



# **Noble Energy, Inc**

Weld County, CO (NAD 83)

Sec 21 - T6N - R63W (Wells Ranch AA21)

Wells Ranch AA21-65HN

Wellbore #1

Design: OH

## **Final Survey Report**

01 January, 2014





# IDS

## Final Survey Report



<b>Company:</b>	Noble Energy, Inc	<b>Local Co-ordinate Reference:</b>	Well Wells Ranch AA21-65HN
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	Well @ 4751.0usft (HP 277)
<b>Site:</b>	Sec 21 - T6N - R63W (Wells Ranch AA21)	<b>MD Reference:</b>	Well @ 4751.0usft (HP 277)
<b>Well:</b>	Wells Ranch AA21-65HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 5000.1 Single User Db

Project	Weld County, CO (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

<b>Site</b>	Sec 21 - T6N - R63W (Wells Ranch AA21)
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<b>Site Position:</b>		<b>Northing:</b>	1,417,534.22 usft	<b>Latitude:</b>	40° 28' 28.704 N
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,296,552.45 usft	<b>Longitude:</b>	104° 26' 2.472 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16"	<b>Grid Convergence:</b>	0.69 °

Well	Wells Ranch AA21-65HN					
Well Position	+N/-S	0.0 usft	Northing:	1,417,534.22 usft	Latitude:	40° 28' 28.704 N
	+E/-W	0.0 usft	Easting:	3,296,552.45 usft	Longitude:	104° 26' 2.472 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,727.0 usft

<b>Wellbore</b>	Wellbore #1
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/17/2013	8.36	67.08	52,950

<b>Design</b>	OH
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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	257.24

Survey Program		Date	1/1/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
278.0	560.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
905.0	10,932.0	Survey #2 (Wellbore #1)	MWD	MWD - Standard	

Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
	278.0	0.20	266.50	278.0	0.0	-0.5	0.5	0.07
	560.0	0.20	210.20	560.0	-0.5	-1.2	1.3	0.07
	905.0	0.10	272.10	905.0	-1.0	-1.8	2.0	0.05
<b>First MWD</b>								
	1,023.0	0.20	206.50	1,023.0	-1.2	-2.0	2.2	0.16
	1,117.0	0.40	209.80	1,117.0	-1.6	-2.3	2.6	0.21
	1,211.0	0.20	340.30	1,211.0	-1.7	-2.5	2.8	0.59
	1,306.0	0.20	142.20	1,306.0	-1.7	-2.4	2.7	0.42
	1,401.0	0.40	311.30	1,401.0	-1.6	-2.6	2.9	0.63
	1,495.0	0.40	270.30	1,495.0	-1.4	-3.2	3.4	0.30





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<b>Site:</b>	Sec 21 - T6N - R63W (Wells Ranch AA21)	<b>MD Reference:</b>	Well @ 4751.0usft (HP 277)
<b>Well:</b>	Wells Ranch AA21-65HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 5000.1 Single User Db

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
1,590.0	0.40	4.90	1,590.0	-1.1	-3.5	3.6	0.62	
1,684.0	0.40	296.10	1,684.0	-0.6	-3.7	3.8	0.48	
1,779.0	0.20	316.90	1,779.0	-0.3	-4.1	4.1	0.24	
1,873.0	0.20	301.20	1,873.0	-0.1	-4.4	4.3	0.06	
1,968.0	0.40	275.60	1,968.0	0.0	-4.9	4.7	0.25	
2,063.0	0.40	283.00	2,063.0	0.1	-5.5	5.4	0.05	
2,157.0	0.40	298.60	2,157.0	0.3	-6.1	5.9	0.12	
2,252.0	0.50	332.00	2,252.0	0.9	-6.6	6.3	0.29	
2,347.0	0.50	355.00	2,347.0	1.6	-6.8	6.3	0.21	
2,441.0	0.90	344.80	2,441.0	2.8	-7.1	6.3	0.44	
2,536.0	0.90	349.80	2,536.0	4.2	-7.4	6.3	0.08	
2,631.0	0.50	328.30	2,630.9	5.3	-7.7	6.4	0.50	
2,725.0	0.50	323.90	2,724.9	6.0	-8.2	6.7	0.04	
2,820.0	0.90	170.30	2,819.9	5.6	-8.3	6.9	1.44	
2,914.0	1.10	158.50	2,913.9	4.0	-7.9	6.8	0.30	
3,009.0	0.90	168.70	3,008.9	2.4	-7.4	6.7	0.28	
3,104.0	1.10	118.90	3,103.9	1.3	-6.4	6.0	0.91	
3,199.0	0.50	129.80	3,198.9	0.5	-5.3	5.1	0.65	
3,294.0	1.20	85.00	3,293.9	0.4	-4.0	3.8	0.96	
3,388.0	1.20	85.40	3,387.9	0.5	-2.1	1.9	0.01	
3,483.0	1.60	108.80	3,482.8	0.2	0.2	-0.2	0.73	
3,578.0	2.10	122.80	3,577.8	-1.2	2.9	-2.6	0.71	
3,673.0	2.60	146.20	3,672.7	-3.9	5.6	-4.6	1.13	
3,767.0	4.80	173.10	3,766.5	-9.6	7.2	-4.9	2.92	
3,862.0	7.90	165.90	3,860.9	-19.9	9.3	-4.7	3.36	
3,957.0	11.60	168.00	3,954.5	-35.6	12.9	-4.7	3.91	
4,052.0	12.70	171.30	4,047.4	-55.2	16.4	-3.8	1.37	
4,147.0	11.80	169.20	4,140.2	-75.1	19.8	-2.8	1.06	
4,241.0	13.00	168.90	4,232.0	-94.9	23.7	-2.1	1.28	
4,336.0	11.30	164.70	4,324.9	-114.4	28.2	-2.2	2.02	
4,431.0	11.80	168.70	4,418.0	-132.9	32.6	-2.4	0.99	
4,525.0	12.80	167.80	4,509.8	-152.5	36.6	-2.1	1.08	
4,620.0	11.10	166.90	4,602.8	-171.7	40.9	-2.0	1.80	
4,715.0	12.80	166.20	4,695.7	-190.8	45.5	-2.3	1.80	
4,810.0	11.30	161.00	4,788.6	-209.8	51.1	-3.5	1.95	
4,904.0	12.00	163.40	4,880.7	-227.9	56.9	-5.1	0.91	
4,999.0	11.80	163.20	4,973.6	-246.7	62.5	-6.5	0.21	
5,094.0	10.20	160.10	5,066.9	-263.9	68.2	-8.2	1.80	
5,189.0	10.90	165.40	5,160.3	-280.5	73.3	-9.5	1.26	
5,284.0	12.00	166.80	5,253.4	-298.8	77.8	-9.9	1.19	
5,378.0	10.00	166.40	5,345.7	-316.2	81.9	-10.1	2.13	
5,473.0	11.30	168.20	5,439.0	-333.4	85.8	-10.0	1.41	
5,568.0	13.00	168.00	5,531.9	-352.9	89.9	-9.8	1.79	
5,663.0	10.20	163.10	5,624.9	-371.4	94.6	-10.2	3.12	
5,755.0	12.00	165.40	5,715.2	-388.5	99.4	-11.1	2.01	



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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 5000.1 Single User Db

Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,849.0	15.20	159.60	5,806.6	-409.5	106.1	-13.1	3.70
5,944.0	17.20	162.20	5,897.8	-434.5	114.8	-16.0	2.24
6,039.0	21.40	164.60	5,987.4	-464.6	123.7	-18.0	4.50
6,134.0	21.60	176.10	6,075.9	-498.8	129.5	-16.1	4.44
6,181.0	24.70	190.20	6,119.1	-517.1	128.3	-10.9	13.47
6,229.0	30.40	202.40	6,161.7	-538.2	121.9	0.0	16.66
6,276.0	32.70	206.00	6,201.7	-560.7	111.8	14.8	6.32
6,324.0	35.10	209.40	6,241.6	-584.3	99.3	32.2	6.37
6,371.0	36.60	213.10	6,279.7	-607.9	85.0	51.3	5.61
6,418.0	37.90	215.70	6,317.1	-631.3	69.0	72.2	4.34
6,466.0	38.20	216.20	6,354.9	-655.3	51.6	94.4	0.90
6,513.0	38.20	217.20	6,391.8	-678.6	34.2	116.5	1.32
6,560.0	40.30	222.40	6,428.2	-701.4	15.2	140.1	8.30
6,608.0	45.50	229.90	6,463.4	-723.9	-8.4	168.1	15.17
6,655.0	51.10	235.10	6,494.7	-745.2	-36.3	200.0	14.49
6,702.0	55.30	237.10	6,522.8	-766.2	-67.5	235.1	9.56
6,750.0	56.10	239.40	6,549.9	-787.0	-101.2	272.5	4.29
6,797.0	58.70	239.80	6,575.2	-807.0	-135.4	310.3	5.58
6,845.0	62.00	243.20	6,598.9	-826.9	-172.0	350.4	9.23
6,892.0	65.90	246.00	6,619.6	-845.0	-210.2	391.6	9.87
6,939.0	66.80	245.70	6,638.4	-862.6	-249.4	433.8	2.00
6,987.0	70.10	249.60	6,656.1	-879.6	-290.7	477.8	10.22
7,034.0	73.50	256.90	6,670.8	-892.4	-333.4	522.3	16.43
7,081.0	78.30	264.70	6,682.2	-899.7	-378.4	567.8	19.06
7,144.0	79.14	265.96	6,694.6	-904.7	-440.0	628.9	2.37
<b>Actual 7" Csg @ 7144' MD / 6695' TVD / 2615' FNL &amp; 888' FEL Sec 21</b>							
7,216.0	80.10	267.40	6,707.5	-908.8	-510.7	698.8	2.37
7,310.0	79.80	268.00	6,723.9	-912.5	-603.2	789.8	0.70
7,405.0	83.90	271.90	6,737.4	-912.6	-697.2	881.5	5.93
7,499.0	91.50	274.70	6,741.2	-907.2	-790.8	971.7	8.61
7,594.0	91.10	273.40	6,739.0	-900.4	-885.6	1,062.6	1.43
7,688.0	95.00	271.70	6,734.0	-896.3	-979.3	1,153.1	4.52
7,783.0	96.00	271.10	6,724.9	-894.0	-1,073.9	1,244.8	1.23
7,877.0	94.30	269.60	6,716.5	-893.4	-1,167.5	1,336.0	2.41
7,972.0	92.30	269.20	6,711.0	-894.4	-1,262.3	1,428.7	2.15
8,067.0	93.10	268.40	6,706.5	-896.4	-1,357.2	1,521.6	1.19
8,162.0	93.80	267.90	6,700.8	-899.4	-1,452.0	1,614.8	0.90
8,256.0	93.41	267.90	6,694.9	-902.9	-1,545.7	1,707.0	0.41
8,351.0	89.14	267.68	6,692.8	-906.5	-1,640.6	1,800.3	4.50
8,445.0	87.47	267.07	6,695.6	-910.8	-1,734.5	1,892.8	1.89
8,540.0	87.69	267.55	6,699.6	-915.3	-1,829.3	1,986.2	0.56
8,634.0	87.47	267.37	6,703.6	-919.4	-1,923.1	2,078.7	0.30
8,728.0	87.56	268.30	6,707.6	-923.0	-2,016.9	2,171.0	0.99
8,822.0	87.69	269.17	6,711.5	-925.1	-2,110.8	2,263.0	0.94





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<b>Site:</b>	Sec 21 - T6N - R63W (Wells Ranch AA21)	<b>MD Reference:</b>	Well @ 4751.0usft (HP 277)
<b>Well:</b>	Wells Ranch AA21-65HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 5000.1 Single User Db

Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
8,916.0	87.69	270.32	6,715.3	-925.5	-2,204.7	2,354.7	1.22
9,010.0	89.98	271.68	6,717.2	-923.8	-2,298.7	2,446.0	2.83
9,104.0	91.43	271.59	6,716.1	-921.2	-2,392.7	2,537.0	1.55
9,199.0	91.69	270.54	6,713.5	-919.4	-2,487.6	2,629.2	1.14
9,294.0	92.00	269.79	6,710.4	-919.1	-2,582.6	2,721.8	0.85
9,388.0	91.08	268.70	6,707.9	-920.4	-2,676.5	2,813.7	1.52
9,482.0	90.07	268.60	6,707.0	-922.6	-2,770.5	2,905.8	1.08
9,576.0	88.88	266.85	6,707.8	-926.3	-2,864.4	2,998.2	2.25
9,671.0	90.33	266.89	6,708.5	-931.5	-2,959.2	3,091.9	1.53
9,765.0	90.11	266.05	6,708.1	-937.3	-3,053.1	3,184.7	0.92
9,859.0	90.99	266.23	6,707.2	-943.6	-3,146.9	3,277.5	0.96
9,953.0	90.46	266.85	6,706.0	-949.3	-3,240.7	3,370.3	0.87
10,048.0	88.66	267.50	6,706.7	-954.0	-3,335.5	3,463.9	2.01
10,143.0	88.57	268.91	6,709.0	-956.9	-3,430.5	3,557.1	1.49
10,238.0	87.78	269.53	6,712.1	-958.2	-3,525.4	3,650.0	1.06
10,333.0	87.69	268.87	6,715.8	-959.6	-3,620.3	3,742.9	0.70
10,428.0	88.26	270.45	6,719.2	-960.1	-3,715.3	3,835.6	1.77
10,522.0	90.51	271.59	6,720.2	-958.4	-3,809.2	3,926.9	2.68
10,617.0	90.15	270.49	6,719.6	-956.7	-3,904.2	4,019.1	1.22
10,712.0	90.46	271.37	6,719.1	-955.2	-3,999.2	4,111.4	0.98
10,807.0	89.76	269.70	6,719.0	-954.3	-4,094.2	4,203.9	1.91
10,863.0	89.32	269.53	6,719.4	-954.7	-4,150.2	4,258.6	0.84
<b>Last MWD @ 10863' MD / 6719' TVD</b>							
10,932.0	89.32	269.53	6,720.2	-955.2	-4,219.2	4,326.0	0.00
<b>PTD @ 10932' MD / 6720' TVD 542' FWL &amp; 2680' FSL Sec 21</b>							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
905.0	905.0	-1.0	-1.8	First MWD
7,144.0	6,694.6	-904.7	-440.0	Actual 7" Csg @ 7144' MD / 6695' TVD / 2615' FNL & 888' FEL Sec 21
10,863.0	6,719.4	-954.7	-4,150.2	Last MWD @ 10863' MD / 6719' TVD
10,932.0	6,720.2	-955.2	-4,219.2	PTD @ 10932' MD / 6720' TVD 542' FWL & 2680' FSL Sec 21

Checked By: _____	Approved By: _____	Date: _____
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# Weld County, CO (NAD 83) Sec 21 - T6N - R63W (Wells Ranch AA21) Wells Ranch AA21-65HN



HP 277

Plan #4

## CASING DETAILS

TVD	MD	Name	Size
6702.9	7189.4	7"	7"

## SITE DETAILS: Sec 21 - T6N - R63W (Wells Ranch AA21)

Site Centre Northing: 1417534.22  
Easting: 3296552.45  
Positional Uncertainty: 0.0  
Convergence: 0.69  
Local North: Grid

## SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
8256.0	93.41	267.90	6694.9	-902.9	-1545.7	0.00	0.00	1707.0	
8473.4	87.00	269.11	6694.1	-908.5	-1763.0	3.00	169.30	1920.1	
8630.4	87.00	269.11	6702.3	-911.0	-1919.7	0.00	0.00	2073.5	
8730.4	90.00	269.11	6705.0	-912.5	-2019.6	3.00	0.04	2171.3	
10928.8	90.00	269.11	6705.0	-946.6	-4217.8	0.00	0.00	4322.7	PBHL Pln4 WR AA21-65HN

