Noble Energy

Weld County, CO (NAD 83)
Sec. 6-T7N-R63W
Jones AC06-75HN

Sidetrack #1

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

01 April, 2013

Well Coordinates: 1,461,715.65 N, 3,283,748.70 E (40° 35' 46.75" N, 104° 28' 41.56" W)
Ground Level: 4,891.00 ft

Local Coordinate Origin:	Centered on Well Jones AC06-75HN
Viewing Datum:	KB @ 4915.00ft (H&P 322)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 2003.16 Build: 43I

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Design Report for Jones AC06-75HN - 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
840.00	0.00	0.00	840.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 840.00ft							
923.00	0.98	305.80	923.00	0.42	-0.58	0.42	1.18
First MWD Survey							
1,203.00	1.24	314.98	1,202.94	3.96	-4.66	4.02	0.11
1,480.00	1.13	333.06	1,479.89	8.51	-8.02	8.61	0.14
1,756.00	1.53	333.22	1,755.81	14.23	-10.91	14.36	0.14
1,941.00	0.94	302.42	1,940.77	17.25	-13.31	17.41	0.47
2,034.00	3.82	245.38	2,033.69	16.36	-16.77	16.58	3.66
2,126.00	6.00	248.07	2,125.34	13.29	-24.01	13.60	2.38
2,218.00	7.13	259.41	2,216.74	10.45	-34.09	10.88	1.86
2,310.00	8.90	254.05	2,307.84	7.44	-46.54	8.03	2.09
2,403.00	10.52	254.94	2,399.51	3.26	-61.66	4.04	1.75
2,498.00	11.63	248.86	2,492.74	-2.45	-78.97	-1.44	1.69
2,593.00	13.29	249.17	2,585.50	-9.79	-98.10	-8.53	1.75
2,688.00	14.31	248.94	2,677.75	-17.89	-119.27	-16.37	1.08
2,784.00	15.41	243.83	2,770.55	-27.78	-141.79	-25.97	1.78
2,879.00	15.40	242.21	2,862.13	-39.23	-164.28	-37.13	0.45
2,974.00	16.42	235.06	2,953.50	-52.80	-186.44	-50.41	2.32
3,069.00	16.20	233.83	3,044.68	-68.31	-208.15	-65.65	0.43
3,164.00	15.92	232.44	3,135.97	-84.07	-229.18	-81.14	0.50
3,259.00	16.53	232.14	3,227.19	-100.31	-250.17	-97.11	0.65
3,353.00	16.44	231.55	3,317.32	-116.79	-271.15	-113.32	0.20
3,448.00	16.43	229.51	3,408.44	-133.87	-291.89	-130.13	0.61
3,543.00	16.05	228.11	3,499.65	-151.36	-311.89	-147.37	0.57
3,638.00	12.71	224.19	3,591.67	-167.63	-328.95	-163.42	3.66
3,733.00	9.29	220.11	3,684.91	-180.99	-341.18	-176.62	3.69
3,828.00	9.16	217.84	3,778.68	-192.83	-350.76	-188.34	0.41
3,923.00	8.92	219.45	3,872.50	-204.49	-360.08	-199.88	0.37
4,018.00	7.30	222.32	3,966.55	-214.64	-368.82	-209.91	1.76
4,114.00	5.90	208.86	4,061.91	-223.47	-375.31	-218.66	2.16
4,209.00	3.16	182.19	4,156.62	-230.37	-377.77	-225.52	3.56
4,303.00	2.12	96.72	4,250.55	-233.16	-376.14	-228.34	3.90
4,399.00	1.54	297.29	4,346.53	-232.78	-375.53	-227.96	3.75
4,493.00	1.64	302.84	4,440.49	-231.47	-377.78	-226.63	0.20
4,588.00	0.39	189.24	4,535.48	-231.05	-378.97	-226.19	1.93
4,683.00	0.24	249.83	4,630.48	-231.44	-379.21	-226.58	0.36
4,968.00	1.85	327.83	4,915.43	-227.75	-382.22	-222.85	0.64
5,064.00	2.42	322.49	5,011.36	-224.83	-384.28	-219.90	0.63
5,159.00	0.84	192.01	5,106.33	-223.92	-385.65	-218.98	3.19
5,254.00	0.68	185.59	5,201.32	-225.16	-385.85	-220.22	0.19
5,539.00	1.18	161.01	5,486.29	-229.62	-385.06	-224.68	0.22
5,824.00	1.02	149.13	5,771.23	-234.57	-382.80	-229.66	0.10
6,109.00	1.00	156.23	6,056.19	-239.02	-380.50	-234.15	0.04
6,141.00	1.16	162.12	6,088.19	-239.59	-380.28	-234.71	0.61
6,203.00	0.50	81.76	6,150.18	-240.15	-379.82	-235.28	1.91
Tie-On to Original Wellbore Sperry MWD Survey							
6,268.00	5.73	55.92	6,215.06	-238.29	-376.85	-233.46	8.13
First MWD Survey of Sidetrack #1							

Design Report for Jones AC06-75HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,300.00	9.22	51.13	6,246.79	-235.78	-373.53	-230.99	11.07
6,345.00	14.04	43.74	6,290.85	-229.57	-366.95	-224.87	11.19
6,394.00	19.11	37.59	6,337.80	-218.91	-357.94	-214.33	10.94
6,439.00	20.27	34.59	6,380.17	-206.66	-349.02	-202.19	3.42
6,490.00	22.34	30.02	6,427.69	-190.99	-339.15	-186.65	5.20
6,535.00	26.17	25.57	6,468.71	-174.63	-330.59	-170.39	9.43
6,585.00	30.96	21.28	6,512.62	-152.68	-321.15	-148.57	10.42
6,630.00	35.74	17.48	6,550.20	-129.35	-313.00	-125.34	11.59
6,680.00	41.33	14.54	6,589.30	-99.41	-304.46	-95.51	11.76
6,725.00	47.36	14.06	6,621.47	-68.94	-296.70	-65.15	13.42
6,774.00	54.20	15.53	6,652.43	-32.27	-286.99	-28.60	14.15
6,819.00	55.77	16.79	6,678.25	3.13	-276.73	6.66	4.17
6,870.00	56.74	16.50	6,706.58	43.76	-264.59	47.13	1.96
6,915.00	58.45	15.98	6,730.70	80.23	-253.96	83.47	3.92
6,965.00	62.52	16.74	6,755.32	121.97	-241.70	125.05	8.25
7,010.00	64.42	17.49	6,775.42	160.45	-229.85	163.37	4.48
7,060.00	65.13	20.87	6,796.74	203.16	-214.99	205.89	6.28
7,105.00	68.50	20.71	6,814.45	241.82	-200.31	244.36	7.50
7,155.00	73.11	21.18	6,830.89	285.91	-183.44	288.23	9.26
7,192.00	74.25	21.42	6,841.28	318.99	-170.54	321.15	3.14
7,249.00	76.48	22.03	6,855.68	370.22	-150.12	372.11	4.05
7,294.00	80.51	23.28	6,864.66	410.91	-133.14	412.57	9.36
7,348.00	83.93	23.42	6,871.97	460.02	-111.94	461.41	6.33
Estimated 7" Casing Point:	**780' FSL, 2310' FEL (Not a Survey Point)**						
7,361.00	84.75	23.45	6,873.25	471.89	-106.79	473.22	6.33
7,443.00	85.63	22.27	6,880.13	547.18	-75.05	548.10	1.79
7,503.00	86.55	21.42	6,884.22	602.74	-52.78	603.37	2.09
7,599.00	88.98	19.33	6,887.96	692.66	-19.38	692.85	3.34
7,668.00	90.12	15.84	6,888.50	758.42	1.46	758.34	5.32
7,725.00	91.14	12.58	6,887.88	813.66	15.45	813.40	5.99
7,789.00	91.42	10.83	6,886.45	876.31	28.43	875.88	2.77
7,836.00	91.42	10.14	6,885.28	922.52	36.98	921.97	1.47
7,884.00	91.48	9.00	6,884.07	969.83	44.95	969.18	2.38
7,931.00	90.09	7.25	6,883.42	1,016.35	51.60	1,015.61	4.75
7,979.00	90.12	5.94	6,883.34	1,064.03	57.11	1,063.22	2.73
8,074.00	89.82	2.46	6,883.39	1,158.76	64.07	1,157.85	3.68
8,169.00	90.83	359.66	6,882.85	1,253.74	65.82	1,252.79	3.13
8,216.00	91.08	359.08	6,882.06	1,300.73	65.31	1,299.79	1.34
8,265.00	91.11	358.11	6,881.13	1,349.70	64.10	1,348.77	1.98
8,312.00	90.71	357.15	6,880.38	1,396.65	62.16	1,395.75	2.21
8,359.00	88.95	355.93	6,880.52	1,443.57	59.33	1,442.69	4.56
8,406.00	89.81	355.89	6,881.03	1,490.44	55.97	1,489.61	1.83
8,455.00	89.38	356.52	6,881.37	1,539.33	52.73	1,538.54	1.56
8,550.00	90.68	357.47	6,881.32	1,634.20	47.75	1,633.46	1.69
8,597.00	90.31	356.21	6,880.92	1,681.13	45.16	1,680.41	2.79
8,645.00	89.23	355.74	6,881.11	1,729.01	41.79	1,728.33	2.45
8,692.00	88.74	355.09	6,881.94	1,775.85	38.03	1,775.22	1.73
8,740.00	89.17	354.52	6,882.82	1,823.64	33.69	1,823.06	1.49
8,834.00	89.48	354.80	6,883.93	1,917.23	24.94	1,916.75	0.44
8,929.00	90.31	354.08	6,884.10	2,011.78	15.74	2,011.41	1.16
8,976.00	90.96	353.88	6,883.58	2,058.52	10.81	2,058.21	1.45

Design Report for Jones AC06-75HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,024.00	91.45	354.29	6,882.57	2,106.25	5.86	2,106.00	1.33
9,120.00	89.14	354.92	6,882.08	2,201.82	-3.16	2,201.68	2.49
9,215.00	89.26	354.35	6,883.40	2,296.39	-12.04	2,296.36	0.61
9,310.00	88.68	357.52	6,885.11	2,391.12	-18.78	2,391.17	3.39
9,405.00	89.08	358.92	6,886.97	2,486.06	-21.73	2,486.13	1.53
9,499.00	89.02	358.85	6,888.53	2,580.03	-23.56	2,580.12	0.10
9,595.00	90.03	0.08	6,889.32	2,676.02	-24.45	2,676.11	1.66
9,690.00	91.17	359.79	6,888.33	2,771.01	-24.56	2,771.10	1.24
9,785.00	92.35	359.99	6,885.41	2,865.96	-24.74	2,866.05	1.26
9,880.00	91.11	359.22	6,882.54	2,960.92	-25.40	2,961.00	1.54
9,975.00	90.31	358.55	6,881.36	3,055.89	-27.25	3,055.99	1.10
10,069.00	91.66	358.86	6,879.75	3,149.85	-29.37	3,149.97	1.47
10,116.00	92.31	359.14	6,878.12	3,196.81	-30.19	3,196.94	1.51
10,164.00	91.39	358.19	6,876.57	3,244.77	-31.31	3,244.91	2.75
10,211.00	90.62	357.85	6,875.75	3,291.74	-32.93	3,291.89	1.79
10,259.00	89.78	357.86	6,875.58	3,339.70	-34.73	3,339.87	1.75
10,384.00	89.14	356.36	6,876.76	3,464.54	-41.03	3,464.78	1.30
10,449.00	89.69	356.88	6,877.42	3,529.42	-44.86	3,529.70	1.16
10,544.00	88.80	357.23	6,878.67	3,624.28	-49.74	3,624.62	1.01
10,639.00	89.57	358.10	6,880.02	3,719.19	-53.61	3,719.57	1.22
10,734.00	89.85	359.36	6,880.51	3,814.17	-55.72	3,814.57	1.36
10,829.00	91.26	358.43	6,879.58	3,909.14	-57.55	3,909.56	1.78
10,876.00	91.72	357.71	6,878.36	3,956.10	-59.13	3,956.53	1.82
10,924.00	90.77	357.14	6,877.32	4,004.04	-61.29	4,004.49	2.31
11,019.00	88.21	356.08	6,878.17	4,098.86	-66.90	4,099.38	2.92
11,114.00	89.38	357.97	6,880.16	4,193.70	-71.83	4,194.28	2.34
11,209.00	89.78	357.51	6,880.86	4,288.63	-75.58	4,289.24	0.64
11,304.00	90.25	357.47	6,880.83	4,383.54	-79.74	4,384.20	0.50
11,325.00	90.31	357.71	6,880.73	4,404.52	-80.62	4,405.19	1.18
Final MWD Survey of Sidetrack #1							
11,382.00	90.31	357.71	6,880.42	4,461.47	-82.90	4,462.16	0.00

Survey Projection to TD of Sidetrack #1 - Estimated BHL: 536' FNL, 2568' FEL

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
840.00	840.00	0.00	0.00	Surface Casing Assumed Vertical at 840.00ft
923.00	923.00	0.42	-0.58	First MWD Survey
6,203.00	6,150.18	-240.15	-379.82	Tie-On to Original Wellbore Sperry MWD Survey
6,268.00	6,215.06	-238.29	-376.85	First MWD Survey of Sidetrack #1
7,348.00	6,871.97	460.02	-111.94	Estimated 7" Casing Point: 780' FSL, 2310' FEL (Not a Survey Point)
11,325.00	6,880.73	4,404.52	-80.62	Final MWD Survey of Sidetrack #1
11,382.00	6,880.42	4,461.47	-82.90	Survey Projection to TD of Sidetrack #1
11,382.00	6,880.42	4,461.47	-82.90	Estimated BHL: 536' FNL, 2568' FEL

Design Report for Jones AC06-75HN - MWD Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Jones AC06-75HN_PlanC - Rev0_BH	359.27	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
840.00	6,203.00	Original Wellbore MWD Surveys	MWD
6,268.00	11,382.00	Sidetrack #1 MWD Surveys	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,348.00	6,871.97	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
Jones	0.00	0.00	6,883.00	4,462.62	-56.98	1,466,178.16	3,283,691.72	40° 36' 30.852 N	104° 28' 41.628 W
- actual wellpath misses target center by 26.07ft at 11382.00ft MD (6880.42 TVD, 4461.47 N, -82.90 E)									
- Point									
Jones	0.00	0.00	0.00	0.00	0.00	1,461,715.65	3,283,748.70	40° 35' 46.752 N	104° 28' 41.556 W
- actual wellpath hits target center									
- Polygon									
Point 1			1,703.00	259.00		1,461,974.65	3,285,451.65		
Point 2			-2,170.00	4.00		1,461,719.65	3,281,578.75		
Point 3			-2,161.00	4,359.00		1,466,074.54	3,281,587.75		
Point 4			-58.00	4,538.00		1,466,253.54	3,283,690.70		
Point 5			2,113.00	4,722.00		1,466,437.53	3,285,861.64		
Point 6			1,703.00	259.00		1,461,974.65	3,285,451.65		
Jones	0.00	0.00	6,883.00	4,462.62	-56.98	1,466,178.16	3,283,691.72	40° 36' 30.852 N	104° 28' 41.628 W
- actual wellpath misses target center by 26.07ft at 11382.00ft MD (6880.42 TVD, 4461.47 N, -82.90 E)									
- Point									
Jones	0.00	0.00	0.00	0.00	0.00	1,461,715.65	3,283,748.70	40° 35' 46.752 N	104° 28' 41.556 W
- actual wellpath hits target center									
- Polygon									
Point 1			2,163.00	-201.00		1,461,514.66	3,285,911.64		
Point 2			-2,630.00	-456.00		1,461,259.66	3,281,118.76		
Point 3			-2,621.00	4,819.00		1,466,534.53	3,281,127.76		
Point 4			-58.00	4,998.00		1,466,713.53	3,283,690.70		
Point 5			2,573.00	5,182.00		1,466,897.52	3,286,321.63		
Point 6			2,163.00	-201.00		1,461,514.66	3,285,911.64		

North Reference Sheet for Sec. 6-T7N-R63W - Jones AC06-75HN - Sidetrack #1

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

Vertical Depths are relative to KB @ 4915.00ft (H&P 322). Northing and Easting are relative to Jones AC06-75HN

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: 0.99997500

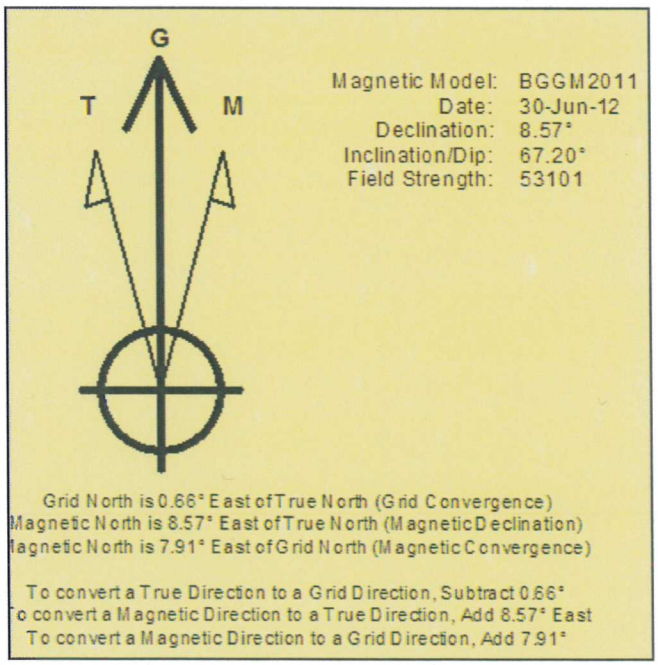
Grid Coordinates of Well: 1,461,715.65 ft N, 3,283,748.70 ft E

Geographical Coordinates of Well: 40° 35' 46.75" N, 104° 28' 41.56" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,382.00ft
the Bottom Hole Displacement is 4,462.24ft in the Direction of 358.94° (Grid).

Magnetic Convergence at surface is: -7.91° (30 June 2012, , BGGM2011)



Project: Weld County, CO (NAD 83)
Site: Sec. 6-T7N-R63W
Well: Jones AC06-75HN

Noble Energy

HALLIBURTON
Sperry Drilling

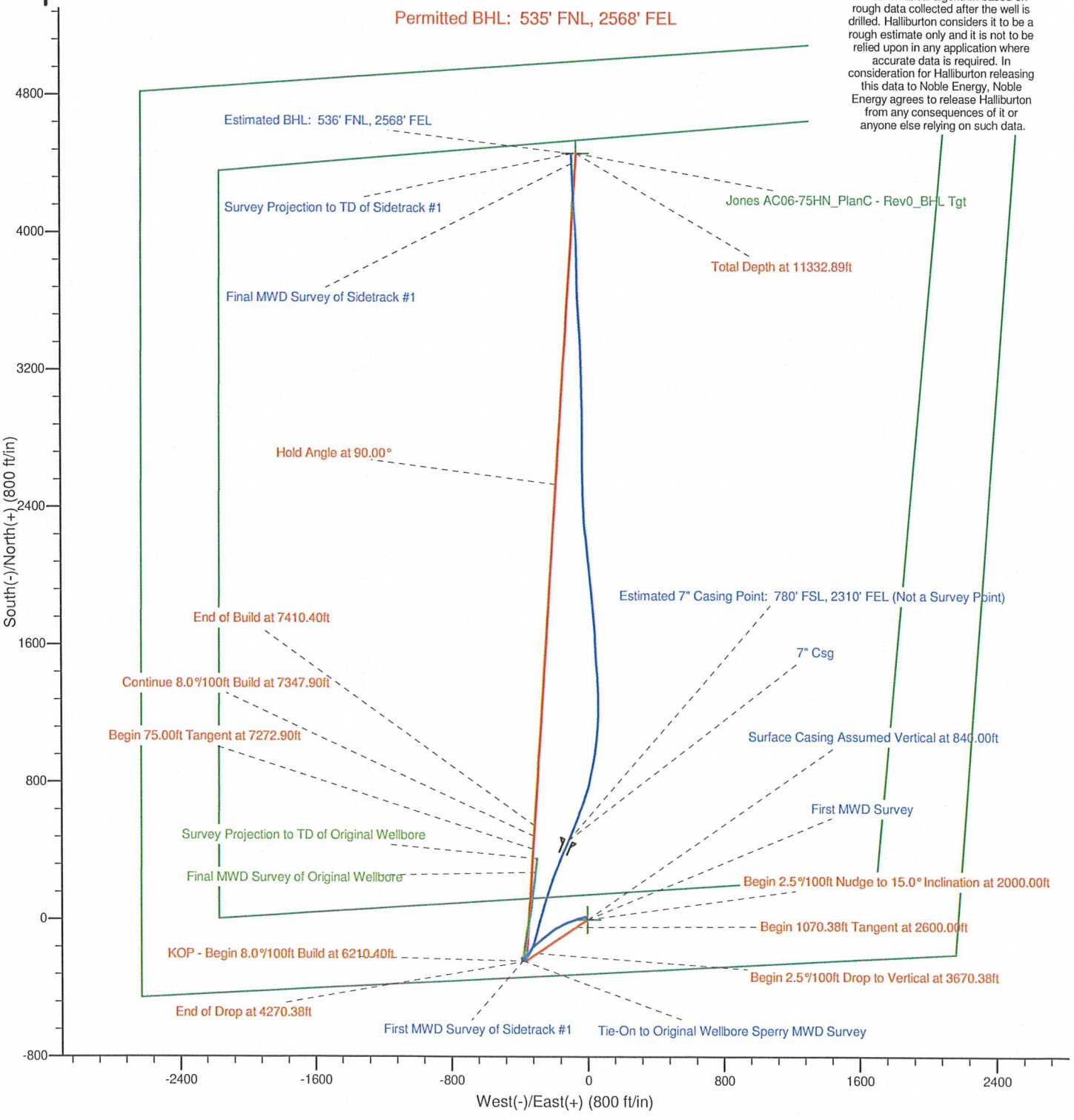
Azimuths to Grid North
True North: -0.66°
Magnetic North: 7.91°

Magnetic Field
Strength: 53101.5snT
Dip Angle: 67.20°
Date: 6/30/2012
Model: BGGM2011

LEGEND

- Jones AC06-75HN, Original Wellbore, Plan A - Rev 1 Proposal V0
- Jones AC06-75HN, Original Wellbore, MWD Survey V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Jones AC06-75HN 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. 6-T7N-R63W
Well: Jones AC06-75HN

Noble Energy

HALLIBURTON
Sperry Drilling

Azimuths to Grid North
True North: -0.66°
Magnetic North: 7.91°

Magnetic Field
Strength: 53101.5snT
Dip Angle: 67.20°
Date: 6/30/2012
Model: BGGM2011

LEGEND

Jones AC06-75HN, Original Wellbore, Plan A - Rev 1 Proposal V0
Jones AC06-75HN, Original Wellbore, MWD Survey V0
MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Jones AC06-75HN 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.