



Noble Energy Inc.

Weld County, CO

Sec 9, T9N, R58W

Rohn State LD09-68-1HN

Wellbore #1

Design: Wellbore #1 FINAL

DDC Survey Report

01 October, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rohn State LD09-68-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4769.0usft (H&P 326)
Site:	Sec 9, T9N, R58W	MD Reference:	WELL @ 4769.0usft (H&P 326)
Well:	Rohn State LD09-68-1HN	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 LD09-68-1HN					
Well Position	+N-S	0.0 usft	Northing:	1,527,763.43 usft	Latitude:	40° 46' 14.124 N
	+E-W	0.0 usft	Easting:	3,453,763.32 usft	Longitude:	103° 51' 42.120 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,739.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/28/2013	8.10	67.42	53,184

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	268.42	

Survey Program		Date	10/1/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
356.0	1,240.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
1,307.0	9,435.0	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
356.0	0.60	67.80	356.0	0.7	1.7	-1.7	0.17	0.17	0.00
636.0	0.30	338.70	636.0	1.9	2.8	-2.9	0.24	-0.11	-31.82
915.0	0.40	187.60	915.0	1.7	2.4	-2.5	0.24	0.04	-54.16
TIE IN @ 1240' MD / 1240' TVD									
1,240.0	0.00	339.00	1,240.0	0.5	2.3	-2.3	0.12	-0.12	0.00
1,307.0	0.60	269.30	1,307.0	0.5	1.9	-1.9	0.90	0.90	0.00
1,399.0	0.60	272.30	1,399.0	0.5	1.0	-1.0	0.03	0.00	3.26
1,492.0	0.50	281.60	1,492.0	0.6	0.1	-0.1	0.14	-0.11	10.00
1,586.0	0.80	132.70	1,586.0	0.3	0.2	-0.2	1.34	0.32	-158.40

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Well:	Rohn State LD09-68-1HN	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)
1,680.0	1.00	127.80	1,680.0	-0.7	1.3	-1.3	0.23	0.21	-5.21
1,772.0	1.10	133.60	1,771.9	-1.8	2.6	-2.5	0.16	0.11	6.30
1,864.0	1.10	139.20	1,863.9	-3.0	3.8	-3.7	0.12	0.00	6.09
1,957.0	1.30	138.30	1,956.9	-4.5	5.1	-4.9	0.22	0.22	-0.97
2,049.0	1.60	140.80	2,048.9	-6.3	6.6	-6.4	0.33	0.33	2.72
2,142.0	0.20	125.50	2,141.9	-7.4	7.5	-7.3	1.51	-1.51	-16.45
2,326.0	0.50	54.10	2,325.9	-7.1	8.4	-8.2	0.26	0.16	-38.80
2,511.0	0.50	65.40	2,510.9	-6.3	9.8	-9.6	0.05	0.00	6.11
2,697.0	0.40	61.30	2,696.8	-5.6	11.1	-11.0	0.06	-0.05	-2.20
2,884.0	0.40	68.40	2,883.8	-5.1	12.3	-12.2	0.03	0.00	3.80
3,073.0	0.60	29.00	3,072.8	-4.0	13.4	-13.3	0.20	0.11	-20.85
3,263.0	0.90	37.40	3,262.8	-1.9	14.8	-14.7	0.17	0.16	4.42
3,452.0	1.30	18.60	3,451.8	1.3	16.4	-16.4	0.28	0.21	-9.95
3,641.0	1.30	21.40	3,640.7	5.3	17.8	-18.0	0.03	0.00	1.48
3,830.0	0.60	309.70	3,829.7	7.9	17.9	-18.1	0.66	-0.37	-37.94
4,019.0	1.20	313.60	4,018.7	9.9	15.7	-15.9	0.32	0.32	2.06
4,209.0	0.50	205.80	4,208.7	10.6	13.9	-14.2	0.75	-0.37	-56.74
4,399.0	0.60	203.20	4,398.7	8.9	13.1	-13.4	0.05	0.05	-1.37
4,588.0	0.70	315.90	4,587.7	8.8	11.9	-12.2	0.57	0.05	59.63
4,778.0	0.90	308.50	4,777.6	10.6	9.9	-10.2	0.12	0.11	-3.89
4,841.0	1.20	311.70	4,840.6	11.3	9.1	-9.4	0.49	0.48	5.08
4,872.0	1.30	304.50	4,871.6	11.7	8.5	-8.9	0.60	0.32	-23.23
4,967.0	4.50	291.10	4,966.5	13.7	4.2	-4.5	3.42	3.37	-14.11
5,061.0	14.00	278.30	5,059.2	16.7	-10.6	10.1	10.28	10.11	-13.62
5,156.0	22.30	271.90	5,149.4	18.9	-40.0	39.5	8.97	8.74	-6.74
5,251.0	27.50	267.00	5,235.5	18.4	-80.0	79.4	5.88	5.47	-5.16
CROSSED HARDLINE @ 5329.3' MD / 5302.3' TVD									
5,329.3	35.23	261.76	5,302.3	14.2	-120.4	120.0	10.46	9.87	-6.69
5,346.0	36.90	260.90	5,315.8	12.7	-130.1	129.7	10.46	10.01	-5.16
5,440.0	44.00	256.50	5,387.3	0.6	-189.8	189.8	8.14	7.55	-4.68
5,535.0	50.00	257.70	5,452.1	-14.9	-257.5	257.9	6.38	6.32	1.26
5,629.0	55.80	263.70	5,508.8	-26.8	-331.5	332.1	8.00	6.17	6.38
5,724.0	67.40	264.70	5,553.9	-35.2	-414.5	415.3	12.25	12.21	1.05
5,819.0	74.70	265.80	5,584.7	-42.6	-503.9	504.9	7.76	7.68	1.16
5,913.0	74.70	269.60	5,609.6	-46.3	-594.5	595.6	3.90	0.00	4.04
6,008.0	74.60	269.10	5,634.7	-47.3	-686.1	687.2	0.52	-0.11	-0.53
6,062.0	79.80	269.10	5,646.7	-48.1	-738.8	739.8	9.63	9.63	0.00
6,157.0	87.30	269.60	5,657.3	-49.2	-833.1	834.1	7.91	7.89	0.53
6,252.0	88.50	269.60	5,660.8	-49.9	-928.0	929.0	1.26	1.26	0.00
6,346.0	90.80	269.60	5,661.4	-50.5	-1,022.0	1,023.0	2.45	2.45	0.00
6,441.0	90.40	269.10	5,660.4	-51.6	-1,117.0	1,118.0	0.67	-0.42	-0.53
6,535.0	90.10	268.10	5,660.0	-53.9	-1,211.0	1,212.0	1.11	-0.32	-1.06
6,630.0	91.40	270.50	5,658.7	-55.0	-1,305.9	1,307.0	2.87	1.37	2.53

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
6,724.0	90.50	271.20	5,657.2	-53.6	-1,399.9	1,400.9	1.21	-0.96	0.74
6,819.0	90.80	271.00	5,656.1	-51.8	-1,494.9	1,495.7	0.38	0.32	-0.21
6,913.0	89.30	271.00	5,656.0	-50.2	-1,588.9	1,589.7	1.60	-1.60	0.00
7,008.0	89.80	271.20	5,656.8	-48.4	-1,683.9	1,684.5	0.57	0.53	0.21
7,102.0	89.70	270.90	5,657.2	-46.6	-1,777.8	1,778.4	0.34	-0.11	-0.32
7,197.0	89.60	270.40	5,657.8	-45.6	-1,872.8	1,873.4	0.54	-0.11	-0.53
7,291.0	89.20	268.60	5,658.7	-46.4	-1,966.8	1,967.3	1.96	-0.43	-1.91
7,386.0	89.80	269.10	5,659.6	-48.3	-2,061.8	2,062.3	0.82	0.63	0.53
7,480.0	88.90	267.40	5,660.6	-51.2	-2,155.7	2,156.3	2.05	-0.96	-1.81
7,574.0	89.10	267.90	5,662.3	-55.0	-2,249.6	2,250.3	0.57	0.21	0.53
7,669.0	88.90	267.50	5,663.9	-58.8	-2,344.6	2,345.3	0.47	-0.21	-0.42
7,763.0	90.00	267.90	5,664.8	-62.6	-2,438.5	2,439.3	1.25	1.17	0.43
7,858.0	90.10	267.50	5,664.8	-66.4	-2,533.4	2,534.3	0.43	0.11	-0.42
7,952.0	89.80	267.20	5,664.8	-70.8	-2,627.3	2,628.2	0.45	-0.32	-0.32
8,047.0	90.00	267.40	5,665.0	-75.2	-2,722.2	2,723.2	0.30	0.21	0.21
8,142.0	90.20	267.20	5,664.8	-79.7	-2,817.1	2,818.2	0.30	0.21	-0.21
8,236.0	90.30	267.00	5,664.4	-84.5	-2,911.0	2,912.2	0.24	0.11	-0.21
8,331.0	89.90	266.00	5,664.3	-90.3	-3,005.8	3,007.1	1.13	-0.42	-1.05
8,426.0	91.30	266.80	5,663.3	-96.2	-3,100.6	3,102.1	1.70	1.47	0.84
8,520.0	90.80	265.80	5,661.5	-102.3	-3,194.4	3,196.0	1.19	-0.53	-1.06
8,614.0	91.50	268.20	5,659.7	-107.2	-3,288.2	3,289.9	2.66	0.74	2.55
8,709.0	92.80	268.60	5,656.1	-109.9	-3,383.1	3,384.9	1.43	1.37	0.42
8,804.0	90.10	270.00	5,653.7	-111.0	-3,478.1	3,479.8	3.20	-2.84	1.47
8,898.0	90.10	269.30	5,653.5	-111.6	-3,572.1	3,573.8	0.74	0.00	-0.74
8,992.0	88.90	270.40	5,654.3	-111.8	-3,666.1	3,667.7	1.73	-1.28	1.17
9,087.0	88.80	269.60	5,656.3	-111.8	-3,761.0	3,762.7	0.85	-0.11	-0.84
9,182.0	89.30	270.20	5,657.8	-112.0	-3,856.0	3,857.6	0.82	0.53	0.63
9,276.0	89.60	270.00	5,658.7	-111.8	-3,950.0	3,951.6	0.38	0.32	-0.21
9,371.0	89.40	269.30	5,659.6	-112.4	-4,045.0	4,046.6	0.77	-0.21	-0.74
TD @ 9435' MD / 5660.2' TVD									
9,435.0	89.40	269.30	5,660.2	-113.2	-4,109.0	4,110.6	0.00	0.00	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,329.3	5,302.3	14.2	-120.4	CROSSED HARDLINE @ 5329.3' MD / 5302.3' TVD
9,435.0	5,660.2	-113.2	-4,109.0	TD @ 9435' MD / 5660.2' TVD

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

Noble Energy Inc
Company

RM-13748
Job Number

10/1/13
Date

Sec9,T9N,R58W
Lease

Rohn State LD 09-68-1HN
Well Name

Weld, CO
County & State

API: 05-123-37547

Surveyed from a depth of: 1240 feet to 9435 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Webb/ Smith

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@directionaldrillers.co
m, c=US
Date: 2013.10.11 12:12:09 -05'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Rohn State LD09-68-1HN
Weld County, CO
Rig: H&P 326
Created By: TIFFANI MIZELL
Date: 10/01/2013

Rohn State LD09-68-1HN
Weld County, CO
Q130749 & RM-13748
Design #1

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

ne noble
energy

DDC
The DIRECTIONAL DRILLING COMPANY

DESIGN TARGET DETAILS

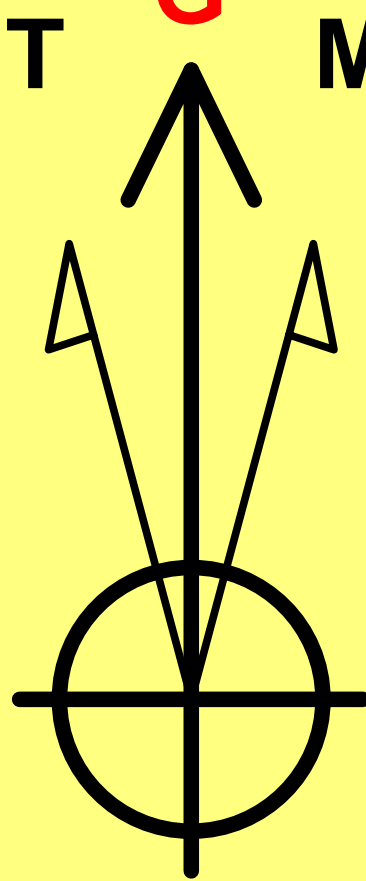
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Rohn State LD09-68-1HN5663.0	-133.9	-4108.7	1527629.56	3449654.58	40° 46' 13.548 N	103° 52' 35.544 W	
- plan hits target center							

WELL DETAILS: Rohn State LD09-68-1HN

+N/-S	+E/-W	Ground Level:	4739.0	Longitude
0.0	0.0	Northing	1527763.43	103° 51' 42.120 W
		Easting	3453763.32	
		Latitude	40° 46' 14.124 N	

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
1240.0	0.00	339.00	1240.0	0.5	2.3	-2.3	6.9	TIE IN @ 1240' MD / 1240' TVD
5329.3	35.23	261.76	5302.3	14.2	-120.4	120.0	186.9	CROSSED HARDLINE @ 5329.3' MD / 5302.3' TVD
9435.0	89.40	269.30	5660.2	-113.2	-4109.0	4110.6	4181.2	TD @ 9435' MD / 5660.2' TVD



Azimuths to Grid North

Correction: 7.04°
Magnetic Field

Strength: 53184.3snT
Dip Angle: 67.42°
Date: 8/28/2013
Model: IGRF2010

