

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

Well Name: **Sauer F33-77-1HNX**

Surface Location: Sauer F33-76-1HN Pad Sec.33-T5N-R65W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

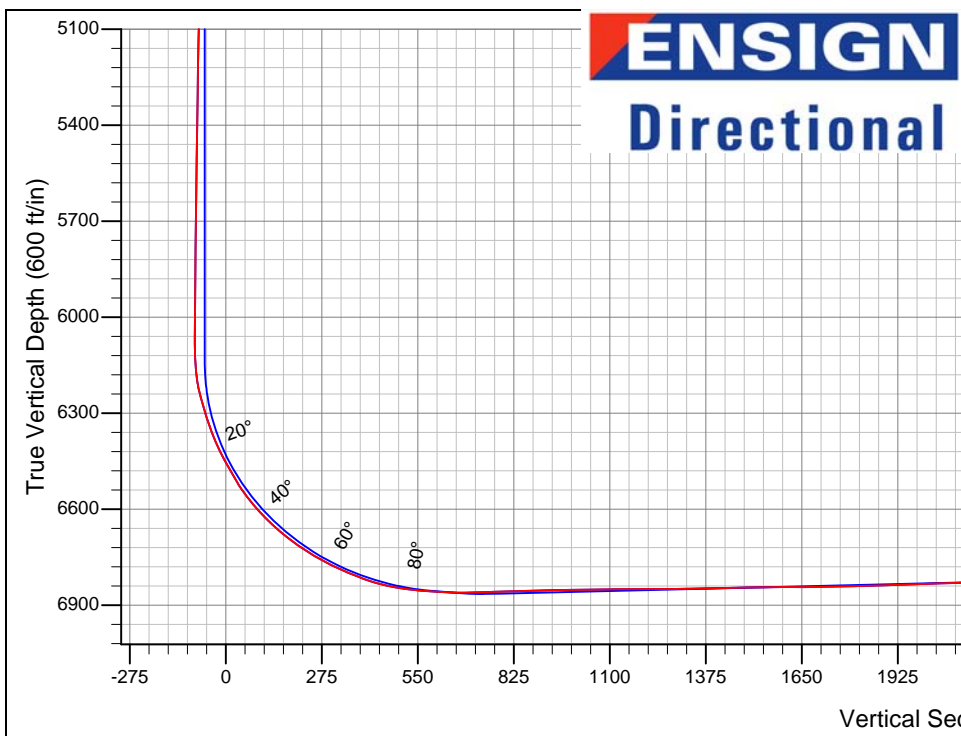
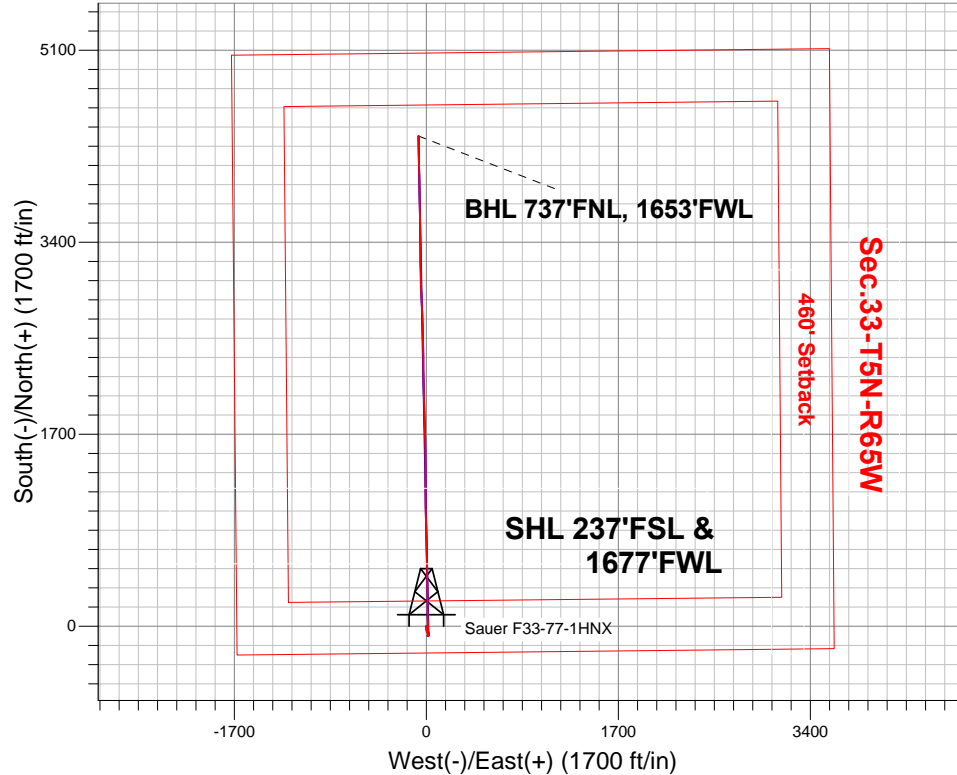
Ground Elevation: 4670.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1371106.56	3230820.85	40.349130	-104.671840	

Ensign 121 RKB - 13' WELL @ 4683.0ft (Ensign 121 RKB - 13')

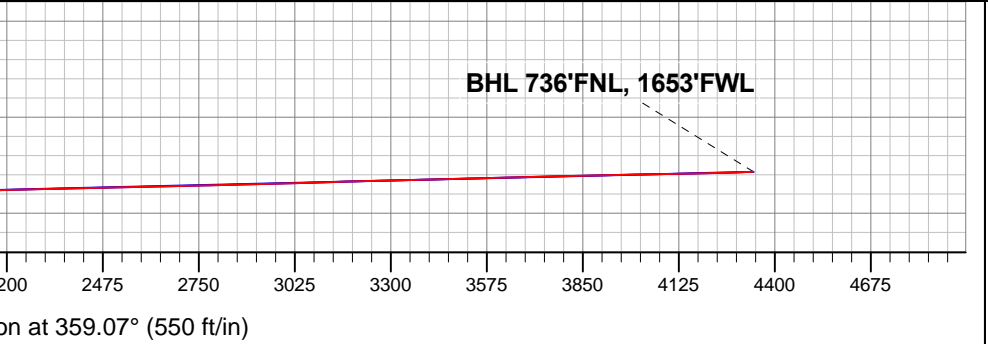
## FINAL SURVEY

Projected Bottom Hole Location  
 10971'MD 6771'TVD 4337'N &  
 68'W of SHL 92.50 degree Incl @  
 359.10 degree AZM



Sauer F33-76-1HN Pad Sec.33-T5N-R65W Sauer F33-77-1HNX Wellbore #1 9:57, May 23 2013	ANNOTATIONS
	No annotation data is available.

LEGEND	
	Sauer F33-77-1HNX, Wellbore #1, Plan A - Rev 1 V0
	Wellbore #1
	Survey #1





## **Directional**

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

**Sec.33-T5N-R65W**

**Sauer F33-76-1HN Pad Sec.33-T5N-R65W**

**Sauer F33-77-1HNX**

**Wellbore #1**

**Survey: Survey #1**

## **Standard Survey Report**

**23 May, 2013**

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-77-1HNX
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-77-1HNX	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

<b>Project</b>	Sec.33-T5N-R65W, Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		Using Well Reference Point
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

<b>Site</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W				
<b>Site Position:</b>		<b>Northing:</b>	1,371,106.36 ft	<b>Latitude:</b>	40.349130
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,230,798.56 ft	<b>Longitude:</b>	-104.671920
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	"	<b>Grid Convergence:</b>	0.54 °

<b>Well</b>	Sauer F33-77-1HNX					
<b>Well Position</b>	<b>+N/-S</b>	0.0 ft	<b>Northing:</b>	1,371,106.56 ft	<b>Latitude:</b>	40.349130
	<b>+E/-W</b>	0.0 ft	<b>Easting:</b>	3,230,820.85 ft	<b>Longitude:</b>	-104.671840
<b>Position Uncertainty</b>		0.0 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	4,670.0 ft

<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	5/13/2013	8.55	66.96	52,915

<b>Design</b>	Wellbore #1				
<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) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	359.07	

<b>Survey Program</b>	<b>Date</b>	5/23/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
315.0	10,971.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
315.0	0.30	228.32	315.0	-0.5	-0.6	-0.5	0.10	0.10	0.00	
595.0	0.30	332.22	595.0	-0.4	-1.5	-0.4	0.17	0.00	37.11	
663.0	0.80	159.70	663.0	-0.7	-1.4	-0.7	1.61	0.74	-253.71	
758.0	0.90	152.20	758.0	-2.0	-0.8	-1.9	0.16	0.11	-7.89	
852.0	3.70	174.30	851.9	-5.6	-0.2	-5.6	3.07	2.98	23.51	
947.0	4.00	181.00	946.7	-12.0	0.0	-12.0	0.57	0.32	7.05	
1,042.0	3.50	181.90	1,041.5	-18.2	-0.1	-18.2	0.53	-0.53	0.95	
1,137.0	3.30	174.50	1,136.3	-23.8	0.1	-23.8	0.51	-0.21	-7.79	
1,232.0	3.60	168.20	1,231.1	-29.5	0.9	-29.5	0.51	0.32	-6.63	
1,326.0	3.90	166.90	1,324.9	-35.5	2.3	-35.5	0.33	0.32	-1.38	
1,421.0	4.00	164.80	1,419.7	-41.8	3.9	-41.9	0.19	0.11	-2.21	

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-77-1HNX
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-77-1HNX	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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)
1,516.0	3.90	166.20	1,514.5	-48.1	5.5	-48.2	0.15	-0.11	1.47
1,611.0	3.90	156.00	1,609.3	-54.2	7.6	-54.4	0.73	0.00	-10.74
1,706.0	2.70	131.40	1,704.1	-58.7	10.6	-58.8	1.93	-1.26	-25.89
1,801.0	1.80	100.10	1,799.0	-60.4	13.7	-60.6	1.57	-0.95	-32.95
1,896.0	1.80	98.10	1,894.0	-60.9	16.7	-61.1	0.07	0.00	-2.11
1,991.0	1.90	85.50	1,989.0	-61.0	19.7	-61.3	0.44	0.11	-13.26
2,086.0	1.10	50.70	2,083.9	-60.3	22.0	-60.6	1.24	-0.84	-36.63
2,181.0	0.50	302.60	2,178.9	-59.5	22.3	-59.8	1.41	-0.63	-113.79
2,276.0	0.50	295.20	2,273.9	-59.1	21.6	-59.4	0.07	0.00	-7.79
2,371.0	0.40	313.50	2,368.9	-58.7	21.0	-59.0	0.18	-0.11	19.26
2,465.0	0.80	320.00	2,462.9	-57.9	20.4	-58.3	0.43	0.43	6.91
2,560.0	0.30	284.30	2,557.9	-57.4	19.7	-57.7	0.61	-0.53	-37.58
2,655.0	0.40	269.10	2,652.9	-57.3	19.1	-57.6	0.14	0.11	-16.00
2,750.0	0.40	293.50	2,747.9	-57.2	18.5	-57.5	0.18	0.00	25.68
2,845.0	0.20	274.20	2,842.9	-57.0	18.0	-57.3	0.23	-0.21	-20.32
2,940.0	0.30	209.30	2,937.9	-57.2	17.7	-57.5	0.30	0.11	-68.32
3,034.0	0.30	234.80	3,031.9	-57.6	17.4	-57.9	0.14	0.00	27.13
3,129.0	0.40	219.80	3,126.9	-58.0	17.0	-58.3	0.14	0.11	-15.79
3,224.0	0.50	174.10	3,221.9	-58.7	16.8	-58.9	0.38	0.11	-48.11
3,319.0	0.70	162.50	3,316.9	-59.6	17.0	-59.9	0.25	0.21	-12.21
3,414.0	0.80	163.10	3,411.9	-60.8	17.4	-61.1	0.11	0.11	0.63
3,508.0	1.00	162.20	3,505.9	-62.2	17.8	-62.5	0.21	0.21	-0.96
3,603.0	1.10	153.40	3,600.8	-63.8	18.5	-64.1	0.20	0.11	-9.26
3,698.0	1.10	169.20	3,695.8	-65.5	19.1	-65.8	0.32	0.00	16.63
3,793.0	1.60	176.90	3,790.8	-67.8	19.3	-68.1	0.56	0.53	8.11
3,888.0	1.00	178.40	3,885.8	-69.9	19.4	-70.2	0.63	-0.63	1.58
3,983.0	1.00	170.10	3,980.8	-71.6	19.6	-71.9	0.15	0.00	-8.74
4,078.0	1.20	162.70	4,075.7	-73.3	20.0	-73.6	0.26	0.21	-7.79
4,172.0	1.80	171.70	4,169.7	-75.7	20.5	-76.0	0.68	0.64	9.57
4,267.0	1.60	188.00	4,264.7	-78.5	20.6	-78.8	0.55	-0.21	17.16
4,362.0	0.40	82.70	4,359.7	-79.8	20.7	-80.1	1.84	-1.26	-110.84
4,457.0	0.40	119.10	4,454.7	-79.9	21.3	-80.2	0.26	0.00	38.32
4,552.0	1.10	24.00	4,549.6	-79.2	22.0	-79.6	1.27	0.74	-100.11
4,646.0	0.60	327.80	4,643.6	-78.0	22.1	-78.3	0.97	-0.53	-59.79
4,741.0	0.90	268.90	4,738.6	-77.6	21.1	-77.9	0.82	0.32	-62.00
4,836.0	1.20	274.50	4,833.6	-77.5	19.3	-77.8	0.33	0.32	5.89
4,931.0	0.50	291.60	4,928.6	-77.3	18.0	-77.6	0.78	-0.74	18.00
5,026.0	0.50	240.10	5,023.6	-77.3	17.2	-77.6	0.46	0.00	-54.21
5,120.0	0.70	212.10	5,117.6	-78.0	16.6	-78.3	0.37	0.21	-29.79
5,215.0	1.00	213.90	5,212.6	-79.2	15.8	-79.5	0.32	0.32	1.89
5,310.0	1.00	214.00	5,307.6	-80.6	14.9	-80.8	0.00	0.00	0.11
5,405.0	1.20	234.30	5,402.6	-81.9	13.6	-82.1	0.46	0.21	21.37
5,500.0	1.30	221.20	5,497.5	-83.3	12.1	-83.4	0.32	0.11	-13.79
5,594.0	1.10	118.40	5,591.5	-84.5	12.2	-84.7	2.00	-0.21	-109.36
5,689.0	1.20	116.70	5,686.5	-85.4	13.8	-85.6	0.11	0.11	-1.79
5,784.0	0.80	136.70	5,781.5	-86.3	15.2	-86.5	0.55	-0.42	21.05
5,879.0	0.90	139.50	5,876.5	-87.3	16.1	-87.6	0.11	0.11	2.95
5,974.0	0.70	114.70	5,971.5	-88.2	17.1	-88.4	0.42	-0.21	-26.11
6,068.0	1.00	109.40	6,065.5	-88.7	18.4	-89.0	0.33	0.32	-5.64
6,163.0	3.90	0.10	6,160.4	-85.7	19.2	-86.0	4.56	3.05	-115.05
6,258.0	14.30	354.50	6,254.1	-70.8	18.1	-71.0	10.97	10.95	-5.89
6,353.0	17.50	356.90	6,345.4	-44.8	16.2	-45.1	3.44	3.37	2.53
6,447.0	26.00	358.50	6,432.6	-10.0	14.9	-10.3	9.06	9.04	1.70

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<b>Design:</b>	Wellbore #1	<b>Database:</b>	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)
6,542.0	28.50	358.00	6,517.1	33.4	13.6	33.2	2.64	2.63	-0.53
6,637.0	39.90	358.90	6,595.5	86.7	12.2	86.5	12.01	12.00	0.95
6,732.0	45.40	0.50	6,665.4	151.1	11.9	150.9	5.90	5.79	1.68
6,827.0	54.90	359.60	6,726.2	223.9	11.9	223.7	10.03	10.00	-0.95
6,922.0	62.30	358.50	6,775.7	304.9	10.5	304.7	7.85	7.79	-1.16
7,017.0	67.30	359.20	6,816.1	390.8	8.8	390.6	5.31	5.26	0.74
7,064.0	73.20	358.70	6,832.0	435.1	8.0	434.9	12.59	12.55	-1.06
7,112.0	78.50	358.70	6,843.7	481.6	7.0	481.4	11.04	11.04	0.00
7,165.0	83.40	359.20	6,852.0	533.9	6.0	533.7	9.29	9.25	0.94
7,293.0	88.50	359.40	6,861.1	661.5	4.4	661.4	3.99	3.98	0.16
7,340.0	91.70	358.50	6,861.0	708.5	3.6	708.3	7.07	6.81	-1.91
7,380.8	92.47	358.41	6,859.5	749.3	2.5	749.1	1.89	1.88	-0.21
<b>Sauer F33-77-1HNX Landing Pt.</b>									
7,388.0	92.60	358.40	6,859.2	756.4	2.3	756.3	1.89	1.87	-0.21
7,483.0	91.20	358.50	6,856.0	851.4	-0.3	851.2	1.48	-1.47	0.11
7,578.0	91.70	358.20	6,853.6	946.3	-3.0	946.2	0.61	0.53	-0.32
7,673.0	90.90	359.40	6,851.5	1,041.2	-5.0	1,041.2	1.52	-0.84	1.26
7,768.0	90.50	359.80	6,850.3	1,136.2	-5.7	1,136.2	0.60	-0.42	0.42
7,863.0	90.20	359.80	6,849.7	1,231.2	-6.0	1,231.2	0.32	-0.32	0.00
7,958.0	90.70	359.90	6,849.0	1,326.2	-6.2	1,326.1	0.54	0.53	0.11
8,053.0	91.90	359.60	6,846.8	1,421.2	-6.7	1,421.1	1.30	1.26	-0.32
8,147.0	90.70	359.10	6,844.7	1,515.2	-7.7	1,515.1	1.38	-1.28	-0.53
8,242.0	90.10	358.90	6,844.0	1,610.1	-9.4	1,610.1	0.67	-0.63	-0.21
8,337.0	91.40	358.70	6,842.8	1,705.1	-11.4	1,705.1	1.38	1.37	-0.21
8,432.0	91.20	358.40	6,840.6	1,800.1	-13.8	1,800.0	0.38	-0.21	-0.32
8,527.0	92.20	358.40	6,837.8	1,895.0	-16.4	1,895.0	1.05	1.05	0.00
8,622.0	92.30	358.20	6,834.1	1,989.9	-19.2	1,989.9	0.24	0.11	-0.21
8,716.0	91.20	358.70	6,831.2	2,083.8	-21.8	2,083.9	1.29	-1.17	0.53
8,811.0	92.30	358.70	6,828.3	2,178.7	-23.9	2,178.8	1.16	1.16	0.00
8,906.0	91.50	359.20	6,825.2	2,273.6	-25.7	2,273.8	0.99	-0.84	0.53
9,001.0	90.70	359.20	6,823.3	2,368.6	-27.0	2,368.7	0.84	-0.84	0.00
9,096.0	92.10	359.20	6,821.0	2,463.6	-28.3	2,463.7	1.47	1.47	0.00
9,191.0	90.80	359.10	6,818.6	2,558.5	-29.7	2,558.7	1.37	-1.37	-0.11
9,286.0	91.90	359.20	6,816.4	2,653.5	-31.2	2,653.7	1.16	1.16	0.11
9,381.0	90.80	356.90	6,814.1	2,748.4	-34.4	2,748.6	2.68	-1.16	-2.42
9,476.0	91.80	356.60	6,812.0	2,843.2	-39.8	2,843.5	1.10	1.05	-0.32
9,570.0	92.20	357.80	6,808.7	2,937.1	-44.4	2,937.4	1.34	0.43	1.28
9,665.0	91.30	358.90	6,805.8	3,032.0	-47.1	3,032.3	1.50	-0.95	1.16
9,760.0	92.20	358.40	6,802.9	3,126.9	-49.3	3,127.3	1.08	0.95	-0.53
9,855.0	90.90	359.40	6,800.3	3,221.8	-51.2	3,222.2	1.73	-1.37	1.05
9,949.0	92.20	359.60	6,797.8	3,315.8	-52.0	3,316.2	1.40	1.38	0.21
10,044.0	91.20	359.40	6,795.0	3,410.8	-52.8	3,411.2	1.07	-1.05	-0.21
10,139.0	91.10	359.20	6,793.1	3,505.7	-54.0	3,506.1	0.24	-0.11	-0.21
10,234.0	92.70	359.10	6,789.9	3,600.7	-55.4	3,601.1	1.69	1.68	-0.11
10,328.0	90.80	359.20	6,787.0	3,694.6	-56.8	3,695.0	2.02	-2.02	0.11
10,423.0	92.10	359.10	6,784.6	3,789.6	-58.2	3,790.0	1.37	1.37	-0.11
10,518.0	91.30	358.00	6,781.8	3,884.5	-60.6	3,885.0	1.43	-0.84	-1.16
10,613.0	90.30	359.40	6,780.5	3,979.4	-62.7	3,979.9	1.81	-1.05	1.47
10,708.0	92.00	359.20	6,778.6	4,074.4	-63.9	4,074.9	1.80	1.79	-0.21
10,802.0	90.80	359.20	6,776.3	4,168.4	-65.2	4,168.9	1.28	-1.28	0.00
10,914.0	92.50	359.10	6,773.1	4,280.3	-66.9	4,280.8	1.52	1.52	-0.09
10,971.0	92.50	359.10	6,770.6	4,337.3	-67.8	4,337.8	0.00	0.00	0.00
<b>Sauer F33-77-1HNX BHL 735'FNL &amp; 1650'FWL</b>									

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-77-1HNX
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4683.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-77-1HNX	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

Checked By: _____	Approved By: _____	Date: _____
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