



Noble Energy Inc.

Weld County, CO

Sec 9, T9N, R58W

Rohn State LD09-65HN

Wellbore #1

Design: Wellbore #1 FINAL

DDC Survey Report

29 October, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rohn State LD09-65HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4746.0usft (H&P 326)
Site:	Sec 9, T9N, R58W	MD Reference:	WELL @ 4746.0usft (H&P 326)
Well:	Rohn State LD09-65HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 9, T9N, R58W			
Site Position:		Northing:	1,523,890.74 usft	Latitude:	40° 45' 35.850 N
From:	Map	Easting:	3,453,841.03 usft	Longitude:	103° 51' 42.040 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.06 °

Well	Rohn State LD09-65HN					
Well Position	+N-S	0.0 usft	Northing:	1,525,552.56 usft	Latitude:	40° 45' 52.272 N
	+E-W	0.0 usft	Easting:	3,453,818.02 usft	Longitude:	103° 51' 41.940 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,716.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/17/2013	8.09	67.41	53,176

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	275.91	

Survey Program		Date	10/29/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
473.0	1,250.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
1,305.0	9,764.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
473.0	0.20	3.30	473.0	0.8	0.0	0.0	0.04	0.04	0.00
938.0	0.60	334.20	938.0	3.8	-1.0	1.4	0.09	0.09	-6.26
TIE IN @ 1250' MD / 1250' TVD									
1,250.0	0.60	287.70	1,250.0	5.8	-3.2	3.8	0.15	0.00	-14.90
1,305.0	0.10	240.30	1,305.0	5.9	-3.5	4.1	0.98	-0.91	-86.18
1,397.0	1.90	36.90	1,397.0	7.0	-2.7	3.4	2.17	1.96	170.22
1,489.0	4.30	30.00	1,488.8	11.2	-0.1	1.2	2.64	2.61	-7.50
1,581.0	6.10	24.40	1,580.4	18.7	3.7	-1.7	2.03	1.96	-6.09
1,675.0	7.70	31.10	1,673.7	28.6	9.0	-6.0	1.90	1.70	7.13

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Well:	Rohn State LD09-65HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,767.0	10.10	29.00	1,764.6	41.0	16.1	-11.8	2.63	2.61	-2.28
1,860.0	11.20	26.90	1,856.0	56.1	24.1	-18.2	1.25	1.18	-2.26
1,953.0	12.90	26.00	1,947.0	73.5	32.8	-25.0	1.84	1.83	-0.97
2,046.0	16.10	24.40	2,037.0	94.6	42.7	-32.7	3.47	3.44	-1.72
2,140.0	16.60	20.00	2,127.2	119.1	52.6	-40.1	1.42	0.53	-4.68
2,233.0	16.00	15.60	2,216.5	143.9	60.6	-45.5	1.48	-0.65	-4.73
2,325.0	15.00	14.20	2,305.1	167.7	67.0	-49.3	1.16	-1.09	-1.52
2,418.0	14.60	19.10	2,395.0	190.4	73.7	-53.7	1.41	-0.43	5.27
2,510.0	16.00	21.60	2,483.8	213.2	82.2	-59.8	1.68	1.52	2.72
2,602.0	15.90	20.90	2,572.2	236.7	91.4	-66.5	0.24	-0.11	-0.76
2,697.0	15.60	20.20	2,663.7	260.9	100.4	-73.0	0.37	-0.32	-0.74
2,791.0	14.90	17.90	2,754.4	284.2	108.5	-78.7	0.98	-0.74	-2.45
2,885.0	14.80	18.60	2,845.2	307.1	116.0	-83.8	0.22	-0.11	0.74
2,980.0	14.30	17.60	2,937.2	329.8	123.5	-88.8	0.59	-0.53	-1.05
3,074.0	15.20	24.10	3,028.1	352.1	132.0	-95.0	2.00	0.96	6.91
3,169.0	16.80	24.30	3,119.4	376.0	142.7	-103.3	1.69	1.68	0.21
3,264.0	17.10	22.70	3,210.3	401.4	153.8	-111.6	0.58	0.32	-1.68
3,358.0	18.00	23.20	3,299.9	427.5	164.8	-119.9	0.97	0.96	0.53
3,453.0	19.00	23.50	3,390.0	455.2	176.8	-129.0	1.06	1.05	0.32
3,548.0	16.80	18.50	3,480.4	482.4	187.3	-136.6	2.82	-2.32	-5.26
3,643.0	13.30	7.90	3,572.1	506.2	193.2	-140.0	4.67	-3.68	-11.16
3,737.0	8.20	8.10	3,664.5	523.6	195.6	-140.6	5.43	-5.43	0.21
3,832.0	3.70	14.10	3,758.9	533.3	197.3	-141.3	4.78	-4.74	6.32
3,927.0	2.30	258.40	3,853.8	535.9	196.2	-140.0	5.40	-1.47	-121.79
4,021.0	2.10	262.60	3,947.8	535.3	192.6	-136.5	0.27	-0.21	4.47
4,116.0	1.90	276.50	4,042.7	535.2	189.3	-133.2	0.55	-0.21	14.63
4,210.0	1.60	280.20	4,136.7	535.6	186.5	-130.3	0.34	-0.32	3.94
4,305.0	1.40	282.30	4,231.6	536.1	184.1	-127.9	0.22	-0.21	2.21
4,399.0	1.10	273.00	4,325.6	536.4	182.0	-125.8	0.38	-0.32	-9.89
4,493.0	1.00	236.60	4,419.6	536.0	180.4	-124.3	0.71	-0.11	-38.72
4,588.0	1.20	142.40	4,514.6	534.8	180.4	-124.3	1.70	0.21	-99.16
4,683.0	1.10	132.50	4,609.6	533.4	181.6	-125.8	0.23	-0.11	-10.42
4,777.0	1.40	120.20	4,703.6	532.2	183.3	-127.5	0.43	0.32	-13.09
4,871.0	1.40	126.70	4,797.5	530.9	185.2	-129.6	0.17	0.00	6.91
4,966.0	1.30	100.40	4,892.5	530.0	187.2	-131.6	0.65	-0.11	-27.68
5,061.0	1.00	184.40	4,987.5	529.0	188.2	-132.7	1.64	-0.32	88.42
5,155.0	11.30	249.30	5,080.8	524.9	179.5	-124.5	11.61	10.96	69.04
5,249.0	18.10	263.00	5,171.7	519.9	156.4	-102.0	8.08	7.23	14.57
5,344.0	25.10	270.30	5,260.0	518.2	121.5	-67.5	7.88	7.37	7.68
5,439.0	31.80	264.20	5,343.5	515.7	76.4	-22.9	7.68	7.05	-6.42
5,533.0	40.90	262.10	5,419.2	509.0	21.2	31.4	9.77	9.68	-2.23
5,628.0	47.60	264.40	5,487.2	501.3	-44.6	96.0	7.25	7.05	2.42
5,722.0	53.40	267.70	5,547.0	496.4	-117.0	167.4	6.74	6.17	3.51

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
CROSSED HARD LINE @ 5741.3' MD / 5558.3' TVD									
5,741.3	54.68	268.20	5,558.3	495.8	-132.6	182.9	6.93	6.61	2.57
5,817.0	59.70	270.00	5,599.3	494.9	-196.2	246.1	6.93	6.64	2.38
5,912.0	66.80	271.40	5,642.0	495.9	-280.9	330.5	7.59	7.47	1.47
6,006.0	72.40	270.00	5,674.8	497.0	-369.0	418.2	6.12	5.96	-1.49
6,095.0	78.20	270.20	5,697.4	497.1	-455.0	503.8	6.52	6.52	0.22
6,231.0	90.30	269.60	5,711.0	496.9	-590.1	638.1	8.91	8.90	-0.44
6,326.0	89.90	269.50	5,710.8	496.1	-685.1	732.5	0.43	-0.42	-0.11
6,421.0	90.40	269.50	5,710.5	495.3	-780.1	826.9	0.53	0.53	0.00
6,515.0	89.00	268.60	5,711.0	493.8	-874.1	920.3	1.77	-1.49	-0.96
6,609.0	89.00	268.80	5,712.7	491.6	-968.0	1,013.5	0.21	0.00	0.21
6,704.0	89.20	268.80	5,714.2	489.6	-1,063.0	1,107.8	0.21	0.21	0.00
6,798.0	89.30	268.60	5,715.4	487.5	-1,157.0	1,201.0	0.24	0.11	-0.21
6,893.0	89.70	268.80	5,716.2	485.3	-1,251.9	1,295.3	0.47	0.42	0.21
6,988.0	88.20	268.40	5,718.0	483.0	-1,346.9	1,389.5	1.63	-1.58	-0.42
7,083.0	88.40	268.40	5,720.8	480.4	-1,441.8	1,483.6	0.21	0.21	0.00
7,178.0	87.80	267.50	5,723.9	477.0	-1,536.7	1,577.6	1.14	-0.63	-0.95
7,273.0	89.20	268.20	5,726.4	473.4	-1,631.6	1,671.7	1.65	1.47	0.74
7,368.0	89.70	267.90	5,727.3	470.2	-1,726.5	1,765.8	0.61	0.53	-0.32
7,463.0	90.30	267.70	5,727.3	466.5	-1,821.5	1,859.8	0.67	0.63	-0.21
7,558.0	91.00	267.50	5,726.3	462.6	-1,916.4	1,953.8	0.77	0.74	-0.21
7,653.0	89.00	268.80	5,726.3	459.5	-2,011.3	2,047.9	2.51	-2.11	1.37
7,748.0	89.10	268.40	5,727.8	457.2	-2,106.3	2,142.2	0.43	0.11	-0.42
7,842.0	89.50	268.60	5,729.0	454.7	-2,200.2	2,235.4	0.48	0.43	0.21
7,937.0	89.30	269.60	5,730.0	453.2	-2,295.2	2,329.7	1.07	-0.21	1.05
8,031.0	89.40	269.60	5,731.0	452.6	-2,389.2	2,423.1	0.11	0.11	0.00
8,126.0	89.30	269.30	5,732.1	451.7	-2,484.2	2,517.5	0.33	-0.11	-0.32
8,221.0	89.20	269.10	5,733.4	450.3	-2,579.2	2,611.8	0.24	-0.11	-0.21
8,315.0	88.90	268.80	5,734.9	448.6	-2,673.2	2,705.1	0.45	-0.32	-0.32
8,410.0	88.30	269.80	5,737.2	447.4	-2,768.1	2,799.5	1.23	-0.63	1.05
8,505.0	87.80	269.60	5,740.5	446.9	-2,863.1	2,893.9	0.57	-0.53	-0.21
8,599.0	90.10	269.50	5,742.2	446.2	-2,957.0	2,987.3	2.45	2.45	-0.11
8,694.0	90.60	269.30	5,741.6	445.2	-3,052.0	3,081.7	0.57	0.53	-0.21
8,789.0	91.00	268.90	5,740.3	443.7	-3,147.0	3,176.0	0.60	0.42	-0.42
8,883.0	90.80	271.00	5,738.8	443.6	-3,241.0	3,269.5	2.24	-0.21	2.23
8,977.0	89.70	271.80	5,738.4	445.9	-3,335.0	3,363.2	1.45	-1.17	0.85
9,072.0	88.50	272.50	5,739.9	449.5	-3,429.9	3,457.9	1.46	-1.26	0.74
9,167.0	88.90	272.50	5,742.1	453.6	-3,524.8	3,552.7	0.42	0.42	0.00
9,261.0	89.50	273.00	5,743.4	458.1	-3,618.7	3,646.6	0.83	0.64	0.53
9,356.0	86.80	272.30	5,746.4	462.5	-3,713.5	3,741.4	2.94	-2.84	-0.74
9,450.0	86.90	270.90	5,751.6	465.2	-3,807.3	3,835.0	1.49	0.11	-1.49
9,545.0	86.40	270.70	5,757.2	466.5	-3,902.1	3,929.4	0.57	-0.53	-0.21
9,640.0	89.80	269.80	5,760.3	466.9	-3,997.1	4,023.9	3.70	3.58	-0.95
9,700.0	89.40	269.80	5,760.7	466.7	-4,057.1	4,083.6	0.67	-0.67	0.00

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Well:	Rohn State LD09-65HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
TD @ 9764' MD / 5761.4' TVD									
9,764.0	89.40	269.80	5,761.4	466.5	-4,121.1	4,147.2	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,250.0	1,250.0	5.8	-3.2	TIE IN @ 1250' MD / 1250' TVD
5,741.3	5,558.3	495.8	-132.6	CROSSED HARD LINE @ 5741.3' MD / 5558.3' TVD
9,764.0	5,761.4	466.5	-4,121.1	TD @ 9764' MD / 5761.4' TVD

Checked By: _____	Approved By: _____	Date: _____
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Survey Certification Sheet

Noble Energy INC.
Company

RM-13829
Job Number

10/29/13
Date

Sec9,T9N,R58W
Lease

Rohn State LD 09-65 HN
Well Name

Weld, CO
County & State

API: 05-123-37530

Surveyed from a depth of: 1250 feet to 9764 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Chris Abbott

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry
Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrille
rs.com, c=US
Date: 2013.10.31 16:30:27
-05'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Rohn State LD09-65HN
Weld County, CO
Rig: H&P 326
Created By: TIFFANI MIZELL
Date: 10/29/2013

Rohn State LD09-65HN
Weld County, CO
Q130804 & RM-13829
Design #3



PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
System Datum: Mean Sea Level

DESIGN TARGET DETAILS

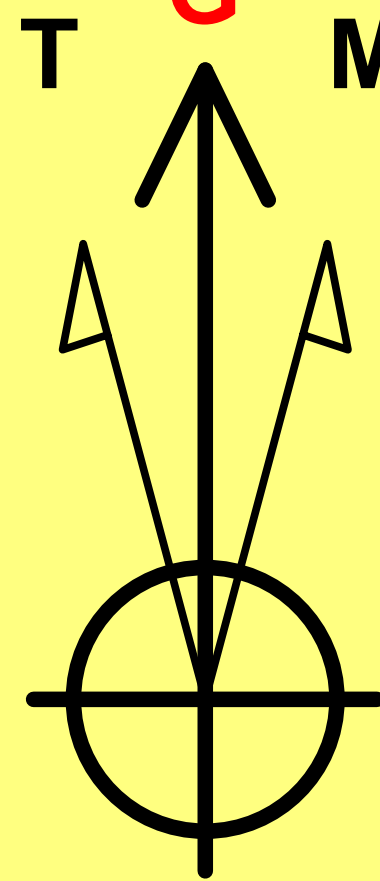
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Rohn State LD09-65HN D#2	5752.4	427.0	-4124.9	1525979.55	3449693.12	40° 45' 57.240 N	103° 52' 35.436 W
- plan hits target center							
PBHL Rohn State LD09-65HN	5863.0	427.0	-4124.9	1525979.55	3449693.12	40° 45' 57.240 N	103° 52' 35.436 W
- plan misses target center by 110.5usft at 9740.5usft MD (5752.4 TVD, 427.0 N, -4124.9 E)							

WELL DETAILS: Rohn State LD09-65HN

+N/-S	+E/-W	Ground Level:	4716.0		
0.0	0.0	Northing	1525552.55	Easting	3453818.02
		Latitude	40° 45' 52.272 N	Longitude	103° 51' 41.940 W

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
1300.0	0.00	0.00	1300.0	0.0	0.0	0.0	0.0	Build 2'/'100'
2050.5	15.01	16.24	2041.9	93.8	27.3	-17.5	97.7	EOB @ 15.01° Inc / 16.24° Azm
3366.4	15.01	16.24	3312.9	421.0	122.6	-78.6	438.5	Drop 2'/'100'
4116.9	0.00	0.00	4054.9	514.9	150.0	-96.2	536.3	EOD @ Vertical
5055.4	0.00	0.00	4993.4	514.9	150.0	-96.2	536.3	Build 8'/'100'
6117.9	85.00	268.82	5706.9	501.4	-503.7	552.6	1190.1	EOB @ 85° Inc / 268.82° Azm
6192.9	85.00	268.82	5713.4	499.9	-578.4	626.8	1264.8	Build 8'/'100'
6247.9	89.40	268.82	5716.1	498.8	-633.3	681.3	1319.8	EOB @ 89.40° Inc / 5716° TVD
9740.5	89.40	268.82	5752.4	427.0	-4124.9	4146.9	4812.1	TD @ 9741' MD / 5752' TVD



Azimuths to Grid North

Correction: 7.03°
Magnetic Field

Strength: 53175.6snT
Dip Angle: 67.41°
Date: 9/17/2013
Model: IGRF2010

