

# Noble Energy

Weld County, CO (NAD 83)

Sec. 3-T2N-R67W

Strear V03-73HN

Design: MWD Surveys

## Sperry Drilling Services

### Final Survey Report

28 October, 2011

Well Coordinates: 1,302,238.63 N, 3,176,234.29 E (40° 09' 40.75" N, 104° 52' 09.98" W)

Ground Level: 4,905.00 ft

Local Coordinate Origin:

Centered on Well Strear V03-73HN

Viewing Datum:

KB @ 4929.00ft (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

**HALLIBURTON**

## Survey Report for Strear V03-73HN - Sperry MWD Surveys

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
875.00	0.74	134.42	874.98	-3.95	4.04	-4.76	0.08
<b>First MWD Survey</b>							
967.00	0.51	174.64	966.97	-4.78	4.50	-5.66	0.52
1,061.00	0.53	194.38	1,060.97	-5.62	4.43	-6.47	0.19
1,249.00	0.52	215.88	1,248.96	-7.15	3.71	-7.80	0.10
1,343.00	0.37	196.94	1,342.96	-7.79	3.37	-8.34	0.22
1,438.00	0.67	263.84	1,437.95	-8.14	2.73	-8.54	0.66
1,532.00	2.29	253.10	1,531.92	-8.74	0.39	-8.61	1.74
1,626.00	2.97	261.29	1,625.82	-9.66	-3.81	-8.56	0.82
1,721.00	4.41	260.87	1,720.62	-10.61	-9.85	-8.13	1.52
1,815.00	5.63	260.87	1,814.26	-11.92	-17.97	-7.59	1.30
1,909.00	6.97	251.59	1,907.69	-14.45	-27.94	-7.82	1.79
2,006.00	8.48	247.93	2,003.81	-18.99	-40.15	-9.52	1.64
2,101.00	8.84	258.11	2,097.73	-23.13	-53.79	-10.49	1.66
2,196.00	11.01	259.77	2,191.30	-26.25	-69.86	-9.93	2.30
2,291.00	11.22	253.90	2,284.52	-30.42	-87.67	-10.01	1.21
2,386.00	9.27	247.71	2,378.01	-35.89	-103.63	-11.76	2.35
2,480.00	9.52	250.93	2,470.75	-41.30	-117.98	-13.82	0.62
2,576.00	9.70	256.00	2,565.40	-45.85	-133.33	-14.81	0.90
2,671.00	11.47	255.03	2,658.78	-50.23	-150.22	-15.29	1.87
2,765.00	12.95	253.17	2,750.65	-55.69	-169.34	-16.33	1.63
2,860.00	12.42	248.89	2,843.34	-62.45	-189.06	-18.51	1.14
2,955.00	11.01	255.41	2,936.36	-68.42	-207.37	-20.22	2.03
3,050.00	10.85	261.12	3,029.64	-72.08	-224.98	-19.84	1.15
3,145.00	12.51	273.25	3,122.68	-72.88	-244.09	-16.34	3.11
3,240.00	11.76	268.82	3,215.56	-72.49	-264.04	-11.49	1.26
3,335.00	9.74	256.14	3,308.90	-74.62	-281.53	-9.65	3.26
3,430.00	9.58	246.58	3,402.56	-79.69	-296.59	-11.21	1.70
3,526.00	9.64	250.03	3,497.21	-85.61	-311.47	-13.65	0.60
3,621.00	9.76	249.04	3,590.86	-91.20	-326.47	-15.74	0.22
3,716.00	9.12	241.97	3,684.57	-97.62	-340.63	-18.82	1.39
3,812.00	8.85	260.97	3,779.42	-102.36	-354.64	-20.30	3.09
3,907.00	9.10	259.45	3,873.25	-104.88	-369.25	-19.49	0.36
4,065.00	8.43	244.84	4,029.43	-112.09	-392.02	-21.41	1.47
4,191.00	10.32	245.10	4,153.74	-120.77	-410.61	-25.71	1.50
4,286.00	9.76	234.70	4,247.29	-129.01	-424.91	-30.53	1.99
4,382.00	8.44	252.69	4,342.10	-135.81	-438.28	-34.16	3.25
4,477.00	6.17	273.20	4,436.34	-137.60	-450.03	-33.27	3.60
4,572.00	6.95	272.15	4,530.71	-137.10	-460.87	-30.36	0.83
4,667.00	9.65	262.95	4,624.71	-137.86	-474.52	-28.04	3.16
4,762.00	9.54	255.85	4,718.39	-140.76	-490.06	-27.39	1.25
4,857.00	9.03	256.82	4,812.14	-144.39	-504.95	-27.58	0.56
4,952.00	6.40	258.73	4,906.28	-147.12	-517.41	-27.46	2.78
5,047.00	6.41	260.61	5,000.68	-149.02	-527.83	-26.98	0.22
5,142.00	3.77	257.21	5,095.30	-150.58	-536.11	-26.64	2.80
5,237.00	1.65	246.27	5,190.19	-151.82	-540.41	-26.89	2.29
5,332.00	0.09	46.03	5,285.18	-152.32	-541.61	-27.10	1.83
5,427.00	0.10	5.26	5,380.18	-152.18	-541.54	-26.99	0.07
5,522.00	0.41	45.23	5,475.18	-151.86	-541.30	-26.73	0.36

## Survey Report for Strear V03-73HN - Sperry MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,617.00	0.73	40.73	5,570.17	-151.16	-540.66	-26.19	0.34
5,713.00	0.59	92.90	5,666.17	-150.73	-539.77	-25.96	0.62
5,808.00	1.14	3.43	5,761.16	-149.81	-539.22	-25.19	1.35
5,903.00	1.60	2.09	5,856.13	-147.54	-539.12	-23.00	0.49
5,998.00	0.80	46.47	5,951.11	-145.76	-538.59	-21.38	1.23
6,093.00	0.80	23.35	6,046.10	-144.69	-537.84	-20.51	0.34
6,187.00	0.43	57.70	6,140.10	-143.90	-537.29	-19.87	0.54
6,282.00	1.09	144.44	6,235.09	-144.44	-536.46	-20.58	1.21
6,378.00	1.19	70.89	6,331.07	-144.86	-534.99	-21.32	1.42
6,444.00	1.61	24.28	6,397.06	-143.79	-533.96	-20.51	1.78
6,536.00	5.36	348.34	6,488.88	-138.40	-534.29	-15.18	4.53
6,567.00	9.85	338.91	6,519.60	-134.51	-535.54	-11.10	14.99
6,599.00	11.25	335.89	6,551.06	-129.11	-537.80	-5.33	4.70
6,630.00	13.43	332.59	6,581.34	-123.15	-540.69	1.12	7.39
6,662.00	15.92	334.79	6,612.29	-115.88	-544.28	9.01	7.97
6,693.00	19.50	337.83	6,641.82	-107.24	-548.04	18.27	11.92
6,725.00	22.32	341.48	6,671.71	-96.53	-551.99	29.60	9.70
6,757.00	24.58	348.84	6,701.07	-84.23	-555.21	42.30	11.55
6,788.00	27.49	349.50	6,728.92	-70.87	-557.76	55.90	9.43
6,820.00	29.22	346.68	6,757.08	-56.00	-560.90	71.09	6.84
6,852.00	31.65	347.57	6,784.67	-40.20	-564.51	87.30	7.72
6,884.00	33.86	350.02	6,811.58	-23.22	-567.86	104.60	8.05
6,915.00	34.16	351.32	6,837.28	-6.11	-570.67	121.90	2.54
6,947.00	35.63	352.87	6,863.53	12.02	-573.19	140.13	5.36
6,979.00	38.65	354.51	6,889.03	31.22	-575.30	159.32	9.93
7,011.00	40.91	354.62	6,913.63	51.60	-577.24	179.62	7.07
7,042.00	43.79	354.94	6,936.53	72.40	-579.14	200.31	9.32
7,074.00	46.42	353.89	6,959.12	94.96	-581.35	222.79	8.54
7,105.00	48.66	354.01	6,980.04	117.70	-583.76	245.49	7.23
7,137.00	49.03	354.44	7,001.10	141.67	-586.18	269.40	1.54
7,169.00	48.17	354.26	7,022.26	165.56	-588.54	293.21	2.72
7,201.00	48.92	355.13	7,043.45	189.44	-590.76	316.98	3.11
7,232.00	49.76	356.00	7,063.65	212.88	-592.58	340.23	3.45
7,264.00	52.77	357.14	7,083.67	237.79	-594.07	364.85	9.81
7,296.00	54.60	356.26	7,102.62	263.53	-595.55	390.27	6.13
7,328.00	57.13	354.84	7,120.58	289.94	-597.61	416.46	8.72
7,360.00	58.78	352.89	7,137.56	316.90	-600.52	443.39	7.30
7,391.00	59.58	352.91	7,153.44	343.32	-603.81	469.87	2.58
7,423.00	61.36	352.76	7,169.21	370.95	-607.28	497.57	5.58
7,455.00	65.25	353.78	7,183.58	399.33	-610.62	525.99	12.49
7,486.00	67.38	353.47	7,196.03	427.54	-613.78	554.19	6.93
7,518.00	70.72	352.22	7,207.48	457.19	-617.50	583.92	11.06
7,550.00	74.96	352.57	7,216.91	487.49	-621.55	614.35	13.29
7,583.00	80.36	352.23	7,223.96	519.43	-625.81	646.44	16.39
7,662.00	87.32	351.54	7,232.44	597.14	-636.89	724.65	8.85
7,725.00	88.36	351.61	7,234.81	659.42	-646.12	787.41	1.65
7,788.00	85.71	353.71	7,238.07	721.81	-654.15	850.02	5.36
7,915.00	84.87	355.69	7,248.50	847.83	-665.85	975.46	1.69
8,011.00	90.62	355.63	7,252.27	943.44	-673.10	1,070.26	5.99
8,106.00	93.24	355.84	7,249.08	1,038.11	-680.16	1,164.11	2.77
8,201.00	93.89	355.98	7,243.17	1,132.69	-686.93	1,257.80	0.70



## Survey Report for Strear V03-73HN - Sperry MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,296.00	91.67	357.85	7,238.56	1,227.43	-692.03	1,351.27	3.05
8,359.00	92.00	358.17	7,236.54	1,290.36	-694.22	1,413.09	0.73
8,423.00	90.71	358.35	7,235.03	1,354.31	-696.16	1,475.85	2.04
8,487.00	90.59	358.56	7,234.30	1,418.28	-697.89	1,538.59	0.38
8,550.00	89.82	356.57	7,234.08	1,481.22	-700.56	1,600.52	3.39
8,613.00	89.69	355.07	7,234.35	1,544.05	-705.15	1,662.79	2.39
8,676.00	90.43	353.41	7,234.28	1,606.73	-711.48	1,725.29	2.88
8,740.00	91.48	353.53	7,233.22	1,670.31	-718.75	1,788.88	1.65
8,803.00	90.86	354.03	7,231.93	1,732.92	-725.58	1,851.43	1.26
8,866.00	91.05	353.69	7,230.88	1,795.55	-732.32	1,913.98	0.62
8,929.00	90.59	353.29	7,229.98	1,858.14	-739.46	1,976.57	0.97
8,993.00	88.21	354.13	7,230.65	1,921.74	-746.47	2,040.13	3.94
9,056.00	88.49	354.59	7,232.46	1,984.41	-752.66	2,102.60	0.85
9,119.00	90.06	355.93	7,233.26	2,047.19	-757.86	2,164.94	3.28
9,182.00	91.47	353.85	7,232.42	2,109.93	-763.47	2,227.34	3.99
9,245.00	91.88	353.64	7,230.58	2,172.53	-770.33	2,289.89	0.73
9,309.00	91.42	355.15	7,228.73	2,236.19	-776.58	2,353.33	2.47
9,372.00	90.56	355.95	7,227.64	2,298.99	-781.47	2,415.63	1.86
9,436.00	89.51	356.07	7,227.61	2,362.84	-785.92	2,478.85	1.65
9,499.00	89.20	355.14	7,228.31	2,425.65	-790.75	2,541.15	1.56
9,562.00	89.08	354.07	7,229.26	2,488.36	-796.67	2,603.59	1.71
9,624.00	90.15	353.24	7,229.68	2,549.98	-803.52	2,665.18	2.18
9,688.00	92.56	351.94	7,228.16	2,613.42	-811.77	2,728.86	4.28
9,814.00	92.37	352.42	7,222.74	2,738.13	-828.90	2,854.24	0.41
9,877.00	91.64	353.53	7,220.54	2,800.62	-836.60	2,916.86	2.11
9,941.00	91.51	353.97	7,218.78	2,864.21	-843.57	2,980.40	0.72
10,004.00	90.52	355.39	7,217.66	2,926.93	-849.41	3,042.83	2.75
10,067.00	88.33	356.65	7,218.30	2,989.77	-853.78	3,105.05	4.01
10,131.00	89.38	356.35	7,219.58	3,053.64	-857.69	3,168.17	1.71
10,194.00	88.83	356.97	7,220.56	3,116.52	-861.36	3,230.28	1.32
10,257.00	86.63	355.81	7,223.06	3,179.34	-865.32	3,292.39	3.95
10,320.00	87.01	355.12	7,226.55	3,242.05	-870.29	3,354.62	1.25
10,384.00	88.71	355.16	7,228.94	3,305.77	-875.71	3,417.93	2.66
10,447.00	87.94	354.86	7,230.78	3,368.50	-881.19	3,480.30	1.31
10,509.00	89.05	352.27	7,232.41	3,430.09	-888.13	3,541.87	4.54
10,573.00	90.59	352.42	7,232.61	3,493.51	-896.66	3,605.60	2.42
10,636.00	91.94	351.55	7,231.22	3,555.88	-905.44	3,668.35	2.55
10,699.00	92.06	353.13	7,229.02	3,618.28	-913.83	3,731.04	2.51
10,762.00	91.85	353.73	7,226.87	3,680.83	-921.04	3,793.61	1.01
10,825.00	91.48	354.48	7,225.04	3,743.47	-927.50	3,856.11	1.33
10,889.00	90.40	355.13	7,223.99	3,807.20	-933.30	3,919.51	1.97
10,952.00	90.74	355.32	7,223.36	3,869.97	-938.54	3,981.87	0.62
11,015.00	89.81	354.67	7,223.06	3,932.73	-944.04	4,044.26	1.80
11,078.00	90.71	353.71	7,222.78	3,995.41	-950.42	4,106.77	2.09
11,141.00	91.20	353.38	7,221.73	4,058.00	-957.50	4,169.36	0.94
11,204.00	90.89	353.00	7,220.58	4,120.54	-964.97	4,231.99	0.78
11,267.00	90.80	353.12	7,219.65	4,183.07	-972.58	4,294.64	0.24
11,328.00	91.98	353.20	7,218.17	4,243.62	-979.84	4,355.27	1.94
<b>Final MWD Survey</b>							
11,386.00	91.98	353.20	7,216.16	4,301.18	-986.70	4,412.90	0.00

Survey Projection to TD - Estimated BHL: 537' FNL 1647' FEL

## Survey Report for Strear V03-73HN - Sperry MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
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Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
875.00	874.98	-3.95	4.04	First MWD Survey
11,328.00	7,218.17	4,243.62	-979.84	Final MWD Survey
11,386.00	7,216.16	4,301.18	-986.70	Survey Projection to TD
11,386.00	7,216.16	4,301.18	-986.70	Estimated BHL: 537' FNL 1647' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Strear V03-73HN_PlanA - Rev1_BHL	347.05	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
875.00	11,386.00	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 - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,302,238.63	3,176,234.29	40° 9' 40.752 N	104° 52' 9.984 W
Strear - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,302,238.63	3,176,234.29	40° 9' 40.752 N	104° 52' 9.984 W
Strear - survey misses target center by 7.63ft at 11386.00ft MD (7216.16 TVD, 4301.18 N, -986.70 E) - Point	0.00	0.00	7,209.10	4,302.72	-989.15	1,306,541.17	3,175,245.18	40° 10' 23.340 N	104° 52' 22.332 W

**North Reference Sheet for Sec. 3-T2N-R67W - Strear V03-73H**

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

Vertical Depths are relative to KB @ 4929.00ft (H&P 322). Northing and Easting are relative to Strear V03-73HN

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: 0.99995806

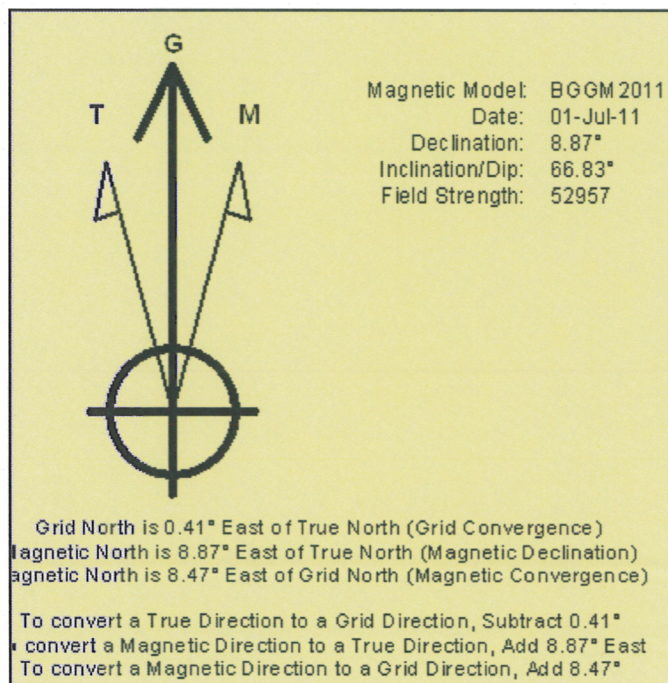
Grid Coordinates of Well: 1,302,238.63 ft N, 3,176,234.29 ft E

Geographical Coordinates of Well: 40° 09' 40.75" N, 104° 52' 09.98" W

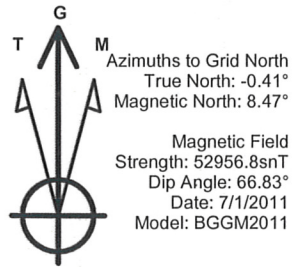
Grid Convergence at Surface is: 0.41°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,386.00ft  
the Bottom Hole Displacement is 4,412.90ft in the Direction of 347.08° (Grid).

Magnetic Convergence at surface is: -8.47° ( 1 July 2011, , BGGM2011)





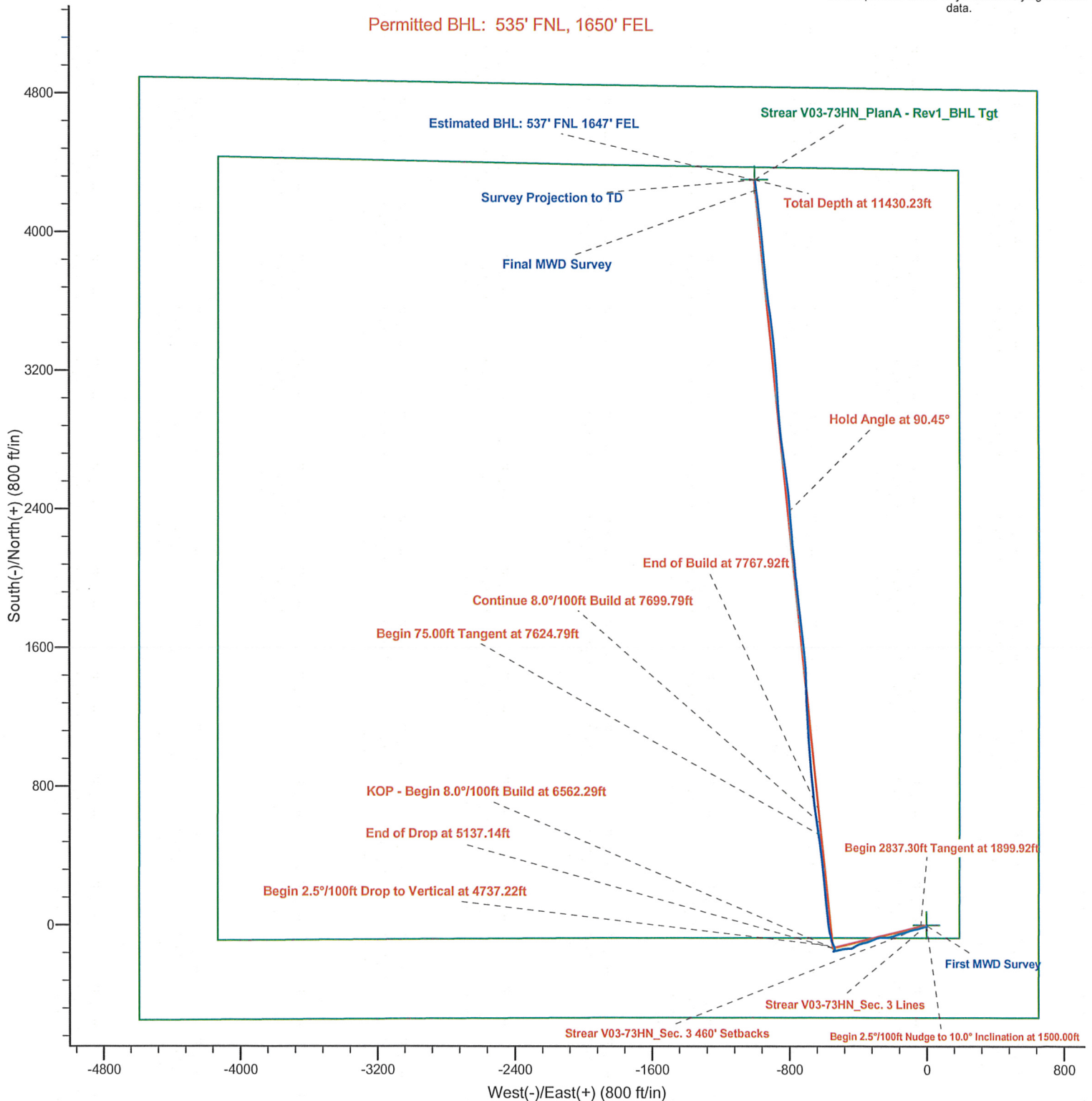


### LEGEND

- Strear V03-73HN, Plan A, Plan A - Rev 1 V0
- MWD Survey

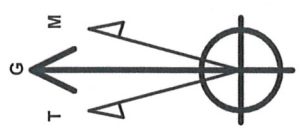
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Strear V03-73HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them 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: 535' FNL, 1650' FEL



Project: Weld County, CO (NAD 83)  
Site: Sec. 3-T2N-R67W  
Well: Strear V03-73HN

# Noble Energy



Azimuths to Grid North  
True North: -0.41°  
Magnetic North: 8.47°  
  
Magnetic Field  
Strength: 52956.8snT  
Dip Angle: 66.83°  
Date: 7/1/2011  
Model: BGGM2011

## LEGEND

- Strear V03-73HN, Plan A, Plan A - Rev 1 V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Strear V03-73HN 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.

