

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

Well Name: **Furrow Federal PC AB14-62HN**

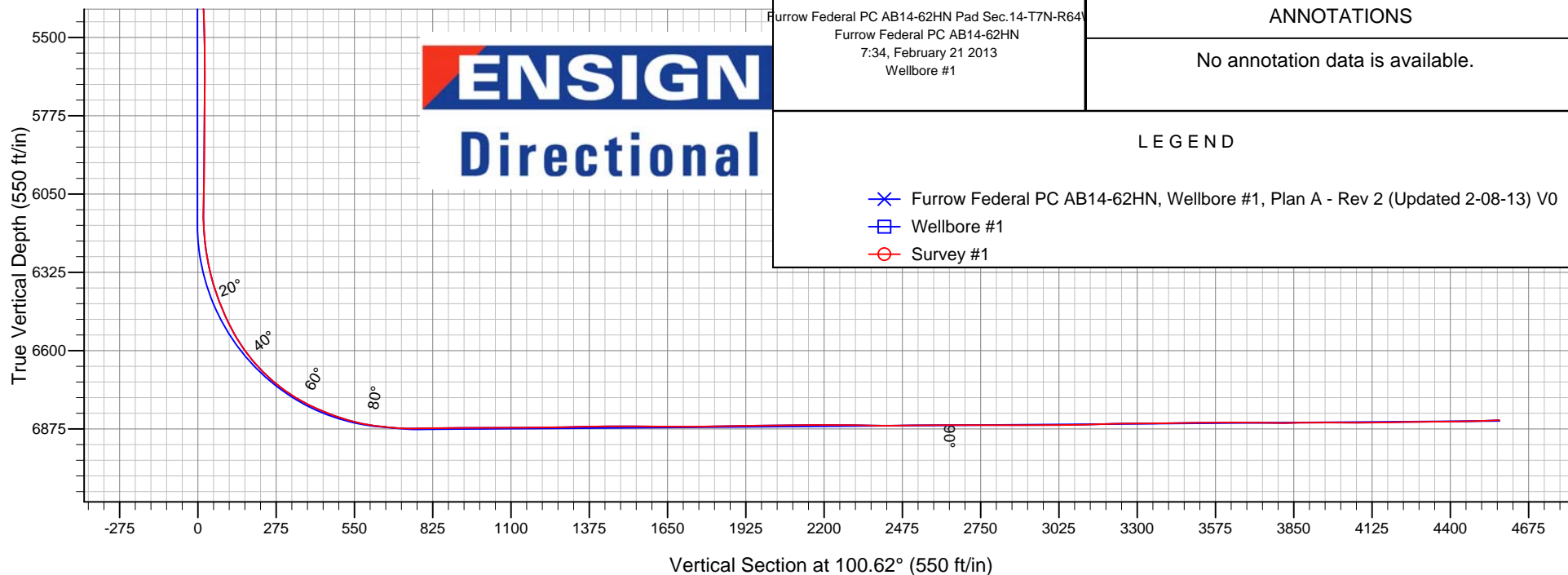
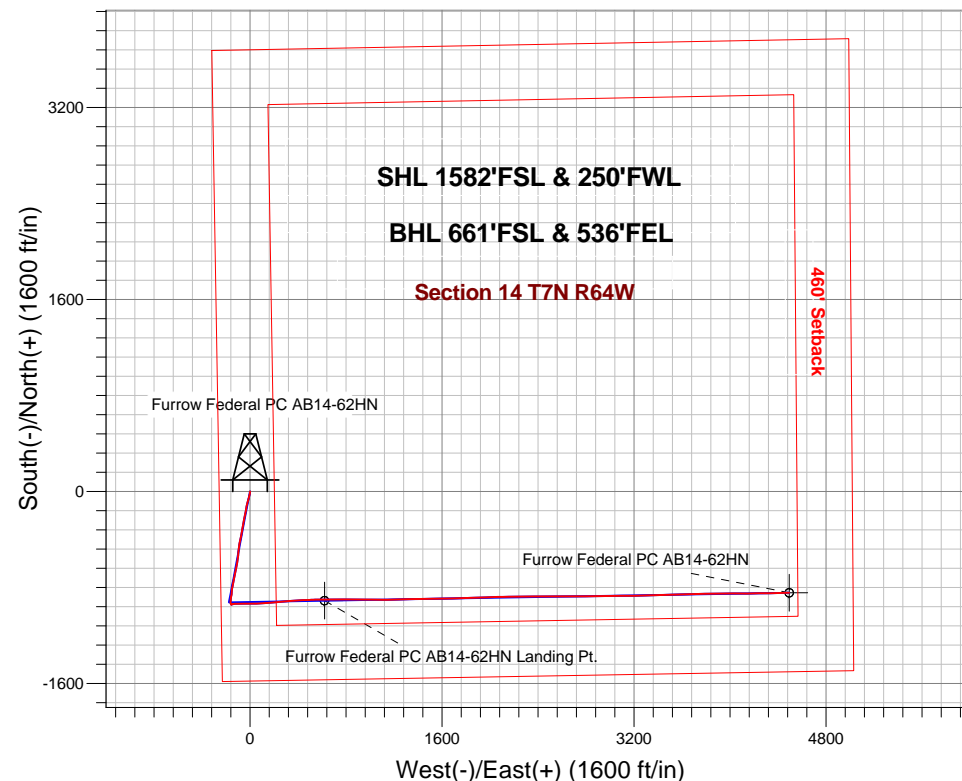
Surface Location: Furrow Federal PC AB14-62HN Pad Sec.14-T7N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4807.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1452104.63	3270820.93	40.570340	-104.525140	

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

FINAL SURVEY

Projected Bottom Hole Location
11343' MD 6845' TVD 842' S & 4493' E of SHL
92.2 degree Incl @ 88.6 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 AB14-62HN

Wellbore #1

Survey: Survey #1

Standard Survey Report

21 February, 2013

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
	1,162.0	0.00	0.00	1,162.0	0.0	0.0	0.0	0.00	0.00	0.00
	1,212.0	0.40	137.30	1,212.0	-0.1	0.1	0.1	0.80	0.80	0.00
	1,307.0	1.80	178.10	1,307.0	-1.9	0.4	0.7	1.60	1.47	42.95
	1,402.0	3.30	192.10	1,401.9	-6.0	-0.1	1.0	1.70	1.58	14.74
	1,497.0	4.50	184.40	1,496.7	-12.4	-1.0	1.3	1.38	1.26	-8.11
	1,592.0	5.90	188.50	1,591.3	-21.0	-2.0	1.9	1.52	1.47	4.32
	1,687.0	6.70	192.50	1,685.7	-31.2	-3.9	1.9	0.96	0.84	4.21
	1,782.0	7.50	196.90	1,780.0	-42.5	-6.9	1.0	1.02	0.84	4.63
	1,877.0	8.30	194.80	1,874.1	-55.1	-10.5	-0.1	0.90	0.84	-2.21
	1,972.0	9.10	196.50	1,968.0	-68.9	-14.4	-1.4	0.88	0.84	1.79

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Furrow Federal PC AB14-62HN
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 AB14-62HN	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	10.80	196.70	2,061.5	-84.7	-19.1	-3.1	1.79	1.79	0.21
2,162.0	12.20	192.50	2,154.6	-103.0	-23.8	-4.4	1.72	1.47	-4.42
2,257.0	13.90	190.00	2,247.2	-124.0	-27.9	-4.6	1.89	1.79	-2.63
2,352.0	14.90	191.10	2,339.2	-147.3	-32.3	-4.6	1.09	1.05	1.16
2,447.0	16.20	188.60	2,430.7	-172.3	-36.6	-4.2	1.54	1.37	-2.63
2,541.0	15.70	192.50	2,521.1	-197.7	-41.3	-4.2	1.26	-0.53	4.15
2,636.0	16.70	192.70	2,612.3	-223.6	-47.1	-5.1	1.05	1.05	0.21
2,731.0	17.90	191.60	2,703.0	-251.2	-53.0	-5.8	1.31	1.26	-1.16
2,826.0	18.10	188.60	2,793.4	-280.1	-58.2	-5.6	1.00	0.21	-3.16
2,921.0	18.00	188.50	2,883.7	-309.2	-62.6	-4.5	0.11	-0.11	-0.11
3,016.0	17.50	191.80	2,974.2	-337.7	-67.6	-4.2	1.18	-0.53	3.47
3,110.0	18.40	191.30	3,063.6	-366.1	-73.4	-4.7	0.97	0.96	-0.53
3,205.0	18.10	193.20	3,153.8	-395.2	-79.8	-5.5	0.70	-0.32	2.00
3,300.0	18.60	190.20	3,244.0	-424.4	-85.8	-6.1	1.12	0.53	-3.16
3,395.0	17.50	186.90	3,334.3	-453.5	-90.2	-5.1	1.58	-1.16	-3.47
3,490.0	16.40	186.20	3,425.2	-481.1	-93.4	-3.1	1.18	-1.16	-0.74
3,585.0	15.70	185.80	3,516.5	-507.2	-96.1	-1.0	0.75	-0.74	-0.42
3,680.0	15.70	186.50	3,607.9	-532.7	-98.9	1.0	0.20	0.00	0.74
3,775.0	15.70	184.90	3,699.4	-558.3	-101.4	3.2	0.46	0.00	-1.68
3,870.0	17.30	191.30	3,790.5	-585.0	-105.3	4.3	2.55	1.68	6.74
3,965.0	17.90	191.10	3,881.0	-613.2	-110.9	4.0	0.63	0.63	-0.21
4,059.0	18.60	189.20	3,970.3	-642.1	-116.0	4.3	0.98	0.74	-2.02
4,154.0	18.60	192.50	4,060.4	-671.9	-121.7	4.2	1.11	0.00	3.47
4,249.0	18.10	191.40	4,150.5	-701.1	-127.9	3.5	0.64	-0.53	-1.16
4,344.0	17.10	192.50	4,241.1	-729.2	-133.9	2.8	1.11	-1.05	1.16
4,439.0	16.30	189.20	4,332.1	-756.0	-139.0	2.7	1.31	-0.84	-3.47
4,534.0	15.60	190.40	4,423.4	-781.8	-143.5	3.1	0.81	-0.74	1.26
4,629.0	14.40	188.80	4,515.2	-806.0	-147.6	3.5	1.34	-1.26	-1.68
4,723.0	13.40	186.90	4,606.4	-828.4	-150.7	4.6	1.17	-1.06	-2.02
4,818.0	12.60	188.60	4,699.0	-849.5	-153.6	5.7	0.93	-0.84	1.79
4,913.0	11.50	187.40	4,791.9	-869.2	-156.3	6.6	1.19	-1.16	-1.26
5,008.0	9.20	189.90	4,885.3	-886.0	-158.9	7.2	2.47	-2.42	2.63
5,103.0	8.40	183.90	4,979.2	-900.5	-160.6	8.1	1.28	-0.84	-6.32
5,198.0	7.10	184.60	5,073.4	-913.2	-161.6	9.5	1.37	-1.37	0.74
5,292.0	5.90	179.70	5,166.8	-923.8	-162.0	11.0	1.41	-1.28	-5.21
5,387.0	3.90	157.50	5,261.4	-931.7	-160.8	13.7	2.86	-2.11	-23.37
5,482.0	4.10	150.00	5,356.2	-937.6	-157.8	17.7	0.59	0.21	-7.89
5,577.0	2.40	138.50	5,451.0	-942.1	-154.8	21.5	1.91	-1.79	-12.11
5,672.0	1.10	97.90	5,546.0	-943.7	-152.6	24.0	1.81	-1.37	-42.74
5,767.0	1.00	315.50	5,641.0	-943.2	-152.3	24.2	2.09	-0.11	-149.90
5,862.0	0.70	347.90	5,736.0	-942.1	-153.0	23.3	0.58	-0.32	34.11
5,957.0	1.20	346.80	5,831.0	-940.5	-153.3	22.7	0.53	0.53	-1.16
6,051.0	0.90	340.30	5,924.9	-938.9	-153.8	21.9	0.34	-0.32	-6.91
6,146.0	0.60	292.50	6,019.9	-938.0	-154.5	21.0	0.70	-0.32	-50.32
6,241.0	1.10	283.60	6,114.9	-937.6	-155.8	19.6	0.54	0.53	-9.37
6,335.0	6.20	88.30	6,208.8	-937.2	-151.6	23.7	7.73	5.43	175.21
6,430.0	12.00	84.00	6,302.5	-936.0	-136.7	38.2	6.14	6.11	-4.53
6,525.0	19.20	91.30	6,394.0	-935.4	-111.2	63.1	7.84	7.58	7.68
6,620.0	24.80	88.40	6,482.0	-935.1	-75.6	98.0	6.00	5.89	-3.05
6,715.0	32.30	89.30	6,565.4	-934.3	-30.3	142.4	7.91	7.89	0.95
6,809.0	41.20	89.30	6,640.7	-933.6	25.9	197.5	9.47	9.47	0.00
6,904.0	49.90	86.50	6,707.1	-931.0	93.6	263.6	9.39	9.16	-2.95
6,999.0	59.90	85.60	6,761.7	-925.6	171.0	338.7	10.55	10.53	-0.95

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Well:	Furrow Federal PC AB14-62HN	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)
7,094.0	66.60	84.00	6,804.4	-917.9	255.5	420.3	7.21	7.05	-1.68
7,141.0	69.90	84.70	6,821.8	-913.6	298.9	462.2	7.16	7.02	1.49
7,189.0	72.60	86.00	6,837.3	-909.9	344.2	506.0	6.18	5.63	2.71
7,236.0	76.20	86.50	6,849.9	-907.0	389.4	549.9	7.73	7.66	1.06
7,284.0	80.00	87.70	6,859.8	-904.6	436.3	595.5	8.29	7.92	2.50
7,334.0	84.90	88.50	6,866.4	-902.9	485.8	643.9	9.93	9.80	1.60
7,344.0	83.50	86.80	6,867.4	-902.5	495.7	653.6	21.96	-14.00	-17.00
7,392.0	86.00	87.90	6,871.8	-900.3	543.5	700.1	5.69	5.21	2.29
7,439.0	90.50	89.10	6,873.2	-899.1	590.4	746.0	9.91	9.57	2.55
7,469.6	91.14	89.10	6,872.8	-898.6	621.0	776.0	2.08	2.08	0.00
Furrow Federal PC AB14-62NN Landing Pt.									
7,487.0	91.50	89.10	6,872.4	-898.3	638.4	793.0	2.08	2.08	0.00
7,582.0	90.10	90.20	6,871.0	-897.8	733.4	886.3	1.87	-1.47	1.16
7,677.0	89.80	90.50	6,871.1	-898.3	828.4	979.8	0.45	-0.32	0.32
7,772.0	90.40	90.70	6,871.0	-899.3	923.4	1,073.3	0.67	0.63	0.21
7,867.0	90.90	90.70	6,869.9	-900.5	1,018.4	1,166.9	0.53	0.53	0.00
7,962.0	90.70	90.50	6,868.5	-901.5	1,113.3	1,260.4	0.30	-0.21	-0.21
8,057.0	91.20	88.10	6,867.0	-900.3	1,208.3	1,353.6	2.58	0.53	-2.53
8,152.0	90.50	88.40	6,865.6	-897.4	1,303.3	1,446.3	0.80	-0.74	0.32
8,246.0	89.50	88.20	6,865.6	-894.6	1,397.2	1,538.2	1.08	-1.06	-0.21
8,341.0	89.30	89.50	6,866.6	-892.7	1,492.2	1,631.2	1.38	-0.21	1.37
8,436.0	90.20	89.50	6,867.0	-891.9	1,587.2	1,724.4	0.95	0.95	0.00
8,531.0	91.50	88.40	6,865.6	-890.2	1,682.2	1,817.4	1.79	1.37	-1.16
8,626.0	90.80	88.10	6,863.7	-887.3	1,777.1	1,910.2	0.80	-0.74	-0.32
8,721.0	90.40	88.20	6,862.7	-884.2	1,872.0	2,002.9	0.43	-0.42	0.11
8,815.0	90.60	88.40	6,861.8	-881.4	1,966.0	2,094.8	0.30	0.21	0.21
8,910.0	90.30	87.90	6,861.1	-878.3	2,060.9	2,187.5	0.61	-0.32	-0.53
9,005.0	89.50	88.90	6,861.3	-875.7	2,155.9	2,280.4	1.35	-0.84	1.05
9,100.0	88.80	89.50	6,862.7	-874.4	2,250.9	2,373.5	0.97	-0.74	0.63
9,195.0	91.10	89.50	6,862.8	-873.5	2,345.9	2,466.7	2.42	2.42	0.00
9,290.0	90.50	89.30	6,861.4	-872.5	2,440.9	2,559.9	0.67	-0.63	-0.21
9,385.0	89.50	90.30	6,861.4	-872.2	2,535.9	2,653.2	1.49	-1.05	1.05
9,480.0	90.00	90.20	6,861.8	-872.6	2,630.9	2,746.6	0.54	0.53	-0.11
9,574.0	90.30	89.30	6,861.6	-872.2	2,724.9	2,838.9	1.01	0.32	-0.96
9,669.0	90.10	89.60	6,861.3	-871.3	2,819.8	2,932.1	0.38	-0.21	0.32
9,764.0	90.10	89.60	6,861.1	-870.6	2,914.8	3,025.4	0.00	0.00	0.00
9,858.0	91.90	89.60	6,859.5	-870.0	3,008.8	3,117.6	1.91	1.91	0.00
9,953.0	91.20	88.90	6,856.9	-868.7	3,103.8	3,210.7	1.04	-0.74	-0.74
10,048.0	90.10	89.30	6,855.8	-867.2	3,198.8	3,303.8	1.23	-1.16	0.42
10,142.0	91.00	88.60	6,854.9	-865.5	3,292.7	3,395.9	1.21	0.96	-0.74
10,237.0	90.70	88.60	6,853.5	-863.2	3,387.7	3,488.8	0.32	-0.32	0.00
10,332.0	90.60	87.50	6,852.4	-860.0	3,482.6	3,581.5	1.16	-0.11	-1.16
10,427.0	89.50	88.40	6,852.3	-856.6	3,577.6	3,674.2	1.50	-1.16	0.95
10,522.0	89.20	88.60	6,853.4	-854.1	3,672.5	3,767.0	0.38	-0.32	0.21
10,617.0	91.10	88.40	6,853.2	-851.6	3,767.5	3,859.9	2.01	2.00	-0.21
10,712.0	90.00	89.10	6,852.3	-849.5	3,862.5	3,952.9	1.37	-1.16	0.74
10,807.0	89.40	89.80	6,852.8	-848.6	3,957.5	4,046.1	0.97	-0.63	0.74
10,901.0	91.20	90.20	6,852.3	-848.6	4,051.5	4,138.5	1.96	1.91	0.43
10,996.0	91.00	89.60	6,850.4	-848.4	4,146.4	4,231.8	0.67	-0.21	-0.63
11,091.0	90.30	89.60	6,849.4	-847.8	4,241.4	4,325.0	0.74	-0.74	0.00
11,186.0	90.50	88.80	6,848.7	-846.5	4,336.4	4,418.1	0.87	0.21	-0.84
11,286.0	92.20	88.60	6,846.3	-844.2	4,436.4	4,516.0	1.71	1.70	-0.20

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11,343.0	92.20	88.60	6,844.2	-842.8	4,493.3	4,571.7	0.00	0.00	0.00
Furrow Federal PC AB14-62HZ BHL 660'FSL, 535'FEL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
Furrow Federal PC AE	0.00	0.00	6,846.9	-842.8	4,493.7	1,451,261.83	3,275,314.50	40.567890	-104.509000
- survey misses target center by 2.8ft at 11343.0ft MD (6844.2 TVD, -842.8 N, 4493.3 E)									
- Circle (radius 35.0)									
Furrow Federal PC AE	0.00	0.00	6,876.3	-908.5	621.2	1,451,196.15	3,271,442.12	40.567828	-104.522940
- survey misses target center by 10.5ft at 7469.6ft MD (6872.8 TVD, -898.6 N, 621.0 E)									
- Circle (radius 35.0)									

Checked By: _____ Approved By: _____ Date: _____