



Noble Energy, Inc

Weld County, CO (NAD 83)

Sec 21 - T6N - R63W (Wells Ranch AA21)

Wells Ranch AA21-66-1HN

Corrected Surveys

Design: Corrected Surveys

Final Survey Report

25 January, 2014





IDS

Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-66-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4751.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4751.0usft (HP 277)
Well:	Wells Ranch AA21-66-1HN	North Reference:	Grid
Wellbore:	Corrected Surveys	Survey Calculation Method:	Minimum Curvature
Design:	Corrected Surveys	Database:	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		

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

Well	Wells Ranch AA21-66-1HN				
Well Position	+N/-S	0.0 usft	Northing:	1,417,574.29 usft	Latitude: 40° 28' 29.100 N
	+E/-W	0.0 usft	Easting:	3,296,551.97 usft	Longitude: 104° 26' 2.472 W
Position Uncertainty	0.0 usft		Wellhead Elevation:	0.0 usft	Ground Level: 4,727.0 usft

Wellbore	Corrected Surveys				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/8/2014	8.35	67.08	52,935

Design	Corrected Surveys				
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	260.06	

Survey Program	Date 1/25/2014				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
290.0	903.0	Survey #1 (Corrected Surveys)	EMS	EMS - Standard	
1,023.0	6,952.0	Survey #2 (Corrected Surveys)	MWD	MWD - Standard	
7,122.0	11,003.0	Survey #3 (Corrected Surveys)	MWD+IFR1+MS+sag	MWD v3: crustal dec & 3-axis correction + sag	

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
290.0	0.30	231.88	290.0	-0.5	-0.6	0.7	0.10
572.0	0.10	337.88	572.0	-0.7	-1.3	1.4	0.12
903.0	0.20	291.18	903.0	-0.2	-1.9	1.9	0.05
1,023.0	0.52	226.70	1,023.0	-0.5	-2.5	2.6	0.39
First MWD							
1,117.0	0.53	223.89	1,117.0	-1.1	-3.1	3.3	0.03
1,211.0	0.88	237.60	1,211.0	-1.8	-4.0	4.3	0.41
1,306.0	0.88	119.48	1,306.0	-2.6	-4.0	4.4	1.59
1,401.0	0.70	131.25	1,401.0	-3.3	-2.9	3.5	0.25



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Well:	Wells Ranch AA21-66-1HN	North Reference:	Grid
Wellbore:	Corrected Surveys	Survey Calculation Method:	Minimum Curvature
Design:	Corrected Surveys	Database:	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)	
1,495.0	0.70	130.73	1,495.0	-4.1	-2.1	2.7	0.01	
1,589.0	3.17	78.52	1,588.9	-3.9	0.9	-0.2	2.97	
1,684.0	4.40	76.41	1,683.7	-2.5	7.0	-6.5	1.30	
1,778.0	5.98	80.28	1,777.3	-0.9	15.4	-15.0	1.72	
1,873.0	7.39	85.20	1,871.7	0.5	26.3	-26.0	1.60	
1,968.0	7.04	93.99	1,965.9	0.6	38.2	-37.7	1.22	
2,063.0	7.21	110.86	2,060.2	-1.9	49.6	-48.5	2.20	
2,157.0	7.39	127.21	2,153.4	-7.7	59.9	-57.7	2.21	
2,252.0	8.09	147.07	2,247.6	-17.0	68.4	-64.5	2.89	
2,346.0	9.15	158.85	2,340.5	-29.5	74.7	-68.5	2.19	
2,441.0	10.73	171.16	2,434.1	-45.3	78.8	-69.8	2.78	
2,536.0	12.67	167.11	2,527.1	-64.2	82.5	-70.2	2.22	
2,631.0	13.20	166.23	2,619.7	-84.9	87.4	-71.4	0.60	
2,725.0	13.90	163.95	2,711.1	-106.2	93.1	-73.3	0.94	
2,820.0	14.60	162.19	2,803.2	-128.5	99.9	-76.2	0.87	
2,914.0	14.78	162.02	2,894.1	-151.2	107.2	-79.5	0.20	
3,009.0	14.60	162.54	2,986.0	-174.2	114.5	-82.8	0.23	
3,104.0	13.55	162.02	3,078.2	-196.2	121.6	-85.9	1.11	
3,199.0	13.37	161.14	3,170.5	-217.2	128.6	-89.1	0.29	
3,293.0	12.14	157.09	3,262.2	-236.6	135.9	-93.0	1.62	
3,388.0	11.09	161.84	3,355.3	-254.4	142.7	-96.6	1.49	
3,483.0	10.91	160.79	3,448.5	-271.6	148.5	-99.3	0.28	
3,578.0	11.26	161.84	3,541.8	-288.9	154.3	-102.1	0.43	
3,673.0	13.20	161.31	3,634.6	-308.0	160.7	-105.1	2.05	
3,767.0	13.90	161.49	3,726.0	-328.9	167.7	-108.4	0.75	
3,862.0	14.60	162.19	3,818.1	-351.1	175.0	-111.8	0.76	
3,957.0	15.31	162.54	3,909.8	-374.5	182.4	-115.0	0.75	
4,052.0	14.78	161.84	4,001.6	-397.9	190.0	-118.4	0.59	
4,146.0	14.25	161.66	4,092.6	-420.3	197.3	-121.8	0.57	
4,241.0	13.02	161.31	4,184.9	-441.6	204.4	-125.2	1.30	
4,336.0	11.61	159.03	4,277.7	-460.6	211.3	-128.6	1.57	
4,431.0	10.56	159.55	4,370.9	-477.7	217.8	-132.0	1.11	
4,525.0	10.38	165.53	4,463.4	-494.0	222.9	-134.3	1.17	
4,620.0	8.09	165.00	4,557.1	-508.7	226.7	-135.5	2.41	
4,715.0	8.62	176.08	4,651.1	-522.3	229.0	-135.4	1.78	
4,809.0	7.04	177.84	4,744.3	-535.1	229.7	-133.9	1.70	
4,904.0	7.92	176.78	4,838.5	-547.4	230.3	-132.3	0.94	
4,999.0	7.74	162.02	4,932.6	-560.0	232.6	-132.4	2.12	
5,094.0	6.33	161.31	5,026.9	-571.1	236.2	-134.1	1.49	
5,189.0	5.10	159.38	5,121.4	-580.0	239.4	-135.7	1.31	
5,283.0	4.05	151.47	5,215.1	-586.8	242.5	-137.5	1.30	
5,378.0	4.75	153.93	5,309.8	-593.3	245.8	-139.7	0.76	
5,473.0	3.87	151.29	5,404.5	-599.6	249.1	-141.8	0.95	
5,568.0	3.34	152.35	5,499.3	-604.9	251.9	-143.7	0.56	



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Wellbore:	Corrected Surveys	Survey Calculation Method:	Minimum Curvature
Design:	Corrected Surveys	Database:	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)
5,662.0	2.99	149.89	5,593.2	-609.5	254.4	-145.4	0.40
5,757.0	2.29	153.05	5,688.1	-613.3	256.5	-146.8	0.75
5,852.0	2.11	159.55	5,783.0	-616.6	258.0	-147.7	0.32
5,947.0	1.58	149.18	5,878.0	-619.4	259.2	-148.4	0.66
6,040.0	1.58	136.97	5,970.9	-621.4	260.8	-149.6	0.36
6,087.0	1.93	244.72	6,017.9	-622.2	260.5	-149.2	6.05
6,134.0	5.19	261.07	6,064.8	-622.9	257.7	-146.3	7.20
6,182.0	8.18	267.92	6,112.5	-623.4	252.1	-140.7	6.44
6,229.0	11.78	281.01	6,158.8	-622.6	244.1	-132.9	9.01
6,324.0	20.14	283.13	6,250.1	-617.0	218.6	-108.8	8.82
6,418.0	29.72	276.45	6,335.2	-610.7	179.6	-71.5	10.61
6,513.0	41.94	273.55	6,412.1	-606.1	124.3	-17.8	12.98
6,561.0	49.68	273.46	6,445.5	-604.0	89.9	15.7	16.13
6,608.0	52.50	271.09	6,475.0	-602.5	53.4	51.4	7.17
6,655.0	55.05	271.62	6,502.8	-601.6	15.5	88.6	5.50
6,703.0	59.79	268.89	6,528.7	-601.5	-24.9	128.4	10.98
6,750.0	62.78	267.13	6,551.2	-602.9	-66.1	169.2	7.16
6,797.0	66.57	267.22	6,571.3	-605.0	-108.5	211.3	8.07
6,845.0	70.00	267.31	6,589.1	-607.1	-153.1	255.6	7.15
6,892.0	74.30	267.13	6,603.5	-609.3	-197.7	299.9	9.16
6,952.0	83.01	268.28	6,615.3	-611.6	-256.5	358.2	14.64
7,004.0	85.52	268.62	6,620.5	-613.0	-308.2	409.4	4.87

Actual 7" Csg @ 7004' MD / 6621' TVD/ 740' FEL & 2286' FNL Sec 21

7,122.0	91.21	269.39	6,623.9	-615.1	-426.1	525.8	4.87
7,216.0	89.85	270.56	6,623.0	-615.1	-520.1	618.4	1.91
7,311.0	87.82	272.17	6,624.9	-612.9	-615.0	711.6	2.73
7,405.0	88.31	275.77	6,628.1	-606.4	-708.7	802.7	3.86
7,499.0	88.04	278.86	6,631.1	-594.4	-801.9	892.4	3.30
7,594.0	89.36	279.73	6,633.2	-579.1	-895.6	982.1	1.66
7,688.0	88.31	278.45	6,635.2	-564.2	-988.4	1,071.0	1.76
7,783.0	89.32	279.10	6,637.1	-549.7	-1,082.3	1,160.9	1.26
7,878.0	88.79	278.49	6,638.7	-535.2	-1,176.1	1,250.9	0.85
7,972.0	89.05	279.19	6,640.5	-520.8	-1,269.0	1,339.8	0.79
8,067.0	89.27	275.15	6,641.9	-508.9	-1,363.2	1,430.6	4.26
8,162.0	91.21	274.09	6,641.5	-501.2	-1,457.9	1,522.6	2.33
8,257.0	89.23	273.53	6,641.1	-494.9	-1,552.7	1,614.8	2.17
8,351.0	90.07	273.95	6,641.7	-488.8	-1,646.5	1,706.2	1.00
8,446.0	89.58	272.82	6,642.0	-483.2	-1,741.3	1,798.6	1.30
8,540.0	90.77	273.13	6,641.7	-478.3	-1,835.2	1,890.2	1.31
8,634.0	89.93	274.57	6,641.1	-472.0	-1,929.0	1,981.5	1.77
8,728.0	91.21	274.89	6,640.2	-464.3	-2,022.7	2,072.4	1.40
8,822.0	89.54	275.85	6,639.5	-455.5	-2,116.2	2,163.1	2.05
8,916.0	89.58	276.74	6,640.3	-445.2	-2,209.7	2,253.3	0.95
9,011.0	89.49	276.57	6,641.0	-434.1	-2,304.0	2,344.4	0.20



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Wellbore:	Corrected Surveys	Survey Calculation Method:	Minimum Curvature
Design:	Corrected Surveys	Database:	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)
9,105.0	89.19	276.09	6,642.1	-423.8	-2,397.4	2,434.6	0.60
9,199.0	89.54	276.45	6,643.2	-413.5	-2,490.9	2,524.9	0.53
9,294.0	89.32	276.07	6,644.1	-403.2	-2,585.3	2,616.1	0.46
9,388.0	89.49	276.13	6,645.1	-393.2	-2,678.8	2,706.4	0.19
9,483.0	89.49	275.56	6,645.9	-383.5	-2,773.3	2,797.8	0.60
9,577.0	89.63	275.39	6,646.7	-374.5	-2,866.8	2,888.5	0.23
9,671.0	90.33	271.34	6,646.7	-369.0	-2,960.7	2,979.9	4.37
9,765.0	93.93	264.36	6,643.2	-372.5	-3,054.5	3,072.9	8.35
9,859.0	92.79	261.13	6,637.7	-384.4	-3,147.5	3,166.6	3.64
9,953.0	90.55	261.60	6,634.9	-398.5	-3,240.4	3,260.6	2.43
10,048.0	90.02	258.78	6,634.5	-414.7	-3,334.0	3,355.5	3.02
10,143.0	88.70	255.29	6,635.5	-436.0	-3,426.6	3,450.4	3.93
10,238.0	88.26	248.68	6,638.0	-465.3	-3,516.8	3,544.4	6.97
10,333.0	89.23	246.14	6,640.1	-501.8	-3,604.5	3,637.0	2.86
10,428.0	88.84	248.17	6,641.7	-538.7	-3,692.0	3,729.6	2.18
10,522.0	88.66	249.85	6,643.8	-572.3	-3,779.8	3,821.8	1.80
10,617.0	90.33	249.88	6,644.6	-605.0	-3,869.0	3,915.3	1.76
10,712.0	91.65	250.00	6,643.0	-637.6	-3,958.2	4,008.8	1.40
10,807.0	89.80	248.73	6,641.8	-671.1	-4,047.1	4,102.2	2.36
10,902.0	90.77	248.96	6,641.3	-705.4	-4,135.7	4,195.4	1.05
Last MWD @ 10902' MD / 6641' MD							
11,003.0	90.77	248.96	6,639.9	-741.6	-4,229.9	4,294.5	0.00
PTD @ 11003' MD / 6640' TVD/ 536' FWL & 2394' FNL Sec 21							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,023.0	1,023.0	-0.5	-2.5	First MWD
7,004.0	6,620.5	-613.0	-308.2	Actual 7" Csg @ 7004' MD / 6621' TVD/ 740' FEL & 2286' FNL Sec 21
10,902.0	6,641.3	-705.4	-4,135.7	Last MWD @ 10902' MD / 6641' MD
11,003.0	6,639.9	-741.6	-4,229.9	PTD @ 11003' MD / 6640' TVD/ 536' FWL & 2394' FNL Sec 21

Checked By: _____ Approved By: _____ Date: _____





Weld County, CO (NAD 83) Sec 21 - T6N - R63W (Wells Ranch AA21) Wells Ranch AA21-66-1HN



HP 277 Plan #5

CASING DETAILS

TVD	MD	Name	Size
6621.2	7014.0	Actual 7" Csg	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
9483.0	89.49	275.56	6645.9	-383.5	-2773.3	0.00	0.00	2797.8	
9547.0	89.49	275.56	6646.5	-377.3	-2837.0	0.00	0.00	2859.5	
10182.9	90.22	250.13	6648.1	-455.8	-3462.8	4.00	-88.42	3489.5	
11001.2	90.22	250.13	6645.0	-733.9	-4232.3	0.00	0.00	4295.5	PBHL Pln 5 WR AA21-66-1HN

