

# Noble Energy

Weld County, CO (NAD 83)

Sec. 26-T9N-59W (Gleason PAD)

Kevin LC26-735

Original Wellbore

Design: Actual Surveys

05-123-40681

## Sperry Drilling Services

### Final Survey Report

05 May, 2015

Well Coordinates: 1,507,336.75 N, 3,431,990.37 E (40° 42' 56.20" N, 103° 56' 29.72" W)

Ground Level: 4,850.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Kevin LC26-735

KB @ 4880.00usft (HP 321)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 26-T9N-59W (Gleason PAD)  
 Well: Kevin LC26-735  
 Wellbore: Original Wellbore  
 Design: Actual Surveys

# Noble Energy



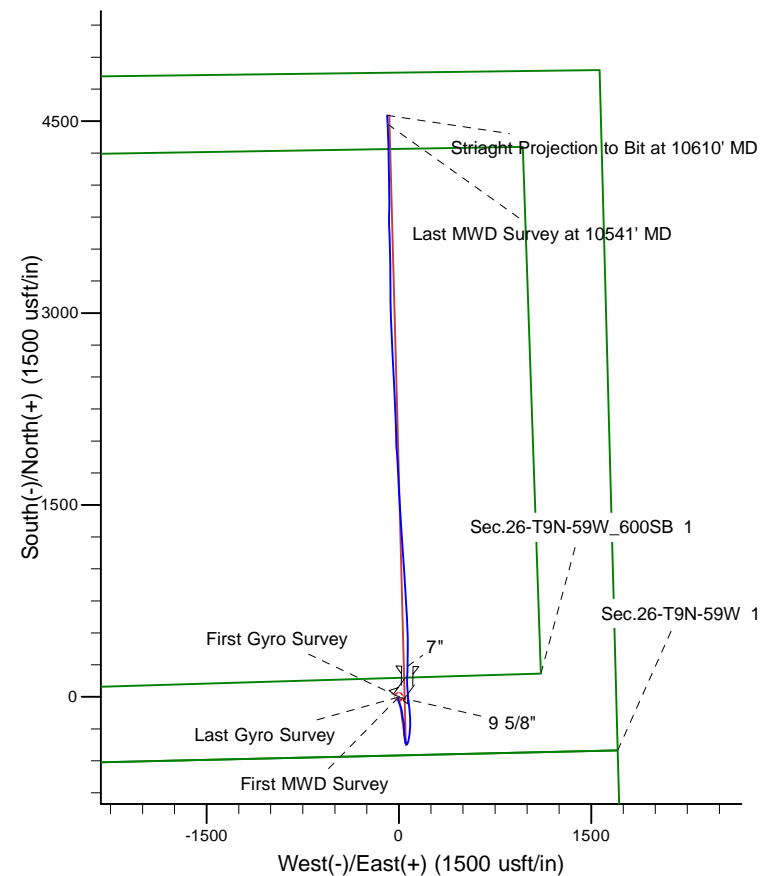
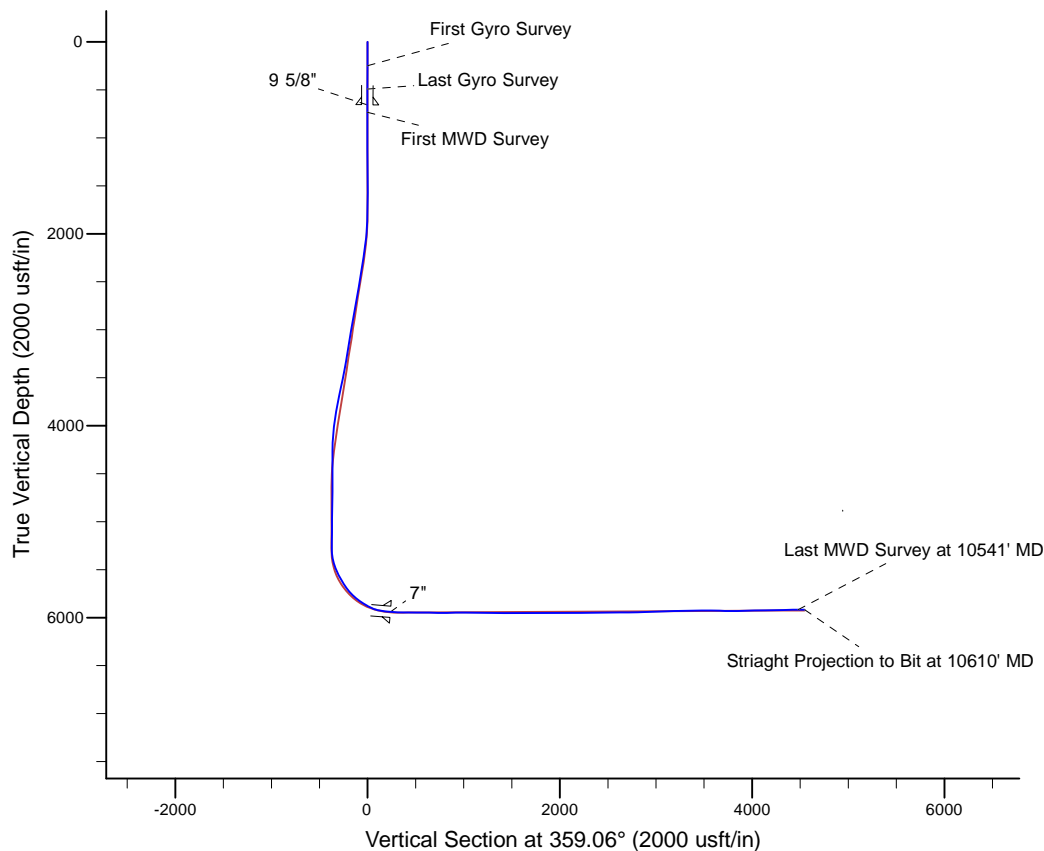
Platted SHL: 460' FSL, 1694' FEL  
 Platted Lat/Long: 40.715610 N, 103.94159 W  
 Location: Sec. 26-T9N-R59W

~7" Casing: 661 FSL, 1651 FEL  
 Lat/Long: 40.716261 N, 103.941335 W  
 State Planes - CO Northern: 1507575.16 N, 3432056.96 E  
 Location: Sec. 26-T9N-R59W

Platted BHL: 330' FNL, 1650' FEL  
 Lat/Long: 40.728090 N, 103.941570 W  
 State Planes - CO Northern: 1511882.99 N, 3431916.01 E  
 Location: Sec. 26-T9N-R59W

## LEGEND

- △ Kevin LC26-735, Original Wellbore, Rev B0 V0
- Actual Surveys



WELL DETAILS: Kevin LC26-735	
Ground Level:	4850.00
KB @ 4880.00usft (HP 321)	
Created By:	Amanda Marchand
Created On:	5/5/2015

**Design Report for Kevin LC26-735 - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249.00	0.60	285.42	249.00	0.35	-1.26	0.37	0.24
<b>First Gyro Survey</b>							
493.00	1.00	185.22	492.98	-1.43	-2.68	-1.39	0.51
<b>Last Gyro Survey</b>							
735.00	0.33	348.85	734.97	-2.85	-3.01	-2.80	0.55
<b>First MWD Survey</b>							
827.00	0.75	339.03	826.97	-2.03	-3.28	-1.98	0.47
919.00	0.28	340.61	918.96	-1.26	-3.57	-1.20	0.51
1,011.00	0.28	347.39	1,010.96	-0.83	-3.69	-0.77	0.04
1,103.00	0.25	345.44	1,102.96	-0.41	-3.79	-0.35	0.03
1,212.00	0.35	312.70	1,211.96	0.04	-4.09	0.11	0.18
1,303.00	0.38	302.75	1,302.96	0.40	-4.55	0.47	0.08
1,487.00	0.22	291.30	1,486.95	0.85	-5.39	0.94	0.09
1,579.00	0.43	248.95	1,578.95	0.79	-5.88	0.89	0.33
1,671.00	0.68	251.13	1,670.95	0.49	-6.72	0.60	0.27
1,763.00	0.78	257.80	1,762.94	0.18	-7.85	0.31	0.14
1,855.00	1.94	192.91	1,854.92	-1.47	-8.81	-1.32	1.91
1,947.00	3.74	180.61	1,946.80	-5.98	-9.19	-5.83	2.05
2,039.00	6.58	169.19	2,038.42	-14.16	-8.23	-14.03	3.27
2,130.00	7.77	164.10	2,128.71	-25.20	-5.57	-25.11	1.48
2,223.00	10.05	161.48	2,220.58	-38.94	-1.27	-38.92	2.49
2,315.00	9.44	158.77	2,311.25	-53.59	4.01	-53.65	0.83
2,406.00	9.39	159.63	2,401.03	-67.50	9.30	-67.65	0.16
2,499.00	9.34	157.93	2,492.79	-81.61	14.78	-81.84	0.30
2,591.00	9.51	164.37	2,583.55	-95.85	19.63	-96.16	1.16
2,684.00	10.16	169.83	2,675.18	-111.32	23.15	-111.68	1.22
2,778.00	10.23	172.87	2,767.70	-127.76	25.65	-128.17	0.58
2,873.00	10.43	172.93	2,861.16	-144.67	27.75	-145.10	0.21
2,968.00	10.14	171.78	2,954.63	-161.48	30.01	-161.95	0.37
3,063.00	9.67	169.96	3,048.22	-177.61	32.59	-178.12	0.59
3,157.00	9.09	166.74	3,140.96	-192.61	35.67	-193.17	0.83
3,252.00	9.39	171.05	3,234.73	-207.57	38.60	-208.18	0.79
3,347.00	9.66	181.39	3,328.43	-223.20	39.61	-223.82	1.82
3,441.00	10.78	180.60	3,420.93	-239.87	39.33	-240.48	1.20
3,536.00	11.12	178.49	3,514.20	-257.92	39.48	-258.53	0.55
3,631.00	11.52	176.07	3,607.36	-276.54	40.37	-277.16	0.65
3,725.00	11.82	174.95	3,699.41	-295.49	41.86	-296.14	0.40
3,820.00	11.74	172.74	3,792.41	-314.77	43.94	-315.45	0.48
3,914.00	9.55	169.63	3,884.79	-331.93	46.55	-332.65	2.41
4,009.00	6.81	168.35	3,978.81	-345.20	49.11	-345.96	2.89
4,104.00	5.02	172.77	4,073.31	-354.84	50.77	-355.62	1.94
4,198.00	3.37	174.27	4,167.05	-361.67	51.56	-362.47	1.76
4,293.00	1.04	106.21	4,261.98	-364.69	52.67	-365.50	3.30
4,388.00	1.23	82.93	4,356.97	-364.81	54.51	-365.65	0.52
4,483.00	0.85	75.70	4,451.95	-364.51	56.20	-365.38	0.42
4,578.00	1.26	77.74	4,546.93	-364.11	57.91	-365.01	0.43
4,672.00	0.35	158.86	4,640.93	-364.16	59.02	-365.08	1.33
4,767.00	0.75	156.46	4,735.92	-365.00	59.37	-365.92	0.42
4,862.00	1.14	149.42	4,830.91	-366.38	60.10	-367.32	0.43

## Design Report for Kevin LC26-735 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,957.00	0.83	134.08	4,925.89	-367.68	61.08	-368.63	0.43
5,052.00	0.84	142.68	5,020.88	-368.71	61.99	-369.67	0.13
5,146.00	0.80	132.02	5,114.87	-369.70	62.90	-370.67	0.17
5,241.00	0.59	160.43	5,209.87	-370.60	63.56	-371.59	0.42
5,336.00	0.51	99.57	5,304.86	-371.13	64.14	-372.13	0.59
5,430.00	15.36	21.75	5,397.73	-359.57	69.19	-360.65	16.23
5,477.00	19.23	14.86	5,442.60	-346.30	73.49	-347.46	9.30
5,525.00	21.19	12.72	5,487.65	-330.20	77.42	-331.42	4.36
5,620.00	28.20	4.88	5,573.93	-291.02	83.12	-292.34	8.13
5,667.00	31.15	4.29	5,614.76	-267.83	84.98	-269.19	6.31
5,714.00	33.74	6.35	5,654.42	-242.73	87.33	-244.13	5.99
5,761.00	35.46	2.58	5,693.11	-216.14	89.39	-217.57	5.84
5,809.00	39.54	356.66	5,731.20	-186.95	89.12	-188.38	11.33
5,856.00	46.26	355.86	5,765.61	-155.05	87.02	-156.45	14.34
5,904.00	50.23	355.25	5,797.57	-119.35	84.24	-120.71	8.32
5,951.00	53.71	353.96	5,826.52	-82.50	80.75	-83.81	7.71
5,999.00	58.87	352.89	5,853.15	-42.85	76.17	-44.09	10.91
6,046.00	61.13	354.65	5,876.65	-2.39	71.76	-3.57	5.80
6,094.00	64.74	354.64	5,898.49	40.16	67.77	39.04	7.52
6,141.00	72.15	357.01	5,915.74	83.72	64.62	82.65	16.45
6,188.00	79.68	1.89	5,927.18	129.26	64.21	128.19	18.92
6,253.00	84.45	0.98	5,936.15	193.60	65.82	192.49	7.47
6,427.00	88.21	0.97	5,947.29	367.18	68.77	366.01	2.16
6,520.00	89.69	359.11	5,948.99	460.16	68.84	458.97	2.56
6,611.00	90.15	357.09	5,949.12	551.10	65.82	549.95	2.28
6,703.00	89.66	356.32	5,949.27	642.95	60.53	641.88	0.99
6,796.00	89.78	357.00	5,949.72	735.79	55.12	734.79	0.74
6,888.00	90.22	356.96	5,949.72	827.66	50.27	826.73	0.48
6,980.00	90.95	357.14	5,948.78	919.54	45.53	918.67	0.82
7,075.00	89.94	356.89	5,948.05	1,014.40	40.59	1,013.60	1.10
7,170.00	89.20	355.69	5,948.76	1,109.20	34.44	1,108.49	1.48
7,264.00	88.58	354.85	5,950.58	1,202.86	26.69	1,202.26	1.11
7,454.00	90.80	356.23	5,951.61	1,392.27	11.92	1,391.88	1.38
7,548.00	89.63	357.33	5,951.26	1,486.11	6.64	1,485.81	1.71
7,643.00	89.14	357.40	5,952.28	1,581.01	2.27	1,580.76	0.52
7,738.00	90.86	357.59	5,952.28	1,675.91	-1.88	1,675.72	1.82
7,833.00	89.32	356.55	5,952.13	1,770.78	-6.74	1,770.66	1.96
7,927.00	89.57	356.43	5,953.04	1,864.60	-12.49	1,864.56	0.30
8,022.00	90.37	356.03	5,953.09	1,959.40	-18.74	1,959.44	0.94
8,117.00	90.49	359.09	5,952.37	2,054.30	-22.78	2,054.40	3.22
8,211.00	90.25	358.11	5,951.77	2,148.27	-25.08	2,148.39	1.07
8,306.00	90.86	357.72	5,950.85	2,243.20	-28.53	2,243.36	0.76
8,401.00	91.79	357.66	5,948.65	2,338.09	-32.36	2,338.31	0.98
8,495.00	90.71	357.30	5,946.60	2,431.98	-36.49	2,432.25	1.21
8,590.00	89.82	356.81	5,946.16	2,526.85	-41.37	2,527.19	1.07
8,685.00	89.97	356.88	5,946.33	2,621.71	-46.60	2,622.12	0.17
8,780.00	90.46	357.06	5,945.98	2,716.57	-51.62	2,717.05	0.55
8,875.00	91.63	357.34	5,944.24	2,811.44	-56.26	2,811.99	1.27
8,969.00	92.03	358.77	5,941.24	2,905.34	-59.45	2,905.92	1.58
9,064.00	92.68	357.96	5,937.34	3,000.22	-62.16	3,000.83	1.09
9,159.00	91.33	358.36	5,934.02	3,095.11	-65.21	3,095.76	1.48

## Design Report for Kevin LC26-735 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,254.00	91.11	0.14	5,931.99	3,190.08	-66.45	3,190.74	1.89
9,349.00	91.63	359.77	5,929.72	3,285.05	-66.53	3,285.70	0.67
9,443.00	91.85	359.10	5,926.87	3,379.00	-67.45	3,379.65	0.75
9,538.00	89.51	358.80	5,925.74	3,473.97	-69.19	3,474.64	2.48
9,633.00	88.92	357.82	5,927.04	3,568.92	-72.00	3,569.62	1.20
9,728.00	88.43	358.50	5,929.24	3,663.84	-75.05	3,664.58	0.88
9,823.00	90.09	0.60	5,930.46	3,758.82	-75.79	3,759.56	2.82
9,918.00	90.77	0.06	5,929.75	3,853.82	-75.24	3,854.53	0.91
10,012.00	90.71	359.51	5,928.54	3,947.81	-75.60	3,948.52	0.59
10,107.00	91.29	359.39	5,926.88	4,042.79	-76.51	4,043.50	0.62
10,202.00	91.29	358.94	5,924.74	4,137.76	-77.89	4,138.48	0.47
10,297.00	90.83	358.24	5,922.98	4,232.71	-80.23	4,233.46	0.88
10,391.00	91.51	358.80	5,921.06	4,326.66	-82.66	4,327.43	0.94
10,486.00	90.43	357.72	5,919.46	4,421.60	-85.54	4,422.40	1.61
10,541.00	89.82	357.19	5,919.34	4,476.54	-87.98	4,477.38	1.47
Last MWD Survey at 10541' MD							
10,610.00	89.92	357.19	5,919.49	4,545.46	-91.37	4,546.35	0.14
Striaight Projection to Bit at 10610' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
249.00	249.00	0.35	-1.26	First Gyro Survey
493.00	492.98	-1.43	-2.68	Last Gyro Survey
735.00	734.97	-2.85	-3.01	First MWD Survey
10,541.00	5,919.34	4,476.54	-87.98	Last MWD Survey at 10541' MD
10,610.00	5,919.49	4,545.46	-91.37	Striaight Projection to Bit at 10610' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Kevin LC26-735_BHL	359.06	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
249.00	493.00	Gyro Surveys	Flexi-Shot
735.00	6,253.00	Intermediate Surveys	MWD
6,427.00	10,610.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
657.00	656.97	9 5/8"	9-5/8	13-3/4
6,298.00	5,940.12	7"	7	8-3/4

**Design Report for Kevin LC26-735 - Actual Surveys**

**Wellbore Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Kevin LC26-735_BHL - actual wellpath misses target center by 17.89usft at 10609.98usft MD (5919.49 TVD, 4545.44 N, -91.36 E) - Point	0.00	0.00	5,914.00	4,546.28	-74.36	1,511,882.99	3,431,916.01	40.728090	-103.941570

**Directional Difficulty Index**

Average Dogleg over Survey:	1.78 °/100usft	Maximum Dogleg over Survey:	18.92 °/100usft at 6,188.00 usft
Net Tortousity applicable to Plans:	0.76 °/100usft	Directional Difficulty Index:	6.254

**Audit Info**

North Reference Sheet for Sec. 26-T9N-59W (Gleason PAD) - Kevin LC26-735 -  
Original Wellbore

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

Vertical Depths are relative to KB @ 4880.00usft (HP 321). Northing and Easting are relative to Kevin LC26-735

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: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99998971

Grid Coordinates of Well: 1,507,336.75 usft N, 3,431,990.37 usft E

Geographical Coordinates of Well: 40° 42' 56.20" N, 103° 56' 29.72" W

Grid Convergence at Surface is: 1.01°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,610.00usft  
the Bottom Hole Displacement is 4,546.38usft in the Direction of 358.85° (Grid).

Magnetic Convergence at surface is: -7.03° (17 March 2015, , BGGM2014)

