

Noble Energy

Weld County, CO (NAD 83)

Sec. 9-T9N-R58W (Rohn State 9 LD10 South PAD)

Rohn State LD10-63HN - A1

Original Wellbore

Design: Noble Flexishot and Sperry MWD Surveys

Sperry Drilling Services

Final Report

06 November, 2014

Well Coordinates: 1,524,276.94 N, 3,454,002.30 E (40° 45' 39.64" N, 103° 51' 39.85" W)

Ground Level: 4,717.00 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 Rohn State LD10-63HN - Slot A1

KB=24' @ 4741.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

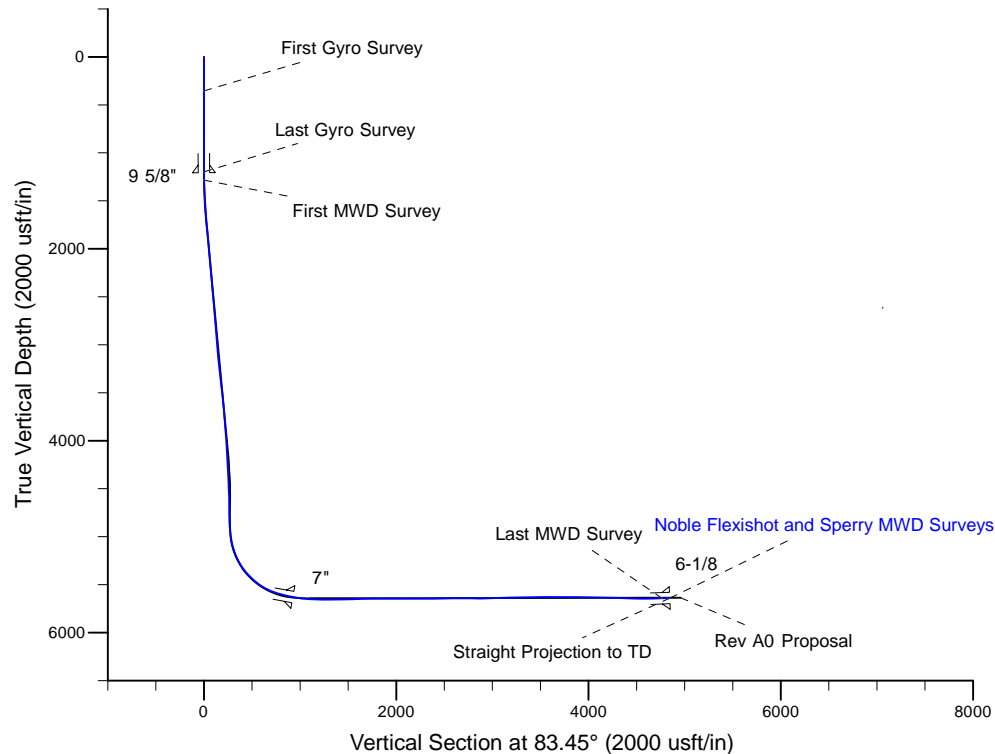
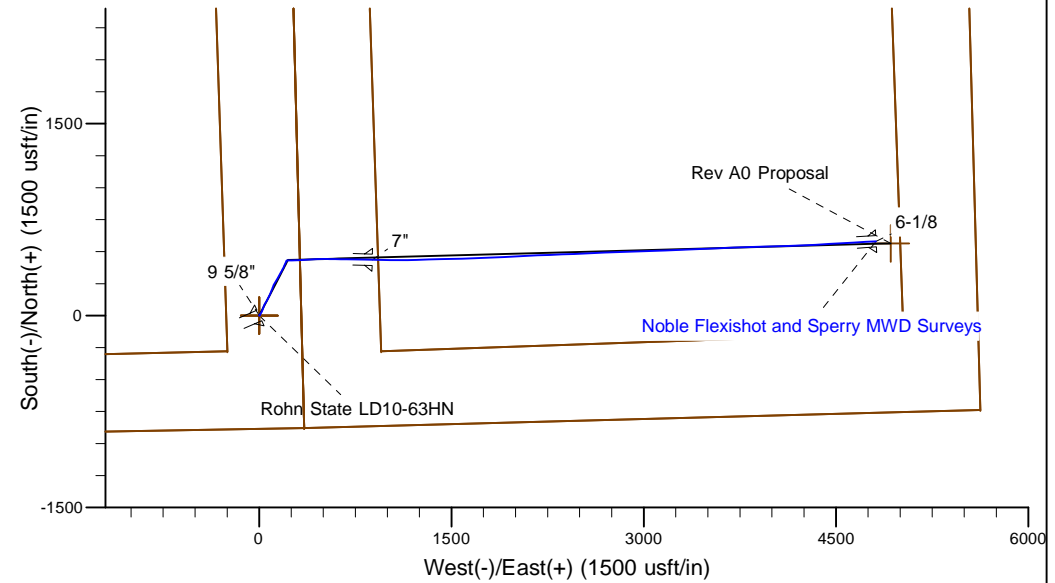
Project: Weld County, CO (NAD 83)
 Site: Sec. 9-T9N-R58W (Rohn State 9 LD10 South PAD)
 Well: Rohn State LD10-63HN
 Wellbore: Original Wellbore
 Design: Noble Flexishot and Sperry MWD Surveys



Platted SHL: 885' FSL, 330' FEL
 Platted Lat/Long: 40.761010N, 103.861070W
 Location: Sec. 9-T9N-R58W

~7" Casing: 1304' FSL, 555' FEL
 Lat/Long: 40.762163 N, -103.103.857855 W
 State Planes - CO Northern: 1524713.26 N, 3454885.08 E
 Sec. 9-T9N-R58W

Platted BHL: 1320' FSL, 660' FEL
 Lat/Long: 40.76231 N, 103.84325 W
 State Planes - CO Northern: 1524842.22N, 3458929.22E
 Location: Sec. 10-T9N-R58W



LEGEND

- Rohn State LD10-63HN, Original Wellbore, Rev A0 Proposal V0
- Noble Flexishot and Sperry MWD Surveys

WELL DETAILS: Rohn State LD10-63HN

Ground Level: 4717.00
 KB=24' @ 4741.00usft (H&P 273)

Created By: Gordy Roth
 Created On: 11/06/2014

Design Report for Rohn State LD10-63HN - Noble Flexishot and Sperry MWD 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	0.30	38.68	355.00	0.73	0.58	0.66	0.08
First Gyro Survey							
700.00	0.20	230.28	700.00	1.05	0.68	0.80	0.14
1,200.00	0.40	58.78	1,199.99	1.39	1.50	1.65	0.12
Last Gyro Survey							
1,286.00	0.59	203.61	1,285.99	1.14	1.58	1.70	1.10
First MWD Survey							
1,379.00	3.62	38.85	1,378.94	2.99	3.23	3.55	4.51
1,472.00	5.98	30.08	1,471.61	9.47	7.50	8.53	2.65
1,564.00	8.19	31.16	1,562.90	19.23	13.30	15.40	2.41
1,657.00	9.78	24.97	1,654.76	32.06	20.06	23.58	2.00
1,750.00	9.73	21.67	1,746.41	46.52	26.30	31.43	0.60
1,844.00	9.40	20.45	1,839.11	61.09	31.91	38.67	0.41
1,937.00	9.02	19.62	1,930.91	75.08	37.01	45.33	0.43
2,029.00	9.66	29.51	2,021.69	88.59	43.24	53.05	1.88
2,122.00	9.37	29.69	2,113.41	101.96	50.83	62.12	0.31
2,215.00	9.01	30.74	2,205.22	114.79	58.30	71.01	0.43
2,307.00	8.58	30.57	2,296.14	126.89	65.47	79.51	0.47
2,400.00	9.63	25.68	2,387.97	139.88	72.37	87.85	1.40
2,493.00	9.60	23.85	2,479.66	153.98	78.88	95.92	0.33
2,585.00	9.66	23.09	2,570.36	168.10	85.01	103.62	0.15
2,678.00	9.50	22.18	2,662.07	182.38	90.97	111.16	0.24
2,773.00	9.01	22.27	2,755.83	196.53	96.75	118.52	0.52
2,868.00	8.67	21.39	2,849.70	210.08	102.18	125.46	0.39
2,963.00	9.89	22.71	2,943.46	224.27	107.94	132.80	1.30
3,057.00	9.45	20.39	3,036.12	238.95	113.74	140.24	0.63
3,152.00	9.89	31.88	3,129.78	253.19	120.77	148.84	2.08
3,247.00	10.09	31.12	3,223.34	267.24	129.38	159.00	0.25
3,342.00	10.52	30.45	3,316.81	281.84	138.08	169.30	0.47
3,437.00	10.71	30.21	3,410.18	296.95	146.91	179.80	0.21
3,532.00	10.89	28.61	3,503.50	312.45	155.65	190.25	0.37
3,627.00	9.71	30.04	3,596.97	327.27	163.96	200.19	1.27
3,721.00	9.14	30.23	3,689.70	340.58	171.69	209.39	0.61
3,816.00	8.13	26.58	3,783.62	353.11	178.49	217.58	1.21
3,911.00	7.64	26.30	3,877.72	364.78	184.30	224.67	0.52
4,006.00	7.18	25.01	3,971.93	375.82	189.60	231.21	0.51
4,101.00	6.79	24.74	4,066.22	386.30	194.46	237.23	0.41
4,196.00	6.31	25.37	4,160.60	396.12	199.05	242.90	0.51
4,290.00	5.79	22.81	4,254.08	405.15	203.10	247.96	0.62
4,385.00	5.31	26.26	4,348.63	413.51	206.90	252.69	0.62
4,480.00	5.11	17.24	4,443.24	421.50	210.10	256.78	0.89
4,575.00	3.23	29.56	4,537.99	427.87	212.68	260.06	2.18
4,670.00	1.77	63.39	4,632.90	430.85	215.31	263.02	2.12
4,765.00	1.17	98.39	4,727.87	431.37	217.58	265.33	1.11
4,859.00	1.29	94.03	4,821.85	431.15	219.59	267.30	0.16
4,907.00	1.53	86.94	4,869.83	431.15	220.77	268.47	0.62
4,954.00	2.98	82.91	4,916.80	431.33	222.60	270.32	3.10
5,002.00	5.89	91.05	4,964.65	431.44	226.31	274.01	6.19
5,049.00	9.47	91.84	5,011.22	431.27	232.58	280.23	7.62

Design Report for Rohn State LD10-63HN - Noble Flexishot and Sperry MWD Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,097.00	12.75	90.55	5,058.31	431.10	241.83	289.39	6.85
5,144.00	15.59	90.28	5,103.88	431.02	253.33	300.81	6.04
5,192.00	18.51	90.52	5,149.76	430.92	267.41	314.78	6.09
5,239.00	21.75	88.01	5,193.89	431.15	283.57	330.87	7.13
5,287.00	25.70	83.84	5,237.82	432.58	302.82	350.15	8.94
5,334.00	30.33	85.29	5,279.31	434.65	324.79	372.22	9.96
5,382.00	34.70	87.09	5,319.77	436.34	350.53	397.98	9.32
5,429.00	38.74	88.11	5,357.44	437.50	378.60	426.00	8.69
5,477.00	43.10	87.02	5,393.70	438.85	410.00	457.35	9.20
5,523.00	45.82	86.76	5,426.53	440.60	442.17	489.51	5.93
5,571.00	49.18	88.32	5,458.96	442.10	477.52	524.80	7.40
5,618.00	52.84	89.53	5,488.52	442.78	514.04	561.16	8.04
5,666.00	56.87	91.34	5,516.15	442.47	553.27	600.10	8.94
5,713.00	62.08	91.72	5,540.01	441.38	593.73	640.17	11.11
5,761.00	66.33	90.49	5,560.90	440.56	636.93	682.99	9.15
5,808.00	71.09	89.81	5,577.96	440.45	680.71	726.48	10.22
5,856.00	73.58	90.65	5,592.52	440.26	726.44	771.89	5.45
5,903.00	75.12	91.58	5,605.20	439.38	771.69	816.74	3.79
5,951.00	76.70	91.58	5,616.89	438.09	818.22	862.83	3.29
5,971.00	77.55	91.67	5,621.34	437.54	837.71	882.13	4.27
6,085.00	82.77	91.06	5,640.82	434.87	949.96	993.34	4.61
6,178.00	85.43	90.48	5,650.38	433.63	1,042.46	1,085.09	2.93
6,271.00	89.11	89.45	5,654.81	433.69	1,135.33	1,177.37	4.11
6,364.00	90.09	87.96	5,655.45	435.79	1,228.30	1,269.97	1.92
6,456.00	90.28	88.08	5,655.16	438.97	1,320.25	1,361.68	0.24
6,551.00	90.59	88.42	5,654.44	441.87	1,415.20	1,456.34	0.48
6,646.00	91.20	88.55	5,652.95	444.38	1,510.15	1,550.96	0.66
6,741.00	92.44	88.99	5,649.94	446.42	1,605.08	1,645.51	1.38
6,836.00	91.67	88.34	5,646.53	448.63	1,699.99	1,740.05	1.06
6,930.00	89.45	86.82	5,645.61	452.60	1,793.90	1,833.80	2.86
7,025.00	89.69	86.96	5,646.32	457.75	1,888.75	1,928.62	0.29
7,120.00	89.63	86.75	5,646.89	462.97	1,983.61	2,023.45	0.23
7,215.00	90.19	87.39	5,647.04	467.82	2,078.48	2,118.26	0.90
7,310.00	90.80	88.17	5,646.22	471.50	2,173.41	2,212.99	1.04
7,405.00	89.78	87.74	5,645.73	474.89	2,268.35	2,307.69	1.17
7,500.00	90.74	87.41	5,645.30	478.91	2,363.26	2,402.44	1.07
7,595.00	90.52	88.00	5,644.26	482.71	2,458.18	2,497.18	0.66
7,690.00	90.28	87.45	5,643.60	486.49	2,553.10	2,591.91	0.63
7,880.00	89.66	87.73	5,643.69	494.48	2,742.93	2,781.41	0.36
7,974.00	89.66	87.75	5,644.25	498.18	2,836.85	2,875.15	0.02
8,069.00	91.23	88.19	5,643.51	501.55	2,931.79	2,969.85	1.72
8,164.00	92.41	88.05	5,640.50	504.66	3,026.69	3,064.49	1.25
8,259.00	91.73	88.44	5,637.07	507.57	3,121.58	3,159.09	0.83
8,354.00	91.63	87.57	5,634.28	510.87	3,216.48	3,253.75	0.92
8,449.00	91.60	87.22	5,631.60	515.19	3,311.35	3,348.49	0.37
8,544.00	90.03	87.84	5,630.25	519.28	3,406.24	3,443.23	1.78
8,639.00	89.97	87.56	5,630.25	523.10	3,501.17	3,537.97	0.30
8,733.00	90.37	87.20	5,629.97	527.39	3,595.07	3,631.75	0.57
8,828.00	89.38	87.98	5,630.18	531.39	3,689.98	3,726.50	1.33
8,922.00	90.37	88.03	5,630.39	534.66	3,783.92	3,820.21	1.05
9,017.00	89.32	88.39	5,630.64	537.63	3,878.88	3,914.88	1.17

Design Report for Rohn State LD10-63HN - Noble Flexishot and Sperry MWD Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,112.00	88.09	88.74	5,632.79	540.01	3,973.82	4,009.47	1.35
9,207.00	88.67	87.87	5,635.48	542.82	4,068.74	4,104.09	1.10
9,302.00	89.88	87.95	5,636.68	546.28	4,163.67	4,198.80	1.28
9,397.00	87.69	87.35	5,638.69	550.17	4,258.56	4,293.52	2.39
9,492.00	87.75	87.02	5,642.47	554.84	4,353.37	4,388.24	0.35
9,586.00	88.92	86.57	5,645.20	560.09	4,447.18	4,482.04	1.33
9,681.00	89.72	86.88	5,646.33	565.52	4,542.02	4,576.88	0.90
9,775.00	91.14	86.42	5,645.62	571.01	4,635.85	4,670.72	1.59
9,870.00	91.91	86.52	5,643.10	576.86	4,730.64	4,765.56	0.82
Last MWD Survey							
9,952.00	91.91	86.52	5,640.36	581.83	4,812.44	4,847.40	0.00
Straight Projection to TD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
355.00	355.00	0.73	0.58	First Gyro Survey
1,200.00	1,199.99	1.39	1.50	Last Gyro Survey
1,286.00	1,285.99	1.14	1.58	First MWD Survey
9,870.00	5,643.10	576.86	4,730.64	Last MWD Survey
9,952.00	5,640.36	581.83	4,812.44	Straight Projection to TD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Rohn State LD10-63HN_Rev A0_BHL Tgt	83.45	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
355.00	1,200.00	Noble Flexishot Surveys	Flexi-Shot
1,286.00	5,971.00	Intermediate Surveys	MWD
6,085.00	9,952.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,210.00	1,209.99	9 5/8"	9-5/8	13-1/2
6,017.00	5,630.43	7"	7	8-3/4
9,952.00	5,640.36	6-1/8	6-1/8	6-1/8

Design Report for Rohn State LD10-63HN - Noble Flexishot and Sperry MWD 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
Rohn State LD10-63HI - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,524,276.94	3,454,002.30	40.761010	-103.861070
Point 1				0.00	-879.00	352.00	1,523,397.94	3,454,354.30	
Point 2				0.00	4,431.00	217.00	1,528,707.92	3,454,219.30	
Point 3				0.00	4,562.00	5,481.00	1,528,838.92	3,459,483.28	
Point 4				0.00	-737.00	5,625.00	1,523,539.94	3,459,627.28	
Point 5				0.00	-879.00	352.00	1,523,397.94	3,454,354.30	
Rohn State LD10-63HI - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,524,276.94	3,454,002.30	40.761010	-103.861070
Point 1				0.00	-879.00	352.00	1,523,397.94	3,454,354.30	
Point 2				0.00	-972.00	-4,903.00	1,523,304.94	3,449,099.32	
Point 3				0.00	4,331.00	-5,031.00	1,528,607.92	3,448,971.32	
Point 4				0.00	4,431.00	217.00	1,528,707.92	3,454,219.30	
Point 5				0.00	-879.00	352.00	1,523,397.94	3,454,354.30	
Rohn State LD10-63HI - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,524,276.94	3,454,002.30	40.761010	-103.861070
Point 1				0.00	3,831.00	-383.00	1,528,107.93	3,453,619.30	
Point 2				0.00	-279.00	-248.00	1,523,997.94	3,453,754.30	
Point 3				0.00	-372.00	-4,303.00	1,523,904.94	3,449,699.31	
Point 4				0.00	3,731.00	-4,431.00	1,528,007.93	3,449,571.31	
Point 5				0.00	3,831.00	-383.00	1,528,107.93	3,453,619.30	
Rohn State LD10-63HI - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,524,276.94	3,454,002.30	40.761010	-103.861070
Point 1				0.00	-279.00	952.00	1,523,997.94	3,454,954.30	
Point 2				0.00	3,831.00	817.00	1,528,107.93	3,454,819.30	
Point 3				0.00	3,962.00	4,881.00	1,528,238.93	3,458,883.28	
Point 4				0.00	-137.00	5,025.00	1,524,139.94	3,459,027.28	
Point 5				0.00	-279.00	952.00	1,523,997.94	3,454,954.30	
Rohn State LD10-63HI - actual wellpath misses target center by 115.73usft at 9952.00usft MD (5640.36 TVD, 581.83 N, 4812.44 E) - Point	0.00	0.00	5,637.18	565.28	4,926.94	1,524,842.22	3,458,929.22	40.762310	-103.843250

Directional Difficulty Index

Average Dogleg over Survey:	1.64 °/100usft	Maximum Dogleg over Survey:	11.11 °/100usft at 5,713.00 usft
Net Tortousity applicable to Plans:	0.54 °/100usft	Directional Difficulty Index:	6.164

Audit Info

North Reference Sheet for Sec. 9-T9N-R58W (Rohn State 9 LD10 South PAD) -
Rohn State LD10-63HN - 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' @ 4741.00usft (H&P 273). Northing and Easting are relative to Rohn State LD10-63HN - Slot A1

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: 0.99999645

Grid Coordinates of Well: 1,524,276.94 usft N, 3,454,002.30 usft E

Geographical Coordinates of Well: 40° 45' 39.64" N, 103° 51' 39.85" W

Grid Convergence at Surface is: 1.06°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,952.00usft
the Bottom Hole Displacement is 4,847.48usft in the Direction of 83.11° (Grid).

Magnetic Convergence at surface is: -6.98° (10 October 2014, , BGGM2014)

