

# Noble Energy

Weld County, CO (NAD 83)

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

Gleason LC26-713

## Plan A

Design: Actual Surveys

05-123-40690

# Sperry Drilling Services

## Final Survey Report

23 April, 2015

Well Coordinates: 1,507,404.22 N, 3,433,131.48 E (40° 42' 56.66" N, 103° 56' 14.89" W)

Ground Level: 4,890.00 usft

Local Coordinate Origin:

Centered on Well Gleason LC26-713

Viewing Datum:

KB = 24' @ 4914.00usft (H&P 273)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 26-T9N-59W (Gleason PAD)  
 Well: Gleason LC26-713  
 Wellbore: Plan A  
 Design: Actual Surveys

# Noble Energy



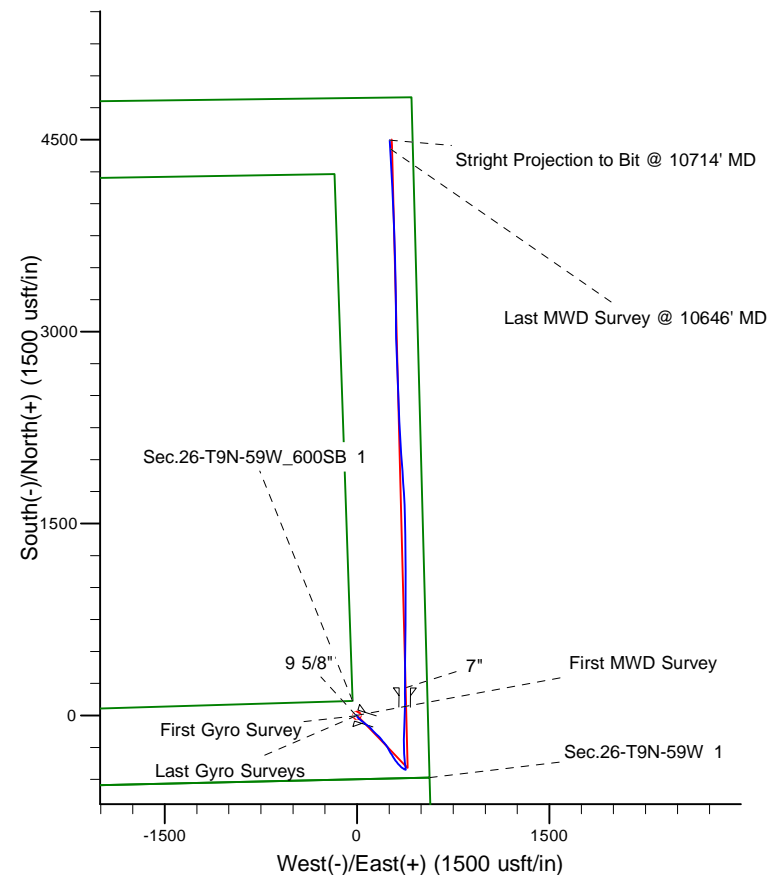
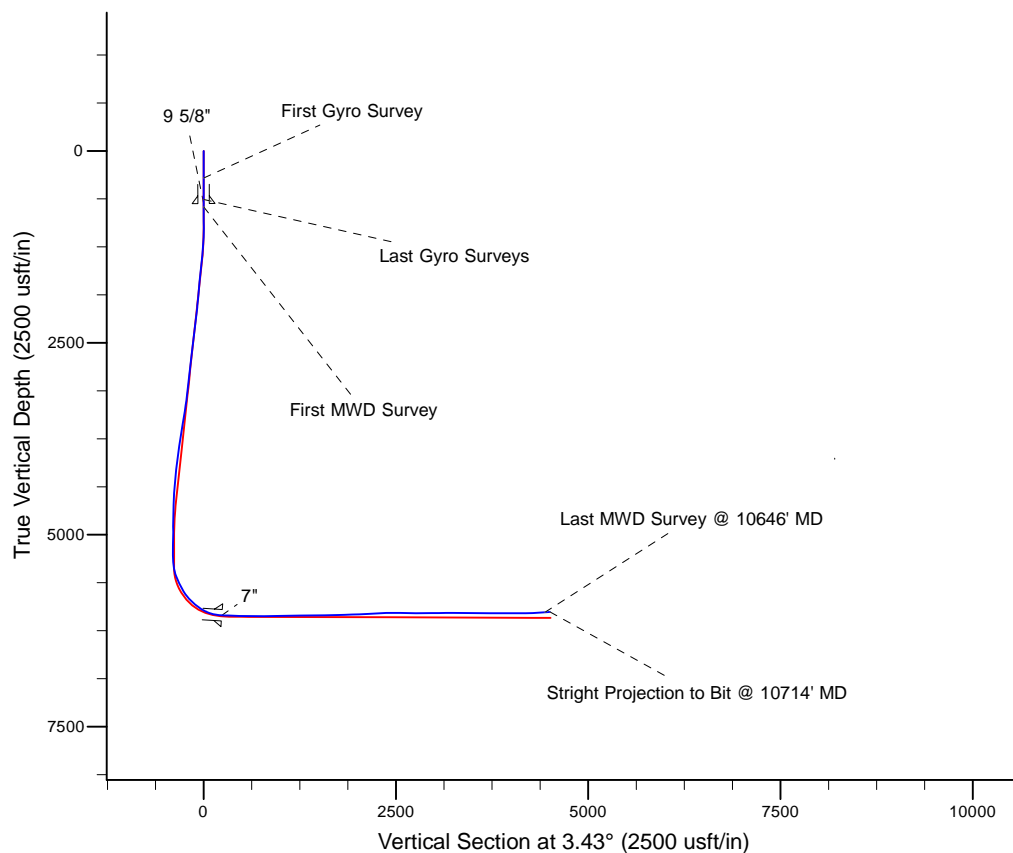
Platted SHL: 500' FSL, 552' FEL  
 Platted Lat/Long: 40.715740 N, 103.937470 W  
 Location: Sec. 26-T9N-R59W

~7" Casing: 663 FSL, 167 FEL  
 Lat/Long: 40.716310 N, 103.936108 W  
 State Planes - CO Northern: 507618.59 N, 3433505.46 E  
 Location: Sec. 26-T9N-R59W

Platted BHL: 330' FNL, 165' FEL  
 Lat/Long: 40.728080 N, 103.936210 W  
 State Planes - CO Northern: 511905.50 N, 3433401.44 E  
 Location: Sec. 26-T9N-R59W

## LEGEND

- ✗ Gleason LC26-713, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys



WELL DETAILS: Gleason LC26-713

Ground Level: 4890.00  
 KB = 24' @ 4914.00usft (H&P 273)

Created By: Amanda Marchand  
 Created On: 4/22/2015

**Design Report for Gleason LC26-713 - 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
355.00	0.40	193.42	355.00	-1.21	-0.29	-1.22	0.11
<b>First Gyro Survey</b>							
635.00	1.60	285.42	634.96	-1.12	-4.28	-1.37	0.59
<b>Last Gyro Surveys</b>							
728.00	1.45	288.79	727.93	-0.39	-6.65	-0.79	0.19
<b>First MWD Survey</b>							
917.00	1.16	298.29	916.88	1.28	-10.59	0.65	0.19
1,012.00	1.05	78.68	1,011.87	1.91	-10.59	1.27	2.19
1,106.00	3.07	124.72	1,105.81	0.64	-7.67	0.18	2.62
1,199.00	5.15	138.97	1,198.57	-3.92	-2.88	-4.09	2.47
1,291.00	6.60	138.79	1,290.08	-11.02	3.31	-10.80	1.58
1,383.00	8.26	140.18	1,381.31	-20.07	11.03	-19.37	1.81
1,476.00	10.03	130.35	1,473.13	-30.45	21.48	-29.11	2.53
1,568.00	9.50	128.09	1,563.79	-40.32	33.56	-38.24	0.71
1,661.00	9.18	126.99	1,655.56	-49.51	45.52	-46.70	0.39
1,845.00	9.90	131.68	1,837.02	-68.86	69.06	-64.61	0.58
1,937.00	9.73	127.13	1,927.67	-78.82	81.17	-73.82	0.86
2,028.00	9.13	123.17	2,017.44	-87.41	93.34	-81.66	0.97
2,120.00	10.27	141.31	2,108.15	-97.81	104.58	-91.37	3.53
2,211.00	10.52	137.68	2,197.65	-110.28	115.25	-103.18	0.77
2,303.00	10.36	136.33	2,288.13	-122.47	126.61	-114.67	0.32
2,488.00	9.42	134.03	2,470.38	-145.03	148.98	-135.85	0.55
2,672.00	9.35	131.33	2,651.92	-165.37	171.03	-154.83	0.24
2,764.00	10.56	143.32	2,742.54	-177.06	181.68	-165.87	2.60
3,048.00	8.41	136.92	3,022.65	-213.11	211.42	-200.07	0.84
3,142.00	8.22	144.70	3,115.66	-223.61	220.00	-210.04	1.21
3,237.00	7.29	142.88	3,209.80	-233.96	227.56	-219.92	1.01
3,332.00	10.34	151.12	3,303.67	-246.24	235.32	-231.71	3.47
3,427.00	10.73	150.58	3,397.06	-261.41	243.78	-246.34	0.42
3,615.00	11.13	149.28	3,581.65	-292.25	261.64	-276.06	0.25
3,710.00	11.12	148.45	3,674.87	-307.94	271.12	-291.16	0.17
3,805.00	10.93	146.75	3,768.12	-323.28	280.85	-305.88	0.40
3,900.00	10.74	146.83	3,861.42	-338.22	290.63	-320.21	0.20
3,995.00	10.08	142.90	3,954.86	-352.26	300.49	-333.64	1.02
4,089.00	8.99	142.45	4,047.56	-364.64	309.93	-345.44	1.16
4,278.00	7.72	136.70	4,234.55	-385.59	327.64	-365.29	0.80
4,372.00	7.29	135.61	4,327.75	-394.45	336.14	-373.62	0.48
4,467.00	6.66	133.49	4,422.04	-402.55	344.35	-381.21	0.72
4,656.00	3.52	119.22	4,610.28	-412.92	357.37	-390.79	1.78
4,751.00	3.92	121.31	4,705.08	-416.04	362.69	-393.58	0.44
4,845.00	3.39	120.83	4,798.89	-419.13	367.82	-396.36	0.56
4,940.00	2.50	119.34	4,893.76	-421.58	372.04	-398.56	0.94
5,127.00	2.13	110.14	5,080.61	-424.78	378.86	-401.34	0.28
5,222.00	1.73	346.20	5,175.58	-423.99	380.17	-400.47	3.59
5,316.00	1.17	345.91	5,269.55	-421.69	379.60	-398.20	0.60
5,410.00	0.66	341.70	5,363.54	-420.24	379.20	-396.79	0.55
5,505.00	15.57	356.06	5,457.33	-406.93	378.14	-383.56	15.72
5,599.00	19.66	351.75	5,546.90	-378.68	375.01	-355.55	4.56
5,694.00	27.34	355.28	5,633.96	-341.06	370.91	-318.25	8.22

## Design Report for Gleason LC26-713 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,788.00	29.30	354.03	5,716.71	-296.67	366.74	-274.18	2.18
5,883.00	36.85	0.34	5,796.28	-244.97	364.49	-222.71	8.73
5,977.00	45.45	2.68	5,867.00	-183.21	366.23	-160.96	9.29
6,072.00	51.77	1.83	5,929.78	-112.03	369.00	-89.74	6.69
6,166.00	61.58	0.27	5,981.36	-33.60	370.38	-11.37	10.53
6,261.00	69.57	1.30	6,020.62	52.82	371.59	74.97	8.47
6,382.00	85.12	0.60	6,047.04	170.50	373.52	192.56	12.86
6,544.00	88.83	0.59	6,055.59	332.24	375.20	354.10	2.29
6,636.00	89.23	0.15	6,057.15	424.22	375.79	445.96	0.65
6,728.00	88.06	0.30	6,059.32	516.19	376.15	537.79	1.28
6,821.00	88.12	0.74	6,062.42	609.14	377.00	630.62	0.48
6,914.00	90.83	0.52	6,063.27	702.12	378.02	723.49	2.92
7,009.00	90.56	0.18	6,062.12	797.11	378.60	818.35	0.46
7,101.00	91.05	0.01	6,060.83	889.10	378.75	910.18	0.56
7,195.00	90.96	359.75	6,059.18	983.09	378.56	1,003.99	0.29
7,290.00	91.36	0.38	6,057.26	1,078.07	378.66	1,098.80	0.79
7,385.00	91.08	359.69	6,055.24	1,173.04	378.72	1,193.61	0.78
7,479.00	91.20	359.77	6,053.37	1,267.03	378.28	1,287.40	0.15
7,573.00	90.37	359.17	6,052.08	1,361.01	377.41	1,381.16	1.09
7,668.00	89.75	359.34	6,051.98	1,456.00	376.17	1,475.91	0.68
7,762.00	90.55	358.02	6,051.73	1,549.97	374.01	1,569.58	1.64
7,857.00	92.40	357.56	6,049.29	1,644.87	370.35	1,664.09	2.01
7,951.00	91.98	356.73	6,045.69	1,738.68	365.67	1,757.45	0.99
8,029.00	91.51	356.40	6,043.32	1,816.50	361.00	1,834.86	0.74
8,124.00	91.51	356.13	6,040.82	1,911.27	354.81	1,929.08	0.28
8,218.00	91.48	356.24	6,038.36	2,005.03	348.56	2,022.30	0.12
8,312.00	92.75	355.72	6,034.89	2,098.73	341.97	2,115.44	1.46
8,406.00	93.49	355.76	6,029.78	2,192.33	335.00	2,208.46	0.79
8,501.00	93.80	357.33	6,023.74	2,286.97	329.29	2,302.58	1.68
8,595.00	91.20	358.47	6,019.64	2,380.80	325.85	2,396.04	3.02
8,690.00	90.59	358.27	6,018.15	2,475.75	323.15	2,490.66	0.68
8,785.00	88.28	358.05	6,019.09	2,570.69	320.10	2,585.24	2.44
8,879.00	88.49	357.44	6,021.74	2,664.58	316.40	2,678.74	0.69
8,974.00	90.22	357.49	6,022.81	2,759.48	312.20	2,773.22	1.82
9,069.00	90.74	357.79	6,022.01	2,854.40	308.29	2,867.73	0.63
9,163.00	90.31	358.50	6,021.15	2,948.34	305.24	2,961.33	0.88
9,258.00	90.89	359.32	6,020.16	3,043.32	303.44	3,056.02	1.06
9,353.00	90.92	359.80	6,018.66	3,138.30	302.71	3,150.80	0.51
9,447.00	90.22	0.20	6,017.72	3,232.30	302.71	3,244.62	0.86
9,541.00	89.14	359.46	6,018.25	3,326.29	302.43	3,338.43	1.39
9,636.00	88.95	358.14	6,019.83	3,421.26	300.44	3,433.11	1.40
9,730.00	90.09	358.19	6,020.62	3,515.20	297.43	3,526.71	1.21
9,825.00	88.64	358.09	6,021.67	3,610.15	294.35	3,621.29	1.53
9,920.00	90.00	358.52	6,022.80	3,705.10	291.54	3,715.90	1.50
10,014.00	90.06	358.47	6,022.75	3,799.06	289.07	3,809.55	0.08
10,108.00	89.63	357.68	6,023.00	3,893.01	285.91	3,903.14	0.96
10,203.00	88.52	357.30	6,024.54	3,987.90	281.75	3,997.62	1.23
10,298.00	89.94	357.17	6,025.81	4,082.78	277.17	4,092.05	1.50
10,392.00	91.42	357.16	6,024.69	4,176.66	272.52	4,185.48	1.58
10,487.00	92.68	357.12	6,021.29	4,271.48	267.78	4,279.85	1.32
10,581.00	93.77	356.56	6,016.00	4,365.18	262.61	4,373.07	1.30

## Design Report for Gleason LC26-713 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,646.00	94.99	356.57	6,011.04	4,429.88	258.73	4,437.42	1.88
<b>Last MWD Survey @ 10646' MD</b>							
10,714.00	94.99	356.57	6,005.12	4,497.50	254.67	4,504.68	0.00
<b>Stright Projection to Bit @ 10714' MD</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
355.00	355.00	-1.21	-0.29	First Gyro Survey
635.00	634.96	-1.12	-4.28	Last Gyro Surveys
728.00	727.93	-0.39	-6.65	First MWD Survey
10,646.00	6,011.04	4,429.88	258.73	Last MWD Survey @ 10646' MD
10,714.00	6,005.12	4,497.50	254.67	Stright Projection to Bit @ 10714' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Gleason LC26-713_Rev A0_BH	3.43	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
355.00	728.00	Gyro Survey	Flexi-Shot
917.00	6,382.00	Intermediate Surveys	MWD
6,544.00	10,714.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
688.00		9 5/8"	9-5/8	13-3/4
6,426.00	6,050.40	7"	7	8-3/4

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Gleason LC26-713_St	0.00	0.00	0.00	0.01	0.00	1,507,404.23	3,433,131.48	40.715740	-103.937470
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Gleason LC26-713_Re	0.00	0.00	6,084.00	4,501.32	269.96	1,511,905.50	3,433,401.44	40.728080	-103.936210
- actual wellpath misses target center by 80.34usft at 10710.03usft MD (6005.47 TVD, 4493.55 N, 254.91 E)									
- Point									

Design Report for Gleason LC26-713 - Actual Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.74 °/100usft	Maximum Dogleg over Survey:	15.72 °/100usft at 5,505.00 usft
Net Tortosity applicable to Plans:	0.73 °/100usft	Directional Difficulty Index:	6.261

Audit Info

North Reference Sheet for Sec. 26-T9N-59W (Gleason PAD) - Gleason LC26-713 - Plan A

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

Vertical Depths are relative to KB = 24' @ 4914.00usft (H&P 273). Northing and Easting are relative to Gleason LC26-713

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: 0.99998973

Grid Coordinates of Well: 1,507,404.22 usft N, 3,433,131.48 usft E

Geographical Coordinates of Well: 40° 42' 56.66" N, 103° 56' 14.89" W

Grid Convergence at Surface is: 1.01°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,714.00usft the Bottom Hole Displacement is 4,504.70usft in the Direction of 3.24° (Grid).

Magnetic Convergence at surface is: -7.02° (15 April 2015, , BGGM2014)

