

Noble Energy

Weld County, CO (NAD 83)

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

Rohn State LD03-62HN - A2

05-123-37471

Original Wellbore

Design: Noble Flexi-Shot and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

24 September, 2014

Surface UWI : 05-123-37471

Well Coordinates: 1,529,437.80 N, 3,453,859.81 E (40° 46' 30.65" N, 103° 51' 40.46" W)

Ground Level: 4,706.00 usft

Local Coordinate Origin: Centered on Well Rohn State LD03-62HN - Slot A2

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

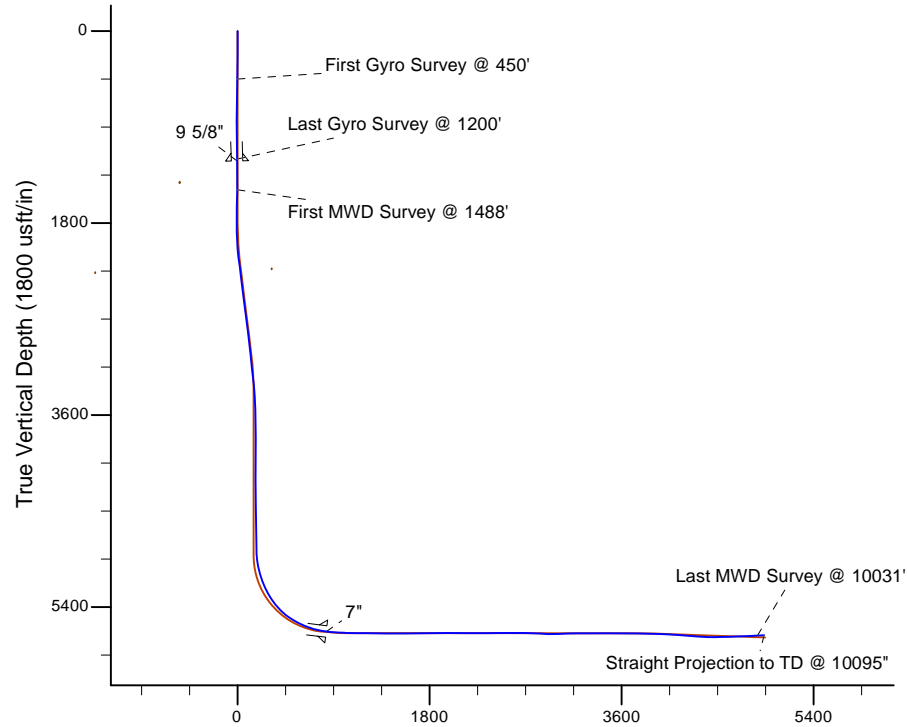
Version: 5000.1 Build: 70

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 4-T9N-R58W (Rohn State 4 LD03 South PAD)
 Well: Rohn State LD03-62HN
 Wellbore: Original Wellbore
 Design: Noble Flexi-Shot and Sperry MWD Survey

Noble Energy

HALLIBURTON
 Sperry Drilling



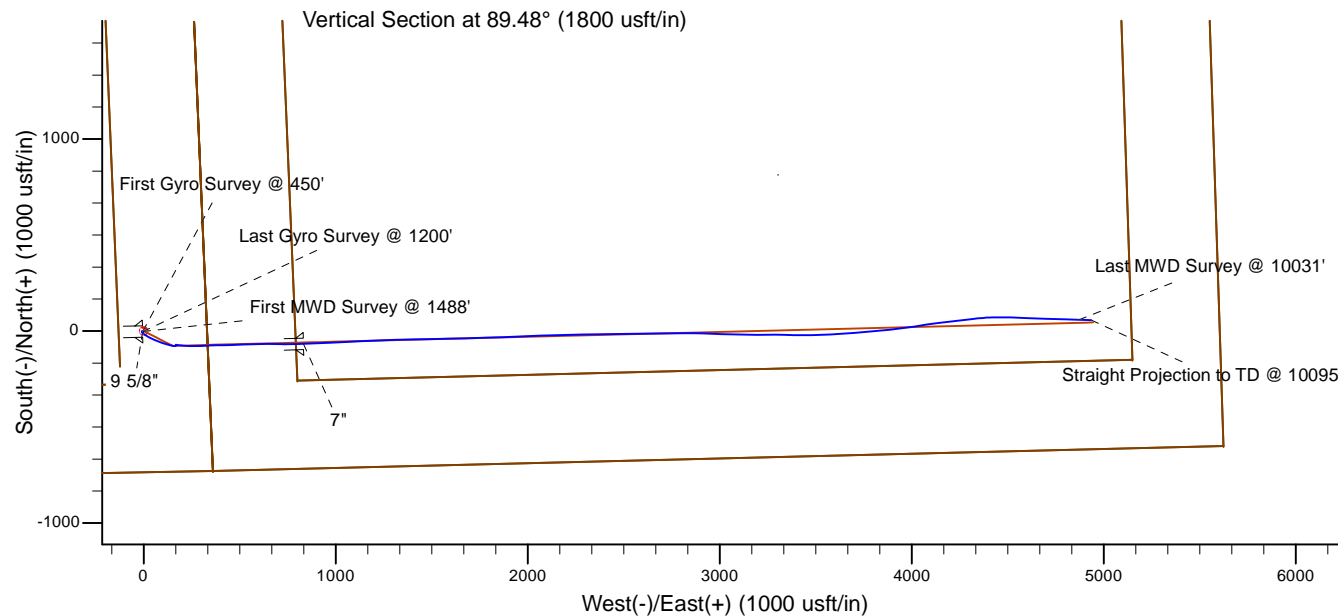
Platted SHL: 737 FSL, 330 FEL
 Platted Lat/Long: 40.77518 N, 103.86124 W
 Location: Sec. 4-T9N-R58W

 ~7" Casing: 650' FSL, 492' 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: 661 FSL, 476 FEL
 Lat/Long: 40.775050 N, 103.843390 W
 State Planes - CO Northern: 1529482.30 N, 3458803.74 E
 Location: Sec. 3-T9N-R58W

LEGEND

- △ Rohn State LD03-62HN, Original Wellbore, Rev B0 Proposal V0
- Noble Flexi-Shot and Sperry MWD Survey



WELL DETAILS: Rohn State LD03-62HN

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 LD03-62HN - Noble Flexi-Shot and Sperry MWD Survey

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	1.20	254.23	449.97	-1.28	-4.53	-4.55	0.27
First Gyro Survey @ 450'							
850.00	0.50	248.38	849.92	-3.06	-10.19	-10.22	0.18
1,200.00	1.79	89.38	1,199.87	-3.57	-6.14	-6.17	0.65
Last Gyro Survey @ 1200'							
1,488.00	1.27	290.96	1,487.83	-2.38	-4.62	-4.64	1.04
First MWD Survey @ 1488'							
1,566.00	1.12	289.82	1,565.82	-1.81	-6.15	-6.16	0.19
1,752.00	1.31	279.34	1,751.78	-0.85	-9.96	-9.96	0.16
1,845.00	2.74	162.34	1,844.74	-2.79	-10.33	-10.36	3.80
1,938.00	4.33	147.14	1,937.56	-7.86	-7.75	-7.82	1.97
2,030.00	6.28	132.86	2,029.17	-14.20	-2.18	-2.31	2.54
2,122.00	8.39	119.78	2,120.42	-20.96	7.34	7.15	2.91
2,215.00	8.02	119.59	2,212.46	-27.53	18.87	18.62	0.40
2,309.00	8.05	116.20	2,305.54	-33.68	30.48	30.17	0.51
2,402.00	7.99	115.84	2,397.63	-39.37	42.14	41.78	0.08
2,495.00	8.21	114.66	2,489.70	-44.96	53.99	53.58	0.30
2,679.00	7.97	112.53	2,671.87	-55.32	77.71	77.21	0.21
2,774.00	7.64	111.30	2,765.99	-60.14	89.68	89.13	0.39
2,868.00	7.26	109.31	2,859.20	-64.38	101.10	100.52	0.49
2,963.00	6.34	105.24	2,953.53	-67.74	111.83	111.22	1.09
3,058.00	6.06	101.40	3,047.98	-70.11	121.81	121.17	0.53
3,152.00	6.31	102.68	3,141.43	-72.22	131.71	131.06	0.30
3,247.00	6.53	104.93	3,235.83	-74.76	142.02	141.35	0.35
3,437.00	4.37	97.59	3,424.96	-78.50	159.64	158.93	1.19
3,532.00	2.87	75.10	3,519.78	-78.37	165.53	164.81	2.15
3,626.00	1.89	8.78	3,613.71	-76.23	168.04	167.35	2.90
3,910.00	0.44	289.93	3,897.65	-71.23	167.73	167.08	0.65
4,195.00	1.14	125.36	4,182.64	-72.50	169.01	168.35	0.55
4,384.00	0.18	287.12	4,371.63	-73.50	170.26	169.59	0.69
4,479.00	0.91	99.59	4,466.62	-73.58	170.86	170.19	1.15
4,764.00	0.84	82.62	4,751.59	-73.69	175.17	174.50	0.09
4,859.00	0.66	90.30	4,846.58	-73.60	176.40	175.73	0.22
4,907.00	2.01	90.57	4,894.57	-73.61	177.52	176.85	2.81
4,953.00	5.40	96.30	4,940.47	-73.86	180.48	179.81	7.40
5,001.00	9.87	97.43	4,988.03	-74.64	186.81	186.13	9.32
5,048.00	12.87	94.17	5,034.10	-75.54	196.03	195.34	6.53
5,096.00	15.81	93.43	5,080.60	-76.32	207.89	207.19	6.14
5,143.00	17.81	93.71	5,125.59	-77.17	221.45	220.75	4.26
5,191.00	20.18	93.16	5,170.97	-78.10	237.05	236.33	4.95
5,238.00	24.27	90.81	5,214.47	-78.68	254.81	254.09	8.90
5,286.00	28.41	88.46	5,257.48	-78.52	276.09	275.38	8.89
5,333.00	32.11	87.45	5,298.07	-77.66	299.76	299.05	7.95
5,381.00	35.19	87.82	5,338.02	-76.57	326.33	325.63	6.43
5,428.00	37.79	87.85	5,375.81	-75.51	354.26	353.56	5.53
5,476.00	41.69	88.28	5,412.71	-74.48	384.92	384.24	8.15
5,522.00	47.19	88.82	5,445.54	-73.67	417.11	416.43	11.98
5,570.00	52.66	88.43	5,476.43	-72.79	453.81	453.14	11.41
5,617.00	55.75	87.69	5,503.92	-71.49	491.91	491.24	6.70

Design Report for Rohn State LD03-62HN - Noble Flexi-Shot and Sperry MWD Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,665.00	59.89	87.78	5,529.48	-69.89	532.49	531.84	8.63
5,712.00	63.73	87.48	5,551.67	-68.17	573.87	573.24	8.19
5,760.00	66.84	89.63	5,571.74	-67.08	617.45	616.83	7.65
5,807.00	70.23	91.23	5,588.94	-67.42	661.19	660.55	7.88
5,855.00	72.68	91.23	5,604.20	-68.39	706.68	706.03	5.10
5,902.00	77.42	90.05	5,616.33	-68.90	752.07	751.42	10.37
5,942.00	81.19	89.02	5,623.75	-68.58	791.37	790.72	9.76
6,082.00	86.67	86.39	5,638.55	-62.99	930.41	929.80	4.34
6,174.00	88.67	87.13	5,642.29	-57.79	1,022.18	1,021.62	2.32
6,267.00	89.20	87.63	5,644.02	-53.54	1,115.06	1,114.54	0.78
6,359.00	89.26	88.53	5,645.25	-50.46	1,207.00	1,206.50	0.98
6,452.00	89.01	87.34	5,646.66	-47.11	1,299.93	1,299.45	1.31
6,547.00	89.54	88.76	5,647.86	-43.88	1,394.86	1,394.41	1.60
6,642.00	89.94	88.71	5,648.29	-41.78	1,489.84	1,489.40	0.42
6,736.00	90.83	89.18	5,647.66	-40.05	1,583.82	1,583.40	1.07
6,831.00	90.22	88.37	5,646.79	-38.02	1,678.79	1,678.38	1.07
6,926.00	91.45	88.23	5,645.41	-35.20	1,773.74	1,773.35	1.30
7,021.00	90.55	87.72	5,643.75	-31.84	1,868.66	1,868.30	1.09
7,116.00	89.97	87.82	5,643.32	-28.15	1,963.59	1,963.26	0.62
7,211.00	89.04	87.56	5,644.14	-24.32	2,058.51	2,058.21	1.02
7,305.00	89.72	88.29	5,645.15	-20.92	2,152.44	2,152.17	1.06
7,400.00	90.86	88.75	5,644.67	-18.46	2,247.41	2,247.15	1.29
7,495.00	89.66	89.17	5,644.24	-16.74	2,342.39	2,342.14	1.34
7,590.00	90.89	90.00	5,643.79	-16.05	2,437.38	2,437.14	1.56
7,684.00	91.02	89.24	5,642.22	-15.43	2,531.37	2,531.12	0.82
7,779.00	89.54	88.42	5,641.76	-13.49	2,626.34	2,626.11	1.78
7,874.00	87.07	89.12	5,644.57	-11.45	2,721.27	2,721.06	2.70
7,969.00	87.50	90.21	5,649.07	-10.89	2,816.16	2,815.95	1.23
8,064.00	87.96	91.44	5,652.83	-12.26	2,911.07	2,910.85	1.38
8,158.00	92.65	92.81	5,652.33	-15.74	3,004.98	3,004.72	5.20
8,253.00	92.31	90.71	5,648.22	-18.66	3,099.84	3,099.55	2.24
8,347.00	90.37	90.12	5,646.02	-19.34	3,193.81	3,193.50	2.16
8,442.00	89.63	90.12	5,646.02	-19.54	3,288.81	3,288.50	0.78
8,537.00	90.37	91.30	5,646.02	-20.72	3,383.80	3,383.47	1.47
8,632.00	90.19	88.63	5,645.55	-20.66	3,478.79	3,478.46	2.82
8,727.00	89.78	88.05	5,645.58	-17.91	3,573.75	3,573.44	0.75
8,822.00	89.14	85.11	5,646.47	-12.24	3,668.56	3,668.30	3.17
8,916.00	88.98	84.50	5,648.02	-3.73	3,762.16	3,761.98	0.67
9,011.00	88.58	86.07	5,650.04	4.08	3,856.82	3,856.70	1.71
9,106.00	87.62	81.31	5,653.19	14.51	3,951.16	3,951.13	5.11
9,200.00	86.85	80.71	5,657.73	29.18	4,043.90	4,044.00	1.04
9,295.00	86.54	83.68	5,663.20	42.06	4,137.85	4,138.06	3.14
9,390.00	85.59	83.48	5,669.72	52.66	4,232.03	4,232.33	1.02
9,484.00	85.49	83.10	5,677.03	63.61	4,325.10	4,325.50	0.42
9,579.00	88.83	87.94	5,681.74	71.01	4,419.66	4,420.12	6.18
9,674.00	91.63	92.69	5,681.36	70.49	4,514.62	4,515.07	5.80
9,769.00	92.04	91.81	5,678.32	66.76	4,609.49	4,609.91	1.02
9,863.00	91.97	91.79	5,675.03	63.81	4,703.39	4,703.77	0.08
9,958.00	91.64	91.67	5,672.04	60.94	4,798.30	4,798.65	0.37
10,031.00	93.39	91.88	5,668.83	58.68	4,871.19	4,871.52	2.41

Last MWD Survey @ 10031'

Design Report for Rohn State LD03-62HN - Noble Flexi-Shot and Sperry MWD Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,095.00	93.39	91.88	5,665.05	56.59	4,935.04	4,935.35	0.00
Straight Projection to TD @ 10095"							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
450.00	449.97	-1.28	-4.53	First Gyro Survey @ 450'
1,200.00	1,199.87	-3.57	-6.14	Last Gyro Survey @ 1200'
1,488.00	1,487.83	-2.38	-4.62	First MWD Survey @ 1488'
10,031.00	5,668.83	58.68	4,871.19	Last MWD Survey @ 10031'
10,095.00	5,665.05	56.59	4,935.04	Straight Projection to TD @ 10095"

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	+N/-S (usft)	+E/-W (usft)	Start TVD (usft)
Target	Rohn State LD03-62HN_Rev B0_BHL Tgt	89.48	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
450.00	1,200.00	Noble Flexi-Shot Surveys	Flexi-Shot
1,488.00	5,942.00	Intermediate Surveys	MWD
6,082.00	10,095.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,218.00	1,217.87	9 5/8"	9-5/8	13-3/4
5,983.00	5,629.46	7"	7	8-3/4

Design Report for Rohn State LD03-62HN - Noble Flexi-Shot and Sperry MWD Survey

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	2,687.16	-113.37	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2689.55usft 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 LD03-65HI	0.00	0.00	-1.00	2,687.16	-113.37	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2689.55usft 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 LD03-62HI	0.00	0.00	5,685.50	44.50	4,943.93	1,529,482.30	3,458,803.74	40° 46' 30.180 N	103° 50' 36.204 W
- actual wellpath misses target center by 25.36usft at 10095.00usft MD (5665.05 TVD, 56.59 N, 4935.04 E)									
- Point									
Rohn State LD03-62HI	0.00	0.00	5,660.00	44.50	4,943.93	1,529,482.30	3,458,803.74	40° 46' 30.180 N	103° 50' 36.204 W
- actual wellpath misses target center by 15.83usft at 10095.00usft MD (5665.05 TVD, 56.59 N, 4935.04 E)									
- Point									
Rohn State LD03-65HI	0.00	0.00	-1.00	2,687.16	-113.37	1,532,124.95	3,453,746.44	40° 46' 57.216 N	103° 51' 41.292 W
- actual wellpath misses target center by 2689.55usft 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 LD03-62HN - 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 LD03-62HN - Slot A2
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: 0.99999869

Grid Coordinates of Well: 1,529,437.80 usft N, 3,453,859.81 usft E
Geographical Coordinates of Well: 40° 46' 30.65" N, 103° 51' 40.46" W
Grid Convergence at Surface is: 1.06°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,095.00usft
the Bottom Hole Displacement is 4,935.37usft in the Direction of 89.34° (Grid).
Magnetic Convergence at surface is: -6.98° (15 September 2014, , BGGM2014)

