

Noble Energy Inc.- Weld County, CO (Grid North)

Well Name: **Furrow Federal PC AB14-63HN**

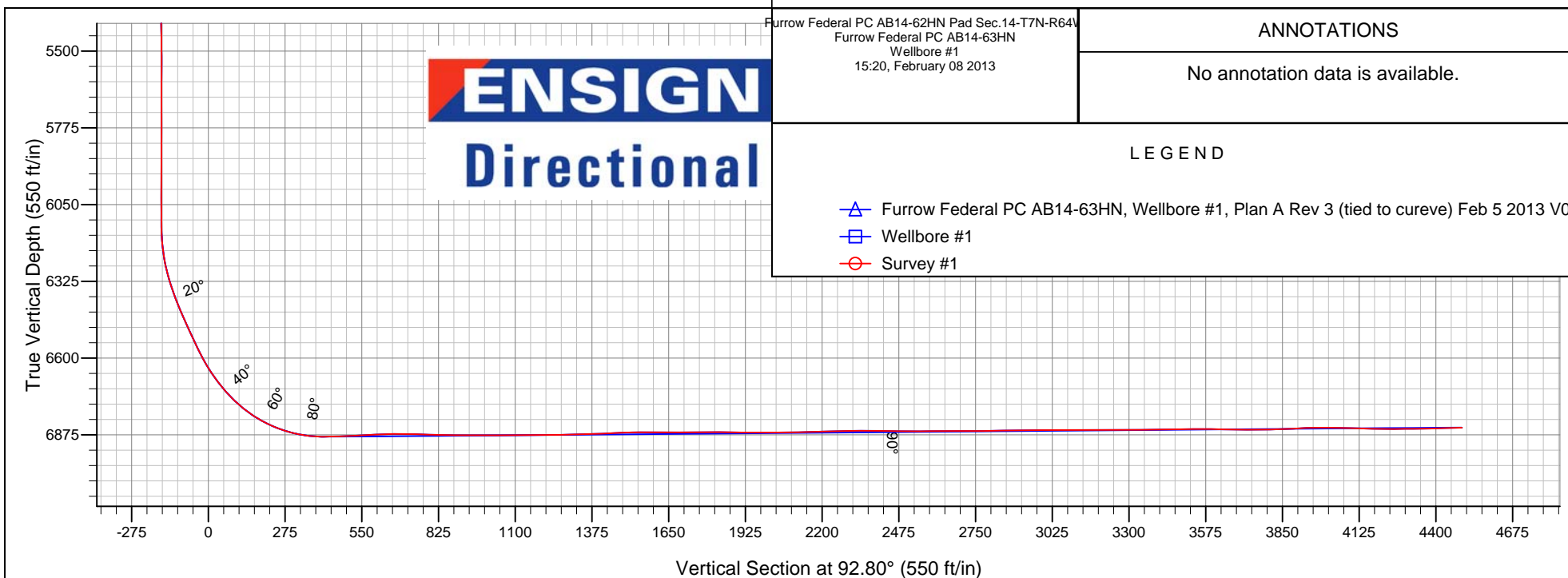
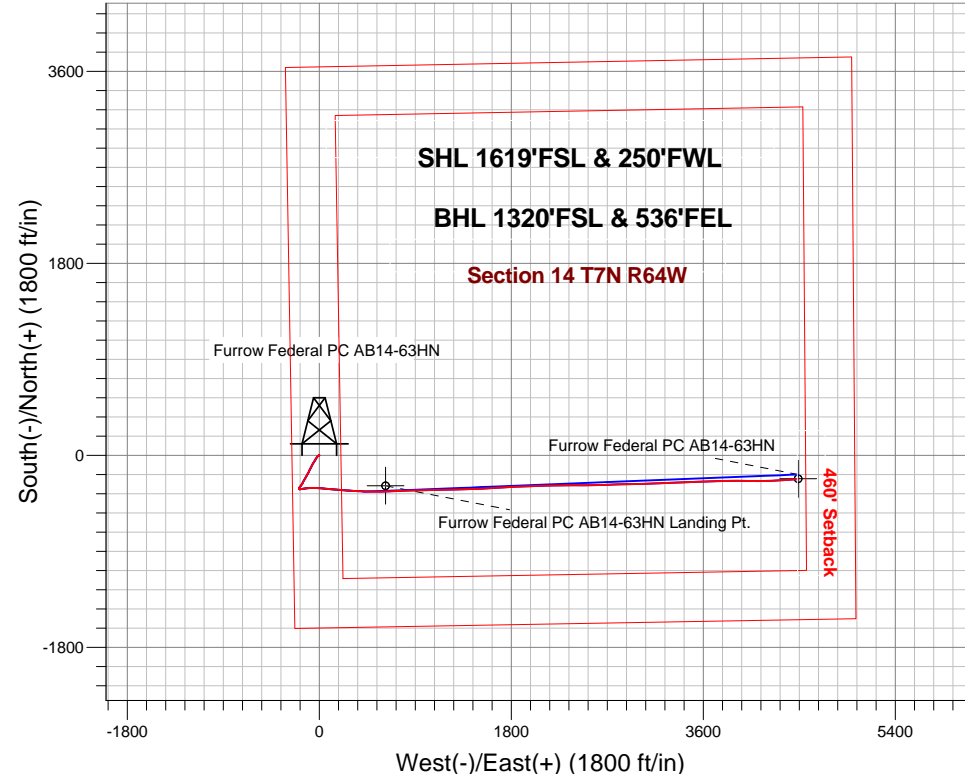
Surface Location: Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4807.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1452144.70	3270820.49	40.570450	-104.525140	

Original Well Elev WELL @ 4820.0ft (Original Well Elev)

FINAL SURVEY

Projected Bottom Hole Location
11296' MD 6849'TVD 219'S & 4488'E of SHL
91.5 degree Incl @ 86.8 degree AZM





Noble Energy Inc.- Weld County, CO (Grid North)

Sec.14-T7N-R64W

Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W

Furrow Federal PC AB14-63HN

Wellbore #1

Survey: Survey #1

Standard Survey Report

08 February, 2013

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Furrow Federal PC AB14-63HN
Project:	Sec.14-T7N-R64W	TVD Reference:	WELL @ 4820.0ft (Original Well Elev)
Site:	Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W	MD Reference:	WELL @ 4820.0ft (Original Well Elev)
Well:	Furrow Federal PC AB14-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	Sec.14-T7N-R64W, Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W				
Site Position:		Northing:	1,452,104.64 ft	Latitude:	40.570340
From:	Lat/Long	Easting:	3,270,820.93 ft	Longitude:	-104.525140
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.63 °

Well	Furrow Federal PC AB14-63HN					
Well Position	+N/-S	0.0 ft	Northing:	1,452,144.70 ft	Latitude:	40.570450
	+E/-W	0.0 ft	Easting:	3,270,820.49 ft	Longitude:	-104.525140
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,807.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/27/2013	8.53	67.17	53,075

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	92.80	

Survey Program	Date 2/8/2013				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
1,149.0	11,296.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1,149.0	0.00	0.00	1,149.0	0.0	0.0	0.0	0.00	0.00	0.00
1,213.0	0.50	274.80	1,213.0	0.0	-0.3	-0.3	0.78	0.78	0.00
1,308.0	0.40	262.50	1,308.0	0.0	-1.0	-1.0	0.15	-0.11	-12.95
1,403.0	0.60	241.90	1,403.0	-0.3	-1.8	-1.8	0.28	0.21	-21.68
1,498.0	1.00	244.90	1,498.0	-0.8	-3.0	-2.9	0.42	0.42	3.16
1,593.0	0.40	253.30	1,593.0	-1.3	-4.0	-4.0	0.64	-0.63	8.84
1,688.0	0.60	196.90	1,688.0	-1.9	-4.5	-4.4	0.53	0.21	-59.37
1,783.0	0.70	141.50	1,783.0	-2.8	-4.3	-4.1	0.64	0.11	-58.32
1,878.0	0.40	232.80	1,878.0	-3.5	-4.2	-4.0	0.86	-0.32	96.11
1,972.0	0.40	254.20	1,972.0	-3.7	-4.8	-4.6	0.16	0.00	22.77

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Site:	Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W	MD Reference:	WELL @ 4820.0ft (Original Well Elev)
Well:	Furrow Federal PC AB14-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,067.0	0.50	115.30	2,067.0	-4.0	-4.7	-4.5	0.89	0.11	-146.21
2,162.0	0.90	60.30	2,162.0	-3.8	-3.7	-3.5	0.78	0.42	-57.89
2,257.0	1.10	62.10	2,256.9	-3.0	-2.2	-2.1	0.21	0.21	1.89
2,352.0	0.80	55.60	2,351.9	-2.2	-0.9	-0.8	0.34	-0.32	-6.84
2,447.0	1.10	263.50	2,446.9	-1.9	-1.2	-1.1	1.94	0.32	-160.11
2,542.0	2.20	252.60	2,541.9	-2.6	-3.9	-3.8	1.20	1.16	-11.47
2,637.0	3.10	244.70	2,636.8	-4.2	-8.0	-7.7	1.02	0.95	-8.32
2,731.0	3.90	234.70	2,730.6	-7.2	-12.9	-12.5	1.07	0.85	-10.64
2,826.0	4.70	217.60	2,825.3	-12.1	-17.9	-17.3	1.58	0.84	-18.00
2,921.0	5.70	217.30	2,919.9	-19.0	-23.1	-22.2	1.05	1.05	-0.32
3,016.0	6.90	210.40	3,014.4	-27.6	-28.9	-27.5	1.49	1.26	-7.26
3,111.0	7.70	208.30	3,108.6	-38.2	-34.8	-32.8	0.89	0.84	-2.21
3,206.0	9.10	211.30	3,202.6	-50.2	-41.7	-39.2	1.54	1.47	3.16
3,301.0	10.80	212.00	3,296.1	-64.2	-50.3	-47.1	1.79	1.79	0.74
3,395.0	11.60	212.00	3,388.4	-79.6	-60.0	-56.0	0.85	0.85	0.00
3,490.0	10.80	205.30	3,481.6	-95.8	-68.8	-64.1	1.61	-0.84	-7.05
3,585.0	9.50	208.50	3,575.1	-110.7	-76.4	-70.9	1.49	-1.37	3.37
3,680.0	10.60	208.00	3,668.6	-125.3	-84.2	-78.0	1.16	1.16	-0.53
3,775.0	11.30	203.40	3,761.9	-141.6	-92.0	-85.0	1.18	0.74	-4.84
3,870.0	10.90	204.80	3,855.1	-158.3	-99.5	-91.6	0.51	-0.42	1.47
3,965.0	10.20	212.00	3,948.5	-173.6	-107.7	-99.1	1.57	-0.74	7.58
4,060.0	11.70	209.60	4,041.8	-189.1	-116.9	-107.5	1.65	1.58	-2.53
4,155.0	11.30	209.40	4,134.9	-205.6	-126.3	-116.1	0.42	-0.42	-0.21
4,250.0	10.80	209.70	4,228.1	-221.4	-135.2	-124.2	0.53	-0.53	0.32
4,344.0	10.60	209.40	4,320.5	-236.6	-143.8	-132.1	0.22	-0.21	-0.32
4,439.0	8.80	209.40	4,414.1	-250.5	-151.7	-139.3	1.89	-1.89	0.00
4,534.0	8.20	208.70	4,508.1	-262.8	-158.5	-145.5	0.64	-0.63	-0.74
4,629.0	7.80	210.40	4,602.1	-274.3	-165.0	-151.4	0.49	-0.42	1.79
4,724.0	6.40	215.00	4,696.4	-284.2	-171.3	-157.2	1.59	-1.47	4.84
4,819.0	5.90	213.90	4,790.9	-292.6	-177.1	-162.6	0.54	-0.53	-1.16
4,914.0	5.00	218.30	4,885.4	-299.9	-182.4	-167.5	1.04	-0.95	4.63
5,008.0	3.10	219.20	4,979.2	-305.1	-186.5	-171.4	2.02	-2.02	0.96
5,103.0	1.70	205.00	5,074.1	-308.3	-188.8	-173.4	1.59	-1.47	-14.95
5,198.0	1.70	165.40	5,169.1	-311.0	-189.0	-173.6	1.21	0.00	-41.68
5,293.0	1.70	87.90	5,264.0	-312.3	-187.2	-171.7	2.24	0.00	-81.58
5,388.0	1.70	157.70	5,359.0	-313.6	-185.3	-169.7	2.05	0.00	73.47
5,483.0	2.00	154.40	5,453.9	-316.3	-184.0	-168.3	0.33	0.32	-3.47
5,578.0	0.30	290.90	5,548.9	-317.8	-183.6	-167.8	2.34	-1.79	143.68
5,673.0	0.30	310.80	5,643.9	-317.5	-184.0	-168.2	0.11	0.00	20.95
5,768.0	0.10	111.60	5,738.9	-317.4	-184.1	-168.3	0.42	-0.21	169.26
5,862.0	0.30	148.40	5,832.9	-317.6	-183.9	-168.1	0.24	0.21	39.15
5,957.0	0.10	216.10	5,927.9	-317.9	-183.8	-168.0	0.29	-0.21	71.26
6,052.0	0.30	252.60	6,022.9	-318.0	-184.1	-168.3	0.24	0.21	38.42
6,146.0	1.00	183.70	6,116.9	-318.9	-184.4	-168.6	0.99	0.74	-73.30
6,241.0	7.20	77.00	6,211.7	-318.4	-178.6	-162.8	7.95	6.53	-112.32
6,336.0	15.70	80.90	6,304.7	-315.0	-160.1	-144.5	8.98	8.95	4.11
6,430.0	21.80	83.20	6,393.7	-311.0	-130.2	-114.8	6.54	6.49	2.45
6,525.0	24.80	85.30	6,480.9	-307.2	-92.8	-77.6	3.28	3.16	2.21
6,620.0	25.50	91.40	6,566.9	-306.1	-52.5	-37.4	2.83	0.74	6.42
6,715.0	33.20	93.20	6,649.7	-308.1	-6.0	9.1	8.16	8.11	1.89
6,810.0	42.10	95.80	6,724.8	-312.7	51.8	67.0	9.51	9.37	2.74
6,905.0	52.90	94.40	6,788.9	-318.9	121.4	136.9	11.42	11.37	-1.47
7,000.0	64.90	94.80	6,837.9	-325.4	202.4	218.0	12.64	12.63	0.42

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Site:	Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W	MD Reference:	WELL @ 4820.0ft (Original Well Elev)
Well:	Furrow Federal PC AB14-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,047.0	71.00	94.60	6,855.5	-329.0	245.8	261.6	12.98	12.98	-0.43
7,095.0	76.20	93.40	6,869.1	-332.2	291.7	307.6	11.10	10.83	-2.50
7,154.0	84.50	93.00	6,879.0	-335.4	349.7	365.7	14.08	14.07	-0.68
7,202.0	90.00	92.00	6,881.3	-337.5	397.6	413.6	11.65	11.46	-2.08
7,296.0	93.40	90.50	6,878.5	-339.6	491.5	507.5	3.95	3.62	-1.60
7,326.4	93.11	90.28	6,876.7	-339.8	521.9	537.9	1.20	-0.95	-0.74
7"									
7,391.0	92.50	89.80	6,873.6	-339.8	586.4	602.3	1.20	-0.95	-0.74
7,426.9	91.29	89.08	6,872.4	-339.5	622.3	638.1	3.92	-3.37	-2.00
Furrow Federal PC AB14-63HN Landing Pt.									
7,486.0	89.30	87.90	6,872.1	-337.9	681.3	697.0	3.92	-3.37	-2.00
7,581.0	88.20	87.50	6,874.2	-334.1	776.2	791.6	1.23	-1.16	-0.42
7,676.0	89.90	87.40	6,875.7	-329.9	871.1	886.2	1.79	1.79	-0.11
7,771.0	89.80	88.90	6,876.0	-326.8	966.1	980.9	1.58	-0.11	1.58
7,865.0	90.20	88.80	6,876.0	-324.9	1,060.1	1,074.7	0.44	0.43	-0.11
7,960.0	90.10	88.80	6,875.7	-322.9	1,155.0	1,169.4	0.11	-0.11	0.00
8,055.0	91.00	88.60	6,874.8	-320.8	1,250.0	1,264.2	0.97	0.95	-0.21
8,150.0	92.10	89.10	6,872.2	-318.9	1,344.9	1,358.9	1.27	1.16	0.53
8,245.0	92.70	88.40	6,868.3	-316.8	1,439.8	1,453.6	0.97	0.63	-0.74
8,339.0	90.70	86.50	6,865.5	-312.6	1,533.7	1,547.1	2.93	-2.13	-2.02
8,434.0	88.90	86.60	6,865.8	-306.9	1,628.5	1,641.6	1.90	-1.89	0.11
8,529.0	91.30	85.90	6,865.6	-300.7	1,723.3	1,735.9	2.63	2.53	-0.74
8,624.0	89.40	87.70	6,865.1	-295.4	1,818.1	1,830.4	2.75	-2.00	1.89
8,719.0	89.10	87.90	6,866.3	-291.7	1,913.1	1,925.0	0.38	-0.32	0.21
8,814.0	90.40	87.50	6,866.7	-287.9	2,008.0	2,019.7	1.43	1.37	-0.42
8,909.0	91.30	88.20	6,865.3	-284.3	2,102.9	2,114.3	1.20	0.95	0.74
9,003.0	91.60	89.50	6,862.9	-282.5	2,196.9	2,208.0	1.42	0.32	1.38
9,098.0	91.40	89.10	6,860.5	-281.3	2,291.8	2,302.8	0.47	-0.21	-0.42
9,193.0	88.30	90.20	6,860.7	-280.7	2,386.8	2,397.7	3.46	-3.26	1.16
9,288.0	90.30	89.80	6,861.9	-280.7	2,481.8	2,492.6	2.15	2.11	-0.42
9,383.0	90.20	89.10	6,861.4	-279.8	2,576.8	2,587.4	0.74	-0.11	-0.74
9,478.0	90.10	88.20	6,861.2	-277.6	2,671.8	2,682.1	0.95	-0.11	-0.95
9,573.0	90.20	87.90	6,860.9	-274.3	2,766.7	2,776.8	0.33	0.11	-0.32
9,667.0	91.50	88.90	6,859.6	-271.7	2,860.7	2,870.5	1.74	1.38	1.06
9,762.0	90.90	88.40	6,857.6	-269.5	2,955.6	2,965.2	0.82	-0.63	-0.53
9,857.0	89.30	88.40	6,857.4	-266.8	3,050.6	3,060.0	1.68	-1.68	0.00
9,952.0	90.00	88.40	6,858.0	-264.2	3,145.5	3,154.7	0.74	0.74	0.00
10,046.0	90.80	87.90	6,857.3	-261.1	3,239.5	3,248.4	1.00	0.85	-0.53
10,141.0	90.30	86.60	6,856.4	-256.6	3,334.4	3,342.9	1.47	-0.53	-1.37
10,236.0	91.00	87.70	6,855.3	-251.9	3,429.2	3,437.4	1.37	0.74	1.16
10,330.0	90.70	88.80	6,853.9	-249.0	3,523.2	3,531.1	1.21	-0.32	1.17
10,425.0	88.60	88.20	6,854.5	-246.5	3,618.1	3,625.9	2.30	-2.21	-0.63
10,520.0	89.20	87.40	6,856.3	-242.9	3,713.0	3,720.5	1.05	0.63	-0.84
10,615.0	92.10	88.90	6,855.3	-239.8	3,808.0	3,815.1	3.44	3.05	1.58
10,710.0	92.90	90.00	6,851.1	-238.9	3,902.9	3,909.9	1.43	0.84	1.16
10,805.0	89.90	91.70	6,848.8	-240.3	3,997.8	4,004.8	3.63	-3.16	1.79
10,900.0	87.40	89.50	6,851.0	-241.3	4,092.8	4,099.7	3.50	-2.63	-2.32
10,995.0	89.90	88.60	6,853.3	-239.7	4,187.7	4,194.4	2.80	2.63	-0.95
11,089.0	89.90	87.00	6,853.4	-236.1	4,281.7	4,288.1	1.70	0.00	-1.70
11,184.0	91.70	85.90	6,852.1	-230.2	4,376.5	4,382.5	2.22	1.89	-1.16
11,237.0	91.50	86.80	6,850.6	-226.8	4,429.3	4,435.1	1.74	-0.38	1.70
11,296.0	91.50	86.80	6,849.1	-223.6	4,488.2	4,493.8	0.00	0.00	0.00

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Well:	Furrow Federal PC AB14-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
Furrow Federal PC AB14-63HN BHL 1320'FSL, 535'FEL									

Design Targets									
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	
	- Shape								Latitude Longitude
Furrow Federal PC AE		0.00	0.00	6,848.5	-219.8	4,489.5	1,451,924.87	3,275,309.86	40.569710 -104.508990
- survey misses target center by 4.0ft at 11296.0ft MD (6849.1 TVD, -223.6 N, 4488.2 E)									
- Circle (radius 35.0)									
Furrow Federal PC AE		0.00	0.00	6,878.1	-285.5	621.3	1,451,859.21	3,271,441.77	40.569648 -104.522915
- survey misses target center by 54.3ft at 7426.3ft MD (6872.4 TVD, -339.5 N, 621.6 E)									
- Circle (radius 35.0)									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,326.4	6,876.7	7"	7	7-1/2	

Checked By: _____ Approved By: _____ Date: _____