



# **Noble Energy, Inc**

**Weld County, CO (NAD 83)**

**Crow Creek State Pad**

**Crow Creek State AC36-74HN**

**Wellbore #1**

**Design: OH**

## **Final Survey Report**

**17 October, 2013**





# IDS Final Survey Report



<b>Company:</b>	Noble Energy, Inc	<b>Local Co-ordinate Reference:</b>	Well Crow Creek State AC36-74HN
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	WELL @ 4871.0usft (H&P 277)
<b>Site:</b>	Crow Creek State Pad	<b>MD Reference:</b>	WELL @ 4871.0usft (H&P 277)
<b>Well:</b>	Crow Creek State AC36-74HN	<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

<b>Project</b>	Weld County, CO (NAD 83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	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:		Slot Radius:	13-3/16"	Grid Convergence:	0.72 °

Well	Crow Creek State AC36-74HN					
Well Position	+N-S	0.0 usft	Northing:	1,435,556.76 usft	Latitude:	40° 31' 24.996 N
	+E-W	0.0 usft	Easting:	3,311,251.70 usft	Longitude:	104° 22' 49.332 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,847.0 usft

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

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N-S (usft)</b>	<b>+E-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	353.28	

<b>Survey Program</b>	<b>Date</b>	10/17/2013			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
288.0	620.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
725.0	11,118.0	Survey #2 (Wellbore #1)	MWD	MWD - Standard	

<b>Survey</b>								
<b>MD (usft)</b>	<b>Inc (°)</b>	<b>Azi (azimuth) (°)</b>	<b>TVD (usft)</b>	<b>N/S (usft)</b>	<b>E/W (usft)</b>	<b>V. Sec (usft)</b>	<b>DLeg (°/100usft)</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	
288.0	0.50	60.85	288.0	0.6	1.1	0.5	0.17	
620.0	0.20	272.95	620.0	1.3	1.8	1.1	0.20	
725.0	0.50	244.40	725.0	1.2	1.2	1.0	0.32	
<b>First MWD</b>								
817.0	0.40	220.90	817.0	0.7	0.6	0.7	0.23	
911.0	0.40	213.10	911.0	0.2	0.2	0.2	0.06	
1,005.0	0.50	158.30	1,005.0	-0.4	0.2	-0.5	0.45	
1,097.0	0.50	163.70	1,097.0	-1.2	0.5	-1.2	0.05	
1,189.0	0.70	173.40	1,189.0	-2.1	0.6	-2.2	0.24	
1,282.0	0.50	159.70	1,282.0	-3.1	0.8	-3.2	0.26	



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<b>Site:</b>	Crow Creek State Pad	<b>MD Reference:</b>	WELL @ 4871.0usft (H&P 277)
<b>Well:</b>	Crow Creek State AC36-74HN	<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)	
1,376.0	0.70	148.60	1,376.0	-4.0	1.3	-4.1	0.25	
1,469.0	0.90	139.80	1,469.0	-5.0	2.0	-5.2	0.25	
1,564.0	0.90	140.00	1,563.9	-6.1	3.0	-6.5	0.00	
1,659.0	0.70	163.20	1,658.9	-7.3	3.7	-7.6	0.40	
1,754.0	0.70	155.50	1,753.9	-8.4	4.1	-8.8	0.10	
1,850.0	0.70	158.30	1,849.9	-9.4	4.5	-9.9	0.04	
1,945.0	0.70	148.50	1,944.9	-10.5	5.0	-11.0	0.13	
2,040.0	2.10	191.70	2,039.9	-12.7	5.0	-13.2	1.75	
2,135.0	3.90	202.10	2,134.8	-17.4	3.4	-17.6	1.97	
2,230.0	3.50	201.50	2,229.6	-23.1	1.1	-23.0	0.42	
2,325.0	4.90	201.70	2,324.3	-29.5	-1.4	-29.2	1.47	
2,420.0	6.20	203.30	2,418.8	-38.0	-4.9	-37.2	1.38	
2,515.0	5.50	203.60	2,513.4	-46.9	-8.8	-45.5	0.74	
2,610.0	6.50	203.30	2,607.8	-56.0	-12.7	-54.1	1.05	
2,705.0	6.00	206.50	2,702.3	-65.4	-17.1	-62.9	0.64	
2,801.0	5.30	204.00	2,797.8	-73.9	-21.1	-70.9	0.77	
2,896.0	6.70	207.00	2,892.3	-82.9	-25.4	-79.3	1.51	
2,991.0	7.00	223.90	2,986.6	-92.0	-32.0	-87.6	2.14	
3,086.0	7.90	237.60	3,080.8	-99.6	-41.5	-94.1	2.09	
3,181.0	7.70	252.30	3,174.9	-105.1	-53.1	-98.1	2.10	
3,277.0	9.10	258.00	3,269.9	-108.6	-66.6	-100.1	1.70	
3,372.0	9.00	259.00	3,363.7	-111.6	-81.3	-101.3	0.20	
3,467.0	8.60	260.40	3,457.6	-114.2	-95.6	-102.2	0.48	
3,562.0	9.50	263.80	3,551.4	-116.2	-110.4	-102.5	1.10	
3,657.0	11.60	258.10	3,644.8	-119.0	-127.5	-103.3	2.47	
3,753.0	12.00	260.40	3,738.8	-122.7	-146.8	-104.7	0.64	
3,848.0	12.80	256.20	3,831.6	-126.9	-166.7	-106.5	1.27	
3,943.0	13.50	254.80	3,924.1	-132.3	-187.7	-109.4	0.81	
4,038.0	13.20	256.20	4,016.5	-137.8	-208.9	-112.4	0.46	
4,133.0	12.10	255.50	4,109.2	-142.8	-229.1	-115.1	1.17	
4,228.0	11.40	254.40	4,202.2	-147.9	-247.8	-117.9	0.77	
4,324.0	10.00	252.50	4,296.5	-152.9	-264.8	-120.9	1.50	
4,419.0	9.10	256.20	4,390.2	-157.2	-280.0	-123.4	1.15	
4,514.0	7.70	254.30	4,484.2	-160.7	-293.4	-125.3	1.50	
4,609.0	8.80	260.60	4,578.2	-163.6	-306.7	-126.6	1.50	
4,704.0	7.60	252.70	4,672.3	-166.7	-319.9	-128.1	1.73	
4,800.0	7.00	262.50	4,767.5	-169.3	-331.8	-129.3	1.44	
4,895.0	6.20	261.10	4,861.9	-170.9	-342.6	-129.6	0.86	
4,990.0	6.20	259.20	4,956.3	-172.6	-352.7	-130.2	0.22	
5,085.0	5.80	258.00	5,050.8	-174.6	-362.4	-131.0	0.44	
5,180.0	4.80	254.10	5,145.4	-176.7	-370.9	-132.1	1.12	
5,275.0	4.60	256.20	5,240.1	-178.7	-378.4	-133.2	0.28	
5,370.0	5.50	257.60	5,334.7	-180.6	-386.6	-134.1	0.96	
5,466.0	4.20	258.10	5,430.3	-182.3	-394.5	-134.9	1.35	
5,561.0	3.70	256.20	5,525.1	-183.7	-400.9	-135.5	0.54	



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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
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Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,656.0	3.50	259.00	5,619.9	-185.0	-406.7	-136.1	0.28
5,751.0	3.00	258.30	5,714.8	-186.1	-412.0	-136.6	0.53
5,846.0	2.60	255.50	5,809.7	-187.1	-416.5	-137.1	0.44
5,941.0	2.10	237.60	5,904.6	-188.6	-420.1	-138.1	0.93
6,030.0	1.80	228.30	5,993.5	-190.4	-422.5	-139.6	0.49
6,125.0	6.40	336.70	6,088.3	-186.5	-425.7	-135.4	7.55
6,173.0	13.10	346.60	6,135.6	-178.8	-428.0	-127.4	14.34
6,220.0	17.40	346.70	6,180.9	-166.7	-430.9	-115.2	9.15
6,268.0	21.50	350.80	6,226.2	-151.1	-434.0	-99.2	9.00
6,315.0	24.10	352.70	6,269.5	-133.0	-436.6	-81.0	5.75
6,363.0	26.90	354.60	6,312.8	-112.5	-438.8	-60.4	6.08
6,411.0	31.80	354.90	6,354.7	-89.1	-441.0	-36.9	10.21
6,458.0	37.80	356.40	6,393.2	-62.3	-443.0	-10.1	12.89
6,506.0	42.60	358.40	6,429.9	-31.4	-444.4	20.8	10.35
6,553.0	45.40	358.50	6,463.7	1.2	-445.2	53.3	5.96
6,601.0	47.90	358.70	6,496.7	36.1	-446.1	88.1	5.22
6,648.0	50.50	358.90	6,527.4	71.7	-446.8	123.5	5.54
6,696.0	54.60	359.50	6,556.5	109.8	-447.4	161.4	8.60
6,744.0	59.80	359.50	6,582.5	150.1	-447.7	201.5	10.83
6,791.0	65.20	359.20	6,604.2	191.8	-448.2	242.9	11.50
6,839.0	70.40	358.30	6,622.4	236.2	-449.2	287.1	10.97
6,886.0	74.80	359.60	6,636.4	281.0	-450.0	331.8	9.73
6,934.0	79.10	359.10	6,647.2	327.8	-450.5	378.2	9.02
6,982.0	83.00	0.10	6,654.7	375.2	-450.8	425.4	8.38
7,033.0	85.26	359.81	6,659.9	425.9	-450.9	475.8	4.47
7" Csg @ 7033' MD / 6660' TVD / 696' FSL & 1979' FEL Sec 36							
7,070.0	86.90	359.60	6,662.5	462.8	-451.1	512.4	4.47
7,133.0	87.30	359.70	6,665.6	525.7	-451.4	575.0	0.65
7,229.0	88.20	358.00	6,669.4	621.6	-453.4	670.4	2.00
7,324.0	90.40	357.80	6,670.6	716.6	-456.9	765.1	2.33
7,419.0	88.90	358.20	6,671.2	811.5	-460.2	859.8	1.63
7,514.0	90.40	358.30	6,671.7	906.5	-463.1	954.4	1.58
7,609.0	89.40	359.40	6,671.9	1,001.4	-465.0	1,049.0	1.56
7,704.0	89.20	0.30	6,673.1	1,096.4	-465.2	1,143.3	0.97
7,800.0	88.30	0.60	6,675.2	1,192.4	-464.5	1,238.6	0.99
7,895.0	89.00	359.20	6,677.4	1,287.4	-464.6	1,332.9	1.65
7,990.0	87.40	0.60	6,680.4	1,382.3	-464.8	1,427.2	2.24
8,085.0	87.10	358.90	6,684.9	1,477.2	-465.2	1,521.5	1.82
8,181.0	88.00	359.20	6,689.0	1,573.1	-466.8	1,616.9	0.99
8,276.0	89.20	359.00	6,691.4	1,668.1	-468.3	1,711.4	1.28
8,371.0	91.50	358.70	6,690.8	1,763.0	-470.2	1,805.9	2.44
8,466.0	90.40	358.70	6,689.2	1,858.0	-472.4	1,900.5	1.16
8,561.0	89.40	359.20	6,689.4	1,953.0	-474.1	1,995.0	1.18
8,656.0	89.90	359.40	6,690.0	2,048.0	-475.3	2,089.5	0.57



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<b>Well:</b>	Crow Creek State AC36-74HN	<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)	
8,752.0	91.00	359.00	6,689.2	2,144.0	-476.6	2,185.0	1.22	
8,847.0	91.50	357.50	6,687.1	2,238.9	-479.5	2,279.6	1.66	
8,942.0	90.10	358.00	6,685.8	2,333.8	-483.2	2,374.3	1.56	
9,037.0	90.40	356.60	6,685.4	2,428.7	-487.7	2,469.1	1.51	
9,133.0	89.40	357.60	6,685.6	2,524.6	-492.6	2,564.9	1.47	
9,228.0	88.70	0.10	6,687.1	2,619.5	-494.5	2,659.4	2.73	
9,323.0	88.90	359.40	6,689.1	2,714.5	-494.9	2,753.8	0.77	
9,418.0	88.90	357.80	6,690.9	2,809.5	-497.2	2,848.3	1.68	
9,513.0	87.80	359.90	6,693.7	2,904.4	-499.1	2,942.8	2.49	
9,608.0	86.40	359.40	6,698.5	2,999.3	-499.7	3,037.1	1.56	
9,704.0	86.40	1.30	6,704.5	3,095.1	-499.1	3,132.2	1.98	
9,799.0	87.40	0.80	6,709.7	3,189.9	-497.4	3,226.2	1.18	
9,894.0	89.40	359.90	6,712.3	3,284.9	-496.8	3,320.4	2.31	
9,989.0	89.70	359.90	6,713.0	3,379.9	-497.0	3,414.8	0.32	
10,084.0	91.00	1.50	6,712.5	3,474.8	-495.8	3,509.0	2.17	
10,180.0	90.10	359.90	6,711.5	3,570.8	-494.6	3,604.2	1.91	
10,275.0	90.30	1.10	6,711.2	3,665.8	-493.8	3,698.4	1.28	
10,370.0	91.10	4.00	6,710.1	3,760.7	-489.6	3,792.2	3.17	
10,465.0	88.30	1.50	6,710.6	3,855.6	-485.0	3,885.9	3.95	
10,560.0	86.70	1.50	6,714.7	3,950.5	-482.5	3,979.8	1.68	
10,656.0	88.50	359.20	6,718.7	4,046.4	-481.9	4,075.0	3.04	
10,751.0	91.10	356.60	6,719.0	4,141.3	-485.4	4,169.6	3.87	
10,846.0	91.00	350.20	6,717.3	4,235.6	-496.3	4,264.6	6.74	
10,941.0	92.70	350.80	6,714.2	4,329.2	-512.0	4,359.4	1.90	
11,036.0	92.60	354.60	6,709.8	4,423.3	-524.1	4,454.3	4.00	
11,065.0	93.40	355.30	6,708.3	4,452.2	-526.6	4,483.2	3.66	
Last MWD @ 11065' MD / 6708' TVD								
11,118.0	93.40	355.30	6,705.2	4,504.9	-530.9	4,536.1	0.00	
PTD @ 11118' MD / 6705' TVD / 537' FNL & 2006' FEL Sec 36								

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
725.0	725.0	1.2	1.2	First MWD	
7,033.0	6,659.9	425.9	-450.9	7" Csg @ 7033' MD / 6660' TVD / 696' FSL & 1979' FEL Sec 36	
11,065.0	6,708.3	4,452.2	-526.6	Last MWD @ 11065' MD / 6708' TVD	
11,118.0	6,705.2	4,504.9	-530.9	PTD @ 11118' MD / 6705' TVD / 537' FNL & 2006' FEL Sec 36	

Checked By: _____	Approved By: _____	Date: _____
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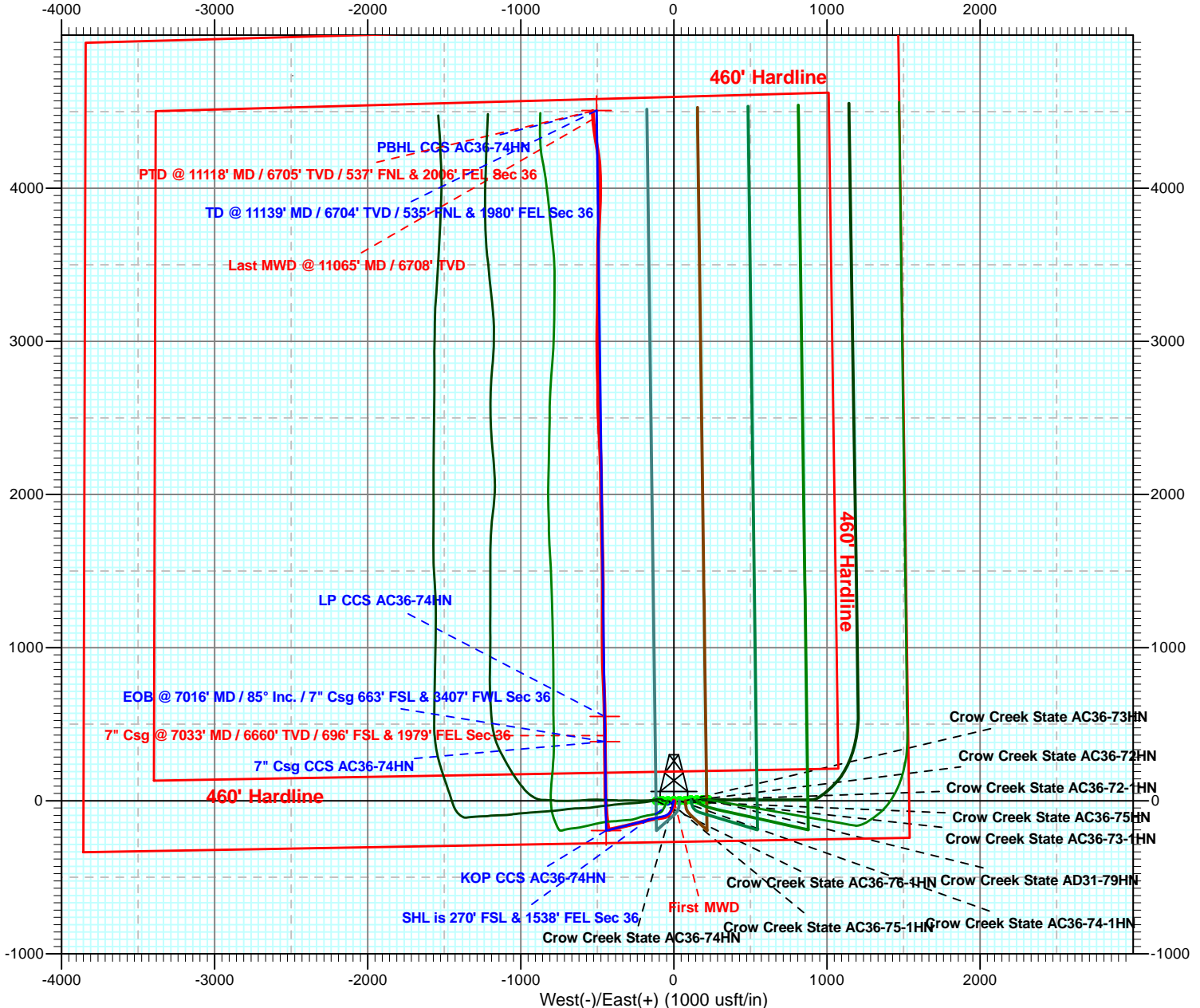
Weld County, CO (NAD 83)  
Crow Creek State Pad  
Crow Creek State AC36-74HN  
H&P 277  
Plan #1



Azimuths to Grid North  
True North:  $-0.72^\circ$   
Magnetic North:  $7.65^\circ$   
  
Magnetic Field  
Strength: 53009.0snT  
Dip Angle:  $67.14^\circ$   
Date: 8/9/2013  
Model: IGRF2010

LEGEND

- ✗ Crow Creek State AC36-74HN, Wellbore #1, OH V0
- Crow Creek State AC36-74-1HN, Wellbore #1, Plan #2 V0
- Crow Creek State AC36-73HN, Wellbore #1, Plan #1 V0
- ✗ Crow Creek State AC36-72-1HN, Wellbore #1, Plan #1 V0
- Crow Creek State AC36-72HN, Wellbore #1, Plan #1 V0
- ✗ Crow Creek State AC36-73-1HN, Wellbore #1, Plan #1 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 #1





Weld County, CO (NAD 83)  
Crow Creek State Pad  
Crow Creek State AC36-74HN

H&P 277

Plan #1

