3,041.80	88.66	-206.39	-70.88	1.53
3,159.00	12.55	294.73	3,134.52	97.07	-225.30	-77.65	0.36
3,254.00	13.61	294.26	3,227.05	105.98	-244.87	-84.87	1.11
3,349.00	11.89	302.01	3,319.71	115.76	-263.36	-93.05	2.55
3,444.00	12.92	297.48	3,412.50	125.84	-281.08	-101.60	1.49
3,539.00	13.18	295.41	3,505.04	135.39	-300.29	-109.49	0.57
3,634.00	13.05	291.70	3,597.57	144.01	-320.04	-116.40	0.90
3,728.00	12.44	296.93	3,689.25	152.51	-338.92	-123.28	1.39
3,823.00	10.61	295.21	3,782.33	160.87	-355.96	-130.17	1.96
3,918.00	9.98	294.23	3,875.80	167.98	-371.38	-135.94	0.69
4,013.00	8.34	292.74	3,969.59	174.02	-385.24	-140.79	1.74
4,108.00	7.08	292.75	4,063.73	178.95	-397.00	-144.71	1.32
4,202.00	5.38	300.60	4,157.17	183.43	-406.14	-148.40	2.02
4,297.00	4.04	314.17	4,251.85	188.03	-412.37	-152.45	1.83
4,392.00	1.42	306.92	4,346.74	191.07	-415.71	-155.20	2.77
4,487.00	0.45	257.55	4,441.72	191.70	-417.02	-155.72	1.24
4,771.00	0.81	40.33	4,725.72	192.99	-416.80	-157.02	0.42
5,056.00	0.99	48.66	5,010.68	196.15	-413.65	-160.44	0.08
5,340.00	1.49	64.80	5,294.61	199.34	-408.47	-164.06	0.22
5,435.00	0.40	350.61	5,389.60	200.20	-407.40	-165.00	1.51
5,720.00	1.15	351.28	5,674.57	204.02	-408.00	-168.75	0.26
6,005.00	1.04	9.08	5,959.52	209.41	-408.02	-174.13	0.13
6,289.00	1.21	324.48	6,243.47	214.41	-409.36	-178.99	0.31
6,384.00	0.75	324.11	6,338.46	215.73	-410.31	-180.23	0.48
6,440.00	0.94	308.85	6,394.45	216.31	-410.88	-180.76	0.52
6,525.00	4.56	200.04	6,479.36	213.57	-412.58	-177.89	5.82
6,571.00	10.05	191.54	6,524.97	207.92	-414.01	-172.13	12.12
6,619.00	12.90	189.35	6,572.01	198.52	-415.72	-162.63	6.01
6,666.00	14.58	186.22	6,617.66	187.46	-417.22	-151.48	3.91
6,714.00	18.93	184.96	6,663.61	173.69	-418.54	-137.65	9.10
6,761.00	24.77	181.80	6,707.22	156.24	-419.51	-120.17	12.66
6,809.00	29.44	178.14	6,749.94	134.39	-419.45	-98.40	10.33

Design Report for English Farms XX08-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,856.00	32.26	179.44	6,790.29	110.29	-418.95	-74.44	6.17
6,904.00	34.44	179.18	6,830.38	83.91	-418.63	-48.18	4.55
6,951.00	37.88	179.04	6,868.32	56.19	-418.19	-20.59	7.33
6,999.00	39.95	178.02	6,905.67	26.05	-417.41	9.37	4.51
7,046.00	44.18	178.11	6,940.55	-5.42	-416.35	40.63	9.00
7,094.00	48.35	177.46	6,973.73	-40.07	-415.00	75.04	8.75
7,141.00	51.93	177.88	7,003.85	-76.11	-413.54	110.83	7.63
7,189.00	55.62	177.21	7,032.21	-114.79	-411.87	149.23	7.77
7,236.00	59.48	177.73	7,057.42	-154.40	-410.12	188.56	8.28
7,284.00	63.60	177.82	7,080.29	-196.56	-408.49	230.43	8.58
7,331.00	67.43	179.56	7,099.77	-239.31	-407.52	272.94	8.83
7,379.00	71.74	179.07	7,116.50	-284.28	-406.98	317.71	9.01
7,426.00	74.99	178.79	7,129.96	-329.30	-406.14	362.49	6.95
7,474.00	78.47	180.51	7,140.98	-376.01	-405.86	409.01	8.04
7,520.00	81.91	179.71	7,148.81	-421.33	-405.95	454.18	7.68
7,575.00	83.66	178.43	7,155.72	-475.89	-405.06	508.46	3.94
7" Casing Point Estimated from section lines 726' FNL 661' FEL (Not a Survey Point)							
7,609.00	84.75	177.64	7,159.15	-509.69	-403.90	542.05	3.94
7,693.00	86.20	179.05	7,165.78	-593.39	-401.49	625.24	2.41
7,788.00	90.00	180.01	7,168.93	-688.32	-400.71	719.76	4.12
7,883.00	88.86	179.88	7,169.87	-783.31	-400.62	814.40	1.21
7,978.00	88.43	178.72	7,172.12	-878.27	-399.46	908.93	1.30
8,072.00	90.12	179.39	7,173.31	-972.25	-397.91	1,002.44	1.94
8,167.00	90.62	180.44	7,172.70	-1,067.25	-397.76	1,097.08	1.22
8,262.00	87.41	179.78	7,174.33	-1,162.22	-397.95	1,191.73	3.45
8,357.00	90.77	182.91	7,175.84	-1,257.16	-400.18	1,286.51	4.83
8,452.00	92.16	182.74	7,173.41	-1,352.01	-404.86	1,381.42	1.47
8,546.00	91.02	181.61	7,170.81	-1,445.90	-408.42	1,475.28	1.71
8,641.00	90.68	179.64	7,169.40	-1,540.88	-409.46	1,570.00	2.10
8,736.00	90.12	179.84	7,168.74	-1,635.88	-409.03	1,664.62	0.62
8,831.00	90.71	179.49	7,168.05	-1,730.87	-408.48	1,759.23	0.72
8,926.00	89.45	177.95	7,167.92	-1,825.84	-406.36	1,853.68	2.10
9,020.00	89.23	179.08	7,169.01	-1,919.80	-403.92	1,947.10	1.22
9,115.00	91.14	191.42	7,168.70	-2,014.22	-412.60	2,041.91	13.15
9,210.00	87.97	192.08	7,169.44	-2,107.21	-431.95	2,136.21	3.41
9,305.00	87.97	185.51	7,172.81	-2,200.98	-446.46	2,230.87	6.91
9,400.00	88.49	180.26	7,175.75	-2,295.78	-451.23	2,325.73	5.56
9,495.00	91.02	178.57	7,176.16	-2,390.77	-450.26	2,420.29	3.20
9,590.00	87.81	178.29	7,177.13	-2,485.71	-447.65	2,514.68	3.39
9,685.00	88.74	175.97	7,180.00	-2,580.54	-442.90	2,608.77	2.63
9,780.00	91.08	176.14	7,180.15	-2,675.31	-436.37	2,702.64	2.47
9,875.00	91.02	176.12	7,178.41	-2,770.08	-429.96	2,796.53	0.07
9,969.00	92.31	177.48	7,175.68	-2,863.89	-424.71	2,889.56	2.00
10,064.00	92.87	177.22	7,171.38	-2,958.69	-420.33	2,983.65	0.65
10,159.00	91.42	177.57	7,167.83	-3,053.52	-416.02	3,077.77	1.57
10,254.00	88.06	177.71	7,168.26	-3,148.43	-412.10	3,172.01	3.54
10,349.00	89.26	176.39	7,170.48	-3,243.27	-407.21	3,266.10	1.88
10,444.00	90.37	177.92	7,170.78	-3,338.15	-402.50	3,360.24	1.99
10,539.00	86.67	180.42	7,173.24	-3,433.08	-401.12	3,454.71	4.70
10,633.00	88.46	178.26	7,177.23	-3,526.98	-400.04	3,548.19	2.98
10,728.00	91.76	181.27	7,177.05	-3,621.96	-399.65	3,642.79	4.70

Design Report for English Farms XX08-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
10,823.00	91.73	178.53	7,174.16	-3,716.90	-399.49	3,737.38	2.88
10,918.00	89.45	174.39	7,173.19	-3,811.69	-393.62	3,831.33	4.97
11,013.00	90.09	175.30	7,173.57	-3,906.30	-385.09	3,924.88	1.17
11,107.00	91.05	176.95	7,172.63	-4,000.08	-378.74	4,017.78	2.03
11,202.00	91.63	178.34	7,170.41	-4,094.97	-374.84	4,112.00	1.59
11,297.00	91.84	180.98	7,167.53	-4,189.92	-374.28	4,206.56	2.79
11,391.00	90.37	179.96	7,165.71	-4,283.89	-375.05	4,300.27	1.91
11,486.00	90.43	180.93	7,165.05	-4,378.89	-375.79	4,394.98	1.02
11,567.00	86.98	178.36	7,166.88	-4,459.85	-375.28	4,475.61	5.31
Final MWD Survey							
11,624.00	86.98	178.36	7,169.88	-4,516.74	-373.65	4,532.16	0.01
Bit Projection - Estimated BHL 539' FSL 648' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,270.00	1,270.00	0.23	0.26	First MWD Survey
7,575.00	7,155.72	-475.89	-405.06	7" Casing Point Estimated from section lines 726' FNL 661' FEL (Not a Survey Point)
11,567.00	7,166.88	-4,459.85	-375.28	Final MWD Survey
11,624.00	7,169.88	-4,516.74	-373.65	Bit Projection
11,624.00	7,169.88	-4,516.74	-373.65	Estimated BHL 539' FSL 648' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	English Farms XX08-72HN_PlanA - Rev0_BH L Tgt	184.85	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
1,270.00	11,624.00	MWD Survey	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,575.00	7,155.72	7"	7	7-1/2

Design Report for English Farms XX08-72HN - MWD Survey**Targets**

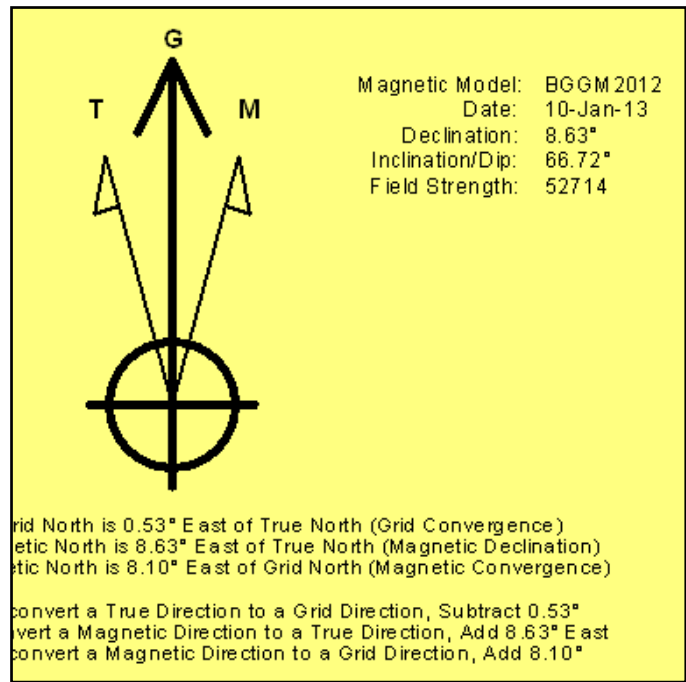
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
English Farms	0.00	0.00	7,171.00	-4,517.30	-383.68	1,265,842.52	3,229,284.71	40.06022	-104.68084
- actual wellpath misses target center by 10.11ft at 11624.00ft MD (7169.88 TVD, -4516.74 N, -373.65 E)									
- Point									
English Farms	0.00	0.00	0.00	0.00	0.00	1,270,359.65	3,229,668.38	40.07261	-104.67932
- actual wellpath misses target center by 1168.00ft at 1168.00ft MD (1168.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				247.00	265.00	1,270,624.64	3,229,915.37		
Point 2				279.00	-5,050.00	1,265,309.84	3,229,947.37		
Point 3				-4,913.00	-5,091.00	1,265,268.84	3,224,755.57		
Point 4				-5,031.00	191.00	1,270,550.64	3,224,637.57		
Point 5				247.00	265.00	1,270,624.64	3,229,915.37		
English Farms	0.00	0.00	0.00	0.00	0.00	1,270,359.65	3,229,668.38	40.07261	-104.67932
- actual wellpath misses target center by 1168.00ft at 1168.00ft MD (1168.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-213.00	-195.00	1,270,164.66	3,229,455.39		
Point 2				-181.00	-4,590.00	1,265,769.82	3,229,487.38		
Point 3				-4,453.00	-4,631.00	1,265,728.83	3,225,215.55		
Point 4				-4,571.00	-269.00	1,270,090.66	3,225,097.55		
Point 5				-213.00	-195.00	1,270,164.66	3,229,455.39		

North Reference Sheet for Sec. 8-T1N-R65W - English Farms XX08-72HN

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' @ 4961.00ft (H&P 321). Northing and Easting are relative to English Farms XX08-72HN
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 -105.50000°, Longitude Origin:0.00000°, Latitude Origin:40.78333°
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996165

Grid Coordinates of Well: 1,270,359.65 ft N, 3,229,668.38 ft E
Geographical Coordinates of Well: 40°04' 21.40" N, 104°40' 45.55" W
Grid Convergence at Surface is: 0.53°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,624.00ft
the Bottom Hole Displacement is 4,532.17ft in the Direction of 184.73°(Grid).
Magnetic Convergence at surface is: -8.10°(10 January 2013, , BGGM2012)



Project: Weld County, CO (NAD 83)
Site: Sec. 8-T1N-R65W
Well: English Farms XX08-72HN

Noble Energy

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Sperry Drilling



Azimuths to Grid North
True North: -0.53°
Magnetic North: 8.10°

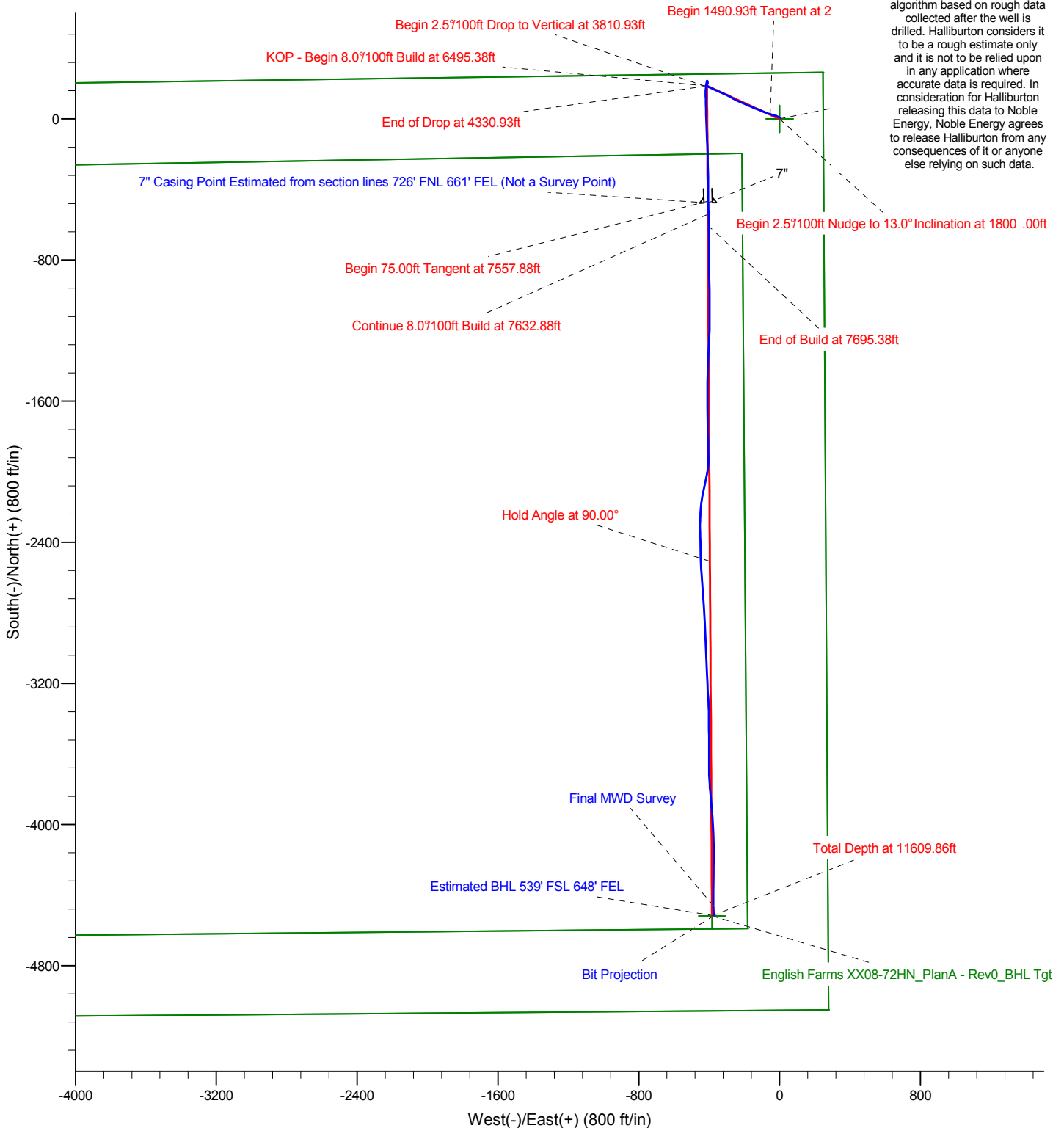
Magnetic Field
Strength: 52713.6snT
Dip Angle: 66.72°
Date: 1/10/2013
Model: BGGM2012

LEGEND

- English Farms XX08-72HN, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 535' FSL, 660' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the English Farms XX08-72HN 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.

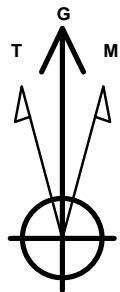


Project: Weld County, CO (NAD 83)
Site: Sec. 8-T1N-R65W
Well: English Farms XX08-72HN

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.53°
Magnetic North: 8.10°

Magnetic Field
Strength: 52713.6snT
Dip Angle: 66.72°
Date: 1/10/2013
Model: BGGM2012

LEGEND

English Farms XX08-72HN, Plan A, Plan A - Rev 0 Proposal V0
MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the English Farms XX08-72HN 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.

