

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

Well Name: **Sauer F33-78-1HN**

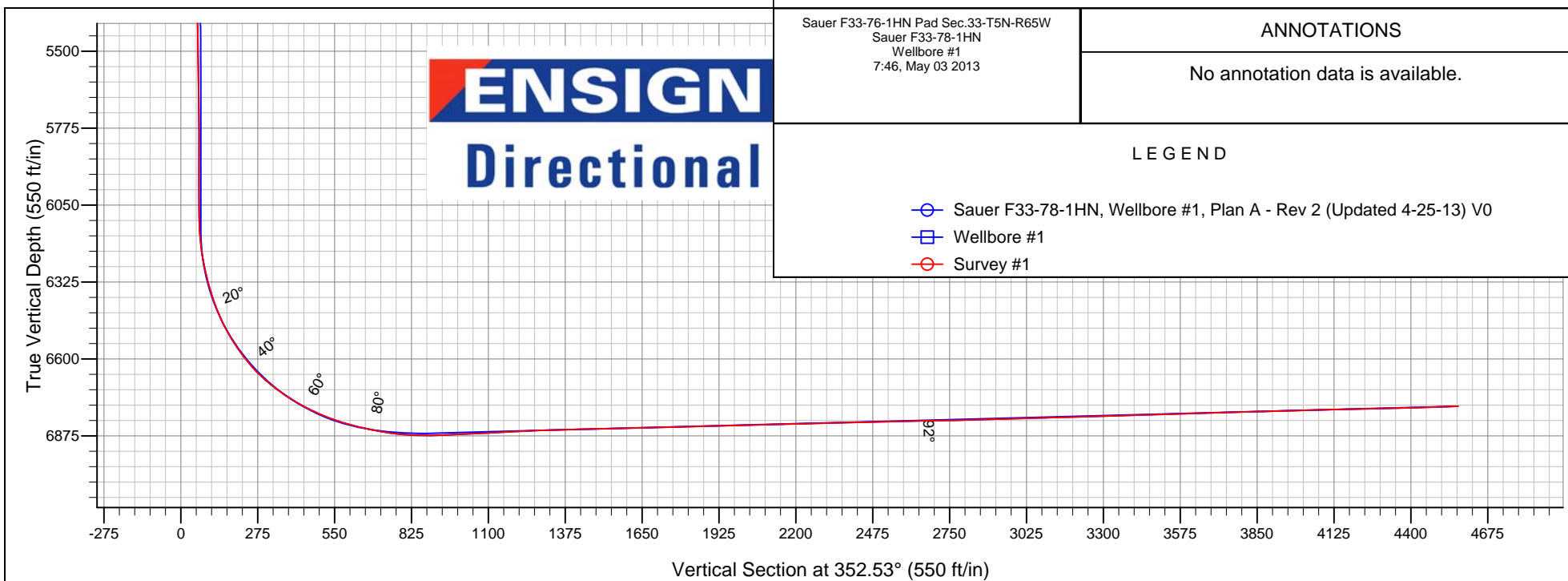
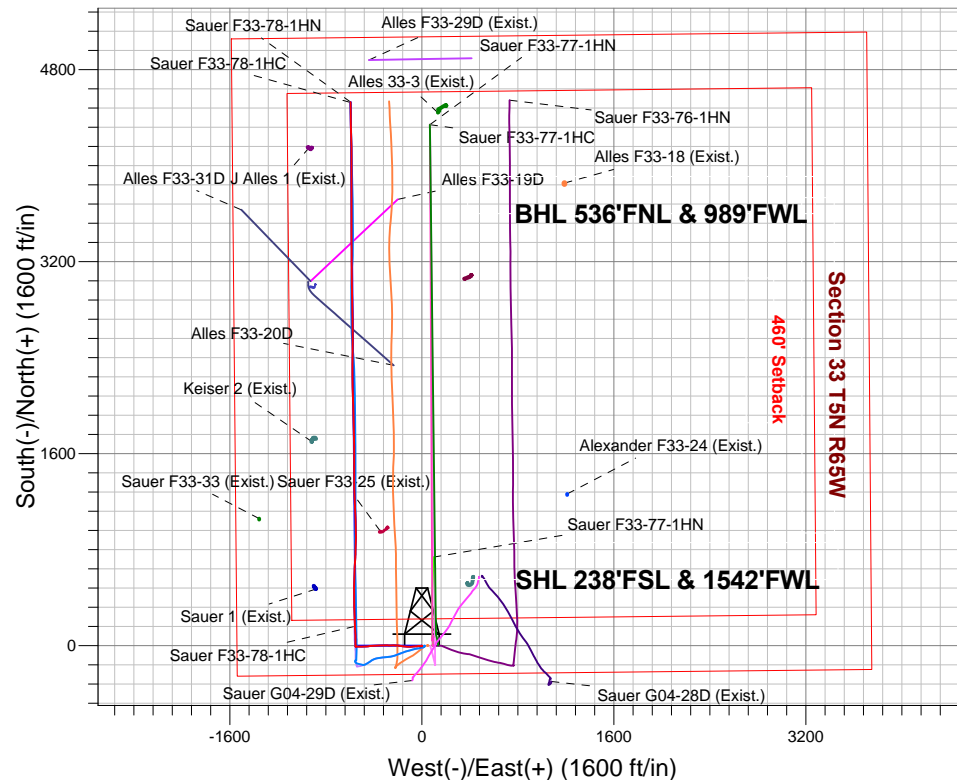
Surface Location: Sauer F33-76-1HN Pad Sec.33-T5N-R65W  
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone  
Ground Elevation: 4671.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1371105.28	3230684.29	40.349130	-104.672330	

Ensign 121 RKB - 13' WELL @ 4684.0ft (Ensign 121 RKB - 13')

## FINAL SURVEY

Projected Bottom Hole Location  
11122' MD 6769' TVD 4529' N & 596' W of SHL  
92.2 degree Incl @ 358.5 degree AZM



Sauer F33-76-1HN Pad Sec.33-T5N-R65W  
Sauer F33-78-1HN  
Wellbore #1  
7:46, May 03 2013

### ANNOTATIONS

No annotation data is available.

### LEGEND

- Sauer F33-78-1HN, Wellbore #1, Plan A - Rev 2 (Updated 4-25-13) V0
- Wellbore #1
- Survey #1



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

**Sec.33-T5N-R65W**

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

**Sauer F33-78-1HN**

**Wellbore #1**

**Survey: Survey #1**

## **Standard Survey Report**

**03 May, 2013**

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-78-1HN
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-78-1HN	<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

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

Well	Sauer F33-78-1HN					
Well Position	+N/-S	0.0 ft	Northing:	1,371,105.28 ft	Latitude:	40.349130
	+E/-W	0.0 ft	Easting:	3,230,684.29 ft	Longitude:	-104.672330
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,671.0 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	4/5/2013	8.57	66.96	52,925

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	352.53	

<b>Survey Program</b>	<b>Date</b> 5/2/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
293.0	11,122.0	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
293.0	0.30	267.55	293.0	0.0	-0.8	0.1	0.10	0.10	0.00
604.0	0.60	218.85	604.0	-1.3	-2.6	-1.0	0.15	0.10	-15.66
663.0	0.40	219.30	663.0	-1.7	-2.9	-1.3	0.34	-0.34	0.76
758.0	0.40	162.60	758.0	-2.3	-3.0	-1.9	0.40	0.00	-59.68
853.0	0.40	102.00	853.0	-2.7	-2.6	-2.3	0.42	0.00	-63.79
948.0	0.50	193.50	948.0	-3.2	-2.4	-2.8	0.68	0.11	96.32
1,043.0	0.30	181.70	1,043.0	-3.8	-2.5	-3.5	0.23	-0.21	-12.42
1,138.0	0.50	207.60	1,138.0	-4.4	-2.7	-4.0	0.28	0.21	27.26
1,233.0	0.60	174.70	1,233.0	-5.3	-2.8	-4.9	0.34	0.11	-34.63
1,328.0	1.50	285.80	1,328.0	-5.5	-4.0	-4.9	1.90	0.95	116.95
1,423.0	2.80	271.00	1,422.9	-5.1	-7.5	-4.1	1.48	1.37	-15.58

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-78-1HN
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-78-1HN	<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)
1,518.0	3.80	274.00	1,517.7	-4.8	-13.0	-3.1	1.07	1.05	3.16
1,613.0	4.70	275.60	1,612.5	-4.2	-20.0	-1.6	0.96	0.95	1.68
1,708.0	6.90	271.20	1,707.0	-3.7	-29.6	0.2	2.36	2.32	-4.63
1,803.0	6.90	265.70	1,801.3	-4.0	-41.0	1.3	0.70	0.00	-5.79
1,898.0	8.50	264.30	1,895.4	-5.1	-53.6	1.9	1.70	1.68	-1.47
1,992.0	7.70	259.90	1,988.5	-6.9	-66.7	1.8	1.08	-0.85	-4.68
2,087.0	7.80	263.60	2,082.6	-8.8	-79.4	1.6	0.54	0.11	3.89
2,182.0	7.70	267.70	2,176.8	-9.8	-92.2	2.3	0.59	-0.11	4.32
2,277.0	7.80	272.80	2,270.9	-9.7	-105.0	4.0	0.73	0.11	5.37
2,372.0	8.70	270.70	2,364.9	-9.3	-118.6	6.2	1.00	0.95	-2.21
2,465.0	8.30	270.50	2,456.9	-9.1	-132.3	8.1	0.43	-0.43	-0.22
2,560.0	8.10	281.90	2,550.9	-7.7	-145.8	11.3	1.72	-0.21	12.00
2,655.0	8.90	281.70	2,644.9	-4.8	-159.5	15.9	0.84	0.84	-0.21
2,750.0	9.10	279.50	2,738.7	-2.1	-174.1	20.6	0.42	0.21	-2.32
2,845.0	8.60	278.40	2,832.6	0.2	-188.5	24.7	0.56	-0.53	-1.16
2,939.0	8.10	271.00	2,925.6	1.3	-202.1	27.6	1.26	-0.53	-7.87
3,034.0	8.60	270.10	3,019.6	1.4	-215.9	29.5	0.54	0.53	-0.95
3,129.0	8.00	268.90	3,113.6	1.3	-229.6	31.2	0.66	-0.63	-1.26
3,224.0	8.10	268.40	3,207.6	1.0	-242.9	32.6	0.13	0.11	-0.53
3,319.0	8.40	273.00	3,301.7	1.2	-256.5	34.5	0.76	0.32	4.84
3,413.0	7.00	270.80	3,394.8	1.6	-269.1	36.6	1.52	-1.49	-2.34
3,508.0	6.90	274.90	3,489.1	2.2	-280.6	38.7	0.53	-0.11	4.32
3,603.0	8.40	269.30	3,583.3	2.6	-293.2	40.7	1.76	1.58	-5.89
3,698.0	7.60	267.70	3,677.3	2.3	-306.4	42.1	0.87	-0.84	-1.68
3,793.0	7.90	267.50	3,771.5	1.7	-319.2	43.2	0.32	0.32	-0.21
3,888.0	8.20	271.90	3,865.5	1.7	-332.5	44.9	0.72	0.32	4.63
3,983.0	7.70	270.70	3,959.6	2.0	-345.7	46.9	0.55	-0.53	-1.26
4,077.0	7.80	266.60	4,052.8	1.7	-358.3	48.2	0.60	0.11	-4.36
4,172.0	8.30	264.70	4,146.8	0.7	-371.6	49.0	0.60	0.53	-2.00
4,267.0	7.30	264.20	4,241.0	-0.6	-384.4	49.4	1.06	-1.05	-0.53
4,362.0	7.30	270.10	4,335.2	-1.2	-396.5	50.4	0.79	0.00	6.21
4,457.0	6.90	272.80	4,429.5	-0.9	-408.2	52.2	0.55	-0.42	2.84
4,552.0	7.40	265.20	4,523.7	-1.1	-420.0	53.5	1.13	0.53	-8.00
4,646.0	7.60	260.50	4,616.9	-2.7	-432.2	53.5	0.69	0.21	-5.00
4,741.0	7.60	264.20	4,711.1	-4.3	-444.6	53.5	0.52	0.00	3.89
4,836.0	8.10	260.50	4,805.2	-6.1	-457.5	53.5	0.75	0.53	-3.89
4,931.0	8.30	266.30	4,899.2	-7.6	-470.9	53.7	0.90	0.21	6.11
5,025.0	7.80	273.30	4,992.3	-7.7	-484.0	55.3	1.17	-0.53	7.45
5,120.0	7.20	270.80	5,086.5	-7.2	-496.4	57.4	0.72	-0.63	-2.63
5,215.0	6.90	267.30	5,180.8	-7.4	-508.1	58.7	0.55	-0.32	-3.68
5,310.0	5.90	264.20	5,275.2	-8.2	-518.6	59.3	1.11	-1.05	-3.26
5,405.0	5.20	269.80	5,369.7	-8.7	-527.8	60.0	0.93	-0.74	5.89
5,500.0	4.20	272.10	5,464.4	-8.6	-535.6	61.1	1.07	-1.05	2.42
5,594.0	3.00	277.20	5,558.2	-8.1	-541.5	62.3	1.32	-1.28	5.43
5,689.0	2.70	280.70	5,653.1	-7.4	-546.1	63.7	0.36	-0.32	3.68
5,784.0	1.60	274.40	5,748.0	-6.9	-549.7	64.6	1.18	-1.16	-6.63
5,879.0	0.50	287.40	5,843.0	-6.7	-551.4	65.1	1.18	-1.16	13.68
5,973.0	0.40	172.20	5,937.0	-6.9	-551.7	64.9	0.81	-0.11	-122.55
6,068.0	0.10	268.00	6,032.0	-7.2	-551.8	64.6	0.44	-0.32	100.84
6,163.0	2.30	348.00	6,127.0	-5.4	-552.2	66.5	2.41	2.32	84.21
6,258.0	8.70	356.80	6,221.5	3.7	-553.0	75.6	6.78	6.74	9.26
6,352.0	14.20	1.20	6,313.6	22.3	-553.2	94.1	5.92	5.85	4.68
6,447.0	20.20	359.80	6,404.3	50.4	-553.0	121.9	6.33	6.32	-1.47

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-78-1HN
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<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-78-1HN	<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)
6,542.0	28.00	357.00	6,491.0	89.1	-554.2	160.5	8.30	8.21	-2.95
6,637.0	35.50	357.20	6,571.7	139.0	-556.7	210.2	7.90	7.89	0.21
6,732.0	44.00	357.30	6,644.7	199.7	-559.7	270.7	8.95	8.95	0.11
6,827.0	53.70	357.90	6,707.1	271.0	-562.6	341.9	10.22	10.21	0.63
6,922.0	60.40	359.10	6,758.7	350.7	-564.7	421.1	7.13	7.05	1.26
7,017.0	67.00	359.80	6,800.8	435.8	-565.5	505.6	6.98	6.95	0.74
7,064.0	71.30	359.80	6,817.5	479.7	-565.6	549.2	9.15	9.15	0.00
7,112.0	74.10	1.20	6,831.8	525.5	-565.2	594.6	6.46	5.83	2.92
7,159.0	77.00	1.90	6,843.5	571.0	-564.0	639.5	6.34	6.17	1.49
7,215.0	79.10	3.10	6,855.1	625.8	-561.6	693.5	4.30	3.75	2.14
7,326.0	85.30	3.30	6,870.2	735.5	-555.5	801.5	5.59	5.59	0.18
7,373.0	88.30	2.20	6,872.8	782.4	-553.2	847.7	6.80	6.38	-2.34
7,400.0	90.10	2.14	6,873.2	809.3	-552.2	874.2	6.67	6.67	-0.21
Sauer F33-78-1HN Landing Pt.									
7,421.0	91.50	2.10	6,872.9	830.3	-551.4	895.0	6.67	6.67	-0.21
7,516.0	92.50	358.40	6,869.6	925.3	-551.0	989.0	4.03	1.05	-3.89
7,611.0	93.00	358.20	6,865.0	1,020.1	-553.8	1,083.5	0.57	0.53	-0.21
7,706.0	93.10	358.20	6,860.0	1,114.9	-556.8	1,177.9	0.11	0.11	0.00
7,801.0	92.10	358.40	6,855.7	1,209.8	-559.6	1,272.3	1.07	-1.05	0.21
7,896.0	91.40	358.90	6,852.8	1,304.7	-561.8	1,366.7	0.91	-0.74	0.53
7,991.0	91.20	358.50	6,850.6	1,399.7	-564.0	1,461.1	0.47	-0.21	-0.42
8,086.0	91.40	0.30	6,848.5	1,494.6	-565.0	1,555.4	1.91	0.21	1.89
8,181.0	91.20	359.20	6,846.3	1,589.6	-565.4	1,649.6	1.18	-0.21	-1.16
8,275.0	92.20	359.60	6,843.5	1,683.6	-566.4	1,742.9	1.15	1.06	0.43
8,370.0	91.50	359.60	6,840.4	1,778.5	-567.1	1,837.1	0.74	-0.74	0.00
8,465.0	90.70	358.20	6,838.6	1,873.5	-568.9	1,931.5	1.70	-0.84	-1.47
8,560.0	91.80	358.00	6,836.5	1,968.4	-572.0	2,026.1	1.18	1.16	-0.21
8,655.0	91.50	358.50	6,833.8	2,063.3	-574.9	2,120.5	0.61	-0.32	0.53
8,750.0	91.20	358.90	6,831.6	2,158.2	-577.1	2,215.0	0.53	-0.32	0.42
8,844.0	91.50	359.20	6,829.4	2,252.2	-578.6	2,308.3	0.45	0.32	0.32
8,939.0	91.40	0.50	6,827.0	2,347.2	-578.9	2,402.5	1.37	-0.11	1.37
9,034.0	91.30	0.30	6,824.7	2,442.1	-578.2	2,496.6	0.24	-0.11	-0.21
9,129.0	91.50	0.60	6,822.4	2,537.1	-577.5	2,590.7	0.38	0.21	0.32
9,224.0	90.70	359.90	6,820.6	2,632.1	-577.1	2,684.8	1.12	-0.84	-0.74
9,319.0	91.40	359.20	6,818.8	2,727.1	-577.8	2,779.1	1.04	0.74	-0.74
9,414.0	91.80	358.20	6,816.2	2,822.0	-580.0	2,873.5	1.13	0.42	-1.05
9,509.0	91.60	358.70	6,813.4	2,916.9	-582.5	2,967.9	0.57	-0.21	0.53
9,603.0	91.20	359.60	6,811.1	3,010.9	-583.9	3,061.3	1.05	-0.43	0.96
9,698.0	92.20	359.20	6,808.2	3,105.9	-584.9	3,155.5	1.13	1.05	-0.42
9,793.0	91.40	359.90	6,805.3	3,200.8	-585.7	3,249.8	1.12	-0.84	0.74
9,888.0	92.20	359.60	6,802.3	3,295.8	-586.1	3,344.0	0.90	0.84	-0.32
9,983.0	91.40	359.80	6,799.3	3,390.7	-586.6	3,438.2	0.87	-0.84	0.21
10,078.0	91.90	359.60	6,796.6	3,485.7	-587.1	3,532.4	0.57	0.53	-0.21
10,172.0	90.90	359.90	6,794.3	3,579.6	-587.5	3,625.6	1.11	-1.06	0.32
10,267.0	91.80	0.30	6,792.0	3,674.6	-587.3	3,719.8	1.04	0.95	0.42
10,362.0	91.20	0.10	6,789.5	3,769.6	-587.0	3,813.9	0.67	-0.63	-0.21
10,457.0	92.20	0.10	6,786.7	3,864.5	-586.8	3,908.0	1.05	1.05	0.00
10,551.0	91.50	0.30	6,783.7	3,958.5	-586.5	4,001.1	0.77	-0.74	0.21
10,646.0	91.80	359.90	6,780.9	4,053.4	-586.3	4,095.3	0.53	0.32	-0.42
10,741.0	90.70	358.70	6,778.9	4,148.4	-587.5	4,189.6	1.71	-1.16	-1.26
10,836.0	91.40	358.70	6,777.1	4,243.4	-589.6	4,284.0	0.74	0.74	0.00
10,931.0	91.20	359.20	6,775.0	4,338.3	-591.4	4,378.4	0.57	-0.21	0.53
11,065.0	92.20	358.50	6,771.0	4,472.2	-594.1	4,511.5	0.91	0.75	-0.52

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Sauer F33-78-1HN
<b>Project:</b>	Sec.33-T5N-R65W	<b>TVD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Site:</b>	Sauer F33-76-1HN Pad Sec.33-T5N-R65W	<b>MD Reference:</b>	WELL @ 4684.0ft (Ensign 121 RKB - 13')
<b>Well:</b>	Sauer F33-78-1HN	<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)
11,122.0	92.20	358.50	6,768.8	4,529.2	-595.6	4,568.2	0.00	0.00	0.00
Sauer F33-78-1HN BHL 535'FNL & 990'FWL									

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_