

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

Well Name: **Loeffler K1-67-1HN**

Surface Location: Loeffler K1-66-1HN Pad Sec.1-T4N-R66W
 North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

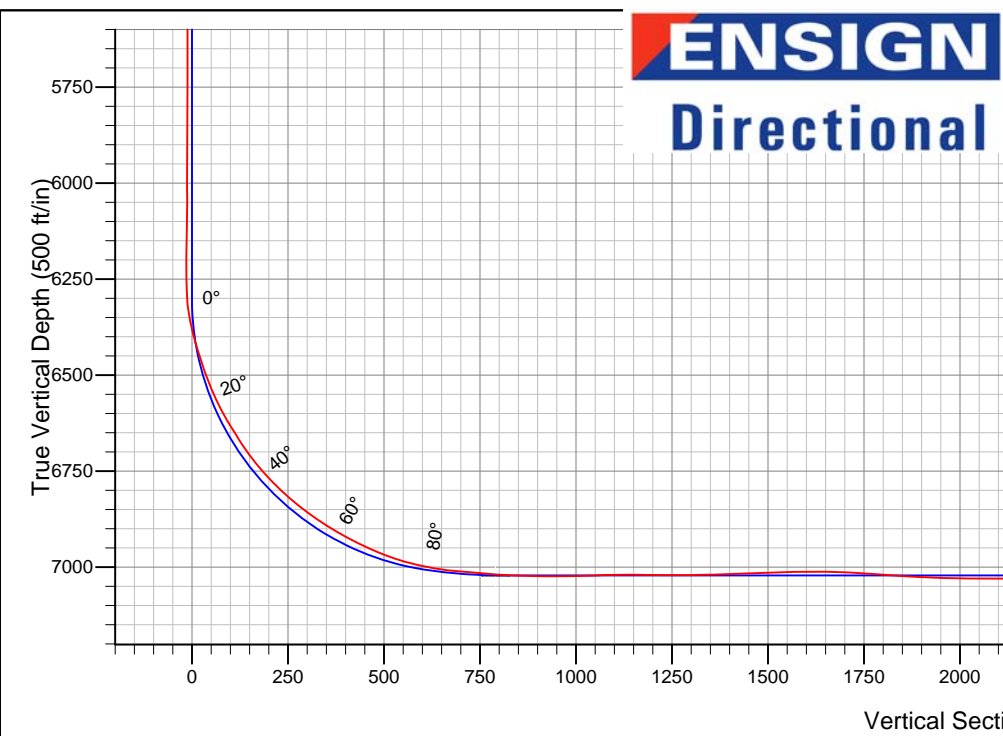
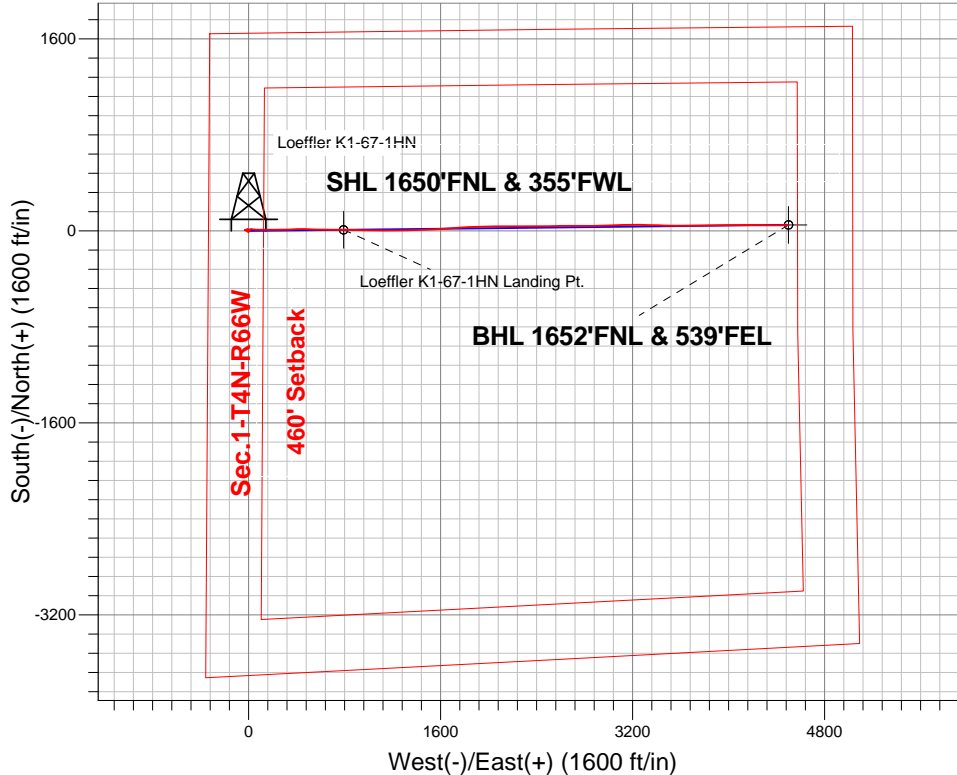
Ground Elevation: 4666.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1369046.54	3213615.95	40.343900	-104.733630	

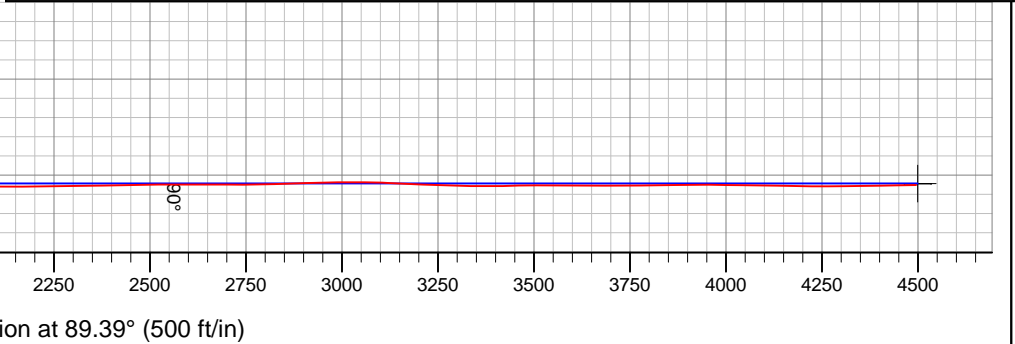
Precision 829 RKB - 16' WELL @ 4682.0ft (Precision 829 RKB - 16')

FINAL SURVEY

Projected Bottom Hole Location
 11190'MD 3525'TVD 48'N & 4495'E of SHL
 91.4 degree Incl @ 89.3
 degree AZM



Loeffler K1-66-1HN Pad Sec.1-T4N-R66W Loeffler K1-67-1HN Wellbore #1 13:54, November 12 2013	<h3>ANNOTATIONS</h3> <p>No annotation data is available.</p>
<h3>LEGEND</h3> <ul style="list-style-type: none"> ▲ Loeffler K1-67-1HN, Wellbore #1, Plan A - Rev 0 V0 □ Wellbore #1 	





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

Sec.1-T4N-R66W

Loeffler K1-66-1HN Pad Sec.1-T4N-R66W

Loeffler K1-67-1HN

Wellbore #1

Design: Wellbore #1

Standard Survey Report

12 November, 2013

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Loeffler K1-67-1HN
Project:	Sec.1-T4N-R66W	TVD Reference:	WELL @ 4682.0ft (Precision 829 RKB - 16')
Site:	Loeffler K1-66-1HN Pad Sec.1-T4N-R66W	MD Reference:	WELL @ 4682.0ft (Precision 829 RKB - 16')
Well:	Loeffler K1-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	Sec.1-T4N-R66W, 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	Loeffler K1-66-1HN Pad Sec.1-T4N-R66W				
Site Position:		Northing:	1,369,046.36 ft	Latitude:	40.343900
From:	Lat/Long	Easting:	3,213,593.65 ft	Longitude:	-104.733710
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.50 °

Well	Loeffler K1-67-1HN					
Well Position	+N/-S	0.0 ft	Northing:	1,369,046.54 ft	Latitude:	40.343900
	+E/-W	0.0 ft	Easting:	3,213,615.95 ft	Longitude:	-104.733630
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,666.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/2/2013	8.53	66.93	52,864

Design	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	89.39

Survey Program	Date	11/12/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
317.0	617.0	Survey #1 (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool
659.0	11,190.0	Survey #2 (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	
317.0	1.00	57.60	317.0	1.5	2.3	2.4	0.32	0.32	0.00	
617.0	1.00	57.60	616.9	4.3	6.8	6.8	0.00	0.00	0.00	
659.0	1.00	210.70	658.9	4.2	6.9	6.9	4.63	0.00	364.52	
749.0	1.10	207.00	748.9	2.7	6.1	6.1	0.13	0.11	-4.11	
839.0	1.10	201.80	838.9	1.2	5.4	5.4	0.11	0.00	-5.78	
928.0	0.90	213.00	927.9	-0.2	4.7	4.7	0.31	-0.22	12.58	
1,017.0	0.90	202.10	1,016.9	-1.5	4.0	4.0	0.19	0.00	-12.25	
1,107.0	0.90	203.20	1,106.9	-2.8	3.5	3.5	0.02	0.00	1.22	
1,204.0	0.60	198.90	1,203.9	-3.9	3.0	3.0	0.31	-0.31	-4.43	
1,299.0	0.70	184.30	1,298.9	-5.0	2.8	2.8	0.20	0.11	-15.37	

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Site:	Loeffler K1-66-1HN Pad Sec.1-T4N-R66W	MD Reference:	WELL @ 4682.0ft (Precision 829 RKB - 16')
Well:	Loeffler K1-67-1HN	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)	
1,393.0	0.40	170.10	1,392.8	-5.9	2.8	2.8	0.35	-0.32	-15.11	
1,487.0	0.40	244.60	1,486.8	-6.4	2.6	2.5	0.52	0.00	79.26	
1,581.0	0.40	281.90	1,580.8	-6.4	2.0	1.9	0.27	0.00	39.68	
1,675.0	0.40	300.20	1,674.8	-6.2	1.4	1.3	0.14	0.00	19.47	
1,770.0	1.00	262.00	1,769.8	-6.1	0.3	0.2	0.77	0.63	-40.21	
1,864.0	0.90	245.90	1,863.8	-6.6	-1.2	-1.3	0.30	-0.11	-17.13	
1,958.0	1.10	247.60	1,957.8	-7.2	-2.7	-2.8	0.22	0.21	1.81	
2,052.0	1.10	260.60	2,051.8	-7.7	-4.5	-4.5	0.26	0.00	13.83	
2,146.0	0.50	251.00	2,145.8	-8.0	-5.7	-5.8	0.65	-0.64	-10.21	
2,240.0	0.50	267.00	2,239.8	-8.1	-6.5	-6.6	0.15	0.00	17.02	
2,332.0	0.40	291.60	2,331.8	-8.0	-7.2	-7.3	0.23	-0.11	26.74	
2,424.0	0.80	343.10	2,423.8	-7.3	-7.7	-7.8	0.69	0.43	55.98	
2,516.0	0.80	344.00	2,515.8	-6.1	-8.1	-8.1	0.01	0.00	0.98	
2,605.0	0.70	6.50	2,604.8	-4.9	-8.2	-8.2	0.35	-0.11	25.28	
2,695.0	0.70	6.60	2,694.7	-3.8	-8.1	-8.1	0.00	0.00	0.11	
2,784.0	0.60	355.90	2,783.7	-2.8	-8.0	-8.1	0.18	-0.11	-12.02	
2,874.0	1.10	0.50	2,873.7	-1.5	-8.1	-8.1	0.56	0.56	5.11	
2,963.0	1.00	350.30	2,962.7	0.1	-8.2	-8.2	0.24	-0.11	-11.46	
3,053.0	0.80	347.10	3,052.7	1.5	-8.5	-8.4	0.23	-0.22	-3.56	
3,143.0	0.90	345.70	3,142.7	2.8	-8.8	-8.7	0.11	0.11	-1.56	
3,232.0	1.10	322.30	3,231.7	4.2	-9.5	-9.4	0.51	0.22	-26.29	
3,322.0	1.00	313.50	3,321.7	5.4	-10.6	-10.5	0.21	-0.11	-9.78	
3,411.0	1.10	264.90	3,410.7	5.8	-12.0	-11.9	0.98	0.11	-54.61	
3,501.0	1.10	274.20	3,500.6	5.8	-13.7	-13.6	0.20	0.00	10.33	
3,591.0	1.10	281.60	3,590.6	6.1	-15.4	-15.3	0.16	0.00	8.22	
3,680.0	1.10	277.20	3,679.6	6.3	-17.1	-17.0	0.09	0.00	-4.94	
3,770.0	1.30	265.00	3,769.6	6.4	-19.0	-18.9	0.36	0.22	-13.56	
3,859.0	1.20	261.20	3,858.6	6.1	-20.9	-20.8	0.15	-0.11	-4.27	
3,949.0	1.40	253.80	3,948.5	5.7	-22.9	-22.8	0.29	0.22	-8.22	
4,039.0	1.20	251.10	4,038.5	5.1	-24.8	-24.8	0.23	-0.22	-3.00	
4,128.0	0.90	276.50	4,127.5	4.8	-26.4	-26.4	0.61	-0.34	28.54	
4,218.0	0.70	292.50	4,217.5	5.1	-27.6	-27.6	0.33	-0.22	17.78	
4,307.0	0.60	316.20	4,306.5	5.7	-28.4	-28.4	0.32	-0.11	26.63	
4,397.0	1.00	330.80	4,396.5	6.7	-29.2	-29.1	0.50	0.44	16.22	
4,487.0	1.40	332.20	4,486.5	8.4	-30.0	-30.0	0.45	0.44	1.56	
4,576.0	0.50	8.20	4,575.4	9.7	-30.5	-30.4	1.17	-1.01	40.45	
4,666.0	1.30	111.60	4,665.4	9.7	-29.5	-29.4	1.66	0.89	114.89	
4,755.0	2.10	120.50	4,754.4	8.5	-27.1	-27.1	0.94	0.90	10.00	
4,845.0	2.20	122.80	4,844.3	6.7	-24.3	-24.2	0.15	0.11	2.56	
4,935.0	2.10	124.40	4,934.3	4.9	-21.5	-21.4	0.13	-0.11	1.78	
5,024.0	1.60	113.70	5,023.2	3.5	-19.0	-18.9	0.68	-0.56	-12.02	
5,114.0	1.00	76.80	5,113.2	3.1	-17.1	-17.0	1.11	-0.67	-41.00	
5,204.0	1.00	52.50	5,203.2	3.8	-15.7	-15.6	0.47	0.00	-27.00	
5,293.0	0.90	57.40	5,292.2	4.6	-14.5	-14.4	0.14	-0.11	5.51	
5,383.0	0.90	63.40	5,382.2	5.3	-13.2	-13.2	0.10	0.00	6.67	
5,472.0	0.80	45.30	5,471.2	6.1	-12.2	-12.1	0.32	-0.11	-20.34	
5,562.0	0.90	16.50	5,561.1	7.2	-11.5	-11.5	0.48	0.11	-32.00	
5,652.0	1.10	2.40	5,651.1	8.7	-11.3	-11.2	0.35	0.22	-15.67	
5,741.0	0.70	341.30	5,740.1	10.1	-11.4	-11.3	0.58	-0.45	-23.71	
5,831.0	0.50	330.40	5,830.1	11.0	-11.8	-11.7	0.25	-0.22	-12.11	
5,920.0	0.50	301.10	5,919.1	11.5	-12.3	-12.2	0.28	0.00	-32.92	
6,010.0	0.40	339.20	6,009.1	12.0	-12.8	-12.6	0.34	-0.11	42.33	
6,100.0	0.40	297.70	6,099.1	12.5	-13.2	-13.0	0.31	0.00	-46.11	
6,188.0	0.50	261.20	6,187.1	12.5	-13.8	-13.7	0.34	0.11	-41.48	

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Site:	Loeffler K1-66-1HN Pad Sec.1-T4N-R66W	MD Reference:	WELL @ 4682.0ft (Precision 829 RKB - 16')
Well:	Loeffler K1-67-1HN	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)
6,234.0	0.40	267.10	6,233.1	12.5	-14.2	-14.0	0.24	-0.22	12.83
6,279.0	1.50	87.30	6,278.1	12.5	-13.7	-13.6	4.22	2.44	-399.56
6,324.0	6.90	92.80	6,323.0	12.4	-10.5	-10.3	12.02	12.00	12.22
6,369.0	12.10	87.30	6,367.3	12.5	-3.0	-2.9	11.72	11.56	-12.22
6,414.0	16.10	86.30	6,411.0	13.1	7.9	8.0	8.91	8.89	-2.22
6,458.0	18.00	88.90	6,453.0	13.7	20.8	20.9	4.65	4.32	5.91
6,503.0	19.30	93.50	6,495.7	13.3	35.2	35.3	4.36	2.89	10.22
6,548.0	22.90	97.20	6,537.7	11.8	51.3	51.4	8.53	8.00	8.22
6,593.0	27.30	92.90	6,578.4	10.2	70.3	70.4	10.58	9.78	-9.56
6,638.0	30.10	89.80	6,617.9	9.7	91.9	92.0	7.05	6.22	-6.89
6,682.0	32.30	89.60	6,655.5	9.8	114.7	114.8	5.01	5.00	-0.45
6,727.0	34.60	89.80	6,693.0	9.9	139.5	139.6	5.12	5.11	0.44
6,772.0	38.20	91.00	6,729.3	9.7	166.2	166.3	8.15	8.00	2.67
6,817.0	42.70	90.80	6,763.5	9.3	195.4	195.4	10.00	10.00	-0.44
6,861.0	46.60	89.60	6,794.8	9.2	226.3	226.4	9.07	8.86	-2.73
6,906.0	49.80	88.70	6,824.8	9.7	259.8	259.9	7.27	7.11	-2.00
6,951.0	52.80	88.20	6,852.9	10.6	294.9	295.0	6.72	6.67	-1.11
6,996.0	56.10	88.40	6,879.1	11.7	331.5	331.6	7.34	7.33	0.44
7,041.0	59.10	87.80	6,903.2	13.0	369.5	369.6	6.76	6.67	-1.33
7,085.0	61.30	88.70	6,925.0	14.1	407.6	407.8	5.31	5.00	2.05
7,130.0	64.70	90.50	6,945.5	14.4	447.7	447.8	8.35	7.56	4.00
7,175.0	68.90	91.70	6,963.2	13.6	489.1	489.2	9.65	9.33	2.67
7,220.0	71.30	91.90	6,978.5	12.3	531.4	531.5	5.35	5.33	0.44
7,265.0	76.10	90.50	6,991.1	11.4	574.5	574.6	11.08	10.67	-3.11
7,315.0	79.20	90.80	7,001.8	10.8	623.4	623.4	6.23	6.20	0.60
7,378.0	85.00	90.50	7,010.5	10.1	685.7	685.8	9.22	9.21	-0.48
7,423.0	85.40	90.80	7,014.3	9.6	730.6	730.6	1.11	0.89	0.67
7,468.0	85.40	90.50	7,017.9	9.1	775.4	775.5	0.66	0.00	-0.67
7,483.7	85.78	90.82	7,019.1	8.9	791.1	791.2	3.16	2.44	2.00
Loeffler K1-67-1HN Landing Pt.									
7,513.0	86.50	91.40	7,021.0	8.4	820.3	820.3	3.16	2.44	2.00
7,557.0	88.90	91.40	7,022.8	7.3	864.2	864.3	5.45	5.45	0.00
7,602.0	89.30	91.20	7,023.5	6.3	909.2	909.2	0.99	0.89	-0.44
7,692.0	91.00	90.80	7,023.3	4.7	999.2	999.2	1.94	1.89	-0.44
7,782.0	92.20	89.80	7,020.8	4.2	1,089.2	1,089.2	1.74	1.33	-1.11
7,871.0	88.70	90.30	7,020.1	4.1	1,178.2	1,178.1	3.97	-3.93	0.56
7,961.0	90.00	89.60	7,021.1	4.2	1,268.1	1,268.1	1.64	1.44	-0.78
8,051.0	91.70	88.40	7,019.8	5.8	1,358.1	1,358.1	2.31	1.89	-1.33
8,140.0	92.70	87.50	7,016.3	9.0	1,447.0	1,447.0	1.51	1.12	-1.01
8,230.0	91.00	87.70	7,013.4	12.7	1,536.9	1,536.9	1.90	-1.89	0.22
8,320.0	90.50	85.90	7,012.3	17.8	1,626.7	1,626.8	2.08	-0.56	-2.00
8,409.0	86.70	86.40	7,014.4	23.7	1,715.5	1,715.6	4.31	-4.27	0.56
8,499.0	86.00	87.30	7,020.2	28.7	1,805.1	1,805.4	1.27	-0.78	1.00
8,589.0	87.00	87.80	7,025.7	32.5	1,894.9	1,895.1	1.24	1.11	0.56
8,678.0	89.10	88.70	7,028.7	35.2	1,983.8	1,984.1	2.57	2.36	1.01
8,768.0	89.40	88.00	7,029.9	37.8	2,073.8	2,074.0	0.85	0.33	-0.78
8,857.0	90.00	91.20	7,030.3	38.4	2,162.7	2,163.0	3.66	0.67	3.60
8,947.0	90.80	90.30	7,029.7	37.3	2,252.7	2,253.0	1.34	0.89	-1.00
9,037.0	91.80	89.40	7,027.7	37.5	2,342.7	2,343.0	1.49	1.11	-1.00
9,126.0	90.90	89.80	7,025.6	38.1	2,431.7	2,431.9	1.11	-1.01	0.45
9,216.0	90.20	88.90	7,024.7	39.1	2,521.7	2,521.9	1.27	-0.78	-1.00
9,306.0	90.00	88.40	7,024.5	41.3	2,611.6	2,611.9	0.60	-0.22	-0.56
9,395.0	89.70	90.70	7,024.8	42.0	2,700.6	2,700.9	2.61	-0.34	2.58

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9,485.0	90.90	90.00	7,024.3	41.4	2,790.6	2,790.9	1.54	1.33	-0.78
9,574.0	92.30	89.30	7,021.8	42.0	2,879.6	2,879.9	1.76	1.57	-0.79
9,664.0	91.20	88.20	7,019.1	43.9	2,969.5	2,969.8	1.73	-1.22	-1.22
9,754.0	89.10	87.00	7,018.8	47.7	3,059.4	3,059.8	2.69	-2.33	-1.33
9,843.0	87.10	90.10	7,021.8	49.9	3,148.3	3,148.7	4.14	-2.25	3.48
9,933.0	87.70	91.00	7,025.9	49.1	3,238.2	3,238.6	1.20	0.67	1.00
10,022.0	89.00	91.00	7,028.4	47.5	3,327.2	3,327.5	1.46	1.46	0.00
10,111.0	91.40	91.20	7,028.1	45.8	3,416.2	3,416.5	2.71	2.70	0.22
10,201.0	90.20	89.80	7,026.9	45.0	3,506.1	3,506.4	2.05	-1.33	-1.56
10,290.0	89.30	90.50	7,027.2	44.8	3,595.1	3,595.4	1.28	-1.01	0.79
10,380.0	90.10	90.00	7,027.7	44.4	3,685.1	3,685.4	1.05	0.89	-0.56
10,470.0	90.70	90.00	7,027.1	44.4	3,775.1	3,775.4	0.67	0.67	0.00
10,559.0	90.80	88.00	7,025.9	46.0	3,864.1	3,864.4	2.25	0.11	-2.25
10,649.0	89.90	88.90	7,025.4	48.4	3,954.1	3,954.4	1.41	-1.00	1.00
10,738.0	88.90	89.60	7,026.3	49.6	4,043.1	4,043.4	1.37	-1.12	0.79
10,828.0	89.00	91.50	7,028.0	48.7	4,133.0	4,133.3	2.11	0.11	2.11
10,917.0	89.50	90.80	7,029.1	46.9	4,222.0	4,222.3	0.97	0.56	-0.79
11,007.0	90.70	90.30	7,029.0	46.0	4,312.0	4,312.3	1.44	1.33	-0.56
11,099.0	91.00	89.10	7,027.6	46.5	4,404.0	4,404.2	1.34	0.33	-1.30
11,138.0	91.40	89.30	7,026.8	47.1	4,443.0	4,443.2	1.15	1.03	0.51
11,190.0	91.40	89.30	7,025.5	47.7	4,495.0	4,495.2	0.00	0.00	0.00
Loeffler K1-67-1HN BHL 1650'FNL & 535'FEL									

Checked By: _____	Approved By: _____	Date: _____
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