

Noble Energy

Weld County, CO (NAD 83)
Sec. 1-T9N-R58W (Nalen State 1 PAD)
Nalen State LD12-77-1BHN
05-123-39765
Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Report

23 December, 2014

Surface UWI : 05-123-39765

Well Coordinates: 1,529,232.54 N, 3,466,246.45 E (40° 46' 26.33" N, 103° 48' 59.54" W)
Ground Level: 4,647.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Nalen State LD12-77-1BHN

KB=24 @ 4671.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 1-T9N-R58W (Nalen State 1 PAD)
Well: Nalen State LD12-77-1BHN
Wellbore: Original Wellbore
Design: Actual Surveys



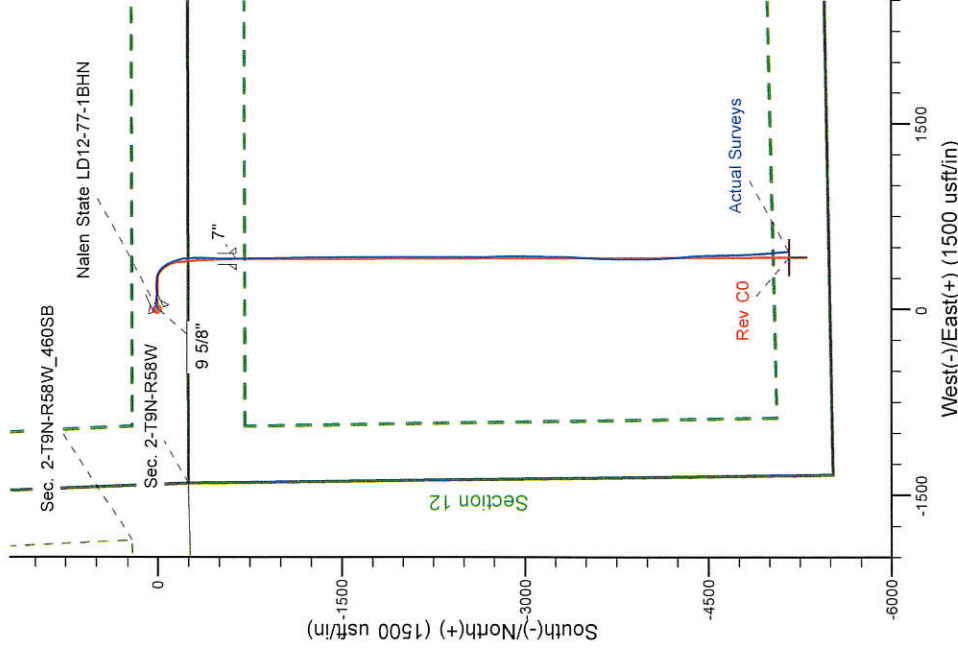
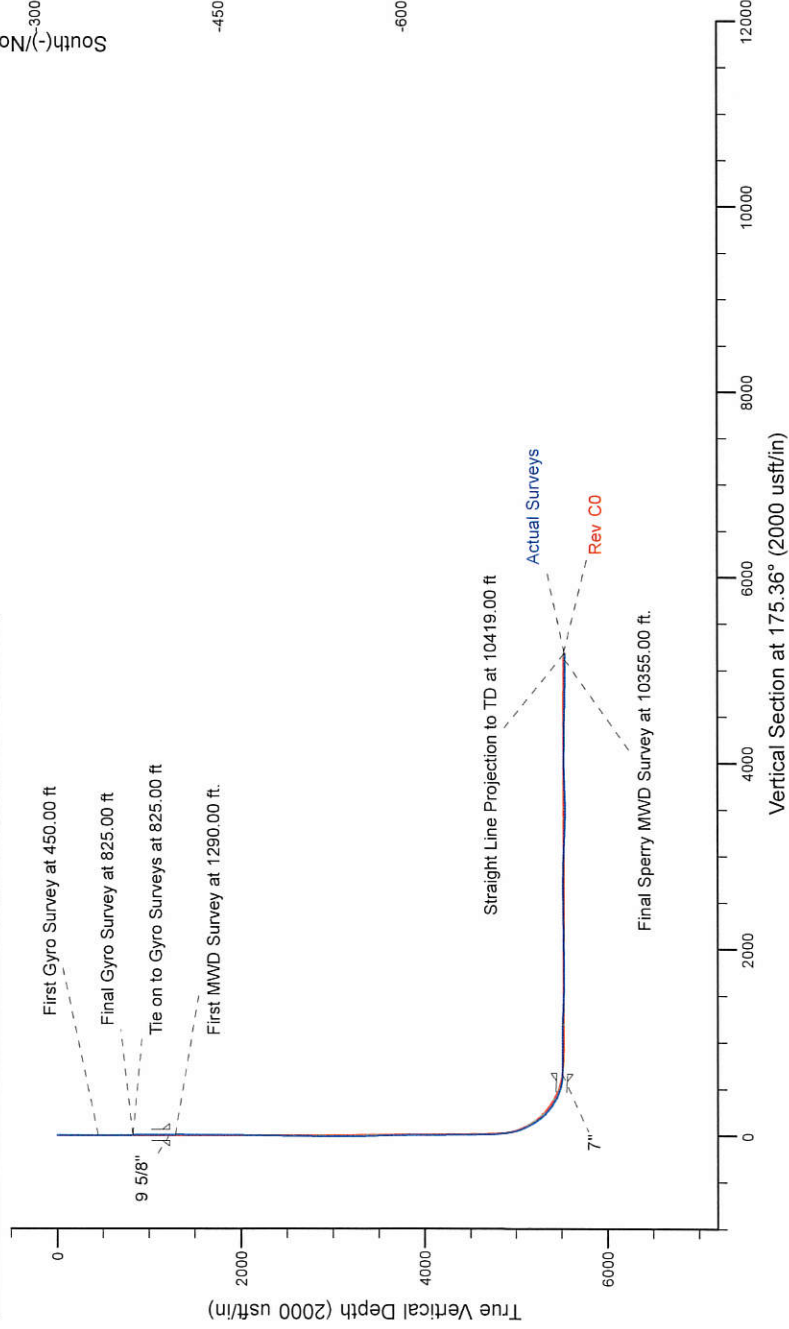
Platted SHL: 250' FSL, 1412' FWL
Platted Lat/Long: 40.77398 N, 103.81654 W
Location: Sec. 1-T9N-R58W

~7" Casing: 390' FNL, 1806' FWL
Lat/Long: 40.772212N, 103.815115W
State Planes - CO Northern: 1528596.02 N, 3466653.25 E
Location: Sec. 12-T9N-R58W

Platted BHL: 330' FSL, 1760' FWL
Lat/Long: 40.759790N, 103.815380W
State Planes - CO Northern: 1524069.72N, 3466665.89E
Location: Sec. 12-T9N-R58W

LEGEND

- Nalen State LD12-77-1BHN, Original Wellbore, Rev C0 V0
- Actual Surveys



WELL DETAILS: Nalen State LD12-77-1BHN

Ground Level: 4647.00
KB=24 @ 4671.00usft (H&P 273)

Created By: Gordy Roth
Created On: 12/23/2014

Design Report for Nalen State LD12-77-1BHN - 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
450.00	0.20	213.31	450.00	-0.66	-0.43	0.62	0.04
First Gyro Survey at 450.00 ft							
825.00	0.80	184.31	824.98	-3.81	-0.99	3.72	0.17
Tie on to Gyro Surveys at 825.00 ft - Final Gyro Survey at 825.00 ft							
1,290.00	0.56	256.02	1,289.96	-7.60	-3.44	7.30	0.18
First MWD Survey at 1290.00 ft.							
1,382.00	0.66	234.00	1,381.95	-8.02	-4.30	7.65	0.27
1,474.00	0.50	238.51	1,473.95	-8.54	-5.07	8.10	0.18
1,567.00	0.49	285.80	1,566.94	-8.64	-5.80	8.15	0.43
1,659.00	1.56	70.22	1,658.94	-8.11	-5.00	7.68	2.15
1,844.00	1.48	58.23	1,843.87	-6.00	-0.60	5.94	0.18
2,124.00	1.07	56.25	2,123.80	-2.65	4.65	3.02	0.15
2,217.00	1.40	47.93	2,216.78	-1.40	6.21	1.90	0.40
2,495.00	1.55	45.54	2,494.69	3.51	11.42	-2.57	0.06
2,681.00	1.63	43.67	2,680.62	7.18	15.04	-5.94	0.05
2,773.00	1.52	46.03	2,772.58	8.97	16.82	-7.58	0.14
2,867.00	3.38	69.90	2,866.49	10.79	20.32	-9.11	2.22
2,962.00	4.72	83.52	2,961.26	12.20	26.84	-9.98	1.73
3,057.00	5.90	88.19	3,055.85	12.79	35.60	-9.87	1.32
3,152.00	6.14	87.46	3,150.32	13.17	45.56	-9.44	0.27
3,246.00	6.78	94.10	3,243.73	13.00	56.11	-8.41	1.05
3,341.00	8.10	95.82	3,337.92	11.92	68.36	-6.34	1.41
3,436.00	8.68	94.96	3,431.91	10.62	82.16	-3.93	0.62
3,531.00	8.53	95.37	3,525.84	9.34	96.32	-1.51	0.17
3,625.00	8.10	97.04	3,618.85	7.88	109.83	1.04	0.52
3,720.00	7.57	94.99	3,712.96	6.51	122.71	3.45	0.63
3,815.00	7.82	87.12	3,807.11	6.29	135.40	4.69	1.14
3,910.00	7.52	81.88	3,901.26	7.49	148.01	4.52	0.80
4,005.00	7.27	86.66	3,995.47	8.72	160.16	4.28	0.70
4,100.00	6.93	92.22	4,089.74	8.85	171.89	5.10	0.81
4,195.00	6.17	87.23	4,184.12	8.88	182.72	5.95	1.00
4,290.00	7.02	88.01	4,278.49	9.32	193.62	6.39	0.90
4,384.00	7.81	94.18	4,371.71	9.06	205.73	7.63	1.19
4,479.00	6.77	90.08	4,465.94	8.58	217.77	9.08	1.22
4,574.00	7.76	91.08	4,560.18	8.45	229.78	10.18	1.05
4,668.00	7.94	91.47	4,653.30	8.16	242.61	11.51	0.20
4,763.00	9.84	105.93	4,747.16	5.77	256.98	15.06	3.07
4,811.00	9.50	106.63	4,794.48	3.51	264.72	17.94	0.75
4,858.00	12.43	115.39	4,840.62	0.23	273.01	21.88	7.15
4,906.00	15.30	118.28	4,887.22	-4.99	283.26	27.91	6.15
4,953.00	18.68	120.54	4,932.16	-11.75	295.20	35.62	7.33
5,048.00	24.15	126.92	5,020.58	-31.17	323.87	57.30	6.25
5,143.00	26.89	146.25	5,106.45	-60.77	351.39	89.02	9.19
5,237.00	32.25	157.19	5,188.24	-101.62	372.96	131.49	8.07
5,332.00	39.15	162.87	5,265.36	-153.72	391.65	184.93	8.05
5,427.00	46.32	170.32	5,335.14	-216.37	406.28	248.55	9.22
5,521.00	54.44	178.79	5,395.10	-288.30	412.82	320.78	11.07
5,616.00	63.64	181.56	5,443.92	-369.66	412.48	401.85	10.00
5,711.00	71.80	182.35	5,479.91	-457.44	409.47	489.10	8.62

Design Report for Nalen State LD12-77-1BHN - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,805.00	81.75	180.79	5,501.39	-548.80	406.99	579.95	10.71
5,846.00	86.86	180.00	5,505.46	-589.58	406.71	620.58	12.61
5,992.00	89.51	179.31	5,510.08	-735.49	407.59	766.08	1.88
6,085.00	90.99	178.76	5,509.68	-828.47	409.15	858.88	1.70
6,177.00	89.91	178.90	5,508.95	-920.45	411.03	950.71	1.18
6,362.00	90.06	178.95	5,509.00	-1,105.42	414.50	1,135.35	0.09
6,455.00	87.04	179.42	5,511.35	-1,198.37	415.83	1,228.10	3.29
6,548.00	87.10	179.25	5,516.11	-1,291.24	416.90	1,320.76	0.19
6,732.00	88.64	178.42	5,522.95	-1,475.07	420.64	1,504.29	0.95
6,825.00	88.49	180.88	5,525.28	-1,568.03	421.21	1,596.99	2.65
7,010.00	89.94	180.01	5,527.81	-1,753.00	419.77	1,781.23	0.91
7,105.00	90.52	179.88	5,527.43	-1,848.00	419.87	1,875.93	0.63
7,200.00	91.82	179.89	5,525.49	-1,942.98	420.06	1,970.61	1.37
7,294.00	90.15	180.75	5,523.87	-2,036.96	419.53	2,064.24	2.00
7,389.00	90.83	180.18	5,523.06	-2,131.95	418.76	2,158.86	0.93
7,483.00	91.26	180.21	5,521.35	-2,225.93	418.44	2,252.51	0.46
7,578.00	90.22	179.60	5,520.12	-2,320.92	418.60	2,347.20	1.27
7,673.00	90.62	179.50	5,519.42	-2,415.92	419.34	2,441.94	0.43
7,768.00	91.94	180.97	5,517.30	-2,510.89	418.95	2,536.57	2.08
7,862.00	90.80	178.93	5,515.05	-2,604.85	419.04	2,630.23	2.49
7,957.00	90.68	178.33	5,513.83	-2,699.82	421.31	2,725.07	0.64
8,051.00	88.34	177.30	5,514.63	-2,793.74	424.89	2,818.97	2.72
8,146.00	87.44	179.02	5,518.13	-2,888.62	427.94	2,913.79	2.04
8,241.00	86.85	181.76	5,522.86	-2,983.49	427.29	3,008.30	2.95
8,336.00	87.17	181.42	5,527.82	-3,078.33	424.66	3,102.60	0.49
8,431.00	87.90	180.93	5,531.90	-3,173.22	422.72	3,197.03	0.93
8,526.00	88.18	180.55	5,535.15	-3,268.15	421.49	3,291.55	0.50
8,621.00	88.55	181.40	5,537.86	-3,363.10	419.87	3,386.06	0.98
8,716.00	90.49	182.67	5,538.66	-3,458.03	416.50	3,480.40	2.44
8,810.00	90.56	182.86	5,537.80	-3,551.92	411.97	3,573.61	0.22
8,905.00	91.23	183.01	5,536.31	-3,646.78	407.10	3,667.77	0.72
8,999.00	91.66	180.84	5,533.94	-3,740.69	403.95	3,761.12	2.35
9,093.00	90.83	179.64	5,531.90	-3,834.67	403.55	3,854.75	1.55
9,189.00	92.25	179.51	5,529.32	-3,930.63	404.26	3,950.45	1.49
9,283.00	89.78	178.52	5,527.65	-4,024.59	405.88	4,044.24	2.83
9,378.00	89.38	177.60	5,528.35	-4,119.53	409.10	4,139.13	1.06
9,472.00	89.69	177.35	5,529.11	-4,213.44	413.24	4,233.06	0.42
9,567.00	89.48	175.72	5,529.80	-4,308.26	418.98	4,328.04	1.73
9,662.00	89.69	175.00	5,530.49	-4,402.94	426.66	4,423.03	0.79
9,757.00	87.72	177.72	5,532.64	-4,497.71	432.69	4,517.98	3.53
9,851.00	88.18	179.50	5,536.00	-4,591.62	434.97	4,611.76	1.95
9,945.00	88.89	178.85	5,538.40	-4,685.58	436.32	4,705.52	1.02
10,040.00	90.28	179.31	5,539.09	-4,780.56	437.85	4,800.32	1.54
10,135.00	89.82	175.60	5,539.01	-4,875.45	442.07	4,895.24	3.94
10,230.00	90.40	174.85	5,538.83	-4,970.12	449.98	4,990.24	1.00
10,324.00	90.06	176.29	5,538.45	-5,063.84	457.24	5,084.23	1.57
10,355.00	90.00	174.71	5,538.43	-5,094.74	459.67	5,115.23	5.10
Final Sperry MWD Survey at 10355.00 ft.							
10,419.00	90.00	174.71	5,538.43	-5,158.47	465.57	5,179.23	0.00
Straight Line Projection to TD at 10419.00 ft							

Design Report for Nalen State LD12-77-1BHN - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
450.00	450.00	-0.66	-0.43	First Gyro Survey at 450.00 ft
825.00	824.98	-3.81	-0.99	Tie on to Gyro Surveys at 825.00 ft
825.00	824.98	-3.81	-0.99	Final Gyro Survey at 825.00 ft
1,290.00	1,289.96	-7.60	-3.44	First MWD Survey at 1290.00 ft.
10,355.00	5,538.43	-5,094.74	459.67	Final Sperry MWD Survey at 10355.00 ft.
10,419.00	5,538.43	-5,158.47	465.57	Straight Line Projection to TD at 10419.00 ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Nalen State LD12-77-1BHN_BHL	175.36	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
450.00	825.00	Surface Surveys	Flexi-Shot
1,290.00	5,846.00	Intermediate Surveys	MWD
5,992.00	10,419.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,229.00	1,228.96	9 5/8"	9-5/8	13-3/4
5,893.00	5,507.68	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									
Nalen State LD12-77-1	0.00	0.00	5,529.06	-5,162.83	419.44	1,524,069.72	3,466,665.89	40.759790	-103.815380
- actual wellpath misses target center by 47.27usft at 10419.00usft MD (5538.43 TVD, -5158.47 N, 465.57 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.78 °/100usft	Maximum Dogleg over Survey:	12.61 °/100usft at 5,846.00 usft
Net Tortousity applicable to Plans:	0.77 °/100usft	Directional Difficulty Index:	6.284

Audit Info

North Reference Sheet for Sec. 1-T9N-R58W (Nalen State 1 PAD) - Nalen State LD12-77-1BHN - 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=24 @ 4671.00usft (H&P 273). Northing and Easting are relative to Nalen State LD12-77-1BHN

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: 0.99999850

Grid Coordinates of Well: 1,529,232.54 usft N, 3,466,246.45 usft E

Geographical Coordinates of Well: 40° 46' 26.33" N, 103° 48' 59.54" W

Grid Convergence at Surface is: 1.09°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,419.00usft

the Bottom Hole Displacement is 5,179.43usft in the Direction of 174.84° (Grid).

Magnetic Convergence at surface is: -6.91° (11 December 2014, , BGGM2014)

