



Noble Energy, Inc

**Weld County, CO (NAD 83)
Crow Creek State Pad
Crow Creek State AC36-75-1HN
Wellbore #1**

Design: OH

Final Survey Report

23 January, 2014





IDS

Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Crow Creek State AC36-75-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	WELL @ 4871.0usft (H&P 277)
Site:	Crow Creek State Pad	MD Reference:	WELL @ 4871.0usft (H&P 277)
Well:	Crow Creek State AC36-75-1HN	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 AC36-75-1HN					
Well Position	+N-S	0.0 usft	Northing:	1,435,556.27 usft	Latitude:	40° 31' 24.996 N
	+E-W	0.0 usft	Easting:	3,311,212.79 usft	Longitude:	104° 22' 49.836 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,847.0 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	349.49	

Survey Program	Date	1/23/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
360.0	580.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
725.0	11,240.0	MWD (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	
360.0	0.20	259.65	360.0	-0.1	-0.6	0.0	0.06	
580.0	0.20	335.95	580.0	0.2	-1.2	0.4	0.11	
725.0	0.40	17.50	725.0	0.9	-1.1	1.1	0.20	
First MWD								
817.0	0.50	356.90	817.0	1.6	-1.0	1.8	0.21	
911.0	0.20	85.70	911.0	2.0	-0.9	2.1	0.57	
1,005.0	0.40	249.90	1,005.0	1.9	-1.0	2.1	0.63	
1,097.0	3.30	215.60	1,096.9	-0.4	-2.9	0.2	3.24	
1,189.0	4.60	204.90	1,188.7	-5.9	-6.0	-4.7	1.62	
1,282.0	5.10	205.80	1,281.4	-13.0	-9.3	-11.0	0.54	



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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)	
1,376.0	4.90	204.20	1,375.0	-20.4	-12.8	-17.7	0.26	
1,469.0	6.00	206.50	1,467.6	-28.4	-16.6	-24.8	1.21	
1,564.0	7.20	211.00	1,562.0	-37.9	-21.9	-33.3	1.37	
1,754.0	7.20	210.30	1,750.5	-58.4	-34.0	-51.2	0.05	
1,850.0	6.30	208.40	1,845.8	-68.2	-39.6	-59.9	0.97	
1,945.0	7.00	237.90	1,940.2	-75.9	-46.9	-66.0	3.63	
2,040.0	7.40	255.90	2,034.5	-80.4	-57.8	-68.6	2.40	
2,135.0	8.30	259.00	2,128.6	-83.2	-70.5	-69.0	1.05	
2,230.0	9.30	253.90	2,222.4	-86.7	-84.6	-69.8	1.33	
2,325.0	10.20	260.10	2,316.1	-90.3	-100.2	-70.5	1.45	
2,420.0	11.10	260.60	2,409.4	-93.2	-117.5	-70.2	0.95	
2,515.0	10.90	261.80	2,502.7	-96.0	-135.4	-69.7	0.32	
2,610.0	12.00	255.50	2,595.8	-99.7	-153.9	-70.0	1.75	
2,705.0	11.60	254.60	2,688.8	-104.7	-172.7	-71.5	0.46	
2,801.0	10.40	254.10	2,783.0	-109.7	-190.3	-73.1	1.25	
2,896.0	10.20	248.80	2,876.5	-115.1	-206.4	-75.5	1.02	
2,991.0	10.90	254.10	2,969.9	-120.6	-222.9	-77.9	1.26	
3,086.0	11.80	263.20	3,063.1	-124.2	-241.2	-78.1	2.11	
3,181.0	13.70	266.90	3,155.7	-125.9	-262.0	-76.0	2.18	
3,277.0	12.30	265.30	3,249.2	-127.4	-283.6	-73.5	1.51	
3,372.0	12.80	264.80	3,342.0	-129.2	-304.1	-71.5	0.54	
3,467.0	10.00	261.50	3,435.1	-131.3	-322.8	-70.3	3.03	
3,562.0	8.60	269.90	3,528.8	-132.6	-338.1	-68.7	2.05	
3,657.0	8.80	265.20	3,622.8	-133.2	-352.4	-66.7	0.78	
3,753.0	10.00	267.10	3,717.5	-134.2	-368.0	-64.8	1.29	
3,848.0	12.10	265.00	3,810.7	-135.5	-386.2	-62.8	2.25	
3,943.0	15.50	261.10	3,902.9	-138.3	-408.7	-61.5	3.71	
4,038.0	16.20	260.20	3,994.3	-142.6	-434.3	-61.0	0.78	
4,133.0	15.50	257.60	4,085.7	-147.6	-459.7	-61.2	1.05	
4,228.0	14.60	257.60	4,177.5	-152.8	-483.8	-62.0	0.95	
4,324.0	12.80	256.20	4,270.7	-158.0	-506.0	-63.0	1.91	
4,419.0	11.30	253.90	4,363.6	-163.1	-525.1	-64.6	1.66	
4,514.0	9.70	256.90	4,457.0	-167.5	-541.9	-65.8	1.78	
4,609.0	9.70	263.40	4,550.7	-170.2	-557.6	-65.6	1.15	
4,704.0	10.00	258.10	4,644.3	-172.8	-573.6	-65.3	1.00	
4,800.0	10.00	261.30	4,738.8	-175.8	-590.0	-65.2	0.58	
4,895.0	10.70	263.90	4,832.3	-178.0	-606.9	-64.3	0.89	
4,990.0	8.80	261.80	4,925.9	-180.0	-622.9	-63.3	2.03	
5,085.0	8.60	261.00	5,019.8	-182.1	-637.1	-62.8	0.25	
5,180.0	6.90	261.30	5,113.9	-184.1	-649.8	-62.5	1.79	
5,275.0	4.90	260.20	5,208.4	-185.6	-659.4	-62.2	2.11	
5,370.0	3.50	250.80	5,303.2	-187.3	-666.2	-62.6	1.64	
5,466.0	3.30	266.80	5,399.0	-188.4	-671.7	-62.7	1.01	
5,561.0	3.00	249.50	5,493.9	-189.4	-676.7	-62.8	1.04	
5,656.0	1.90	234.40	5,588.8	-191.2	-680.3	-63.9	1.33	



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Site:	Crow Creek State Pad	MD Reference:	WELL @ 4871.0usft (H&P 277)
Well:	Crow Creek State AC36-75-1HN	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)
5,751.0	3.00	267.30	5,683.7	-192.2	-684.1	-64.2	1.83
5,846.0	2.10	258.70	5,778.6	-192.7	-688.3	-63.9	1.03
5,941.0	3.00	259.00	5,873.5	-193.5	-692.4	-64.0	0.95
6,037.0	4.00	274.00	5,969.3	-193.8	-698.3	-63.1	1.40
6,132.0	2.50	267.80	6,064.2	-193.6	-703.6	-62.0	1.62
6,220.0	2.60	301.90	6,152.1	-192.6	-707.2	-60.4	1.70
6,268.0	7.20	321.80	6,199.9	-189.7	-710.0	-57.0	10.08
6,315.0	12.10	324.20	6,246.2	-183.4	-714.7	-49.9	10.46
6,363.0	18.40	333.40	6,292.5	-172.5	-721.1	-38.1	14.02
6,411.0	23.50	337.20	6,337.3	-156.9	-728.2	-21.4	10.99
6,458.0	29.60	338.00	6,379.4	-137.5	-736.2	-0.9	13.00
6,506.0	33.20	340.10	6,420.3	-114.1	-745.1	23.7	7.84
6,553.0	35.40	344.40	6,459.1	-88.9	-753.1	50.0	6.96
6,601.0	39.10	351.10	6,497.4	-60.5	-759.2	79.0	11.43
6,648.0	43.40	356.30	6,532.7	-29.8	-762.6	109.8	11.70
6,696.0	46.60	357.10	6,566.6	4.1	-764.5	143.5	6.77
6,744.0	49.80	0.30	6,598.6	39.9	-765.3	178.8	8.31
6,791.0	54.40	4.00	6,627.5	76.9	-763.9	215.0	11.59
6,839.0	60.60	5.50	6,653.3	117.2	-760.5	254.0	13.18
6,886.0	64.40	5.50	6,675.0	158.7	-756.5	294.1	8.09
6,904.0	65.90	5.27	6,682.5	175.0	-755.0	309.8	8.41
Crosses HL @ 6904' MD / 6683' TVD							
6,934.0	68.40	4.90	6,694.2	202.5	-752.5	336.4	8.41
6,982.0	73.00	3.30	6,710.1	247.7	-749.3	380.2	10.09
7,029.0	76.20	2.90	6,722.5	292.9	-746.8	424.2	6.86
7,077.0	79.00	1.40	6,732.8	339.8	-745.1	470.0	6.58
7,126.0	81.18	0.10	6,741.3	388.0	-744.5	517.3	5.17
Actual 7" Csg @ 7126' MD / 6743' TVD / 671' FSL & 2315' FEL Sec 36							
7,160.0	82.70	359.20	6,746.0	421.7	-744.7	550.5	5.17
7,223.0	81.60	358.00	6,754.6	484.1	-746.2	612.1	2.57
7,318.0	86.70	359.40	6,764.3	578.5	-748.3	705.3	5.56
7,414.0	89.20	0.40	6,767.8	674.5	-748.5	799.7	2.80
7,509.0	89.90	359.90	6,768.5	769.5	-748.2	893.0	0.91
7,604.0	89.20	359.60	6,769.3	864.5	-748.7	986.5	0.80
7,699.0	91.10	359.40	6,769.0	959.4	-749.5	1,080.1	2.01
7,794.0	91.30	358.90	6,767.0	1,054.4	-750.9	1,173.7	0.57
7,889.0	90.60	357.80	6,765.4	1,149.4	-753.6	1,267.5	1.37
7,985.0	91.70	358.70	6,763.5	1,245.3	-756.6	1,362.4	1.48
8,080.0	92.00	359.00	6,760.4	1,340.2	-758.5	1,456.1	0.45
8,175.0	91.50	357.80	6,757.5	1,435.1	-761.1	1,549.9	1.37
8,270.0	89.90	356.40	6,756.4	1,530.0	-765.9	1,644.0	2.24
8,365.0	89.60	356.80	6,756.8	1,624.8	-771.6	1,738.3	0.53
8,461.0	90.60	358.70	6,756.6	1,720.8	-775.3	1,833.3	2.24
8,556.0	91.10	358.30	6,755.2	1,815.7	-777.8	1,927.1	0.67



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Site:	Crow Creek State Pad	MD Reference:	WELL @ 4871.0usft (H&P 277)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey							
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8,651.0	90.40	358.30	6,754.0	1,910.7	-780.6	2,021.0	0.74
8,746.0	90.60	359.90	6,753.1	2,005.6	-782.1	2,114.7	1.70
8,841.0	93.10	1.80	6,750.1	2,100.6	-780.7	2,207.7	3.30
8,937.0	93.30	0.40	6,744.7	2,196.4	-778.9	2,301.6	1.47
9,032.0	93.80	1.80	6,738.8	2,291.2	-777.1	2,394.5	1.56
9,127.0	92.40	1.30	6,733.7	2,386.0	-774.5	2,487.3	1.56
9,222.0	89.60	0.40	6,732.0	2,481.0	-773.1	2,580.4	3.10
9,317.0	89.20	0.80	6,733.0	2,576.0	-772.1	2,673.6	0.60
9,413.0	89.60	2.90	6,734.0	2,671.9	-769.0	2,767.4	2.23
9,508.0	89.60	5.40	6,734.7	2,766.7	-762.1	2,859.3	2.63
9,603.0	89.00	4.10	6,735.9	2,861.3	-754.2	2,950.9	1.51
9,698.0	89.00	2.40	6,737.5	2,956.2	-748.9	3,043.2	1.79
9,793.0	89.40	2.40	6,738.9	3,051.1	-744.9	3,135.7	0.42
9,888.0	89.40	0.30	6,739.8	3,146.0	-742.6	3,228.7	2.21
9,984.0	89.90	0.60	6,740.4	3,242.0	-741.9	3,323.0	0.61
10,079.0	89.70	1.30	6,740.8	3,337.0	-740.3	3,416.1	0.77
10,174.0	89.20	359.40	6,741.7	3,432.0	-739.7	3,509.3	2.07
10,269.0	90.30	356.00	6,742.1	3,526.9	-743.5	3,603.4	3.76
10,365.0	88.70	353.90	6,742.9	3,622.5	-752.0	3,698.9	2.75
10,460.0	87.80	354.30	6,745.8	3,717.0	-761.8	3,793.6	1.04
10,555.0	89.40	355.00	6,748.2	3,811.5	-770.6	3,888.1	1.84
10,650.0	89.20	353.60	6,749.3	3,906.0	-780.0	3,982.8	1.49
10,745.0	89.90	353.60	6,750.1	4,000.4	-790.6	4,077.6	0.74
10,840.0	90.10	350.60	6,750.1	4,094.5	-803.7	4,172.4	3.16
10,936.0	90.10	348.80	6,749.9	4,189.0	-820.9	4,268.4	1.87
11,031.0	88.90	356.90	6,750.7	4,283.2	-832.7	4,363.2	8.62
11,126.0	86.70	359.70	6,754.4	4,378.0	-835.5	4,457.0	3.75
11,179.0	86.00	1.50	6,757.7	4,430.9	-834.9	4,508.9	3.64
Last MWD @ 11179' MD / 6758' TVD							
11,240.0	86.00	1.50	6,762.0	4,491.8	-833.3	4,568.4	0.00
PTD @ 11240' MD / 6762' TVD / 545' FNL & 2347' FEL Sec 36							

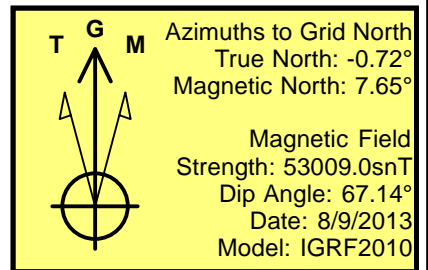
Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
725.0	725.0	0.9	-1.1	First MWD
6,904.0	6,682.5	175.0	-755.0	Crosses HL @ 6904' MD / 6683' TVD
7,126.0	6,741.3	388.0	-744.5	Actual 7" Csg @ 7126' MD / 6743' TVD / 671' FSL & 2315' FEL Sec 36
11,179.0	6,757.7	4,430.9	-834.9	Last MWD @ 11179' MD / 6758' TVD
11,240.0	6,762.0	4,491.8	-833.3	PTD @ 11240' MD / 6762' TVD / 545' FNL & 2347' FEL Sec 36

Checked By: _____ Approved By: _____ Date: _____



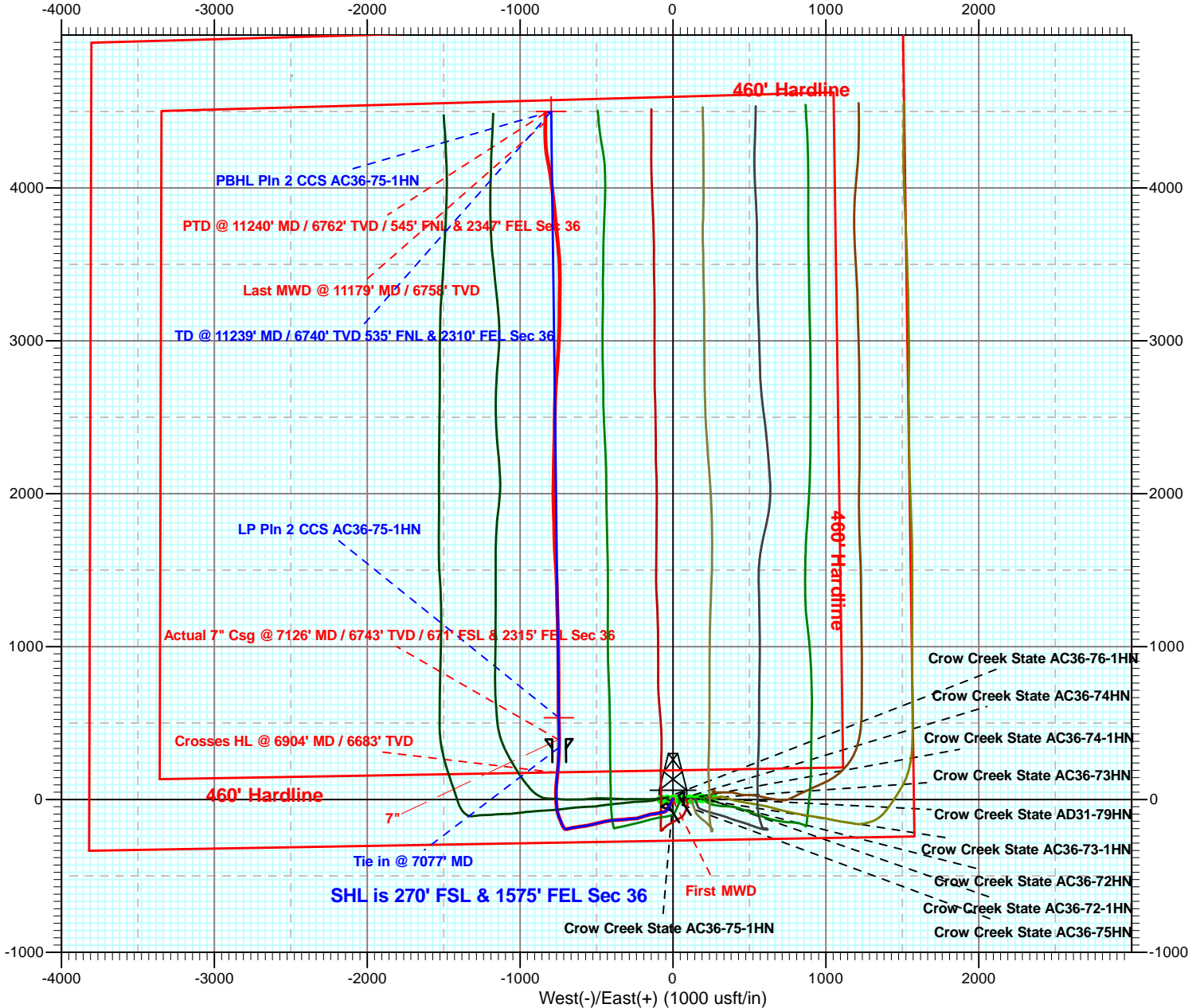
Weld County, CO (NAD 83)
Crow Creek State Pad
Crow Creek State AC36-75-1HN
H&P 277

Plan #2



LEGEND

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





Weld County, CO (NAD 83)
Crow Creek State Pad
Crow Creek State AC36-75-1HN

H&P 277

Plan #2

