



Noble Energy, Inc

Weld County, CO (NAD 83)

Crow Creek State Pad

Crow Creek State AC36-72HN

Wellbore #1

Design: OH

Final Survey Report

16 November, 2013





IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Crow Creek State AC36-72HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	WELL @ 4874.0usft (H&P 277)
Site:	Crow Creek State Pad	MD Reference:	WELL @ 4874.0usft (H&P 277)
Well:	Crow Creek State AC36-72HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	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		Crow Creek State Pad			
Site Position:		Northing:	1,435,563.26 usft	Latitude:	40° 31' 25.032 N
From:	Lat/Long	Easting:	3,311,476.82 usft	Longitude:	104° 22' 46.416 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.72 °

Well	Crow Creek State AC36-72HN					
Well Position	+N-S	0.0 usft	Northing:	1,435,562.30 usft	Latitude:	40° 31' 25.032 N
	+E-W	0.0 usft	Easting:	3,311,401.77 usft	Longitude:	104° 22' 47.388 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,850.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/9/2013	8.38	67.14	53,009

Design	OH				
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	8.50	

Survey Program	Date	11/16/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
287.0	641.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
731.0	11,211.0	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	
287.0	0.20	267.30	287.0	0.0	-0.5	-0.1	0.07	
641.0	0.80	225.50	641.0	-1.8	-2.9	-2.2	0.19	
731.0	0.70	244.30	731.0	-2.5	-3.8	-3.0	0.29	
First MWD								
824.0	0.90	242.30	824.0	-3.0	-5.0	-3.8	0.22	
918.0	0.90	33.70	918.0	-2.8	-5.2	-3.5	1.86	
1,012.0	1.20	41.90	1,011.9	-1.4	-4.2	-2.0	0.36	
1,104.0	1.20	50.00	1,103.9	-0.1	-2.8	-0.5	0.18	
1,196.0	1.20	47.20	1,195.9	1.2	-1.3	1.0	0.06	
1,289.0	1.40	53.70	1,288.9	2.5	0.3	2.5	0.27	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)	
1,383.0	1.20	56.30	1,382.9	3.7	2.0	4.0	0.22	
1,476.0	1.80	101.50	1,475.8	4.0	4.3	4.6	1.38	
1,571.0	1.80	112.90	1,570.8	3.1	7.1	4.1	0.38	
1,666.0	1.90	106.80	1,665.7	2.1	10.0	3.5	0.23	
1,761.0	2.10	109.80	1,760.7	1.0	13.1	3.0	0.24	
1,857.0	2.80	146.00	1,856.6	-1.5	16.1	0.9	1.73	
1,952.0	2.60	148.80	1,951.5	-5.3	18.5	-2.5	0.25	
2,047.0	2.30	144.60	2,046.4	-8.7	20.7	-5.5	0.37	
2,142.0	3.00	137.20	2,141.3	-12.1	23.5	-8.4	0.82	
2,237.0	3.70	139.00	2,236.1	-16.2	27.2	-12.0	0.75	
2,332.0	5.10	133.90	2,330.9	-21.4	32.3	-16.4	1.53	
2,428.0	4.20	131.90	2,426.5	-26.7	38.0	-20.8	0.95	
2,522.0	4.60	117.90	2,520.3	-30.8	43.9	-24.0	1.22	
2,617.0	6.50	109.30	2,614.8	-34.4	52.3	-26.2	2.18	
2,713.0	5.80	107.50	2,710.3	-37.6	62.1	-28.0	0.76	
2,808.0	7.40	100.30	2,804.6	-40.2	72.7	-29.0	1.89	
2,903.0	8.80	102.40	2,898.7	-42.8	85.8	-29.7	1.51	
2,998.0	10.20	100.10	2,992.4	-45.8	101.2	-30.4	1.53	
3,093.0	13.00	95.20	3,085.4	-48.3	120.1	-30.0	3.12	
3,188.0	14.30	93.60	3,177.7	-50.0	142.4	-28.4	1.42	
3,284.0	12.80	90.40	3,271.1	-50.8	164.9	-25.9	1.75	
3,379.0	14.60	98.40	3,363.4	-52.6	187.3	-24.4	2.75	
3,474.0	14.60	101.50	3,455.3	-56.8	210.9	-25.0	0.82	
3,569.0	13.00	100.10	3,547.6	-61.0	233.1	-25.9	1.72	
3,665.0	16.20	111.40	3,640.5	-67.8	256.2	-29.2	4.45	
3,760.0	20.10	110.10	3,730.7	-78.3	283.9	-35.4	4.13	
3,855.0	22.90	109.40	3,819.1	-90.0	316.7	-42.2	2.96	
3,950.0	25.50	109.80	3,905.7	-103.1	353.4	-49.7	2.74	
4,045.0	23.60	109.80	3,992.2	-116.5	390.5	-57.5	2.00	
4,140.0	20.60	105.60	4,080.2	-127.4	424.5	-63.2	3.57	
4,236.0	20.10	105.70	4,170.2	-136.4	456.6	-67.4	0.52	
4,331.0	16.50	102.70	4,260.4	-143.8	485.5	-70.4	3.92	
4,426.0	13.50	98.90	4,352.1	-148.5	509.6	-71.5	3.32	
4,521.0	12.00	97.10	4,444.8	-151.4	530.4	-71.3	1.63	
4,616.0	10.70	97.30	4,537.9	-153.7	549.0	-70.9	1.37	
4,711.0	8.80	91.80	4,631.5	-155.1	565.0	-69.9	2.23	
4,807.0	6.50	90.30	4,726.7	-155.4	577.7	-68.3	2.40	
4,902.0	7.60	93.40	4,821.0	-155.8	589.4	-66.9	1.22	
4,997.0	6.90	90.80	4,915.2	-156.2	601.4	-65.6	0.81	
5,092.0	7.70	99.20	5,009.4	-157.3	613.4	-64.9	1.40	
5,187.0	7.60	101.70	5,103.6	-159.6	625.8	-65.3	0.37	
5,282.0	6.50	104.30	5,197.9	-162.2	637.2	-66.2	1.21	
5,378.0	5.10	108.90	5,293.4	-164.9	646.5	-67.6	1.54	
5,473.0	5.10	108.20	5,388.0	-167.6	654.5	-69.0	0.07	
5,568.0	4.20	115.80	5,482.7	-170.4	661.6	-70.8	1.15	



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)
5,663.0	4.40	118.00	5,577.4	-173.7	668.0	-73.0	0.27
5,758.0	2.80	119.60	5,672.2	-176.5	673.2	-75.1	1.69
5,853.0	2.30	125.40	5,767.1	-178.8	676.8	-76.8	0.59
5,949.0	1.80	136.00	5,863.1	-181.0	679.4	-78.6	0.65
6,044.0	1.20	151.30	5,958.0	-182.9	680.9	-80.3	0.75
6,069.0	1.10	151.80	5,983.0	-183.4	681.1	-80.7	0.40
6,133.0	0.10	257.90	6,047.0	-183.9	681.4	-81.2	1.77
6,181.0	4.30	8.70	6,095.0	-182.1	681.6	-79.4	9.03
6,228.0	8.40	14.70	6,141.7	-177.1	682.7	-74.2	8.83
6,324.0	17.10	7.90	6,235.2	-156.3	686.5	-53.1	9.18
6,419.0	26.60	5.80	6,323.3	-121.2	690.5	-17.8	10.03
6,514.0	37.70	5.40	6,403.6	-71.0	695.4	32.6	11.69
6,609.0	43.90	6.10	6,475.5	-9.2	701.7	94.6	6.54
6,704.0	54.30	4.70	6,537.6	62.2	708.4	166.2	11.00
6,799.0	62.60	1.60	6,587.3	142.9	712.7	246.7	9.17
6,895.0	71.20	0.70	6,624.9	231.1	714.5	334.2	9.00
6,990.0	79.20	0.50	6,649.2	322.9	715.4	425.1	8.42
7,024.0	83.40	0.70	6,654.3	356.5	715.8	458.4	12.37
7,061.0	84.01	0.73	6,658.4	393.3	716.2	494.8	1.65
Actual 7" Csg @ 7061' MD / 6658' TVD / 651' FSL & 666' FEL Sec 36							
7,133.0	85.20	0.80	6,665.1	464.9	717.2	565.8	1.65
7,229.0	85.50	1.30	6,672.9	560.6	718.9	660.7	0.61
7,324.0	86.70	359.60	6,679.4	655.4	719.7	754.5	2.19
7,419.0	89.00	358.00	6,682.9	750.3	717.7	848.1	2.95
7,514.0	91.30	357.60	6,682.7	845.2	714.0	941.5	2.46
7,609.0	89.00	356.20	6,682.4	940.0	708.9	1,034.5	2.83
7,704.0	89.40	354.30	6,683.8	1,034.7	701.0	1,127.0	2.04
7,800.0	89.40	352.90	6,684.8	1,130.1	690.3	1,219.7	1.46
7,895.0	91.50	355.70	6,684.0	1,224.6	680.9	1,311.8	3.68
7,990.0	94.30	358.50	6,679.2	1,319.4	676.1	1,404.8	4.17
8,085.0	94.30	0.80	6,672.1	1,414.1	675.5	1,498.4	2.41
8,181.0	95.50	0.60	6,663.9	1,509.7	676.7	1,593.2	1.27
8,276.0	93.40	1.70	6,656.5	1,604.4	678.6	1,687.1	2.49
8,371.0	89.70	3.30	6,654.0	1,699.3	682.7	1,781.5	4.24
8,466.0	89.40	3.80	6,654.7	1,794.1	688.6	1,876.2	0.61
8,561.0	90.30	4.00	6,655.0	1,888.9	695.1	1,970.8	0.97
8,656.0	86.60	2.90	6,657.5	1,983.6	700.8	2,065.4	4.06
8,752.0	85.30	2.40	6,664.3	2,079.3	705.2	2,160.7	1.45
8,847.0	87.60	1.10	6,670.2	2,174.0	708.1	2,254.8	2.78
8,942.0	87.80	0.60	6,674.0	2,269.0	709.5	2,348.9	0.57
9,037.0	88.00	0.10	6,677.5	2,363.9	710.1	2,442.9	0.57
9,133.0	90.30	0.40	6,678.9	2,459.9	710.5	2,537.9	2.42
9,228.0	88.70	0.30	6,679.7	2,554.9	711.1	2,631.9	1.69
9,323.0	90.40	0.60	6,680.5	2,649.9	711.9	2,726.0	1.82



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Site:	Crow Creek State Pad	MD Reference:	WELL @ 4874.0usft (H&P 277)
Well:	Crow Creek State AC36-72HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)	
9,418.0	88.70	359.40	6,681.2	2,744.8	711.9	2,819.9	2.19	
9,513.0	90.40	359.70	6,682.0	2,839.8	711.1	2,913.8	1.82	
9,608.0	88.30	358.70	6,683.0	2,934.8	709.8	3,007.5	2.45	
9,704.0	88.70	358.30	6,685.6	3,030.8	707.3	3,102.0	0.59	
9,799.0	89.90	359.00	6,686.7	3,125.7	705.0	3,195.6	1.46	
9,894.0	88.20	359.00	6,688.3	3,220.7	703.4	3,289.3	1.79	
9,989.0	88.90	359.00	6,690.7	3,315.6	701.7	3,382.9	0.74	
10,084.0	89.90	359.00	6,691.7	3,410.6	700.1	3,476.6	1.05	
10,180.0	90.80	359.00	6,691.1	3,506.6	698.4	3,571.3	0.94	
10,275.0	88.50	359.60	6,691.7	3,601.6	697.2	3,665.1	2.50	
10,370.0	89.20	359.60	6,693.6	3,696.6	696.6	3,758.9	0.74	
10,465.0	90.10	359.90	6,694.2	3,791.6	696.1	3,852.8	1.00	
10,560.0	90.10	0.10	6,694.0	3,886.6	696.1	3,946.8	0.21	
10,656.0	89.70	359.70	6,694.2	3,982.6	696.0	4,041.7	0.59	
10,751.0	90.30	0.60	6,694.2	4,077.6	696.2	4,135.7	1.14	
10,846.0	88.00	358.20	6,695.6	4,172.5	695.2	4,229.5	3.50	
10,941.0	89.20	358.00	6,697.9	4,267.4	692.1	4,322.9	1.28	
11,036.0	88.70	357.10	6,699.6	4,362.3	688.0	4,416.1	1.08	
11,131.0	89.60	356.60	6,701.1	4,457.2	682.8	4,509.2	1.08	
11,157.0	89.70	356.60	6,701.2	4,483.1	681.3	4,534.6	0.38	
Last MWD @ 11157' MD / 6702' TVD								
11,211.0	89.70	356.60	6,701.5	4,537.0	678.1	4,587.4	0.00	
PTD @ 11211' MD / 6702' TVD / 538' FNL & 645' FEL Sec 36								

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
731.0	731.0	-2.5	-3.8	First MWD	
7,061.0	6,658.4	393.3	716.2	Actual 7" Csg @ 7061' MD / 6658' TVD / 651' FSL & 666' FEL Sec 36	
11,157.0	6,701.2	4,483.1	681.3	Last MWD @ 11157' MD / 6702' TVD	
11,211.0	6,701.5	4,537.0	678.1	PTD @ 11211' MD / 6702' TVD / 538' FNL & 645' FEL Sec 36	

Checked By: _____ Approved By: _____ Date: _____



Weld County, CO (NAD 83)

Crow Creek State AC36-72HN
H&P 277
Plan #2

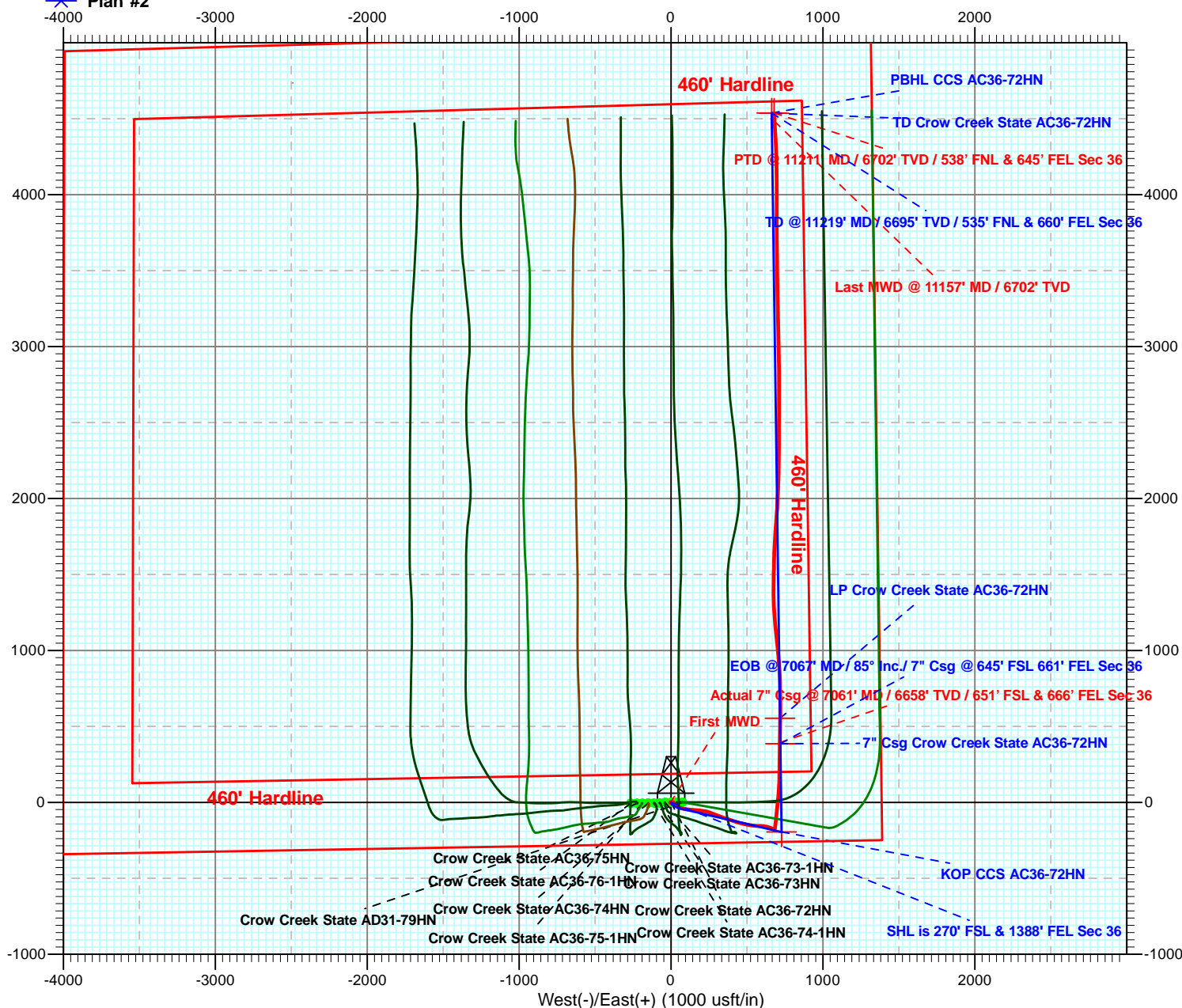


Azimuths to Grid North
True North: -0.72°
Magnetic North: 7.65°

Magnetic Field
Strength: 53009.0snT
Dip Angle: 67.14°
Date: 8/9/2013
Model: IGRF2010

LEGEND

- △ Crow Creek State AC36-72HN, Wellbore #1, OH V0
- ◇ Crow Creek State AC36-72-1HN, Wellbore #1, Plan #2 V0
- Crow Creek State AC36-73-1HN, Wellbore #1, OH V0
- Crow Creek State AC36-73HN, Wellbore #1, OH V0
- Crow Creek State AC36-74-1HN, Wellbore #1, OH V0
- × Crow Creek State AC36-74HN, Wellbore #1, OH V0
- Crow Creek State AC36-75-1HN, Wellbore #1, OH V0
- Crow Creek State AC36-75HN, Wellbore #1, OH V0
- Crow Creek State AC36-76-1HN, Wellbore #1, OH V0
- ◇ Crow Creek State AD31-79HN, Wellbore #1, Plan #1 V0
- × Plan #2





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Crow Creek State AC36-72HN

H&P 277

Plan #2

