

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

Well Name: **Kummer PC LE23-64HN**

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
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North	East	North	East	Latitude	Longitude
0.0	0.0	1480952.36	3365898.52	40.646142	-104.181394

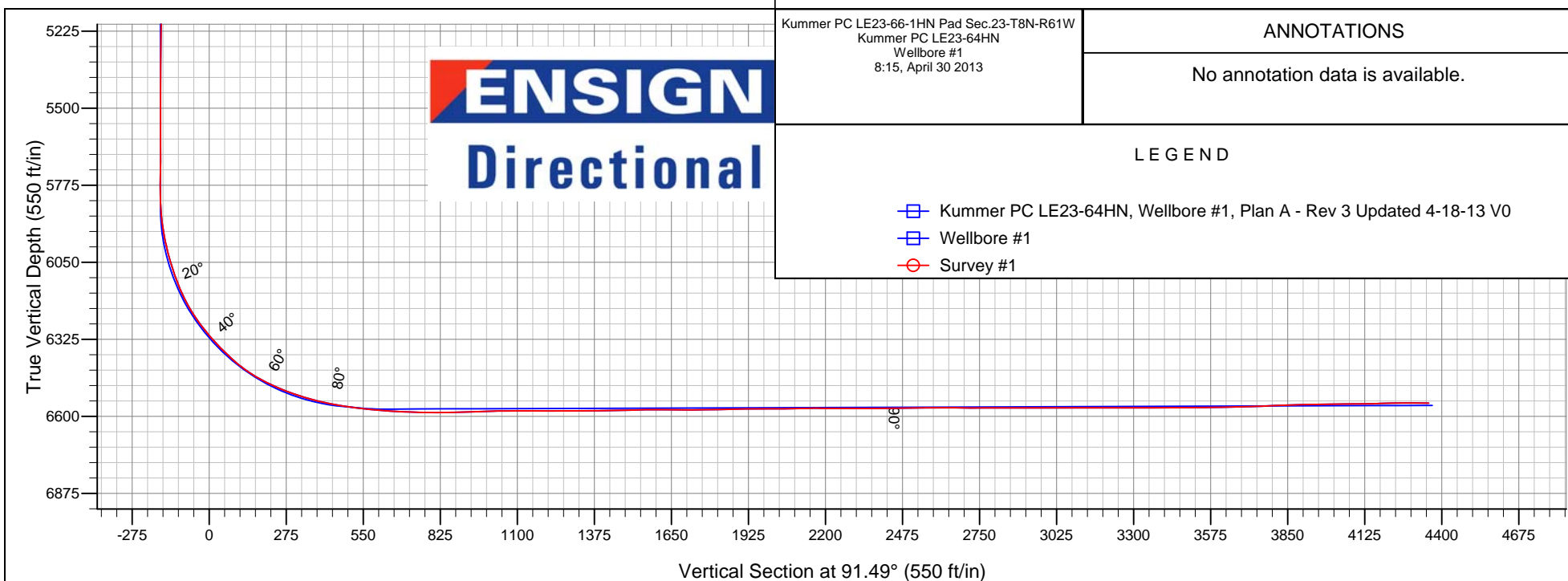
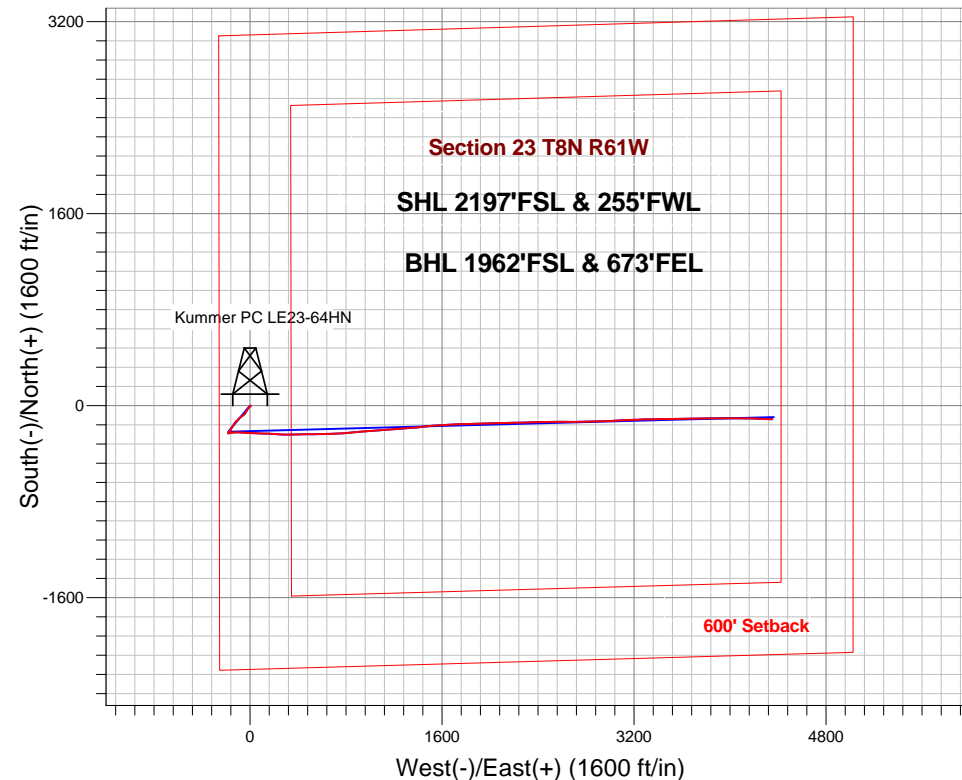
H&P 273 RKB - 24' WELL @ 5006.0ft (H&P 273 RKB - 24')

FINAL SURVEY

Projected Bottom Hole Location

10804' MD 6553' TVD 113' S & 4352' E of SHL

89.4 degree Incl @ 92.0 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 LE23-64HN

Wellbore #1

Survey: Survey #1

Standard Survey Report

30 April, 2013

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Kummer PC LE23-64HN
Project:	SEC.23-T8N-R61W	TVD Reference:	WELL @ 5006.0ft (H&P 273 RKB - 24')
Site:	Kummer PC LE23-66-1HN Pad Sec.23-T8N-R61W	MD Reference:	WELL @ 5006.0ft (H&P 273 RKB - 24')
Well:	Kummer PC LE23-64HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.23-T8N-R61W, 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	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 LE23-64HN					
Well Position	+N-S	0.0 ft	Northing:	1,480,952.36 ft	Latitude:	40.646142
	+E-W	0.0 ft	Easting:	3,365,898.52 ft	Longitude:	-104.181394
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,982.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/18/2013	8.32	67.28	53,125

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	91.49	

Survey Program	Date	4/30/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
818.0	10,804.0	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
818.0	0.60	107.30	818.0	-1.3	4.1	4.1	0.07	0.07	0.00
911.0	0.50	118.70	911.0	-1.6	4.9	5.0	0.16	-0.11	12.26
1,004.0	0.40	114.90	1,004.0	-1.9	5.6	5.6	0.11	-0.11	-4.09
1,097.0	0.50	142.60	1,097.0	-2.4	6.1	6.2	0.25	0.11	29.79
1,190.0	0.40	234.60	1,190.0	-2.9	6.1	6.2	0.70	-0.11	98.92
1,283.0	0.70	221.70	1,283.0	-3.5	5.4	5.5	0.35	0.32	-13.87
1,376.0	0.80	240.90	1,376.0	-4.3	4.5	4.6	0.29	0.11	20.65
1,469.0	1.00	235.80	1,468.9	-5.0	3.3	3.4	0.23	0.22	-5.48
1,563.0	1.70	236.50	1,562.9	-6.3	1.4	1.6	0.74	0.74	0.74
1,658.0	2.90	226.70	1,657.8	-8.7	-1.5	-1.3	1.32	1.26	-10.32

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Well:	Kummer PC LE23-64HN	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)
1,753.0	4.20	222.60	1,752.7	-12.9	-5.6	-5.3	1.39	1.37	-4.32
1,848.0	5.00	224.90	1,847.4	-18.4	-10.9	-10.4	0.86	0.84	2.42
1,943.0	5.00	218.20	1,942.0	-24.6	-16.4	-15.7	0.61	0.00	-7.05
2,037.0	6.20	211.40	2,035.5	-32.1	-21.5	-20.7	1.46	1.28	-7.23
2,132.0	6.20	209.80	2,130.0	-41.0	-26.8	-25.7	0.18	0.00	-1.68
2,227.0	6.20	204.30	2,224.4	-50.1	-31.4	-30.1	0.63	0.00	-5.79
2,322.0	6.20	212.30	2,318.9	-59.1	-36.3	-34.7	0.91	0.00	8.42
2,417.0	5.70	215.10	2,413.4	-67.3	-41.7	-40.0	0.61	-0.53	2.95
2,512.0	5.80	235.30	2,507.9	-73.9	-48.4	-46.5	2.12	0.11	21.26
2,607.0	5.40	232.80	2,602.4	-79.3	-55.9	-53.8	0.49	-0.42	-2.63
2,702.0	5.00	236.20	2,697.1	-84.3	-62.9	-60.7	0.53	-0.42	3.58
2,796.0	4.70	233.50	2,790.7	-88.9	-69.4	-67.1	0.40	-0.32	-2.87
2,891.0	5.50	228.80	2,885.3	-94.2	-76.0	-73.5	0.95	0.84	-4.95
2,986.0	5.30	230.00	2,979.9	-100.0	-82.7	-80.1	0.24	-0.21	1.26
3,081.0	5.30	229.50	3,074.5	-105.7	-89.4	-86.7	0.05	0.00	-0.53
3,176.0	4.90	221.20	3,169.1	-111.6	-95.5	-92.5	0.88	-0.42	-8.74
3,271.0	4.60	222.30	3,263.8	-117.5	-100.7	-97.6	0.33	-0.32	1.16
3,366.0	4.00	218.80	3,358.5	-122.9	-105.3	-102.1	0.69	-0.63	-3.68
3,460.0	3.20	235.80	3,452.4	-126.9	-109.6	-106.2	1.41	-0.85	18.09
3,555.0	4.20	229.00	3,547.2	-130.7	-114.4	-110.9	1.15	1.05	-7.16
3,650.0	5.50	215.10	3,641.8	-136.7	-119.6	-116.0	1.84	1.37	-14.63
3,745.0	6.00	215.90	3,736.3	-144.4	-125.1	-121.3	0.53	0.53	0.84
3,840.0	6.20	215.10	3,830.8	-152.7	-131.0	-127.0	0.23	0.21	-0.84
3,935.0	6.70	216.60	3,925.2	-161.3	-137.3	-133.0	0.56	0.53	1.58
4,030.0	6.80	214.00	4,019.5	-170.4	-143.7	-139.2	0.34	0.11	-2.74
4,125.0	5.60	211.90	4,114.0	-179.0	-149.3	-144.6	1.29	-1.26	-2.21
4,220.0	5.30	210.30	4,208.6	-186.7	-154.0	-149.1	0.35	-0.32	-1.68
4,315.0	4.00	206.60	4,303.2	-193.5	-157.7	-152.6	1.40	-1.37	-3.89
4,410.0	2.80	215.90	4,398.1	-198.3	-160.5	-155.3	1.39	-1.26	9.79
4,505.0	2.90	173.80	4,493.0	-202.6	-161.6	-156.3	2.16	0.11	-44.32
4,599.0	2.60	204.70	4,586.9	-206.9	-162.2	-156.8	1.59	-0.32	32.87
4,694.0	1.90	236.70	4,681.8	-209.7	-164.5	-158.9	1.49	-0.74	33.68
4,789.0	1.80	218.80	4,776.7	-211.7	-166.7	-161.1	0.61	-0.11	-18.84
4,884.0	2.20	257.40	4,871.7	-213.3	-169.4	-163.8	1.45	0.42	40.63
4,979.0	1.90	241.10	4,966.6	-214.5	-172.6	-166.9	0.69	-0.32	-17.16
5,074.0	1.40	230.00	5,061.6	-216.0	-174.9	-169.2	0.62	-0.53	-11.68
5,169.0	1.30	232.10	5,156.6	-217.4	-176.6	-170.9	0.12	-0.11	2.21
5,264.0	1.40	215.40	5,251.5	-219.0	-178.1	-172.4	0.43	0.11	-17.58
5,358.0	1.20	200.00	5,345.5	-220.9	-179.1	-173.3	0.43	-0.21	-16.38
5,453.0	1.10	188.80	5,440.5	-222.7	-179.6	-173.7	0.26	-0.11	-11.79
5,548.0	1.30	182.40	5,535.5	-224.7	-179.8	-173.9	0.25	0.21	-6.74
5,643.0	1.10	178.00	5,630.5	-226.7	-179.8	-173.8	0.23	-0.21	-4.63
5,738.0	1.00	194.10	5,725.4	-228.4	-180.0	-174.0	0.33	-0.11	16.95
5,828.0	0.90	180.80	5,815.4	-229.8	-180.2	-174.1	0.27	-0.11	-14.78
5,923.0	7.60	79.40	5,910.2	-229.4	-174.0	-168.0	8.24	7.05	-106.74
6,018.0	14.00	82.20	6,003.4	-226.7	-156.4	-150.5	6.76	6.74	2.95
6,113.0	19.00	83.90	6,094.5	-223.5	-129.6	-123.8	5.29	5.26	1.79
6,208.0	26.70	92.20	6,182.0	-222.7	-92.9	-87.0	8.77	8.11	8.74
6,303.0	35.80	93.10	6,263.1	-225.0	-43.7	-37.8	9.59	9.58	0.95
6,398.0	42.80	92.70	6,336.6	-228.0	16.4	22.3	7.37	7.37	-0.42
6,492.0	48.50	93.10	6,402.3	-231.4	83.5	89.5	6.07	6.06	0.43
6,587.0	59.60	91.30	6,458.0	-234.3	160.2	166.2	11.78	11.68	-1.89
6,682.0	67.40	95.20	6,500.3	-239.2	245.0	251.1	8.99	8.21	4.11

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Survey									
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6,777.0	73.20	88.00	6,532.4	-241.6	334.3	340.5	9.39	6.11	-7.58
6,872.0	79.50	88.30	6,554.8	-238.6	426.5	432.6	6.64	6.63	0.32
6,903.0	80.30	90.10	6,560.2	-238.2	457.0	463.1	6.27	2.58	5.81
7,032.0	84.90	88.90	6,576.8	-237.1	584.9	590.9	3.68	3.57	-0.93
7,061.0	85.57	88.62	6,579.2	-236.5	613.8	619.8	2.50	2.32	-0.95
Kummer PC LE23-64HN Landing Pt.									
7,127.0	87.10	88.00	6,583.5	-234.5	679.6	685.5	2.50	2.32	-0.95
7,222.0	89.50	86.60	6,586.3	-230.1	774.5	780.2	2.92	2.53	-1.47
7,317.0	91.00	85.00	6,585.9	-223.1	869.2	874.7	2.31	1.58	-1.68
7,411.0	92.40	84.30	6,583.1	-214.3	962.8	968.0	1.67	1.49	-0.74
7,506.0	90.70	86.20	6,580.5	-206.5	1,057.4	1,062.4	2.68	-1.79	2.00
7,601.0	89.40	86.40	6,580.4	-200.3	1,152.2	1,157.0	1.38	-1.37	0.21
7,696.0	90.10	85.90	6,580.8	-194.0	1,247.0	1,251.6	0.91	0.74	-0.53
7,791.0	90.40	84.80	6,580.4	-186.3	1,341.7	1,346.1	1.20	0.32	-1.16
7,886.0	91.40	83.20	6,578.9	-176.3	1,436.1	1,440.2	1.99	1.05	-1.68
7,981.0	91.20	84.80	6,576.8	-166.4	1,530.6	1,534.4	1.70	-0.21	1.68
8,075.0	89.40	87.80	6,576.3	-160.3	1,624.4	1,628.0	3.72	-1.91	3.19
8,170.0	90.00	87.60	6,576.8	-156.5	1,719.3	1,722.8	0.67	0.63	-0.21
8,265.0	91.40	88.00	6,575.6	-152.9	1,814.2	1,817.6	1.53	1.47	0.42
8,360.0	90.80	88.20	6,573.8	-149.7	1,909.1	1,912.4	0.67	-0.63	0.21
8,455.0	90.00	88.20	6,573.1	-146.7	2,004.1	2,007.2	0.84	-0.84	0.00
8,549.0	91.50	88.50	6,571.9	-144.0	2,098.0	2,101.1	1.63	1.60	0.32
8,644.0	89.30	89.20	6,571.2	-142.1	2,193.0	2,196.0	2.43	-2.32	0.74
8,739.0	90.50	88.50	6,571.4	-140.2	2,288.0	2,290.9	1.46	1.26	-0.74
8,834.0	89.70	88.90	6,571.2	-138.1	2,383.0	2,385.7	0.94	-0.84	0.42
8,928.0	91.30	88.70	6,570.4	-136.1	2,476.9	2,479.6	1.72	1.70	-0.21
9,023.0	89.90	89.20	6,569.4	-134.4	2,571.9	2,574.5	1.56	-1.47	0.53
9,118.0	89.40	90.30	6,570.0	-133.9	2,666.9	2,669.5	1.27	-0.53	1.16
9,213.0	90.70	90.10	6,569.9	-134.3	2,761.9	2,764.5	1.38	1.37	-0.21
9,308.0	89.60	88.70	6,569.7	-133.3	2,856.9	2,859.4	1.87	-1.16	-1.47
9,403.0	90.00	87.60	6,570.0	-130.2	2,951.8	2,954.2	1.23	0.42	-1.16
9,498.0	90.00	86.40	6,570.0	-125.2	3,046.7	3,048.9	1.26	0.00	-1.26
9,592.0	90.30	87.80	6,569.8	-120.5	3,140.6	3,142.7	1.52	0.32	1.49
9,687.0	90.10	88.00	6,569.4	-117.0	3,235.5	3,237.5	0.30	-0.21	0.21
9,782.0	90.00	89.70	6,569.3	-115.1	3,330.5	3,332.4	1.79	-0.11	1.79
9,877.0	89.90	88.00	6,569.4	-113.2	3,425.5	3,427.3	1.79	-0.11	-1.79
9,972.0	90.70	88.30	6,568.9	-110.1	3,520.4	3,522.1	0.90	0.84	0.32
10,066.0	91.10	89.70	6,567.4	-108.5	3,614.4	3,616.0	1.55	0.43	1.49
10,161.0	91.40	89.00	6,565.4	-107.4	3,709.4	3,710.9	0.80	0.32	-0.74
10,256.0	92.70	89.90	6,562.0	-106.5	3,804.3	3,805.8	1.66	1.37	0.95
10,351.0	91.80	89.90	6,558.2	-106.3	3,899.2	3,900.7	0.95	-0.95	0.00
10,446.0	90.30	90.40	6,556.5	-106.6	3,994.2	3,995.6	1.66	-1.58	0.53
10,541.0	90.50	89.90	6,555.8	-106.8	4,089.2	4,090.6	0.57	0.21	-0.53
10,636.0	92.20	91.50	6,553.6	-108.0	4,184.2	4,185.6	2.46	1.79	1.68
10,749.0	89.40	92.00	6,552.0	-111.4	4,297.1	4,298.5	2.52	-2.48	0.44
10,804.0	89.40	92.00	6,552.6	-113.4	4,352.0	4,353.5	0.00	0.00	0.00
Kummer PC LE23-64HN BHL 1980'FSL & 660'FEL									

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Design:	Wellbore #1	Database:	Landmark

Checked By: _____	Approved By: _____	Date: _____
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