

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

Well Name: **Castor Federal LD15-72HN**

Surface Location: Castor Federal LD15-72HN Pad Sec.15-T9N-R58W  
 North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

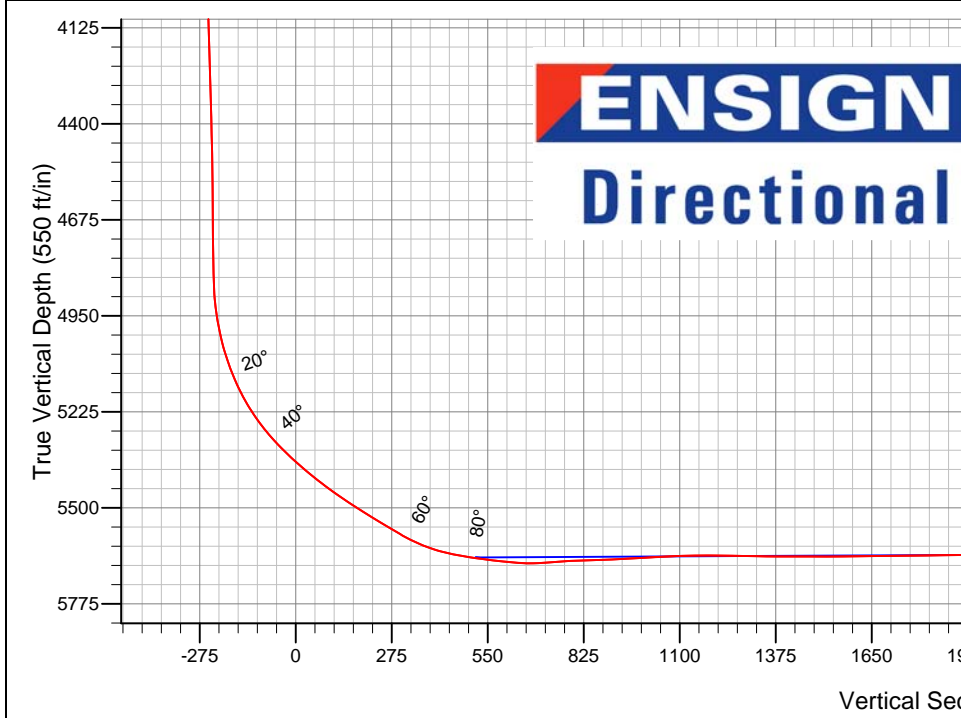
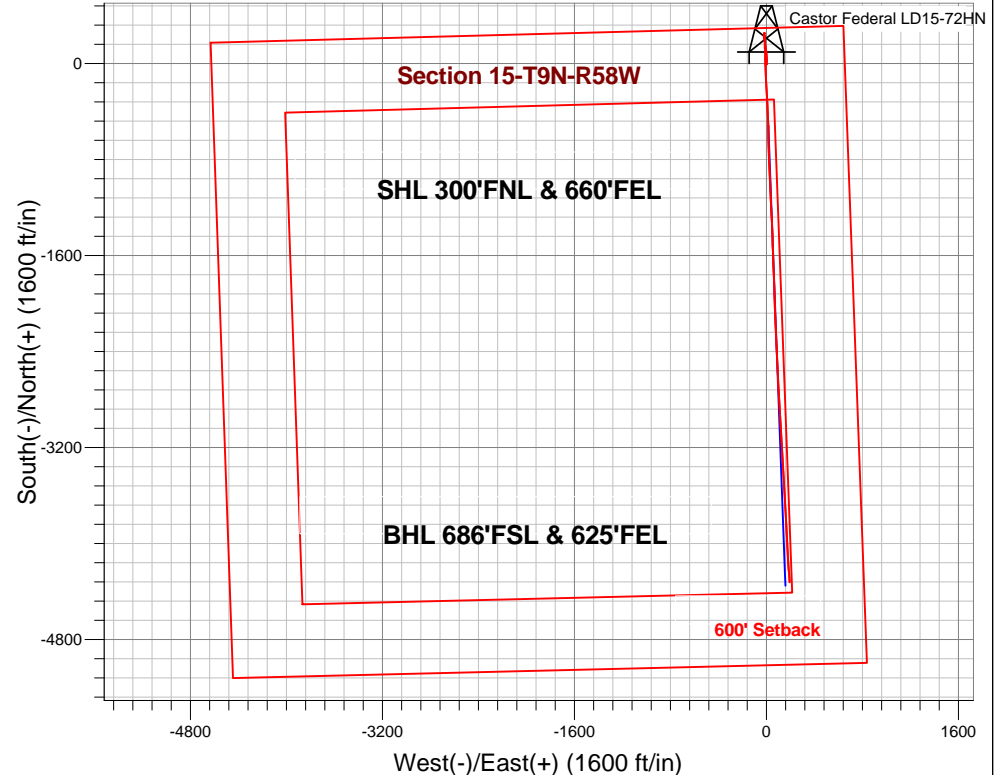
Ground Elevation: 4704.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1523221.58	3458978.90	40.757860	-103.843180	

H&P 273 RKB - 24' WELL @ 4728.0ft (H&P 273 RKB - 24')

## FINAL SURVEY

Projected Bottom Hole Location  
 9861' MD 5629' TVD 4322' S & 194' E of SHL  
 88.9 degree Incl @ 175.4 degree AZM

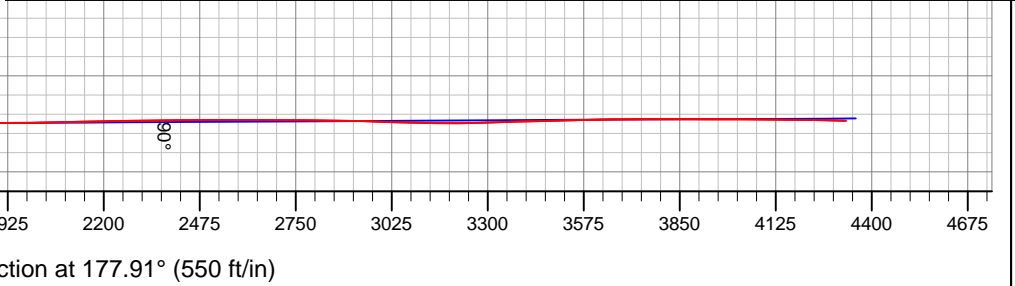


Castor Federal LD15-72HN Pad Sec.15-T9N-R58W  
 Castor Federal LD15-72HN  
 Wellbore #1  
 8:33, January 09 2014

**ANNOTATIONS**  
 No annotation data is available.

**LEGEND**

- Castor Federal LD15-72HN, Wellbore #1, Plan B - Rev 0 V0
- Castor Federal LD15-72HN, Wellbore #1, Intermediate
- Castor Federal LD15-72HN, Wellbore #1, Lateral
- Castor Federal LD15-72HN, Wellbore #1, Surface
- Wellbore #1





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

**Sec.15-T9N-R58W**

**Castor Federal LD15-72HN Pad Sec.15-T9N-R58W**

**Castor Federal LD15-72HN**

**Wellbore #1**

**Design: Wellbore #1**

## **Standard Survey Report**

**09 January, 2014**

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Castor Federal LD15-72HN
<b>Project:</b>	Sec.15-T9N-R58W	<b>TVD Reference:</b>	WELL @ 4728.0ft (H&P 273 RKB - 24')
<b>Site:</b>	Castor Federal LD15-72HN Pad Sec.15-T9N-R58W	<b>MD Reference:</b>	WELL @ 4728.0ft (H&P 273 RKB - 24')
<b>Well:</b>	Castor Federal LD15-72HN	<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.15-T9N-R58W, 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>	Castor Federal LD15-72HN Pad Sec.15-T9N-R58W				
<b>Site Position:</b>		<b>Northing:</b>	1,523,221.59 ft	<b>Latitude:</b>	40.757860
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,458,978.90 ft	<b>Longitude:</b>	-103.843180
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	"	<b>Grid Convergence:</b>	1.07 °

<b>Well</b>	Castor Federal LD15-72HN					
<b>Well Position</b>	<b>+N/-S</b>	0.0 ft	<b>Northing:</b>	1,523,221.58 ft	<b>Latitude:</b>	40.757860
	<b>+E/-W</b>	0.0 ft	<b>Easting:</b>	3,458,978.90 ft	<b>Longitude:</b>	-103.843180
<b>Position Uncertainty</b>		0.0 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	4,704.0 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	12/6/2013	8.05	67.40	53,151

<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	177.91	

<b>Survey Program</b>	<b>Date</b>	1/9/2014			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
350.0	1,200.0	Surface (Wellbore #1)	MWD	MWD - Standard	
1,279.0	6,066.0	Intermediate (Wellbore #1)	MWD	MWD - Standard	
6,159.0	9,861.0	Lateral (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	
350.0	0.30	237.50	350.0	-0.5	-0.8	0.5	0.09	0.09	0.00	
750.0	0.60	156.20	750.0	-3.0	-0.8	2.9	0.16	0.08	-20.33	
1,200.0	0.60	99.71	1,200.0	-5.5	2.5	5.6	0.13	0.00	-12.55	
1,279.0	0.20	305.10	1,279.0	-5.5	2.8	5.6	0.99	-0.51	-195.71	
1,372.0	0.20	297.90	1,372.0	-5.3	2.5	5.4	0.03	0.00	-7.74	
1,465.0	0.30	299.10	1,465.0	-5.2	2.1	5.2	0.11	0.11	1.29	
1,558.0	0.30	283.00	1,558.0	-5.0	1.7	5.0	0.09	0.00	-17.31	
1,650.0	0.30	299.10	1,650.0	-4.8	1.2	4.8	0.09	0.00	17.50	

<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Castor Federal LD15-72HN
<b>Project:</b>	Sec.15-T9N-R58W	<b>TVD Reference:</b>	WELL @ 4728.0ft (H&P 273 RKB - 24')
<b>Site:</b>	Castor Federal LD15-72HN Pad Sec.15-T9N-R58W	<b>MD Reference:</b>	WELL @ 4728.0ft (H&P 273 RKB - 24')
<b>Well:</b>	Castor Federal LD15-72HN	<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)	
1,743.0	0.20	311.10	1,743.0	-4.6	0.9	4.6	0.12	-0.11	12.90	
1,838.0	1.70	30.70	1,837.9	-3.3	1.5	3.3	1.76	1.58	83.79	
1,933.0	3.30	353.30	1,932.9	0.7	1.9	-0.6	2.32	1.68	-39.37	
2,028.0	4.80	8.90	2,027.6	7.3	2.2	-7.2	1.95	1.58	16.42	
2,123.0	6.50	1.90	2,122.2	16.6	3.0	-16.5	1.93	1.79	-7.37	
2,218.0	7.30	1.00	2,216.5	28.0	3.3	-27.9	0.85	0.84	-0.95	
2,312.0	7.90	359.40	2,309.6	40.5	3.3	-40.3	0.68	0.64	-1.70	
2,407.0	9.10	359.90	2,403.6	54.5	3.2	-54.3	1.27	1.26	0.53	
2,502.0	9.60	353.40	2,497.3	69.9	2.3	-69.7	1.23	0.53	-6.84	
2,597.0	9.40	353.60	2,591.0	85.5	0.5	-85.4	0.21	-0.21	0.21	
2,692.0	9.10	354.10	2,684.8	100.6	-1.1	-100.6	0.33	-0.32	0.53	
2,787.0	8.60	354.10	2,778.7	115.2	-2.6	-115.2	0.53	-0.53	0.00	
2,882.0	9.10	349.80	2,872.5	129.6	-4.7	-129.7	0.87	0.53	-4.53	
2,977.0	8.60	347.60	2,966.4	144.0	-7.5	-144.1	0.64	-0.53	-2.32	
3,071.0	8.60	350.50	3,059.4	157.8	-10.2	-158.0	0.46	0.00	3.09	
3,166.0	8.80	347.60	3,153.3	171.9	-12.9	-172.2	0.51	0.21	-3.05	
3,261.0	8.90	352.00	3,247.1	186.2	-15.5	-186.7	0.72	0.11	4.63	
3,356.0	8.40	358.50	3,341.0	200.5	-16.7	-200.9	1.15	-0.53	6.84	
3,451.0	8.90	358.90	3,435.0	214.7	-17.0	-215.2	0.53	0.53	0.42	
3,546.0	8.10	356.30	3,528.9	228.8	-17.6	-229.3	0.93	-0.84	-2.74	
3,641.0	6.00	359.60	3,623.2	240.4	-18.1	-240.9	2.25	-2.21	3.47	
3,736.0	3.80	6.30	3,717.8	248.5	-17.8	-249.0	2.39	-2.32	7.05	
3,830.0	2.10	16.80	3,811.7	253.2	-16.9	-253.7	1.89	-1.81	11.17	
3,925.0	1.10	215.80	3,906.7	254.2	-17.0	-254.6	3.33	-1.05	-169.47	
4,020.0	1.90	198.10	4,001.7	251.9	-18.0	-252.4	0.96	0.84	-18.63	
4,115.0	1.40	199.30	4,096.6	249.3	-18.9	-249.9	0.53	-0.53	1.26	
4,210.0	1.60	165.70	4,191.6	247.0	-18.9	-247.5	0.93	0.21	-35.37	
4,305.0	1.90	195.90	4,286.6	244.2	-19.0	-244.7	1.01	0.32	31.79	
4,400.0	2.60	228.10	4,381.5	241.2	-21.1	-241.8	1.49	0.74	33.89	
4,495.0	1.30	192.10	4,476.4	238.7	-22.9	-239.4	1.82	-1.37	-37.89	
4,589.0	0.60	148.70	4,570.4	237.3	-22.9	-237.9	1.02	-0.74	-46.17	
4,684.0	0.80	91.70	4,665.4	236.8	-21.9	-237.5	0.73	0.21	-60.00	
4,779.0	1.60	138.80	4,760.4	235.8	-20.4	-236.4	1.27	0.84	49.58	
4,871.0	1.90	125.30	4,852.4	233.9	-18.3	-234.5	0.55	0.33	-14.67	
4,966.0	8.60	169.40	4,946.9	226.0	-15.7	-226.5	7.74	7.05	46.42	
5,061.0	15.30	177.50	5,039.8	206.5	-13.9	-206.9	7.25	7.05	8.53	
5,156.0	23.00	179.80	5,129.5	175.4	-13.2	-175.8	8.14	8.11	2.42	
5,251.0	31.70	177.80	5,213.8	131.8	-12.2	-132.2	9.21	9.16	-2.11	
5,346.0	40.40	179.40	5,290.5	76.0	-10.9	-76.3	9.21	9.16	1.68	
5,441.0	48.00	178.00	5,358.6	9.8	-9.4	-10.1	8.07	8.00	-1.47	
5,535.0	51.40	177.80	5,419.4	-61.8	-6.8	61.5	3.62	3.62	-0.21	
5,630.0	56.30	176.40	5,475.4	-138.4	-2.8	138.2	5.29	5.16	-1.47	
5,725.0	58.40	177.30	5,526.7	-218.3	1.5	218.2	2.35	2.21	0.95	
5,820.0	59.60	177.10	5,575.6	-299.6	5.5	299.6	1.28	1.26	-0.21	
5,915.0	70.60	177.00	5,615.5	-385.5	10.0	385.6	11.58	11.58	-0.11	
5,950.0	75.50	176.80	5,625.7	-418.9	11.8	419.1	14.01	14.00	-0.57	
5,988.0	79.10	177.70	5,634.1	-456.0	13.5	456.2	9.75	9.47	2.37	
6,066.0	82.50	179.20	5,646.5	-532.9	15.6	533.1	4.75	4.36	1.92	
6,096.0	83.27	179.33	5,650.3	-562.7	16.0	562.9	2.62	2.58	0.43	
<b>Castor Federal LD15-72HN Landing Pt.</b>										
6,159.0	84.90	179.60	5,656.7	-625.3	16.6	625.5	2.62	2.58	0.43	
6,252.0	94.80	178.20	5,657.0	-718.2	18.4	718.4	10.75	10.65	-1.51	

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<b>Well:</b>	Castor Federal LD15-72HN	<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)
6,345.0	92.00	177.10	5,651.5	-811.0	22.2	811.2	3.23	-3.01	-1.18
6,439.0	92.40	176.80	5,647.9	-904.8	27.2	905.1	0.53	0.43	-0.32
6,534.0	93.20	177.80	5,643.2	-999.5	31.6	1,000.0	1.35	0.84	1.05
6,629.0	92.90	178.90	5,638.2	-1,094.4	34.4	1,094.9	1.20	-0.32	1.16
6,724.0	89.30	176.40	5,636.3	-1,189.2	38.3	1,189.8	4.61	-3.79	-2.63
6,819.0	88.50	176.60	5,638.2	-1,284.0	44.1	1,284.8	0.87	-0.84	0.21
6,913.0	90.40	178.50	5,639.1	-1,377.9	48.1	1,378.8	2.86	2.02	2.02
7,008.0	89.40	178.70	5,639.2	-1,472.9	50.4	1,473.8	1.07	-1.05	0.21
7,103.0	90.50	177.10	5,639.3	-1,567.8	53.9	1,568.8	2.04	1.16	-1.68
7,198.0	91.10	177.80	5,638.0	-1,662.7	58.1	1,663.8	0.97	0.63	0.74
7,293.0	90.10	178.00	5,637.0	-1,757.7	61.6	1,758.8	1.07	-1.05	0.21
7,388.0	91.20	177.70	5,635.9	-1,852.6	65.2	1,853.7	1.20	1.16	-0.32
7,482.0	89.90	177.80	5,635.0	-1,946.5	68.9	1,947.7	1.39	-1.38	0.11
7,577.0	91.60	178.00	5,633.8	-2,041.4	72.3	2,042.7	1.80	1.79	0.21
7,672.0	91.50	178.00	5,631.2	-2,136.4	75.6	2,137.7	0.11	-0.11	0.00
7,767.0	90.80	177.80	5,629.3	-2,231.3	79.1	2,232.7	0.77	-0.74	-0.21
7,862.0	90.60	177.70	5,628.1	-2,326.2	82.9	2,327.7	0.24	-0.21	-0.11
7,957.0	90.40	177.70	5,627.3	-2,421.1	86.7	2,422.7	0.21	-0.21	0.00
8,052.0	90.20	177.70	5,626.8	-2,516.0	90.5	2,517.7	0.21	-0.21	0.00
8,146.0	90.00	177.00	5,626.7	-2,609.9	94.8	2,611.7	0.77	-0.21	-0.74
8,241.0	89.70	177.00	5,626.9	-2,704.8	99.8	2,706.6	0.32	-0.32	0.00
8,336.0	89.30	176.60	5,627.7	-2,799.6	105.1	2,801.6	0.60	-0.42	-0.42
8,431.0	89.10	176.80	5,629.1	-2,894.5	110.6	2,896.6	0.30	-0.21	0.21
8,526.0	88.00	175.60	5,631.5	-2,989.2	116.9	2,991.5	1.71	-1.16	-1.26
8,592.4	88.35	176.16	5,633.6	-3,055.4	121.6	3,057.8	0.99	0.53	0.84
<b>Bradbury 1</b>									
8,621.0	88.50	176.40	5,634.4	-3,084.0	123.5	3,086.4	0.99	0.53	0.84
8,715.0	89.60	176.80	5,635.9	-3,177.8	129.1	3,180.4	1.25	1.17	0.43
8,810.0	92.00	177.00	5,634.6	-3,272.6	134.2	3,275.3	2.54	2.53	0.21
8,905.0	91.50	177.10	5,631.7	-3,367.5	139.1	3,370.3	0.54	-0.53	0.11
9,000.0	91.50	177.00	5,629.2	-3,462.3	144.0	3,465.2	0.11	0.00	-0.11
9,095.0	91.20	177.00	5,627.0	-3,557.1	148.9	3,560.2	0.32	-0.32	0.00
9,190.0	91.00	176.10	5,625.1	-3,651.9	154.7	3,655.2	0.97	-0.21	-0.95
9,285.0	89.90	177.80	5,624.4	-3,746.8	159.7	3,750.1	2.13	-1.16	1.79
9,379.0	89.90	176.60	5,624.6	-3,840.7	164.3	3,844.1	1.28	0.00	-1.28
9,474.0	90.00	177.10	5,624.6	-3,935.5	169.5	3,939.1	0.54	0.11	0.53
9,569.0	89.80	177.30	5,624.8	-4,030.4	174.2	4,034.1	0.30	-0.21	0.21
9,664.0	89.50	176.60	5,625.4	-4,125.3	179.2	4,129.1	0.80	-0.32	-0.74
9,759.0	88.90	175.70	5,626.7	-4,220.1	185.6	4,224.0	1.14	-0.63	-0.95
9,791.0	88.90	175.40	5,627.3	-4,252.0	188.1	4,256.0	0.94	0.00	-0.94
9,861.0	88.90	175.40	5,628.7	-4,321.7	193.7	4,325.9	0.00	0.00	0.00
<b>Castor Federal LD15-72HN BHL 660'FSL &amp; 660'FEL</b>									

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