Noble Energy

Weld County, CO (NAD 83)
Sec. 34-T9N-R59W
Haley LC27-735

Original Wellbore

Design: Actual Surveys

05-123-40600

Sperry Drilling Services

Final Survey Report

06 May, 2015

Well Coordinates: 1,506,101.60 N, 3,426,990.73 E (40° 42' 44.86" N, 103° 57' 34.92" W)
Ground Level: 4,816.00 usft

Local Coordinate Origin:	Centered on Well Haley LC27-735
Viewing Datum:	KB @ 4840.00usft (HP 343)
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. 34-T9N-R59W
Well: Haley LC27-735
Wellbore: Original Wellbore
Design: Actual Surveys

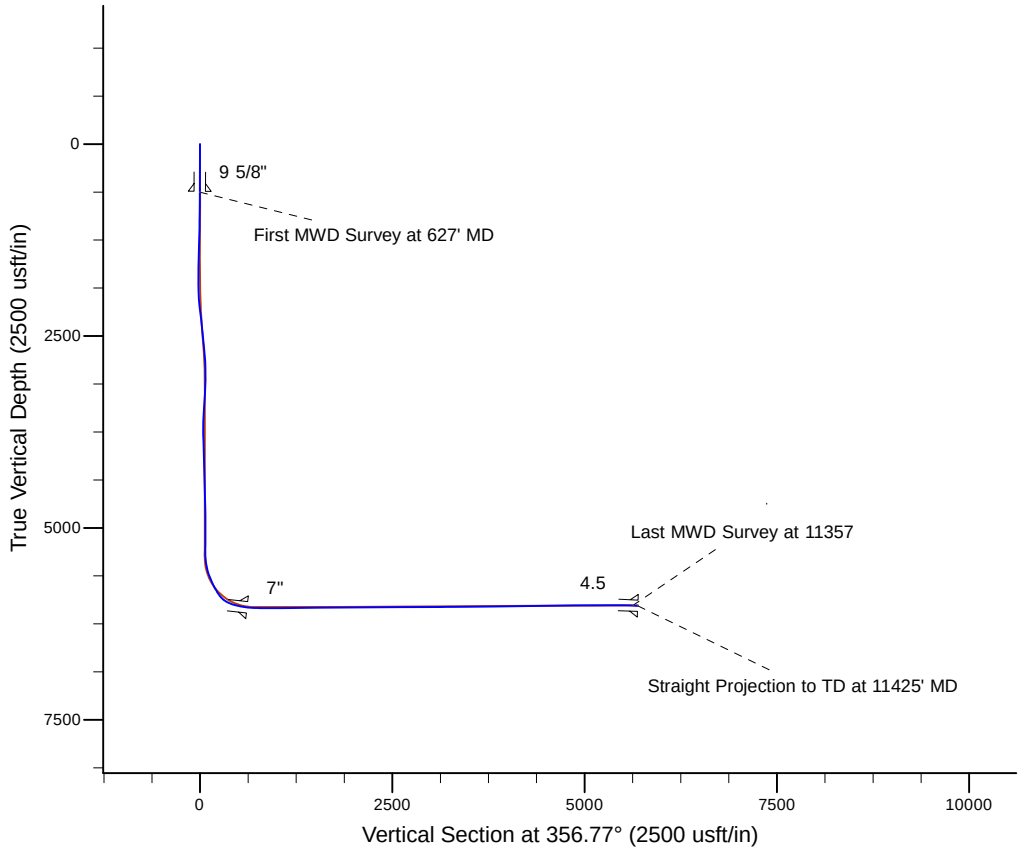
Noble Energy

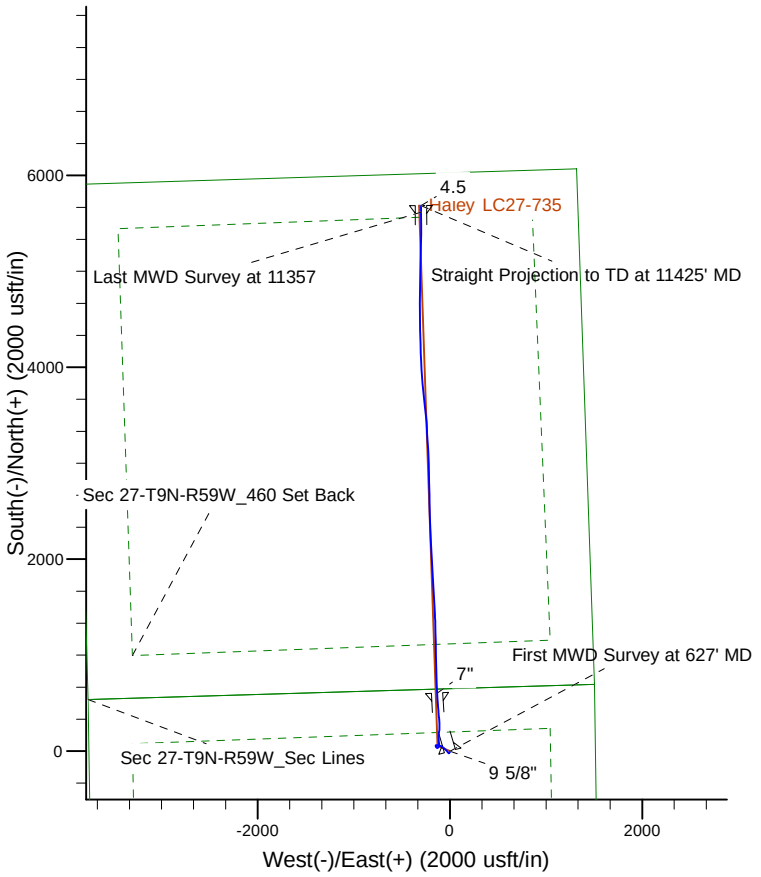
HALLIBURTON
Sperry Drilling

Platted SHL:	660' FNL, 1512' FEL
Platted Lat/Long:	40.712460 N, 103.95970 W
Location:	Sec. 34-T9N-R59W
~7" Casing:	10' FNL, 1652 FEL
Lat/Long:	40.714128 N, 103.960143 W
State Planes - CO Northern:	1506707.16 N, 3426857.42 E
Location:	Sec. 34-T9N-R59W
Platted BHL:	330' FNL, 1650' FEL
Lat/Long:	40.728080 N, 103.96050 W
State Planes - CO Northern	1511787.70 N, 3426670.19 E
Location:	Sec. 27-T9N-R59W

LEGEND

Haley LC27-735, Original Wellbore, Rev B0 V0
Actual Surveys





WELL DETAILS: Haley LC27-735	
Ground Level:	4816.00
KB @ 4840.00usft (HP 343)	

Created By: Amanda Marchand
Created On: 5/6/2015

Design Report for Haley LC27-735 - 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
627.00	0.37	163.61	627.00	-1.94	0.57	-1.97	0.06
First MWD Survey at 627' MD							
721.00	0.56	200.09	720.99	-2.66	0.50	-2.69	0.36
910.00	1.14	203.12	909.97	-5.26	-0.56	-5.22	0.31
1,005.00	1.13	200.43	1,004.95	-7.01	-1.25	-6.93	0.06
1,098.00	1.17	202.71	1,097.93	-8.74	-1.94	-8.62	0.07
1,190.00	1.35	206.45	1,189.91	-10.58	-2.79	-10.41	0.22
1,283.00	1.58	213.06	1,282.88	-12.64	-3.97	-12.39	0.31
1,376.00	1.71	210.16	1,375.84	-14.91	-5.37	-14.58	0.17
1,469.00	1.59	201.68	1,468.80	-17.31	-6.54	-16.91	0.29
1,561.00	1.64	203.18	1,560.77	-19.71	-7.53	-19.25	0.07
1,654.00	1.64	203.30	1,653.73	-22.15	-8.58	-21.63	0.00
1,747.00	1.25	197.69	1,746.70	-24.34	-9.42	-23.77	0.45
1,839.00	1.57	315.88	1,838.69	-24.39	-10.60	-23.76	2.64
1,930.00	3.47	313.81	1,929.59	-21.59	-13.46	-20.80	2.09
2,024.00	5.00	318.22	2,023.33	-16.56	-18.24	-15.51	1.66
2,116.00	7.58	324.85	2,114.77	-8.61	-24.40	-7.22	2.91
2,209.00	9.61	316.63	2,206.73	2.05	-33.27	3.92	2.55
2,301.00	8.92	316.51	2,297.53	12.80	-43.45	15.23	0.75
2,394.00	8.24	313.05	2,389.49	22.59	-53.28	25.55	0.92
2,486.00	8.81	306.98	2,480.47	31.32	-63.73	34.86	1.16
2,580.00	9.44	305.35	2,573.28	40.11	-75.77	44.31	0.72
2,672.00	10.12	295.69	2,663.95	47.98	-89.21	52.93	1.93
2,763.00	10.45	294.22	2,753.49	54.83	-103.94	60.60	0.46
2,857.00	8.67	281.29	2,846.19	59.72	-118.66	66.30	2.96
2,952.00	8.28	277.54	2,940.15	62.02	-132.46	69.38	0.71
3,047.00	5.06	267.59	3,034.50	62.74	-143.44	70.71	3.59
3,141.00	2.00	205.84	3,128.34	61.09	-148.29	69.34	4.76
3,236.00	3.60	172.39	3,223.23	56.64	-148.62	64.92	2.34
3,330.00	4.08	167.22	3,317.01	50.45	-147.49	58.68	0.63
3,425.00	3.92	151.60	3,411.79	44.30	-145.20	52.40	1.16
3,520.00	4.16	136.28	3,506.55	38.96	-141.27	46.84	1.16
3,615.00	3.38	114.57	3,601.35	35.30	-136.34	42.92	1.70
3,710.00	3.54	110.15	3,696.18	33.13	-131.04	40.45	0.33
3,804.00	3.10	47.07	3,790.05	33.86	-126.46	40.92	3.72
3,899.00	2.36	48.15	3,884.94	36.91	-123.12	43.78	0.78
3,994.00	2.28	36.59	3,979.86	39.73	-120.54	46.46	0.50
4,089.00	1.79	26.51	4,074.80	42.58	-118.75	49.19	0.64
4,184.00	2.11	23.91	4,169.75	45.51	-117.38	52.04	0.35
4,279.00	2.33	20.83	4,264.68	48.91	-115.98	55.36	0.26
4,374.00	1.49	26.94	4,359.62	51.82	-114.73	58.19	0.91
4,469.00	1.91	35.57	4,454.58	54.20	-113.25	60.49	0.52
4,564.00	1.97	331.01	4,549.54	56.92	-113.12	63.20	2.18
4,659.00	1.50	353.96	4,644.49	59.59	-114.05	65.91	0.87
4,754.00	0.83	6.30	4,739.47	61.51	-114.10	67.83	0.75
4,849.00	0.49	4.33	4,834.47	62.59	-114.00	68.91	0.36
4,944.00	0.25	342.92	4,929.47	63.20	-114.03	69.52	0.29
5,039.00	0.09	294.44	5,024.47	63.43	-114.15	69.75	0.21
5,134.00	0.19	199.51	5,119.47	63.31	-114.28	69.64	0.23

Design Report for Haley LC27-735 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,229.00	0.57	213.25	5,214.46	62.77	-114.59	69.12	0.41
5,324.00	0.39	164.26	5,309.46	62.06	-114.76	68.42	0.45
5,419.00	3.99	6.70	5,404.39	65.03	-114.28	71.36	4.58
5,514.00	11.73	358.77	5,498.43	77.99	-114.11	84.29	8.21
5,608.00	17.81	355.87	5,589.28	101.90	-115.35	108.23	6.51
5,703.00	22.81	359.79	5,678.35	134.83	-116.46	141.17	5.45
5,798.00	27.25	4.38	5,764.41	174.95	-114.87	181.14	5.10
5,893.00	32.65	6.73	5,846.70	222.13	-110.20	227.98	5.82
5,988.00	45.12	356.93	5,920.57	281.48	-108.99	287.16	14.60
6,083.00	65.89	354.43	5,974.09	359.10	-115.07	365.00	21.97
6,178.00	74.18	355.83	6,006.50	447.99	-122.62	454.18	8.84
6,294.00	81.50	356.13	6,030.91	561.03	-130.56	567.49	6.32
6,415.00	87.29	357.90	6,042.73	681.23	-136.82	687.85	5.00
6,508.00	89.41	357.91	6,045.41	774.13	-140.21	780.79	2.28
6,600.00	89.88	358.51	6,045.98	866.08	-143.09	872.76	0.83
6,693.00	90.22	359.19	6,045.90	959.06	-144.95	965.70	0.82
6,785.00	90.59	359.49	6,045.25	1,051.05	-146.01	1,057.60	0.52
6,879.00	89.91	358.40	6,044.83	1,145.03	-147.74	1,151.53	1.37
6,971.00	91.54	358.27	6,043.67	1,236.98	-150.42	1,243.49	1.78
7,062.00	90.71	358.80	6,041.88	1,327.93	-152.74	1,334.43	1.08
7,156.00	89.94	356.95	6,041.35	1,421.86	-156.23	1,428.40	2.13
7,248.00	90.96	356.75	6,040.63	1,513.72	-161.28	1,520.40	1.13
7,341.00	90.46	357.32	6,039.48	1,606.59	-166.09	1,613.39	0.82
7,433.00	90.28	356.86	6,038.88	1,698.47	-170.76	1,705.39	0.54
7,526.00	90.28	356.18	6,038.43	1,791.29	-176.41	1,798.38	0.73
7,618.00	89.57	356.32	6,038.55	1,883.10	-182.43	1,890.38	0.79
7,711.00	90.31	356.42	6,038.65	1,975.91	-188.31	1,983.38	0.80
7,804.00	90.74	357.26	6,037.79	2,068.76	-193.44	2,076.37	1.01
7,895.00	90.46	357.06	6,036.84	2,159.65	-197.95	2,167.36	0.38
7,990.00	90.68	357.72	6,035.89	2,254.54	-202.27	2,262.35	0.73
8,084.00	90.15	357.63	6,035.21	2,348.46	-206.09	2,356.34	0.57
8,179.00	90.62	358.53	6,034.58	2,443.40	-209.27	2,451.31	1.07
8,275.00	90.65	358.27	6,033.51	2,539.36	-211.95	2,547.27	0.27
8,370.00	90.89	359.80	6,032.24	2,634.34	-213.55	2,642.18	1.63
8,465.00	89.60	358.17	6,031.83	2,729.32	-215.23	2,737.10	2.19
8,560.00	90.80	0.08	6,031.50	2,824.30	-216.68	2,832.02	2.37
8,655.00	89.41	358.47	6,031.32	2,919.28	-217.89	2,926.92	2.24
8,750.00	90.34	357.16	6,031.53	3,014.21	-221.51	3,021.90	1.69
8,845.00	91.14	357.34	6,030.30	3,109.09	-226.07	3,116.89	0.86
8,939.00	90.03	356.51	6,029.34	3,202.95	-231.11	3,210.88	1.47
9,034.00	91.26	356.62	6,028.27	3,297.77	-236.80	3,305.87	1.30
9,129.00	90.89	356.85	6,026.49	3,392.60	-242.21	3,400.86	0.46
9,223.00	89.45	354.90	6,026.21	3,486.35	-248.97	3,494.84	2.58
9,319.00	89.85	353.73	6,026.80	3,581.87	-258.48	3,590.75	1.29
9,413.00	89.26	352.97	6,027.53	3,675.24	-269.37	3,684.57	1.02
9,508.00	91.39	354.79	6,026.99	3,769.69	-279.49	3,779.44	2.95
9,604.00	90.52	355.70	6,025.39	3,865.34	-287.45	3,875.39	1.31
9,699.00	90.80	355.96	6,024.30	3,960.08	-294.36	3,970.37	0.40
9,794.00	92.07	357.55	6,021.92	4,054.90	-299.73	4,065.34	2.14
9,888.00	91.51	358.50	6,018.98	4,148.79	-302.97	4,159.27	1.17
9,984.00	90.68	359.12	6,017.15	4,244.75	-304.96	4,255.19	1.08

Design Report for Haley LC27-735 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,078.00	90.43	358.95	6,016.24	4,338.73	-306.55	4,349.11	0.32
10,174.00	90.31	358.65	6,015.62	4,434.71	-308.56	4,445.05	0.34
10,268.00	89.94	358.21	6,015.41	4,528.68	-311.13	4,539.01	0.61
10,364.00	90.62	358.99	6,014.94	4,624.64	-313.48	4,634.96	1.08
10,458.00	90.83	0.18	6,013.75	4,718.63	-314.16	4,728.84	1.29
10,553.00	91.17	1.38	6,012.09	4,813.61	-312.87	4,823.59	1.31
10,648.00	90.28	1.41	6,010.89	4,908.57	-310.55	4,918.27	0.94
10,743.00	90.71	2.08	6,010.07	5,003.52	-307.66	5,012.91	0.84
10,839.00	90.25	1.07	6,009.27	5,099.48	-305.02	5,108.57	1.16
10,934.00	90.86	1.96	6,008.35	5,194.44	-302.51	5,203.23	1.14
11,029.00	90.34	0.62	6,007.35	5,289.41	-300.37	5,297.93	1.51
11,124.00	89.29	0.02	6,007.66	5,384.41	-299.84	5,392.75	1.27
11,219.00	88.80	359.82	6,009.24	5,479.39	-299.97	5,487.59	0.56
11,314.00	88.00	359.30	6,011.89	5,574.35	-300.70	5,582.44	1.00
11,357.00	87.53	359.57	6,013.57	5,617.32	-301.13	5,625.36	1.26
Last MWD Survey at 11357							
11,425.00	87.53	359.57	6,016.50	5,685.25	-301.64	5,693.22	0.00
Straight Projection to TD at 11425' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
627.00	627.00	-1.94	0.57	First MWD Survey at 627' MD
11,357.00	6,013.57	5,617.32	-301.13	Last MWD Survey at 11357
11,425.00	6,016.50	5,685.25	-301.64	Straight Projection to TD at 11425' MD

Vertical Section Information

	Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target		Haley LC27-735_BHL	356.77	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
627.00	6,294.00	Intermediate Surveys	MWD
6,415.00	11,425.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
617.00	617.00	9 5/8"	9-5/8	13-3/4
6,339.00		7"	7	8-3/4
11,425.00		4.5	4-1/2	6-1/8

Design Report for Haley LC27-735 - 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
Haley LC27-735_BHL - actual wellpath misses target center by 29.41usft at 11425.00usft MD (6016.50 TVD, 5685.25 N, -301.64 E) - Point	0.00	0.00	5,994.00	5,686.16	-320.55	1,511,787.70	3,426,670.19	40.728080	-103.960500

Directional Difficulty Index

Average Dogleg over Survey:	1.74 °/100usft	Maximum Dogleg over Survey:	21.97 °/100usft at 6,083.00 usft
Net Tortousity applicable to Plans:	0.79 °/100usft	Directional Difficulty Index:	6.346

Audit Info

North Reference Sheet for Sec. 34-T9N-R59W - Haley LC27-735 - 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 @ 4840.00usft (HP 343). Northing and Easting are relative to Haley LC27-735

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: 0.99998927

Grid Coordinates of Well: 1,506,101.60 usft N, 3,426,990.73 usft E

Geographical Coordinates of Well: 40° 42' 44.86" N, 103° 57' 34.92" W

Grid Convergence at Surface is: 1.00°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,425.00usft
the Bottom Hole Displacement is 5,693.25usft in the Direction of 356.96° (Grid).

Magnetic Convergence at surface is: -7.05° (30 March 2015, , BGGM2014)