

# Noble Energy

Weld County, CO (NAD 83)

Sec. 6-T2N-R67W

Strear V06-63HN

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

09 March, 2012

Well Coordinates: 1,302,248.73 N, 3,160,565.64 E (40° 09' 41.90" N, 104° 55' 31.80" W)

Ground Level: 4,866.00 ft

Local Coordinate Origin:

Centered on Well Strear V06-63HN

Viewing Datum:

KB @ 4879.00ft (Ensign 132)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

**HALLIBURTON**

## Design Report for Strear V06-63HN - 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
653.00	0.00	0.00	653.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 653.00ft							
691.00	0.35	193.57	691.00	-0.11	-0.03	0.00	0.92
First MWD Survey							
782.00	0.27	251.94	782.00	-0.45	-0.30	0.17	0.34
874.00	0.34	249.76	874.00	-0.61	-0.76	0.57	0.08
966.00	0.71	237.91	965.99	-1.01	-1.50	1.18	0.42
1,060.00	0.69	254.68	1,059.99	-1.47	-2.54	2.07	0.22
1,155.00	0.64	237.15	1,154.98	-1.91	-3.53	2.92	0.22
1,250.00	0.89	277.90	1,249.97	-2.09	-4.71	4.00	0.61
1,346.00	1.14	260.78	1,345.96	-2.14	-6.39	5.61	0.41
1,441.00	1.16	256.28	1,440.94	-2.52	-8.26	7.32	0.10
1,536.00	1.33	359.09	1,535.92	-1.65	-9.21	8.46	2.05
1,631.00	3.42	32.93	1,630.84	1.83	-7.69	7.90	2.56
1,725.00	5.90	40.84	1,724.52	7.84	-3.00	4.94	2.72
1,821.00	7.85	44.42	1,819.83	16.26	4.81	-0.41	2.08
1,916.00	9.35	40.45	1,913.76	26.77	14.36	-6.89	1.70
2,011.00	11.35	47.02	2,007.21	39.01	26.21	-15.14	2.44
2,107.00	12.82	55.17	2,101.09	51.54	41.86	-26.99	2.34
2,204.00	13.52	55.19	2,195.54	64.16	60.01	-41.22	0.72
2,299.00	13.83	49.99	2,287.85	77.80	77.82	-54.86	1.33
2,394.00	15.89	47.37	2,379.67	93.91	96.09	-68.30	2.28
2,489.00	14.18	47.00	2,471.41	110.65	114.17	-81.39	1.80
2,584.00	14.86	47.94	2,563.38	126.75	131.72	-94.14	0.76
2,679.00	15.58	44.28	2,655.05	144.04	149.68	-106.97	1.26
2,774.00	15.81	44.14	2,746.50	162.46	167.60	-119.47	0.25
2,869.00	14.55	46.94	2,838.19	179.90	185.33	-132.05	1.53
2,964.00	15.79	48.47	2,929.88	196.62	203.72	-145.45	1.37
3,060.00	15.68	50.53	3,022.28	213.52	223.52	-160.15	0.59
3,155.00	14.23	50.00	3,114.06	229.19	242.37	-174.27	1.53
3,250.00	14.69	51.11	3,206.05	244.26	260.69	-188.04	0.57
3,345.00	15.69	55.73	3,297.73	259.05	280.68	-203.48	1.65
3,440.00	15.41	57.73	3,389.26	273.03	301.97	-220.39	0.64
3,535.00	15.48	51.04	3,480.83	287.74	322.50	-236.38	1.88
3,630.00	14.94	47.71	3,572.51	303.95	341.42	-250.42	1.08
3,725.00	13.81	46.57	3,664.53	319.99	358.71	-262.94	1.23
3,820.00	12.45	45.94	3,757.05	334.90	374.31	-274.11	1.44
3,915.00	13.23	46.40	3,849.67	349.52	389.54	-285.00	0.83
4,010.00	12.24	45.29	3,942.33	364.10	404.57	-295.71	1.07
4,105.00	9.64	48.93	4,035.60	376.42	417.73	-305.21	2.83
4,200.00	7.19	41.81	4,129.57	386.07	427.69	-312.31	2.80
4,295.00	4.75	35.57	4,224.05	393.71	433.94	-316.36	2.65
4,390.00	4.64	46.90	4,318.73	399.53	439.03	-319.76	0.98
4,485.00	2.90	65.76	4,413.53	403.14	444.03	-323.64	2.23
4,580.00	1.60	93.98	4,508.45	404.04	447.55	-326.80	1.76
4,675.00	1.54	95.72	4,603.42	403.82	450.14	-329.36	0.08
4,770.00	0.73	66.99	4,698.40	403.93	451.97	-331.10	1.02
4,865.00	0.64	56.20	4,793.39	404.46	452.96	-331.92	0.17
4,961.00	0.37	109.55	4,889.39	404.65	453.70	-332.58	0.54

**Design Report for Strear V06-63HN - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,056.00	0.20	302.72	4,984.39	404.64	453.85	-332.73	0.60
5,151.00	0.33	1.58	5,079.39	405.00	453.72	-332.51	0.30
5,246.00	0.52	324.87	5,174.39	405.63	453.48	-332.11	0.34
5,341.00	0.22	124.66	5,269.39	405.88	453.38	-331.95	0.77
5,436.00	0.42	189.84	5,364.38	405.43	453.47	-332.16	0.40
5,531.00	0.78	227.85	5,459.38	404.66	452.93	-331.84	0.55
5,626.00	0.60	253.83	5,554.37	404.08	451.98	-331.06	0.38
5,721.00	0.55	348.79	5,649.37	404.39	451.41	-330.44	0.89
5,817.00	0.80	242.34	5,745.37	404.53	450.73	-329.74	1.14
5,911.00	0.67	263.11	5,839.36	404.16	449.60	-328.75	0.31
6,006.00	1.53	228.82	5,934.34	403.26	448.09	-327.53	1.10
6,101.00	1.14	243.55	6,029.31	402.00	446.29	-326.12	0.54
6,196.00	0.83	286.59	6,124.30	401.78	444.79	-324.72	0.82
6,291.00	0.82	334.25	6,219.29	402.59	443.83	-323.59	0.70
6,355.00	1.35	336.90	6,283.28	403.69	443.34	-322.83	0.83
6,386.00	1.33	346.76	6,314.27	404.38	443.11	-322.43	0.75
6,418.00	1.11	352.39	6,346.27	405.05	442.99	-322.13	0.78
6,449.00	1.40	1.96	6,377.26	405.73	442.96	-321.93	1.15
6,481.00	1.43	329.65	6,409.25	406.46	442.77	-321.56	2.46
6,513.00	3.20	285.48	6,441.22	407.04	441.71	-320.38	7.47
6,544.00	6.61	276.72	6,472.11	407.48	439.10	-317.75	11.23
6,576.00	10.27	271.14	6,503.75	407.76	434.42	-313.16	11.71
6,608.00	14.06	271.81	6,535.03	407.94	427.68	-306.60	11.85
6,639.00	16.88	272.95	6,564.90	408.29	419.42	-298.54	9.15
6,671.00	20.26	273.35	6,595.23	408.85	409.24	-288.57	10.57
6,703.00	23.73	274.03	6,624.90	409.63	397.29	-276.82	10.87
6,735.00	26.75	275.16	6,653.84	410.73	383.69	-263.40	9.56
6,766.00	29.05	276.51	6,681.24	412.21	369.26	-249.09	7.69
6,798.00	31.28	275.87	6,708.90	413.94	353.28	-233.21	7.04
6,830.00	33.75	276.23	6,735.88	415.75	336.17	-216.22	7.74
6,861.00	34.47	279.34	6,761.55	418.11	318.95	-198.98	6.09
6,893.00	35.50	281.43	6,787.77	421.42	300.91	-180.70	4.94
6,925.00	36.54	282.97	6,813.65	425.40	282.52	-161.91	4.31
6,956.00	39.74	281.37	6,838.03	429.43	263.81	-142.79	10.80
6,988.00	41.81	280.93	6,862.26	433.47	243.30	-121.94	6.53
7,020.00	43.04	278.92	6,885.89	437.18	222.04	-100.45	5.72
7,051.00	44.80	278.57	6,908.21	440.45	200.79	-79.08	5.73
7,083.00	47.02	281.12	6,930.48	444.39	178.15	-56.19	8.99
7,115.00	49.65	280.38	6,951.75	448.85	154.66	-32.36	8.40
7,147.00	51.39	279.72	6,972.10	453.15	130.34	-7.76	5.67
7,179.00	53.50	278.86	6,991.60	457.25	105.31	17.48	6.93
7,210.00	55.47	277.99	7,009.61	460.94	80.35	42.54	6.75
7,242.00	57.26	276.38	7,027.33	464.27	53.92	68.92	6.99
7,273.00	59.40	275.89	7,043.61	467.09	27.69	94.98	7.03
7,305.00	61.44	275.23	7,059.40	469.78	-0.01	122.42	6.62
7,337.00	63.69	274.37	7,074.15	472.16	-28.31	150.36	7.42
7,369.00	65.83	273.84	7,087.79	474.23	-57.18	178.78	6.85
7,400.00	67.11	273.14	7,100.17	475.96	-85.55	206.62	4.62
7,432.00	69.46	273.53	7,112.01	477.69	-115.22	235.72	7.43
7,464.00	72.58	275.44	7,122.41	480.06	-145.38	265.46	11.27
7,477.00	73.97	276.25	7,126.15	481.32	-157.77	277.74	12.24



**Design Report for Strear V06-63HN - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
7,529.00	77.21	273.31	7,139.10	485.51	-207.95	327.28	8.29
7,625.00	85.80	279.84	7,153.28	496.43	-302.12	421.04	11.19
7,688.00	87.04	280.39	7,157.21	507.47	-364.02	483.68	2.15
7,751.00	89.60	279.57	7,159.06	518.38	-426.03	546.39	4.27
7,846.00	91.26	280.25	7,158.35	534.73	-519.61	641.00	1.89
7,941.00	91.14	281.62	7,156.36	552.75	-612.86	735.72	1.45
8,036.00	88.92	281.74	7,156.31	571.98	-705.89	830.55	2.34
8,131.00	89.94	282.04	7,157.25	591.55	-798.84	925.39	1.12
8,226.00	89.23	281.60	7,157.94	611.01	-891.83	1,020.23	0.88
8,322.00	88.89	279.22	7,159.52	628.35	-986.23	1,115.89	2.50
8,417.00	90.06	277.68	7,160.39	642.31	-1,080.19	1,210.24	2.04
8,511.00	91.60	278.24	7,159.02	655.33	-1,173.27	1,303.50	1.74
8,606.00	89.75	277.83	7,157.90	668.60	-1,267.32	1,397.77	1.99
8,701.00	89.97	277.73	7,158.14	681.46	-1,361.45	1,491.99	0.25
8,797.00	91.51	277.67	7,156.90	694.32	-1,456.57	1,587.18	1.61
8,892.00	90.59	278.21	7,155.16	707.44	-1,550.65	1,681.42	1.12
8,987.00	90.43	278.99	7,154.31	721.65	-1,644.57	1,775.80	0.84
9,082.00	89.63	278.68	7,154.26	736.24	-1,738.44	1,870.24	0.90
9,177.00	89.44	277.80	7,155.03	749.86	-1,832.46	1,964.55	0.95
9,272.00	89.20	277.84	7,156.16	762.78	-1,926.57	2,058.78	0.26
9,367.00	90.06	277.86	7,156.77	775.75	-2,020.68	2,153.01	0.91
9,462.00	87.66	276.56	7,158.66	787.67	-2,114.90	2,247.09	2.87
9,557.00	88.18	276.42	7,162.11	798.41	-2,209.23	2,340.95	0.57
9,653.00	90.15	278.77	7,163.51	811.09	-2,304.36	2,436.11	3.19
9,716.00	90.86	278.78	7,162.95	820.70	-2,366.62	2,498.72	1.13
9,811.00	92.31	278.77	7,160.33	835.19	-2,460.47	2,593.10	1.53
9,906.00	89.85	279.01	7,158.54	849.87	-2,554.31	2,687.52	2.60
10,001.00	90.25	278.73	7,158.45	864.51	-2,648.17	2,781.96	0.51
10,096.00	90.34	279.30	7,157.96	879.40	-2,742.00	2,876.42	0.61
10,191.00	91.66	279.69	7,156.31	895.07	-2,835.68	2,970.95	1.45
10,286.00	90.18	279.46	7,154.78	910.87	-2,929.34	3,065.49	1.58
10,381.00	91.42	279.90	7,153.46	926.84	-3,022.98	3,160.05	1.38
10,412.00	92.13	279.82	7,152.49	932.15	-3,053.50	3,190.91	2.30
10,507.00	89.78	279.75	7,150.91	948.29	-3,147.10	3,285.48	2.47
10,602.00	90.77	279.87	7,150.46	964.47	-3,240.71	3,380.07	1.05
10,698.00	90.12	280.54	7,149.71	981.48	-3,335.19	3,475.72	0.97
10,793.00	90.34	280.35	7,149.33	998.70	-3,428.61	3,570.40	0.31
10,888.00	89.29	279.64	7,149.64	1,015.19	-3,522.17	3,665.02	1.33
10,983.00	90.46	280.11	7,149.84	1,031.48	-3,615.76	3,759.63	1.33
11,078.00	89.69	279.70	7,149.72	1,047.83	-3,709.34	3,854.23	0.92
11,173.00	88.83	279.86	7,150.95	1,063.96	-3,802.95	3,948.82	0.92
11,268.00	90.03	280.76	7,151.89	1,080.96	-3,896.41	4,043.48	1.58
11,349.00	90.92	281.12	7,151.22	1,096.33	-3,975.93	4,124.26	1.19
<b>Final MWD Survey</b>							
11,405.00	90.92	281.12	7,150.32	1,107.13	-4,030.88	4,180.12	0.00

Survey Projection to TD - Estimated BHL: 1518' FSL, 539' FWL

## Design Report for Strear V06-63HN - MWD Survey

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
653.00	653.00	0.00	0.00	Surface Casing Assumed Vertical at 653.00ft
691.00	691.00	-0.11	-0.03	First MWD Survey
11,349.00	7,151.22	1,096.33	-3,975.93	Final MWD Survey
11,405.00	7,150.32	1,107.13	-4,030.88	Survey Projection to TD
11,405.00	7,150.32	1,107.13	-4,030.88	Estimated BHL: 1518' FSL, 539' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Strear V06-63HN_PlanA - Rev1_BHL Tgt	285.10	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
653.00	11,405.00	Sperry MWD Surveys	MWD

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
Strear	0.00	0.00	7,151.24	1,088.96	-4,034.57	1,303,337.64	3,156,531.23	40° 9' 52.920 N	104° 56' 23.676 W
- actual wellpath misses target center by 18.57ft at 11405.00ft MD (7150.32 TVD, 1107.13 N, -4030.88 E)									
- Point									
Strear	0.00	0.00	0.00	0.00	0.00	1,302,248.73	3,160,565.64	40° 9' 41.904 N	104° 55' 31.800 W
- actual wellpath hits target center									
- Polygon									
Point 1				38.00	-18.00	1,302,230.73	3,160,603.63		
Point 2				-4,102.00	56.00	1,302,304.73	3,156,463.81		
Point 3				-4,130.00	4,549.00	1,306,797.54	3,156,435.81		
Point 4				119.00	4,524.00	1,306,772.54	3,160,684.63		
Point 5				38.00	-18.00	1,302,230.73	3,160,603.63		
Strear	0.00	0.00	0.00	0.00	0.00	1,302,248.73	3,160,565.64	40° 9' 41.904 N	104° 55' 31.800 W
- actual wellpath hits target center									
- Polygon									
Point 1				498.00	-478.00	1,301,770.75	3,161,063.62		
Point 2				-4,562.00	-404.00	1,301,844.75	3,156,003.83		
Point 3				-4,590.00	5,009.00	1,307,257.52	3,155,975.83		
Point 4				579.00	4,984.00	1,307,232.52	3,161,144.61		
Point 5				498.00	-478.00	1,301,770.75	3,161,063.62		

**North Reference Sheet for Sec. 6-T2N-R67W - Strear V06-63HN**

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

Vertical Depths are relative to KB @ 4879.00ft (Ensign 132). Northing and Easting are relative to Strear V06-63HN

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: 0.99995805

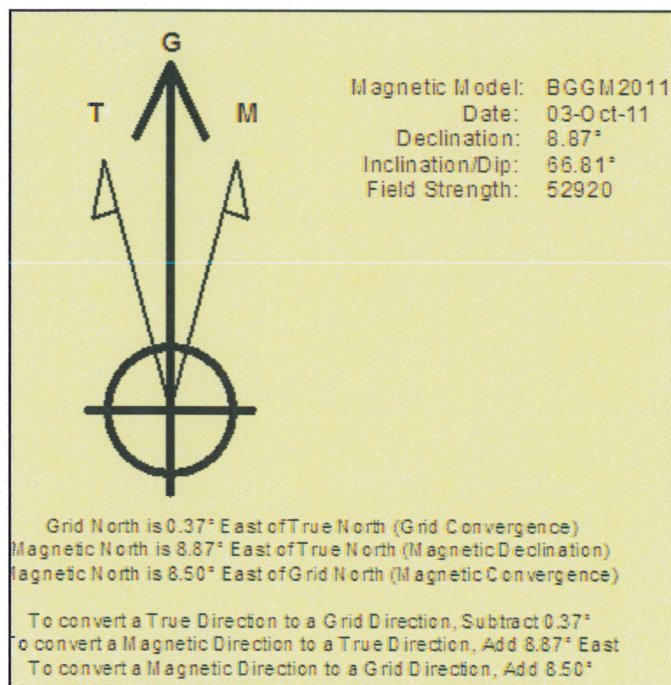
Grid Coordinates of Well: 1,302,248.73 ft N, 3,160,565.64 ft E

Geographical Coordinates of Well: 40° 09' 41.90" N, 104° 55' 31.80" W

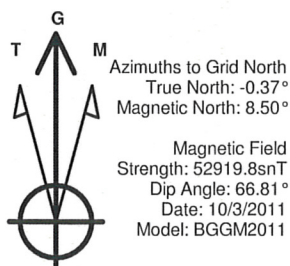
Grid Convergence at Surface is: 0.37°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,405.00ft  
the Bottom Hole Displacement is 4,180.16ft in the Direction of 285.36° (Grid).

Magnetic Convergence at surface is: -8.50° ( 3 October 2011, , BGGM2011)



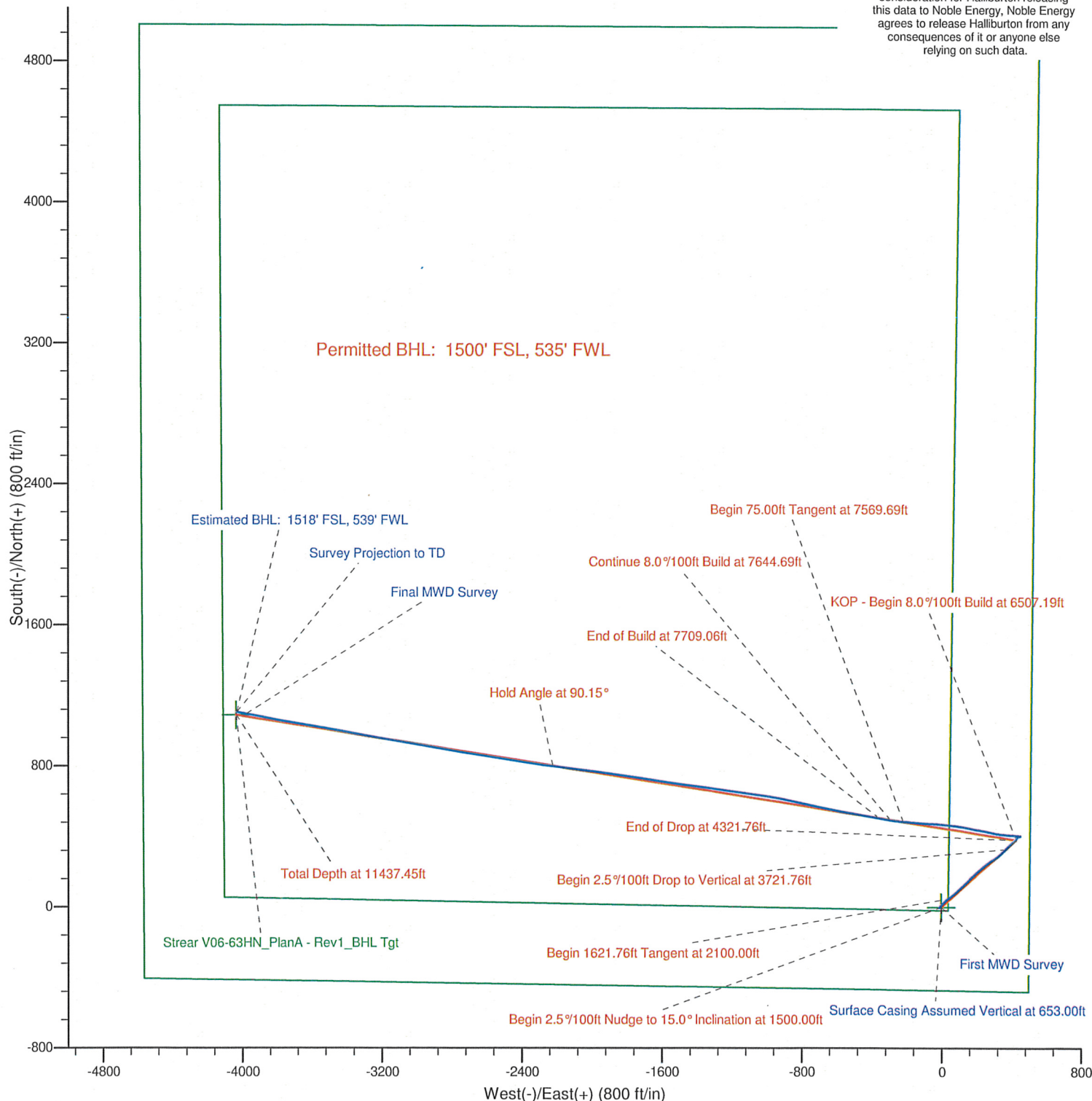




### LEGEND

- Strear V06-63HN, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

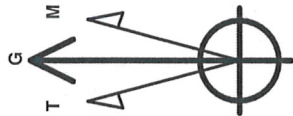
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Strear V06-63HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them 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.



# Noble Energy

Project: Weld County, CO (NAD 83)  
Site: Sec. 6-T2N-R67W  
Well: Strear V06-63HN

**HALLIBURTON**  
Sperry Drilling



Azimuths to Grid North  
True North: -0.37°  
Magnetic North: 8.50°  
  
Magnetic Field  
Strength: 52919.8snT  
Dip Angle: 66.81°  
Date: 10/3/2011  
Model: BGGM2011

## LEGEND

- Strear V06-63HN, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Strear V06-63HN 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.

