

Noble Energy

Weld County, CO (NAD 83)
Sec. 5-T8N-R60W
Shable LF07-68HN

Design: Actual Field Survey

Sperry Drilling Services

Final Survey Report

15 April, 2013

Well Coordinates: 1,495,250.54 N, 3,381,755.67 E (40°41' 05.00" N, 104°07' 24.45" W)
Ground Level: 4,921.00 ft

Local Coordinate Origin:	Centered on Well Shable LF07-68HN
Viewing Datum:	KB=16' @ 4937.00ft (Precision 829)
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 Shable LF07-68HN - Actual Field Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
629.00	0.00	0.00	629.00	0.00	0.00	0.00	0.00
Tie On to Surface Casing Assumed Vertical							
655.00	0.14	262.61	655.00	0.00	-0.03	0.03	0.54
First MWD Survey							
744.00	0.35	348.95	744.00	0.25	-0.19	0.14	0.41
834.00	0.40	44.26	834.00	0.74	-0.02	-0.13	0.39
924.00	0.41	62.02	924.00	1.12	0.48	-0.70	0.14
1,013.00	0.48	38.74	1,012.99	1.56	0.99	-1.29	0.22
1,103.00	0.41	55.82	1,102.99	2.03	1.50	-1.88	0.17
1,169.00	0.44	67.64	1,168.99	2.26	1.93	-2.35	0.14
1,263.00	0.65	198.12	1,262.99	1.89	2.09	-2.44	1.06
1,357.00	1.93	213.49	1,356.96	0.07	1.05	-1.05	1.40
1,452.00	4.12	205.16	1,451.82	-4.36	-1.28	2.15	2.35
1,546.00	7.99	184.97	1,545.29	-13.93	-3.28	6.08	4.64
1,640.00	10.37	177.93	1,638.08	-28.89	-3.54	9.41	2.80
1,734.00	13.49	188.51	1,730.05	-48.20	-4.86	14.66	4.04
1,829.00	15.01	190.30	1,822.13	-71.26	-8.70	23.16	1.67
1,923.00	15.33	187.74	1,912.85	-95.55	-12.55	31.92	0.79
2,017.00	15.93	196.07	2,003.39	-120.26	-17.79	42.14	2.47
2,111.00	17.72	200.92	2,093.36	-146.02	-26.47	55.93	2.42
2,206.00	18.19	200.00	2,183.74	-173.46	-36.71	71.58	0.58
2,282.00	18.70	203.37	2,255.84	-195.79	-45.60	84.87	1.55
2,372.00	20.28	205.19	2,340.68	-223.15	-57.96	102.60	1.88
2,461.00	18.76	202.80	2,424.56	-250.30	-70.07	120.03	1.93
2,551.00	19.49	204.59	2,509.59	-277.30	-81.93	137.18	1.04
2,640.00	17.95	202.39	2,593.88	-303.48	-93.33	153.72	1.90
2,730.00	19.45	202.35	2,679.13	-330.16	-104.31	169.96	1.67
2,820.00	19.41	201.33	2,764.00	-357.95	-115.45	186.57	0.38
2,909.00	19.15	198.79	2,848.01	-385.55	-125.53	202.11	0.99
2,999.00	20.71	199.58	2,932.62	-414.52	-135.62	217.94	1.76
3,089.00	21.15	204.20	3,016.69	-444.33	-147.61	235.80	1.90
3,178.00	20.17	199.89	3,099.97	-473.40	-159.41	253.32	2.03
3,268.00	20.03	205.98	3,184.50	-501.85	-171.45	270.95	2.33
3,357.00	18.60	203.51	3,268.49	-528.57	-183.78	288.52	1.85
3,447.00	17.71	202.27	3,354.01	-554.40	-194.70	304.51	1.08
3,537.00	18.20	206.80	3,439.63	-579.61	-206.22	320.97	1.64
3,626.00	20.57	207.05	3,523.57	-605.95	-219.60	339.48	2.66
3,716.00	21.23	207.18	3,607.65	-634.53	-234.24	359.67	0.74
3,805.00	19.68	206.53	3,691.04	-662.27	-248.29	379.13	1.76
3,895.00	20.37	205.55	3,775.60	-689.96	-261.82	398.06	0.85
3,985.00	16.37	203.44	3,860.99	-715.74	-273.62	414.91	4.50
4,074.00	16.34	202.12	3,946.39	-738.85	-283.33	429.16	0.42
4,164.00	15.43	197.83	4,032.96	-761.97	-291.76	442.16	1.65
4,254.00	14.01	197.43	4,120.00	-783.77	-298.69	453.43	1.58
4,343.00	13.34	190.66	4,206.48	-804.14	-303.82	462.63	1.95
4,433.00	13.88	191.97	4,293.96	-824.90	-307.98	470.97	0.69
4,522.00	14.36	188.84	4,380.27	-846.25	-311.89	479.18	1.01
4,612.00	13.17	188.96	4,467.68	-867.41	-315.20	486.77	1.32
4,702.00	12.21	189.58	4,555.48	-886.92	-318.38	493.90	1.08

Design Report for Shable LF07-68HN - Actual Field Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,791.00	9.33	194.40	4,642.91	-903.19	-321.74	500.53	3.39
4,881.00	6.81	203.27	4,732.01	-915.16	-325.66	506.83	3.12
4,971.00	5.38	211.11	4,821.50	-923.68	-329.95	512.78	1.83
5,060.00	2.74	231.90	4,910.28	-928.56	-333.78	517.53	3.35
5,150.00	1.08	304.30	5,000.23	-929.41	-336.18	520.05	2.92
5,240.00	1.31	316.38	5,090.21	-928.19	-337.59	521.18	0.38
5,329.00	1.00	307.42	5,179.20	-926.98	-338.90	522.22	0.40
5,419.00	0.39	208.32	5,269.19	-926.77	-339.67	522.93	1.25
5,509.00	0.44	119.62	5,359.19	-927.21	-339.52	522.87	0.65
5,599.00	0.61	116.60	5,449.19	-927.60	-338.79	522.24	0.19
5,688.00	0.47	118.97	5,538.18	-927.99	-338.05	521.59	0.16
5,733.00	0.58	220.51	5,583.18	-928.25	-338.03	521.63	1.81
5,778.00	1.26	246.66	5,628.17	-928.62	-338.64	522.30	1.74
5,823.00	2.47	249.25	5,673.15	-929.16	-340.00	523.74	2.69
5,867.00	4.60	251.60	5,717.06	-930.05	-342.56	526.43	4.85
5,912.00	6.37	248.90	5,761.86	-931.52	-346.60	530.69	3.97
5,957.00	8.12	245.77	5,806.50	-933.72	-351.83	536.25	3.99
6,002.00	9.43	250.54	5,850.97	-936.26	-358.20	543.01	3.33
6,047.00	12.15	250.21	5,895.17	-939.09	-366.13	551.36	6.05
6,092.00	16.94	259.50	5,938.72	-941.89	-377.04	562.61	11.81
6,136.00	21.97	266.75	5,980.20	-943.52	-391.58	577.17	12.66
6,181.00	23.76	270.77	6,021.66	-943.88	-409.05	594.34	5.28
6,226.00	26.08	275.70	6,062.48	-942.77	-427.96	612.62	6.92
6,271.00	29.69	281.79	6,102.25	-939.51	-448.72	632.27	10.21
6,316.00	35.50	282.01	6,140.15	-934.51	-472.43	654.45	12.91
6,361.00	40.72	281.80	6,175.54	-928.79	-499.60	679.86	11.60
6,405.00	43.08	279.95	6,208.29	-923.26	-528.45	706.96	6.05
6,450.00	47.37	277.13	6,239.98	-918.54	-560.03	736.89	10.52
6,495.00	47.84	271.55	6,270.34	-916.04	-593.15	768.78	9.22
6,540.00	50.45	271.22	6,299.77	-915.22	-627.17	801.91	5.83
6,585.00	54.47	272.15	6,327.19	-914.16	-662.83	836.59	9.08
6,629.00	60.72	274.09	6,350.75	-912.12	-699.90	872.45	14.68
6,674.00	63.19	272.95	6,371.91	-909.68	-739.54	910.74	5.93
6,719.00	67.73	271.71	6,390.60	-908.03	-780.43	950.42	10.40
6,764.00	70.64	271.93	6,406.59	-906.69	-822.46	991.28	6.48
6,809.00	76.54	272.07	6,419.29	-905.18	-865.58	1,033.17	13.11
6,854.00	83.05	270.82	6,427.26	-904.07	-909.83	1,076.25	14.72
6,903.00	88.69	270.93	6,430.79	-903.33	-958.68	1,123.90	11.52
7" Casing Point Estimated from section lines 630' FNL 701' FEL (Not a survey point)							
6,932.00	92.03	271.00	6,430.61	-902.84	-987.67	1,152.17	11.52
7,022.00	92.37	268.36	6,427.15	-903.34	-1,077.60	1,240.28	2.96
7,112.00	90.55	266.00	6,424.86	-907.76	-1,167.45	1,329.12	3.31
7,201.00	91.39	265.57	6,423.35	-914.31	-1,256.19	1,417.32	1.06
7,291.00	94.30	267.46	6,418.88	-919.77	-1,345.90	1,506.23	3.85
7,381.00	91.97	268.47	6,413.96	-922.96	-1,435.70	1,594.77	2.82
7,471.00	87.99	269.59	6,413.99	-924.48	-1,525.67	1,683.13	4.59
7,560.00	88.77	268.56	6,416.51	-925.92	-1,614.62	1,770.48	1.45
7,650.00	89.29	268.36	6,418.03	-928.34	-1,704.58	1,859.01	0.62
7,739.00	89.85	267.39	6,418.70	-931.64	-1,793.51	1,946.72	1.26
7,829.00	89.72	266.26	6,419.04	-936.62	-1,883.37	2,035.69	1.26
7,919.00	89.66	265.28	6,419.53	-943.26	-1,973.12	2,124.89	1.09

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,009.00	89.41	265.94	6,420.26	-950.15	-2,062.86	2,214.12	0.78
8,098.00	90.65	267.28	6,420.21	-955.41	-2,151.70	2,302.14	2.05
8,188.00	89.17	267.98	6,420.35	-959.13	-2,241.62	2,390.91	1.82
8,277.00	90.25	273.02	6,420.80	-958.36	-2,330.58	2,477.81	5.79
8,367.00	89.69	271.59	6,420.85	-954.74	-2,420.51	2,565.07	1.71
8,457.00	90.00	269.96	6,421.09	-953.52	-2,510.50	2,652.89	1.84
8,546.00	92.52	270.18	6,419.14	-953.41	-2,599.47	2,739.94	2.84
8,636.00	94.38	269.39	6,413.72	-953.75	-2,689.30	2,827.92	2.24
8,725.00	94.35	270.01	6,406.95	-954.21	-2,778.04	2,914.86	0.70
8,815.00	92.53	270.29	6,401.55	-953.98	-2,867.87	3,002.73	2.05
8,905.00	93.21	269.63	6,397.04	-954.04	-2,957.76	3,090.71	1.05
8,994.00	93.30	268.20	6,391.99	-955.72	-3,046.60	3,177.99	1.61
9,084.00	91.97	268.07	6,387.85	-958.65	-3,136.45	3,266.53	1.48
9,174.00	90.12	269.16	6,386.21	-960.82	-3,226.40	3,355.01	2.39
9,263.00	90.40	270.55	6,385.80	-961.05	-3,315.40	3,442.15	1.59
9,353.00	89.97	269.93	6,385.51	-960.67	-3,405.40	3,530.15	0.84
9,443.00	89.01	268.97	6,386.31	-961.54	-3,495.39	3,618.40	1.51
9,532.00	91.94	269.67	6,385.58	-962.59	-3,584.37	3,705.70	3.38
9,622.00	90.46	267.73	6,383.69	-964.63	-3,674.32	3,794.14	2.71
9,712.00	88.89	266.81	6,384.20	-968.92	-3,764.21	3,883.00	2.02
9,801.00	89.81	265.67	6,385.21	-974.76	-3,853.01	3,971.10	1.65
9,890.00	87.04	267.08	6,387.66	-980.38	-3,941.79	4,059.14	3.49
9,980.00	87.13	267.40	6,392.23	-984.71	-4,031.57	4,147.89	0.37
10,070.00	87.16	266.29	6,396.72	-989.66	-4,121.32	4,236.74	1.23
10,159.00	88.49	268.73	6,400.09	-993.52	-4,210.16	4,324.48	3.12
10,249.00	88.40	266.58	6,402.54	-997.20	-4,300.05	4,413.21	2.39
10,338.00	87.72	267.74	6,405.55	-1,001.61	-4,388.89	4,501.05	1.51
10,428.00	89.14	267.70	6,408.02	-1,005.19	-4,478.78	4,589.76	1.58
10,518.00	90.40	268.36	6,408.38	-1,008.28	-4,568.72	4,678.42	1.58
10,608.00	90.18	268.27	6,407.92	-1,010.93	-4,658.68	4,767.00	0.26
10,697.00	89.48	264.80	6,408.19	-1,016.30	-4,747.51	4,855.03	3.98
10,790.00	89.48	265.04	6,409.03	-1,024.54	-4,840.14	4,947.38	0.26
Final MWD Survey							
10,854.00	89.48	265.04	6,409.61	-1,030.07	-4,903.90	5,010.91	0.00
Bit Projection at TD - Estimated BHL 680' FNL 696' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
629.00	629.00	0.00	0.00	Tie On to Surface Casing Assumed Vertical
655.00	655.00	0.00	-0.03	First MWD Survey
6,903.00	6,430.79	-903.33	-958.68	7" Casing Point Estimated from section lines 630' FNL 701' FEL (Not a survey point)
10,790.00	6,409.03	-1,024.54	-4,840.14	Final MWD Survey
10,854.00	6,409.61	-1,030.07	-4,903.90	Bit Projection at TD
10,854.00	6,409.61	-1,030.07	-4,903.90	Estimated BHL 680' FNL 696' FWL

Design Report for Shable LF07-68HN - Actual Field Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
TD	No Target (Freehand)	258.14	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
629.00	6,903.00	Sperry MWD Surveys	MWD
6,903.00	10,854.00	Sperry MWD Surveys	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
6,903.00	6,430.79	7"	7	7-1/2

Design Report for Shable LF07-68HN - Actual Field Survey

Targets

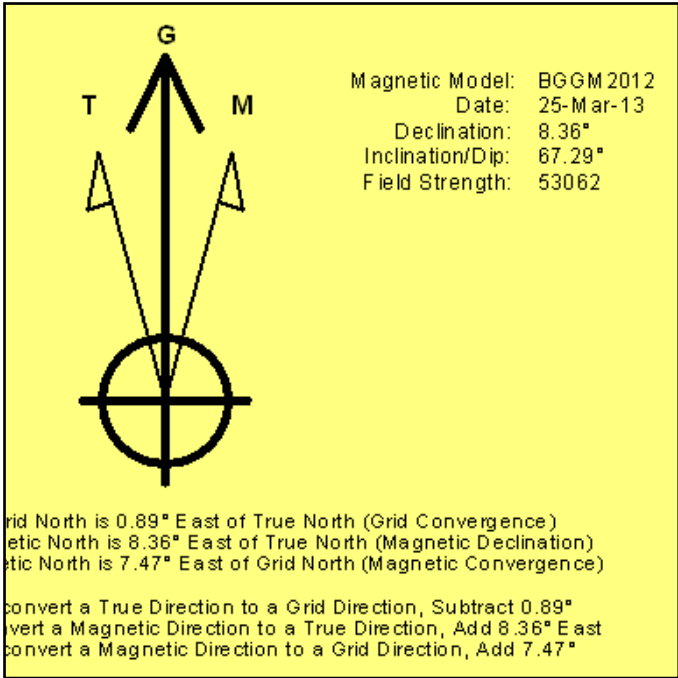
Target Name - hit/miss target - Shale	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Shable	0.00	0.00	6,387.00	-1,004.87	-4,908.88	1,494,245.68	3,376,846.86	40.682172	-104.141211
- actual wellpath misses target center by 34.22ft at 10854.00ft MD (6409.61 TVD, -1030.07 N, -4903.90 E)									
- Point									
Shable	0.00	0.00	0.00	0.00	0.00	1,495,250.54	3,381,755.67	40.684722	-104.123458
- actual wellpath hits target center									
- Polygon									
Point 1				-250.00	-256.00	1,494,994.54	3,381,505.67		
Point 2				-248.00	2,389.00	1,497,639.50	3,381,507.67		
Point 3				-261.00	5,075.00	1,500,325.46	3,381,494.67		
Point 4				2,009.00	5,098.00	1,500,348.46	3,383,764.64		
Point 5				5,000.00	5,210.00	1,500,460.46	3,386,755.59		
Point 6				5,028.00	2,486.00	1,497,736.50	3,386,783.59		
Point 7				5,042.00	-177.00	1,495,073.54	3,386,797.59		
Point 8				2,396.00	-201.00	1,495,049.54	3,384,151.63		
Point 9				-250.00	-256.00	1,494,994.54	3,381,505.67		
Shable	0.00	0.00	0.00	0.00	0.00	1,495,250.54	3,381,755.67	40.684722	-104.123458
- actual wellpath hits target center									
- Polygon									
Point 1				350.00	344.00	1,495,594.53	3,382,105.66		
Point 2				352.00	2,389.00	1,497,639.50	3,382,107.66		
Point 3				339.00	4,475.00	1,499,725.47	3,382,094.66		
Point 4				2,009.00	4,498.00	1,499,748.47	3,383,764.64		
Point 5				4,400.00	4,610.00	1,499,860.47	3,386,155.60		
Point 6				4,428.00	2,486.00	1,497,736.50	3,386,183.60		
Point 7				4,442.00	423.00	1,495,673.53	3,386,197.60		
Point 8				2,396.00	399.00	1,495,649.53	3,384,151.63		
Point 9				350.00	344.00	1,495,594.53	3,382,105.66		
Shable	0.00	0.00	0.00	0.00	0.00	1,495,250.54	3,381,755.67	40.684722	-104.123458
- actual wellpath hits target center									
- Polygon									
Point 1				-250.00	-256.00	1,494,994.54	3,381,505.67		
Point 2				-239.00	-2,900.00	1,492,350.58	3,381,516.67		
Point 3				-236.00	-5,541.00	1,489,709.62	3,381,519.67		
Point 4				-2,877.00	-5,596.00	1,489,654.62	3,378,878.71		
Point 5				-5,520.00	-5,651.00	1,489,599.62	3,376,235.75		
Point 6				-5,548.00	-3,004.00	1,492,246.58	3,376,207.75		
Point 7				-5,575.00	-357.00	1,494,893.54	3,376,180.75		
Point 8				-2,900.00	-335.00	1,494,915.54	3,378,855.71		
Point 9				-250.00	-256.00	1,494,994.54	3,381,505.67		
Shable	0.00	0.00	0.00	0.00	0.00	1,495,250.54	3,381,755.67	40.684722	-104.123458
- actual wellpath hits target center									
- Polygon									
Point 1				-850.00	-856.00	1,494,394.55	3,380,905.68		
Point 2				-839.00	-2,900.00	1,492,350.58	3,380,916.68		
Point 3				-836.00	-4,941.00	1,490,309.61	3,380,919.68		
Point 4				-2,877.00	-4,996.00	1,490,254.61	3,378,878.71		
Point 5				-4,920.00	-5,051.00	1,490,199.61	3,376,835.74		
Point 6				-4,948.00	-3,004.00	1,492,246.58	3,376,807.74		
Point 7				-4,975.00	-957.00	1,494,293.55	3,376,780.74		
Point 8				-2,900.00	-935.00	1,494,315.55	3,378,855.71		
Point 9				-850.00	-856.00	1,494,394.55	3,380,905.68		

North Reference Sheet for Sec. 5-T8N-R60W - Shable LF07-68HN

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.
Vertical Depths are relative to KB=16' @ 4937.00ft (Precision 829). Northing and Easting are relative to Shable LF07-68HN
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: 0.99998549

Grid Coordinates of Well: 1,495,250.54 ft N, 3,381,755.67 ft E
Geographical Coordinates of Well: 40°41' 05.00" N, 104°07' 24.45" W
Grid Convergence at Surface is: 0.89°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,854.00ft
the Bottom Hole Displacement is 5,010.91ft in the Direction of 258.14°(Grid).
Magnetic Convergence at surface is: -7.47°(25 March 2013, , BGGM2012)

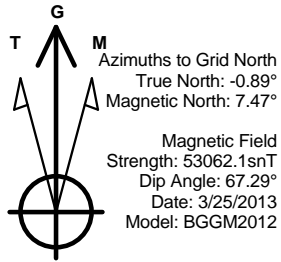


Project: Weld County, CO (NAD 83)
Site: Sec. 5-T8N-R60W
Well: Shable LF07-68HN

Noble Energy

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Sperry Drilling

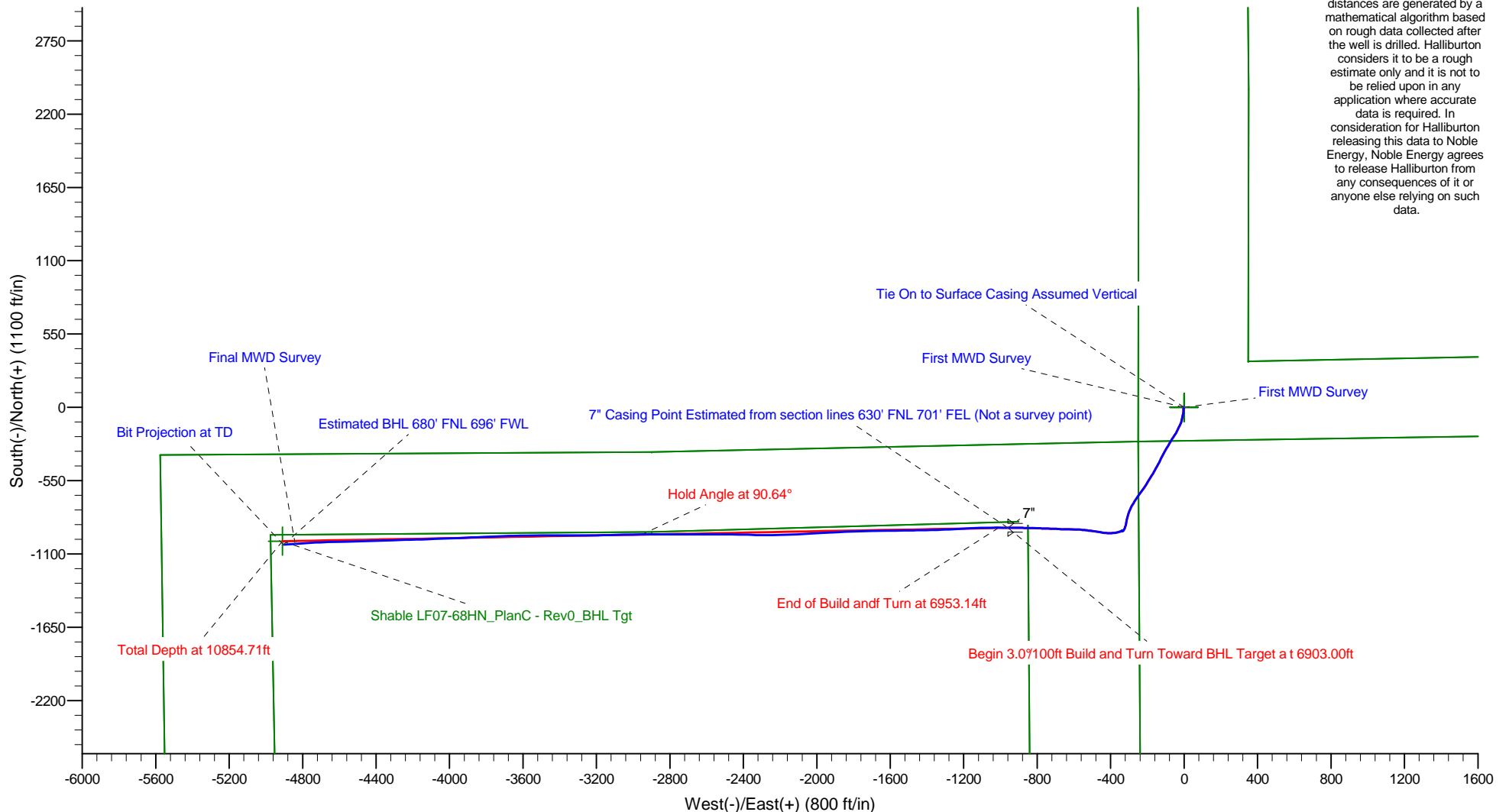


LEGEND

- Shable LF07-68HN, Plan C, Plan C - Rev 0 Proposal V0
- Actual Field Survey

Permitted BHL: 600' FNL, 660' FWL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Shable LF07-68HN 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.

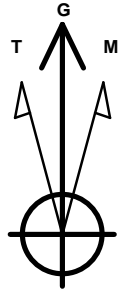


Project: Weld County, CO (NAD 83)
Site: Sec. 5-T8N-R60W
Well: Shable LF07-68HN

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.89°
Magnetic North: 7.47°

Magnetic Field
Strength: 53062.1snT
Dip Angle: 67.29°
Date: 3/25/2013
Model: BGGM2012

LEGEND

- Shable LF07-68HN, Plan C, Plan C - Rev 0 Proposal V0
- Actual Field Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Shable LF07-68HN 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.

