

Noble Energy

Weld County, CO (NAD 83)

Sec. 4-T9N-R58W (Rohn State 4 LD03 South PAD)

Rohn State LD03-63-1HN - A1

API: 05-123-37471

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

23 September, 2014

Well Coordinates: 1,529,474.17 N, 3,453,856.37 E (40° 46' 31.01" N, 103° 51' 40.50" W)

Ground Level: 4,706.00 usft

Local Coordinate Origin: Centered on Well Rohn State LD03-63-1HN - Slot A1

Viewing Datum: KB=24' @ 4730.00usft (H&P 273)

TVDs to System: N

North Reference: Grid

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

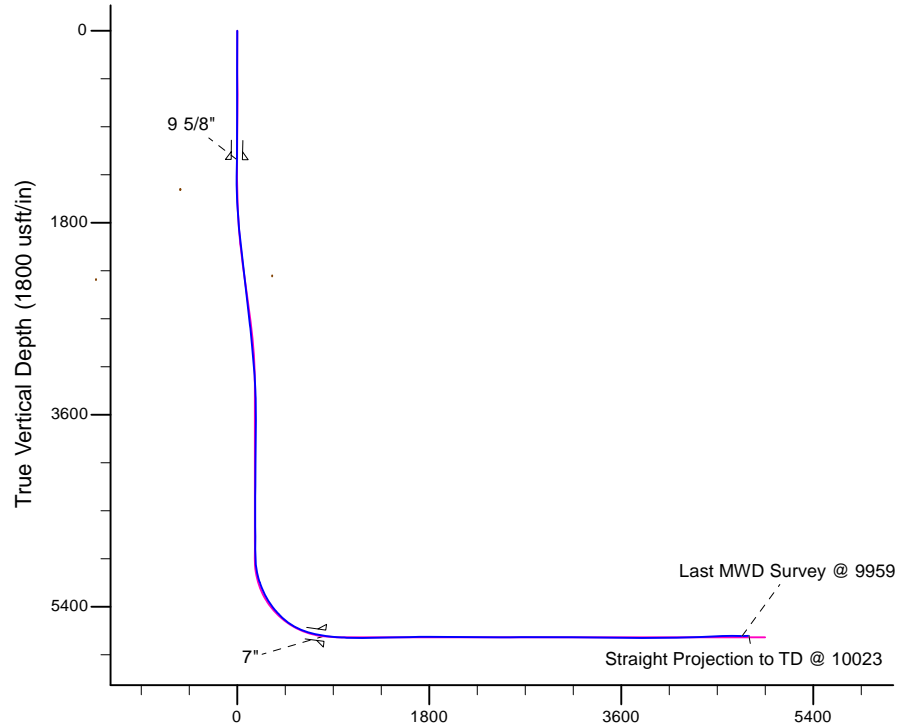
Version: 5000.1 Build: 70

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 4-T9N-R58W (Rohn State 4 LD03 South PAD)
Well: Rohn State LD03-63-1HN
Wellbore: Original Wellbore
Design: Actual Surveys

Noble Energy

HALLIBURTON
Sperry Drilling



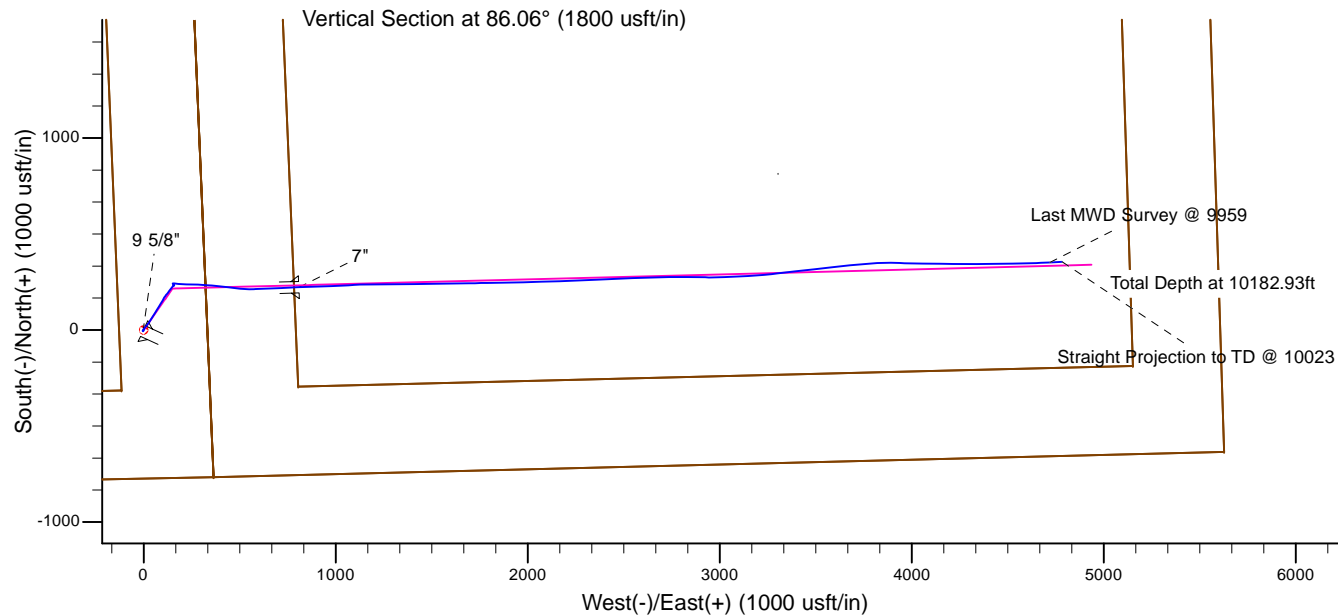
Platted SHL: 774 FSL, 330 FEL
Platted Lat/Long: 40.775280 N, 103.861250 W
Location: Sec. 4-T9N-R58W

~7" Casing: 983' FSL, 487' FWL
Lat/Long: 40° 46' 33.065 N 103° 51' 29.949 W
State Planes - CO Northern: 1529697.28 N 3454664.10 E
Location: Sec. 3-T9N-R58W

Platted BHL: 990 FSL, 660 FEL
Lat/Long: 40.775960 N, 103.843410 W
State Planes - CO Northern: 1529813.68 N, 3458792.00 E
Location: Sec. 3-T9N-R58W

LEGEND

- Rohn State LD03-63-1HN, Original Wellbore, Rev A0 Proposal V0
- Actual Surveys



WELL DETAILS: Rohn State LD03-63-1HN

Ground Level: 4706.00
KB=24' @ 4730.00usft (H&P 273)

Created By: Amanda Marchand
Created On: 09/24/2014

Design Report for Rohn State LD03-63-1HN - 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
350.00	0.70	229.39	349.99	-1.39	-1.62	-1.71	0.20
First Gyro Survey @ 350'							
800.00	0.70	142.99	799.97	-5.38	-2.06	-2.42	0.21
1,200.00	1.00	294.19	1,199.95	-5.90	-3.77	-4.16	0.41
Last Gyro Survey @ 1200'							
1,363.00	0.41	329.79	1,362.94	-4.81	-5.36	-5.68	0.43
First MWD Survey @ 1363'							
1,456.00	0.58	344.16	1,455.93	-4.07	-5.66	-5.92	0.22
1,549.00	2.57	34.46	1,548.90	-1.90	-4.60	-4.72	2.41
1,642.00	5.14	37.46	1,641.68	3.13	-0.89	-0.67	2.77
1,734.00	6.58	39.35	1,733.20	10.48	4.96	5.67	1.58
1,828.00	7.93	39.60	1,826.44	19.64	12.51	13.83	1.44
1,923.00	9.05	39.81	1,920.40	30.43	21.47	23.51	1.18
2,018.00	10.32	30.21	2,014.05	43.52	30.54	33.45	2.16
2,112.00	11.33	31.03	2,106.38	58.71	39.53	43.47	1.09
2,207.00	9.89	33.22	2,199.75	73.53	48.81	53.74	1.57
2,302.00	11.89	32.41	2,293.03	88.62	58.53	64.47	2.11
2,396.00	11.45	31.41	2,385.09	104.76	68.58	75.61	0.52
2,491.00	11.91	31.36	2,478.12	121.18	78.60	86.73	0.48
2,586.00	11.61	29.62	2,571.13	137.86	88.42	97.68	0.49
2,681.00	11.35	30.17	2,664.23	154.25	97.85	108.20	0.30
2,775.00	10.56	31.72	2,756.51	169.58	107.02	118.41	0.90
2,870.00	8.97	39.66	2,850.14	182.68	116.33	128.59	2.19
2,965.00	7.47	38.05	2,944.16	193.25	124.86	137.83	1.60
3,060.00	7.03	37.03	3,038.40	202.75	132.17	145.77	0.48
3,154.00	7.21	36.98	3,131.68	212.06	139.18	153.41	0.19
3,249.00	5.68	40.99	3,226.07	220.37	145.85	160.63	1.68
3,344.00	4.38	35.36	3,320.71	226.88	151.03	166.25	1.46
3,439.00	2.75	50.35	3,415.52	231.29	154.89	170.40	1.96
3,534.00	0.35	105.68	3,510.48	232.66	156.92	172.52	2.70
3,629.00	0.52	123.15	3,605.48	232.35	157.56	173.14	0.23
3,723.00	0.42	70.09	3,699.48	232.23	158.24	173.81	0.46
3,818.00	0.75	321.68	3,794.47	232.84	158.19	173.79	1.02
3,913.00	1.27	300.71	3,889.46	233.87	156.90	172.58	0.66
4,008.00	1.59	312.91	3,984.43	235.30	155.03	170.81	0.46
4,103.00	0.59	341.11	4,079.41	236.66	153.90	169.78	1.16
4,198.00	0.70	339.15	4,174.41	237.67	153.54	169.48	0.12
4,293.00	1.09	317.18	4,269.39	238.87	152.72	168.75	0.54
4,387.00	1.47	323.41	4,363.37	240.50	151.39	167.54	0.43
4,482.00	0.38	25.60	4,458.36	241.76	150.80	167.03	1.41
4,577.00	0.53	4.24	4,553.35	242.48	150.97	167.25	0.24
4,672.00	0.33	86.73	4,648.35	242.93	151.27	167.59	0.62
4,766.00	0.62	79.07	4,742.35	243.05	152.04	168.36	0.32
4,860.00	0.26	108.94	4,836.35	243.07	152.74	169.07	0.44
4,932.00	0.23	134.55	4,908.35	242.92	153.00	169.31	0.16
4,953.00	0.19	162.10	4,929.35	242.86	153.04	169.35	0.51
5,000.00	3.48	78.79	4,976.32	243.06	154.47	170.78	7.37
5,048.00	8.29	93.14	5,024.05	243.15	159.35	175.66	10.40
5,095.00	11.18	97.81	5,070.37	242.35	167.25	183.49	6.37

Design Report for Rohn State LD03-63-1HN - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,143.00	15.06	99.72	5,117.11	240.66	178.01	194.11	8.13
5,190.00	17.81	92.37	5,162.19	239.33	191.22	207.19	7.32
5,238.00	21.73	91.94	5,207.35	238.73	207.44	223.33	8.17
5,285.00	24.20	93.35	5,250.62	237.87	225.75	241.55	5.38
5,332.00	26.72	91.86	5,293.06	236.97	245.93	261.62	5.53
5,379.00	31.06	90.46	5,334.20	236.53	268.63	284.23	9.34
5,427.00	36.32	92.62	5,374.12	235.78	295.23	310.72	11.24
5,474.00	38.98	93.43	5,411.33	234.25	323.90	339.21	5.76
5,522.00	41.76	95.91	5,447.90	231.71	354.88	369.94	6.69
5,569.00	44.96	95.32	5,482.07	228.55	386.99	401.76	6.86
5,617.00	48.89	96.59	5,514.84	224.90	421.85	436.29	8.41
5,664.00	52.86	98.42	5,544.50	220.13	457.99	472.01	8.97
5,712.00	58.24	96.01	5,571.64	215.18	497.24	510.83	11.95
5,759.00	63.81	90.88	5,594.41	212.77	538.25	551.58	15.21
5,806.00	68.13	87.26	5,613.55	213.48	581.15	594.43	11.57
5,853.00	70.07	87.97	5,630.32	215.31	625.02	638.32	4.36
5,900.00	73.67	87.86	5,644.94	216.94	669.65	682.96	7.66
5,947.00	78.58	87.22	5,656.21	218.90	715.22	728.55	10.53
5,995.00	80.08	87.28	5,665.10	221.16	762.33	775.71	3.13
6,084.00	84.13	88.28	5,677.32	224.57	850.40	863.81	4.68
6,176.00	85.68	88.22	5,685.49	227.37	941.99	955.38	1.69
6,269.00	88.64	87.31	5,690.10	230.99	1,034.80	1,048.21	3.33
6,362.00	90.15	85.96	5,691.08	236.45	1,127.63	1,141.20	2.18
6,454.00	91.36	91.27	5,689.87	238.67	1,219.56	1,233.06	5.92
6,549.00	89.66	89.35	5,689.02	238.16	1,314.55	1,327.79	2.70
6,643.00	91.76	89.33	5,687.86	239.24	1,408.53	1,421.62	2.23
6,738.00	90.99	88.51	5,685.58	241.03	1,503.48	1,516.48	1.18
6,833.00	91.57	89.13	5,683.45	242.99	1,598.44	1,611.34	0.89
6,928.00	91.39	89.86	5,681.00	243.82	1,693.40	1,706.14	0.79
7,023.00	89.54	88.60	5,680.23	245.10	1,788.38	1,800.99	2.36
7,118.00	90.09	89.10	5,680.54	247.01	1,883.36	1,895.87	0.78
7,212.00	88.40	88.27	5,681.78	249.16	1,977.33	1,989.76	2.00
7,307.00	89.26	88.42	5,683.72	251.91	2,072.26	2,084.67	0.92
7,402.00	90.43	88.11	5,683.97	254.78	2,167.22	2,179.59	1.27
7,497.00	89.97	88.11	5,683.64	257.92	2,262.17	2,274.53	0.48
7,591.00	88.55	87.17	5,684.85	261.79	2,356.08	2,368.49	1.81
7,686.00	89.60	87.48	5,686.39	266.22	2,450.96	2,463.45	1.15
7,781.00	91.79	87.70	5,685.24	270.21	2,545.86	2,558.40	2.32
7,876.00	90.43	88.25	5,683.40	273.57	2,640.78	2,653.33	1.54
7,971.00	88.89	89.48	5,683.96	275.45	2,735.76	2,748.21	2.07
8,065.00	90.77	90.19	5,684.24	275.72	2,829.75	2,842.00	2.14
8,159.00	90.28	91.48	5,683.38	274.35	2,923.74	2,935.67	1.47
8,254.00	88.03	87.06	5,684.78	275.56	3,018.69	3,030.48	5.22
8,348.00	89.69	87.81	5,686.65	279.77	3,112.57	3,124.43	1.94
8,443.00	89.66	85.83	5,687.19	285.04	3,207.42	3,219.42	2.08
8,538.00	89.66	82.90	5,687.75	294.36	3,301.95	3,314.36	3.08
8,633.00	89.32	83.78	5,688.60	305.38	3,396.30	3,409.25	0.99
8,727.00	89.75	83.55	5,689.36	315.75	3,489.72	3,503.17	0.52
8,822.00	89.69	83.21	5,689.82	326.70	3,584.09	3,598.06	0.36
8,917.00	89.32	84.64	5,690.65	336.76	3,678.55	3,692.99	1.55
9,012.00	89.20	84.44	5,691.87	345.80	3,773.11	3,787.95	0.25

Design Report for Rohn State LD03-63-1HN - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,107.00	89.66	90.95	5,692.82	349.61	3,867.98	3,882.85	6.87
9,201.00	91.39	91.18	5,691.96	347.87	3,961.95	3,976.49	1.86
9,296.00	92.28	90.72	5,688.91	346.29	4,056.89	4,071.09	1.05
9,391.00	91.45	90.48	5,685.82	345.30	4,151.83	4,165.74	0.91
9,485.00	91.11	90.57	5,683.72	344.44	4,245.81	4,259.43	0.37
9,580.00	90.46	90.11	5,682.42	343.87	4,340.80	4,354.16	0.84
9,675.00	94.29	88.94	5,678.49	344.66	4,435.69	4,448.89	4.22
9,769.00	92.53	88.57	5,672.89	346.70	4,529.50	4,542.61	1.91
9,864.00	88.24	88.89	5,672.26	348.80	4,624.45	4,637.49	4.53
9,959.00	91.17	87.57	5,672.75	351.74	4,719.39	4,732.40	3.38
Last MWD Survey @ 9959							
10,023.00	91.17	87.57	5,671.44	354.45	4,783.32	4,796.37	0.00
Straight Projection to TD @ 10023							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
350.00	349.99	-1.39	-1.62	First Gyro Survey @ 350'
1,200.00	1,199.95	-5.90	-3.77	Last Gyro Survey @ 1200'
1,363.00	1,362.94	-4.81	-5.36	First MWD Survey @ 1363'
9,959.00	5,672.75	351.74	4,719.39	Last MWD Survey @ 9959
10,023.00	5,671.44	354.45	4,783.32	Straight Projection to TD @ 10023

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Rohn State LD03-63-1HN_Rev A0_BHL Tgt	86.06	Slot	0.00	0.00	5,686.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
350.00	1,200.00	Surface Surveys	Flexi-Shot
1,363.00	5,995.00	Intermediate Surveys	MWD
6,084.00	10,023.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,207.00	1,206.95	9 5/8"	9-5/8	13-3/4
6,041.00	5,672.19	7"	7	8-3/4

Design Report for Rohn State LD03-63-1HN - Actual Surveys

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 LD03-65HI	0.00	0.00	-1.00	2,650.78	-109.93	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2653.06usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-4,481.08	1,306.69	1,533,431.64	3,449,265.36		
Point 2				-4,330.55	-3,048.17	1,529,076.79	3,449,415.89		
Point 3				-6.00	-2,965.64	1,529,159.32	3,453,740.44		
Point 4				-187.40	1,400.65	1,533,525.60	3,453,559.04		
Point 5				-4,481.08	1,306.69	1,533,431.64	3,449,265.36		
Rohn State LD03-63-1	0.00	0.00	5,686.00	339.51	4,935.64	1,529,813.68	3,458,792.00	40° 46' 33.456 N	103° 50' 36.276 W
- actual wellpath misses target center by 153.74usft at 10023.00usft MD (5671.44 TVD, 354.45 N, 4783.32 E)									
- Point									
Rohn State LD03-65HI	0.00	0.00	-1.00	2,650.78	-109.93	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2653.06usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				913.96	-2,945.49	1,529,179.47	3,454,660.40		
Point 2				5,262.44	-2,837.50	1,529,287.46	3,459,008.87		
Point 3				5,123.82	1,514.25	1,533,639.20	3,458,870.25		
Point 4				732.57	1,420.53	1,533,545.48	3,454,479.01		
Point 5				913.96	-2,945.49	1,529,179.47	3,454,660.40		
Rohn State LD03-65HI	0.00	0.00	-1.00	2,650.78	-109.93	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2653.06usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-4,956.90	1,756.39	1,533,881.34	3,448,789.54		
Point 2				-4,774.63	-3,516.73	1,528,608.23	3,448,971.81		
Point 3				473.13	-3,416.58	1,528,708.38	3,454,219.57		
Point 4				253.48	1,870.41	1,533,995.36	3,453,999.92		
Point 5				473.13	-3,416.58	1,528,708.38	3,454,219.57		
Point 6				5,736.95	-3,285.86	1,528,839.10	3,459,483.38		
Point 7				5,569.10	1,983.86	1,534,108.81	3,459,315.53		
Point 8				253.48	1,870.41	1,533,995.36	3,453,999.92		

North Reference Sheet for Sec. 4-T9N-R58W (Rohn State 4 LD03 South PAD) -
Rohn State LD03-63-1HN - 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' @ 4730.00usft (H&P 273). Northing and Easting are relative to Rohn State LD03-63-1HN - 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° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°
False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99999870

Grid Coordinates of Well: 1,529,474.17 usft N, 3,453,856.37 usft E
Geographical Coordinates of Well: 40° 46' 31.01" N, 103° 51' 40.50" W
Grid Convergence at Surface is: 1.06°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,023.00usft
the Bottom Hole Displacement is 4,796.44usft in the Direction of 85.76° (Grid).
Magnetic Convergence at surface is: -6.99° (9 September 2014, , BGGM2014)

