

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

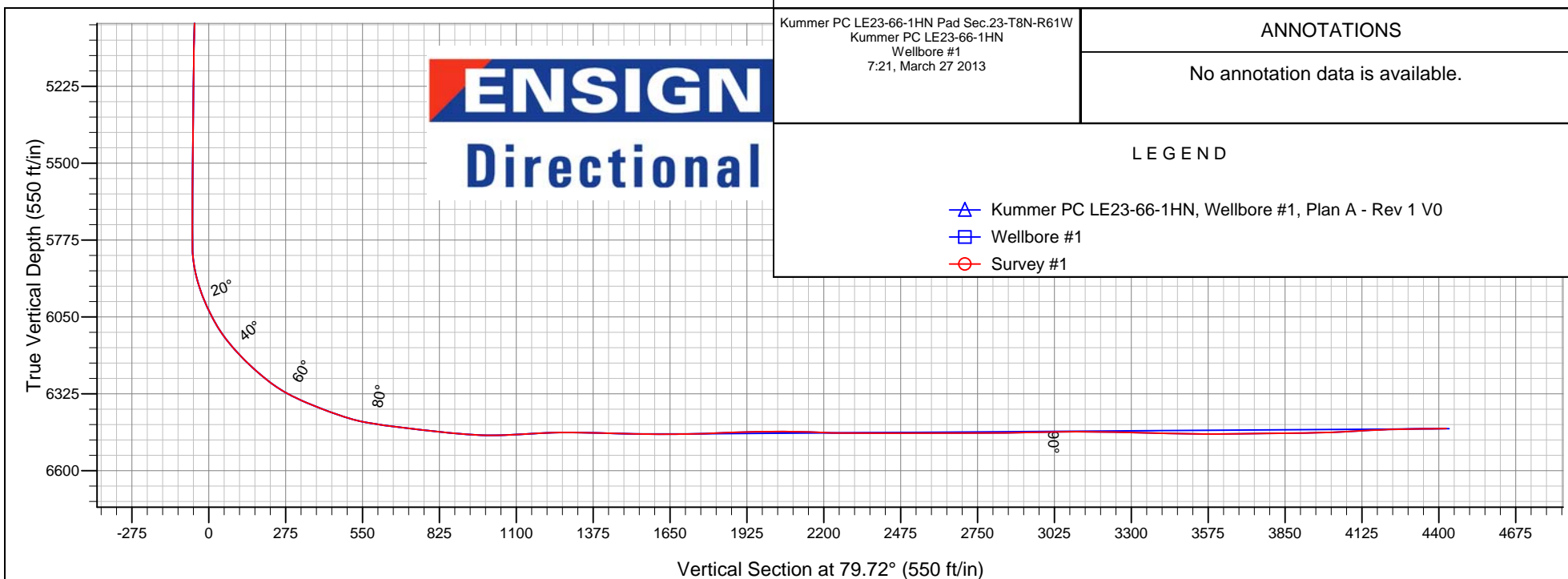
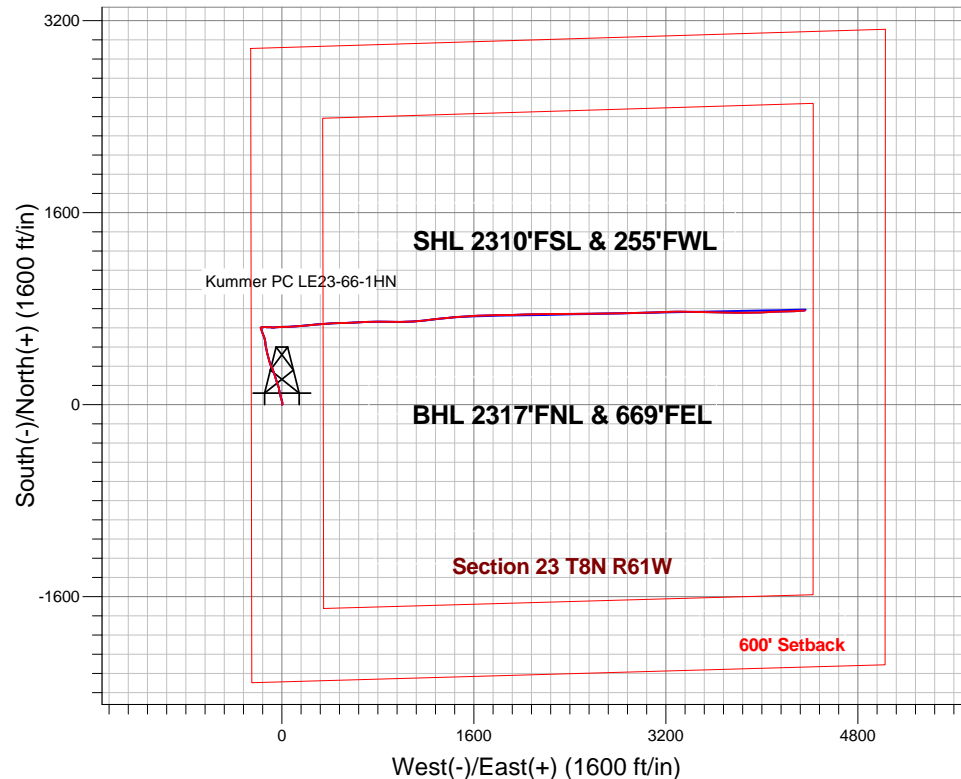
Well Name: **Kummer PC LE23-66-1HN**

Surface Location: Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W  
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone  
Ground Elevation: 4982.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1481064.58	3365898.24	40.646450	-104.181389	
H&P 273 RKB - 16' WELL @ 4998.0ft (H&P 273 RKB - 16')						

## FINAL SURVEY

Projected Bottom Hole Location  
10720' MD 6450' TVD 784' N & 4356' E of SHL  
90.7 degree Incl @ 86.6 degree AZM





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

**SEC.23-T8N-R61W**

**Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W**

**Kummer PC LE23-66-1HN**

**Wellbore #1**

**Survey: Survey #1**

## **Standard Survey Report**

**27 March, 2013**

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Kummer PC LE23-66-1HN
<b>Project:</b>	SEC.23-T8N-R61W	<b>TVD Reference:</b>	WELL @ 4998.0ft (H&P 273 RKB - 16')
<b>Site:</b>	Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W	<b>MD Reference:</b>	WELL @ 4998.0ft (H&P 273 RKB - 16')
<b>Well:</b>	Kummer PC LE23-66-1HN	<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.23-T8N-R61W, 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	Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W				
Site Position:		Northing:	1,481,064.59 ft	Latitude:	40.646450
From:	Lat/Long	Easting:	3,365,898.23 ft	Longitude:	-104.181389
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.85 °

Well	Kummer PC LE23-66-1HN					
Well Position	+N-S	0.0 ft	Northing:	1,481,064.58 ft	Latitude:	40.646450
	+E-W	0.0 ft	Easting:	3,365,898.24 ft	Longitude:	-104.181389
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,982.0 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	2/25/2013	8.34	67.28	53,140

<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	79.72	

<b>Survey Program</b>	<b>Date</b>	3/26/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
855.0	10,720.0	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
855.0	0.40	66.90	855.0	1.2	2.7	2.9	0.05	0.05	0.00
950.0	3.30	350.30	949.9	4.0	2.6	3.3	3.40	3.05	-80.63
1,045.0	6.10	4.80	1,044.6	11.7	2.6	4.6	3.18	2.95	15.26
1,140.0	7.60	347.10	1,138.9	22.9	1.6	5.6	2.71	1.58	-18.63
1,235.0	7.40	341.60	1,233.1	34.8	-1.8	4.5	0.78	-0.21	-5.79
1,328.0	8.20	343.60	1,325.3	46.9	-5.5	2.9	0.91	0.86	2.15
1,421.0	9.80	344.60	1,417.1	60.8	-9.5	1.5	1.73	1.72	1.08
1,514.0	9.50	348.70	1,508.8	76.0	-13.1	0.7	0.81	-0.32	4.41
1,607.0	10.80	345.90	1,600.3	92.0	-16.7	0.0	1.49	1.40	-3.01
1,700.0	9.70	345.30	1,691.9	108.0	-20.8	-1.2	1.19	-1.18	-0.65

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Kummer PC LE23-66-1HN
<b>Project:</b>	SEC.23-T8N-R61W	<b>TVD Reference:</b>	WELL @ 4998.0ft (H&P 273 RKB - 16')
<b>Site:</b>	Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W	<b>MD Reference:</b>	WELL @ 4998.0ft (H&P 273 RKB - 16')
<b>Well:</b>	Kummer PC LE23-66-1HN	<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)
1,793.0	10.60	357.50	1,783.4	124.1	-23.2	-0.7	2.50	0.97	13.12
1,886.0	11.10	342.70	1,874.8	141.2	-26.2	-0.6	3.03	0.54	-15.91
1,979.0	10.10	340.90	1,966.2	157.5	-31.6	-3.0	1.13	-1.08	-1.94
2,072.0	10.60	337.10	2,057.7	173.1	-37.6	-6.1	0.91	0.54	-4.09
2,165.0	9.60	341.50	2,149.2	188.3	-43.4	-9.1	1.36	-1.08	4.73
2,258.0	9.40	346.40	2,241.0	203.0	-47.6	-10.6	0.90	-0.22	5.27
2,351.0	9.90	342.50	2,332.6	218.0	-51.8	-12.0	0.88	0.54	-4.19
2,444.0	9.60	342.00	2,424.3	233.0	-56.6	-14.1	0.34	-0.32	-0.54
2,537.0	10.00	345.20	2,515.9	248.2	-61.1	-15.8	0.73	0.43	3.44
2,631.0	10.20	339.90	2,608.5	263.9	-66.0	-17.8	1.01	0.21	-5.64
2,726.0	9.80	336.50	2,702.0	279.3	-72.1	-21.1	0.75	-0.42	-3.58
2,821.0	10.00	341.10	2,795.6	294.5	-78.0	-24.2	0.86	0.21	4.84
2,916.0	9.70	336.50	2,889.2	309.6	-83.9	-27.3	0.89	-0.32	-4.84
3,010.0	9.60	334.40	2,981.9	323.9	-90.4	-31.1	0.39	-0.11	-2.23
3,105.0	9.10	336.50	3,075.6	338.0	-96.8	-35.0	0.64	-0.53	2.21
3,200.0	8.60	343.20	3,169.5	351.7	-101.9	-37.5	1.21	-0.53	7.05
3,295.0	8.30	340.40	3,263.5	364.9	-106.2	-39.4	0.54	-0.32	-2.95
3,390.0	7.20	347.30	3,357.6	377.2	-109.8	-40.8	1.51	-1.16	7.26
3,485.0	7.20	344.30	3,451.9	388.7	-112.8	-41.6	0.40	0.00	-3.16
3,580.0	6.90	341.60	3,546.1	399.9	-116.2	-42.9	0.47	-0.32	-2.84
3,675.0	8.50	353.80	3,640.3	412.3	-118.7	-43.2	2.40	1.68	12.84
3,769.0	9.00	349.60	3,733.2	426.4	-120.8	-42.8	0.86	0.53	-4.47
3,864.0	9.10	347.60	3,827.0	441.1	-123.8	-43.1	0.35	0.11	-2.11
3,959.0	9.10	345.50	3,920.8	455.7	-127.3	-43.9	0.35	0.00	-2.21
4,054.0	9.10	342.90	4,014.6	470.1	-131.4	-45.3	0.43	0.00	-2.74
4,149.0	7.70	353.60	4,108.6	483.6	-134.3	-45.8	2.20	-1.47	11.26
4,244.0	7.10	351.70	4,202.8	495.8	-135.8	-45.2	0.68	-0.63	-2.00
4,339.0	6.60	351.50	4,297.1	507.0	-137.5	-44.8	0.53	-0.53	-0.21
4,433.0	8.10	354.30	4,390.4	518.9	-138.9	-44.1	1.64	1.60	2.98
4,528.0	7.20	353.20	4,484.5	531.5	-140.3	-43.2	0.96	-0.95	-1.16
4,623.0	7.10	345.90	4,578.8	543.1	-142.4	-43.2	0.96	-0.11	-7.68
4,718.0	6.60	347.80	4,673.1	554.1	-145.0	-43.8	0.58	-0.53	2.00
4,813.0	7.30	337.40	4,767.4	565.0	-148.5	-45.3	1.51	0.74	-10.95
4,908.0	6.90	336.40	4,861.7	575.8	-153.1	-47.9	0.44	-0.42	-1.05
5,003.0	6.60	338.80	4,956.0	586.1	-157.4	-50.2	0.43	-0.32	2.53
5,098.0	6.20	337.80	5,050.4	596.0	-161.3	-52.3	0.44	-0.42	-1.05
5,193.0	4.10	338.50	5,145.0	603.9	-164.5	-54.0	2.21	-2.21	0.74
5,288.0	4.20	344.50	5,239.8	610.4	-166.6	-55.0	0.47	0.11	6.32
5,383.0	4.00	340.40	5,334.6	616.9	-168.7	-55.9	0.37	-0.21	-4.32
5,478.0	3.70	341.10	5,429.3	622.9	-170.8	-56.9	0.32	-0.32	0.74
5,573.0	3.20	341.50	5,524.2	628.3	-172.6	-57.7	0.53	-0.53	0.42
5,667.0	3.00	341.50	5,618.0	633.1	-174.2	-58.4	0.21	-0.21	0.00
5,762.0	3.00	338.70	5,712.9	637.8	-175.9	-59.3	0.15	0.00	-2.95
5,857.0	2.10	46.70	5,807.8	641.3	-175.6	-58.3	3.10	-0.95	71.58
5,952.0	13.70	80.60	5,901.8	644.4	-163.1	-45.5	12.65	12.21	35.68
6,047.0	23.00	91.50	5,991.9	645.7	-133.4	-16.0	10.39	9.79	11.47
6,142.0	30.80	92.60	6,076.5	644.1	-90.5	25.9	8.23	8.21	1.16
6,236.0	40.90	85.90	6,152.7	645.2	-35.6	80.1	11.51	10.74	-7.13
6,331.0	46.70	88.90	6,221.2	648.1	30.0	145.2	6.48	6.11	3.16
6,426.0	52.80	86.20	6,282.6	651.3	102.4	217.0	6.78	6.42	-2.84
6,521.0	63.40	83.90	6,332.7	658.3	182.7	297.2	11.34	11.16	-2.42
6,616.0	68.90	85.50	6,371.1	666.3	269.1	383.7	5.99	5.79	1.68
6,710.0	70.70	85.40	6,403.6	673.3	357.1	471.5	1.92	1.91	-0.11

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Kummer PC LE23-66-1HN
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<b>Well:</b>	Kummer PC LE23-66-1HN	<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)
6,805.0	80.00	88.00	6,427.6	678.6	448.7	562.6	10.14	9.79	2.74
6,836.0	81.00	88.30	6,432.7	679.6	479.3	592.9	3.36	3.23	0.97
6,886.0	82.31	87.72	6,439.9	681.3	528.7	641.8	2.86	2.62	-1.17
7"									
6,939.0	83.70	87.10	6,446.4	683.7	581.3	694.0	2.86	2.62	-1.16
6,971.2	83.53	87.17	6,450.0	685.3	613.3	725.7	0.57	-0.53	0.21
Kummer PC LE23-66-1HN Landing Pt.									
7,034.0	83.20	87.30	6,457.2	688.3	675.5	787.5	0.57	-0.53	0.21
7,129.0	84.90	88.90	6,467.1	691.4	770.0	881.0	2.45	1.79	1.68
7,224.0	87.80	91.00	6,473.1	691.5	864.8	974.3	3.77	3.05	2.21
7,319.0	92.70	91.00	6,472.7	689.8	959.7	1,067.4	5.16	5.16	0.00
7,385.8	93.33	88.61	6,469.2	690.1	1,026.5	1,133.1	3.70	0.95	-3.58
WP1									
7,414.0	93.60	87.60	6,467.5	691.0	1,054.5	1,160.9	3.70	0.94	-3.58
7,509.0	90.80	84.80	6,463.8	697.3	1,149.3	1,255.3	4.17	-2.95	-2.95
7,604.0	88.50	82.40	6,464.4	707.9	1,243.6	1,350.0	3.50	-2.42	-2.53
7,699.0	88.40	83.90	6,467.0	719.2	1,337.9	1,444.8	1.58	-0.11	1.58
7,793.0	89.60	85.50	6,468.6	727.9	1,431.5	1,538.4	2.13	1.28	1.70
7,889.0	89.30	85.40	6,469.5	735.5	1,527.2	1,634.0	0.33	-0.31	-0.10
7,983.0	91.50	88.90	6,468.9	740.2	1,621.1	1,727.1	4.40	2.34	3.72
8,078.0	92.50	88.70	6,465.6	742.2	1,716.0	1,820.9	1.07	1.05	-0.21
8,173.0	91.70	88.00	6,462.1	744.9	1,810.9	1,914.8	1.12	-0.84	-0.74
8,267.0	90.60	88.30	6,460.2	747.9	1,904.8	2,007.7	1.21	-1.17	0.32
8,362.0	88.60	88.20	6,460.9	750.8	1,999.8	2,101.7	2.11	-2.11	-0.11
8,457.0	87.90	88.50	6,463.8	753.6	2,094.7	2,195.5	0.80	-0.74	0.32
8,552.0	89.80	89.90	6,465.7	754.9	2,189.6	2,289.2	2.48	2.00	1.47
8,647.0	89.90	89.70	6,465.9	755.2	2,284.6	2,382.7	0.24	0.11	-0.21
8,741.0	90.00	89.00	6,466.0	756.3	2,378.6	2,475.4	0.75	0.11	-0.74
8,836.0	90.30	89.90	6,465.8	757.2	2,473.6	2,569.1	1.00	0.32	0.95
8,931.0	90.00	90.10	6,465.5	757.2	2,568.6	2,662.5	0.38	-0.32	0.21
9,026.0	90.00	89.00	6,465.5	757.9	2,663.6	2,756.1	1.16	0.00	-1.16
9,121.0	90.50	89.40	6,465.1	759.3	2,758.6	2,849.8	0.67	0.53	0.42
9,216.0	91.70	88.70	6,463.3	760.8	2,853.6	2,943.6	1.46	1.26	-0.74
9,310.0	90.40	87.60	6,461.5	763.9	2,947.5	3,036.5	1.81	-1.38	-1.17
9,405.0	89.90	87.60	6,461.3	767.8	3,042.4	3,130.6	0.53	-0.53	0.00
9,500.0	89.00	89.00	6,462.2	770.7	3,137.4	3,224.5	1.75	-0.95	1.47
9,595.0	88.90	88.30	6,464.0	772.9	3,232.3	3,318.4	0.74	-0.11	-0.74
9,690.0	88.50	89.90	6,466.1	774.4	3,327.3	3,412.1	1.74	-0.42	1.68
9,784.0	88.50	91.00	6,468.6	773.7	3,421.3	3,504.4	1.17	0.00	1.17
9,879.0	90.80	92.20	6,469.2	771.0	3,516.2	3,597.4	2.73	2.42	1.26
9,974.0	90.30	91.00	6,468.2	768.4	3,611.2	3,690.3	1.37	-0.53	-1.26
10,069.0	91.10	92.40	6,467.1	765.5	3,706.1	3,783.2	1.70	0.84	1.47
10,164.0	90.20	89.00	6,466.0	764.4	3,801.1	3,876.5	3.70	-0.95	-3.58
10,258.0	91.50	88.20	6,464.6	766.7	3,895.0	3,969.3	1.62	1.38	-0.85
10,353.0	92.90	88.00	6,461.0	769.8	3,989.9	4,063.3	1.49	1.47	-0.21
10,448.0	93.30	88.20	6,455.8	773.0	4,084.7	4,157.1	0.47	0.42	0.21
10,543.0	90.90	88.00	6,452.3	776.1	4,179.6	4,251.0	2.54	-2.53	-0.21
10,638.0	90.90	87.50	6,450.8	779.8	4,274.5	4,345.1	0.53	0.00	-0.53
10,665.0	90.70	86.60	6,450.5	781.2	4,301.5	4,371.8	3.41	-0.74	-3.33
10,720.0	90.70	86.60	6,449.8	784.5	4,356.4	4,426.4	0.00	0.00	0.00
Kummer PC LE23-66-1HN BHL 2310'FNL & 660'FEL									

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<b>Well:</b>	Kummer PC LE23-66-1HN	<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

Casing Points					
	Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
	6,886.0	6,439.9	7"	7	8-3/4

Checked By: _____	Approved By: _____	Date: _____
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