

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

Well Name: Cannon W15-67-1HN

Surface Location: Cannon W15-67-1HN Pad Sec.15-T2N-R66W
 North American Datum 1983 , US State Plane 1983 Colorado Northern Zone
 Ground Elevation: 4971.0

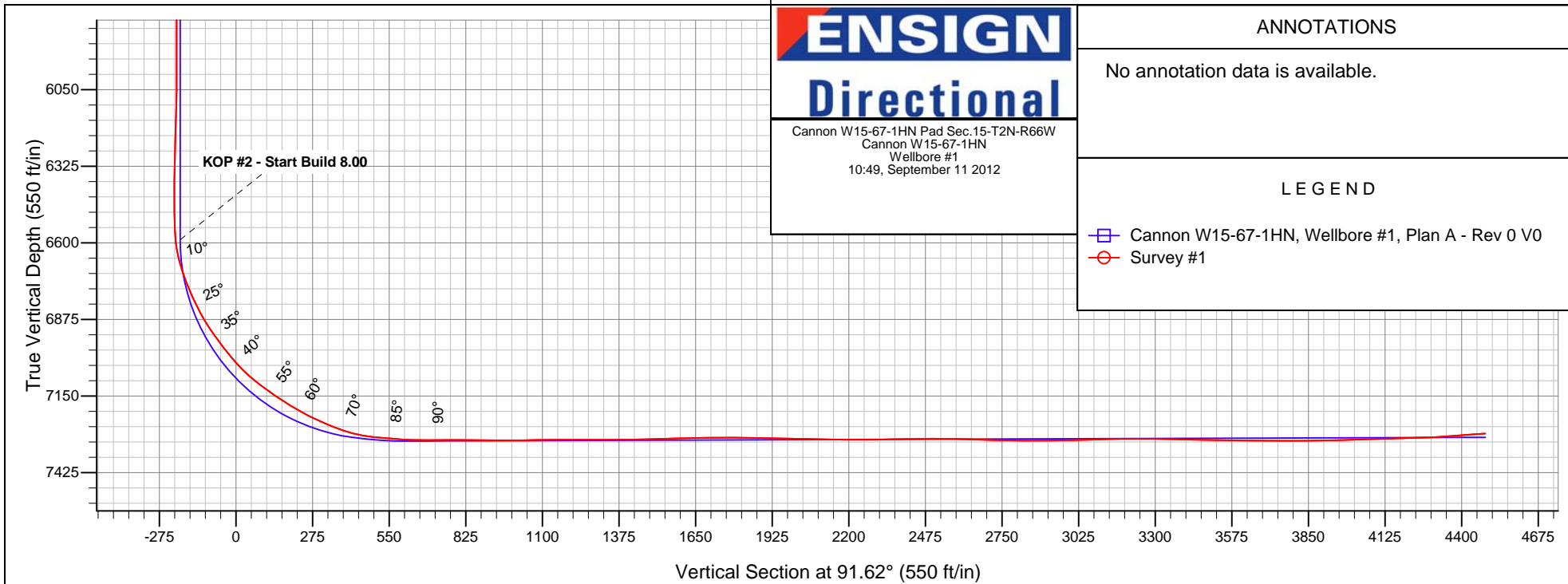
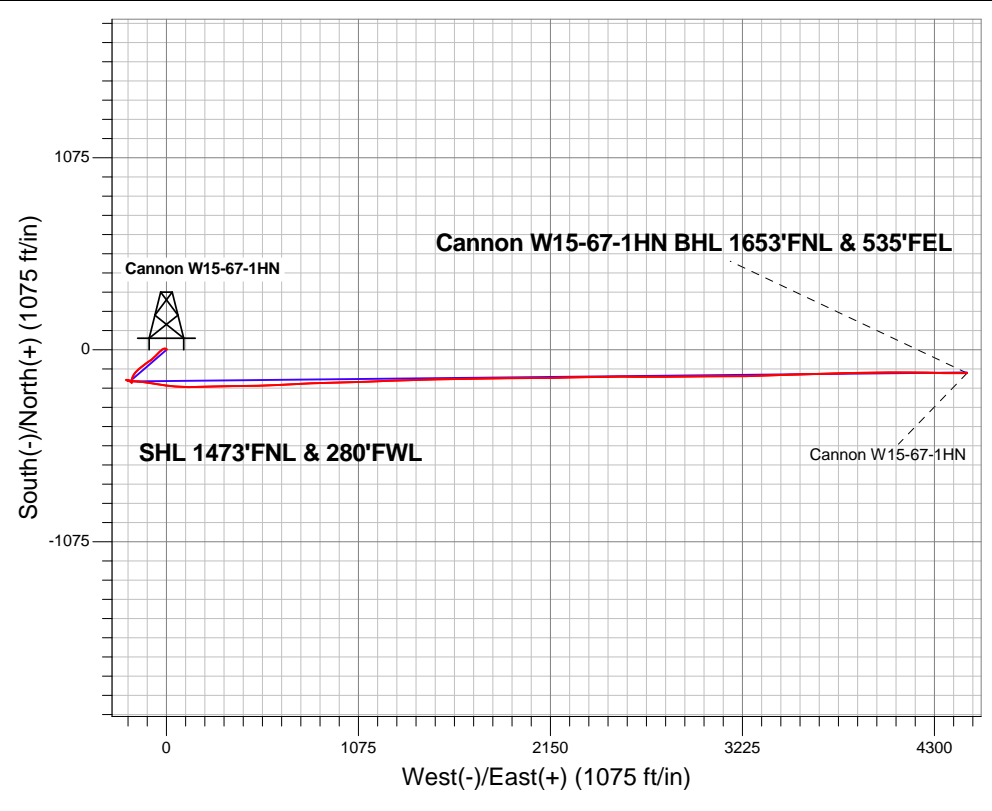
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1295169.66	3203588.34	40.141340	-104.771780	

Original Well Elev WELL @ 4984.0ft (Original Well Elev)

FINAL SURVEY

Projected Bottom Hole Location
 11682' MD 7284' TVD 130' S & 4483' E of SHL

94.10 degree Incl @ 90.10 degree AZM



ENSIGN
Directional

Cannon W15-67-1HN Pad Sec.15-T2N-R66W
 Cannon W15-67-1HN
 Wellbore #1
 10:49, September 11 2012

ANNOTATIONS

No annotation data is available.

LEGEND

- Cannon W15-67-1HN, Wellbore #1, Plan A - Rev 0 V0
- Survey #1



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

Sec.15-T2N-R66W

Cannon W15-67-1HN Pad Sec.15-T2N-R66W

Cannon W15-67-1HN

Wellbore #1

Survey: Survey #1

Standard Survey Report

11 September, 2012

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Cannon W15-67-1HN
Project:	Sec.15-T2N-R66W	TVD Reference:	WELL @ 4984.0ft (Original Well Elev)
Site:	Cannon W15-67-1HN Pad Sec.15-T2N-R66W	MD Reference:	WELL @ 4984.0ft (Original Well Elev)
Well:	Cannon W15-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	Sec.15-T2N-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	Cannon W15-67-1HN Pad Sec.15-T2N-R66W				
Site Position:		Northing:	1,295,169.67 ft	Latitude:	40.141340
From:	Lat/Long	Easting:	3,203,588.34 ft	Longitude:	-104.771780
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Cannon W15-67-1HN					
Well Position	+N/-S	0.0 ft	Northing:	1,295,169.66 ft	Latitude:	40.141340
	+E/-W	0.0 ft	Easting:	3,203,588.34 ft	Longitude:	-104.771780
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,971.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/7/2012	8.69	66.80	52,873

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	91.62	

Survey Program	Date	9/11/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
996.0	11,682.0	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	
Cannon Red W #15-6 (P&A) - Cannon Red W15-3 (Exist.) - HSR-Cannon 3-15 (Exist.) - UPRR 38 Pan Am Gas Unit H #2 (F										
996.0	0.00	0.00	996.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,022.0	0.40	48.10	1,022.0	0.1	0.1	0.1	1.54	1.54	0.00	
1,117.0	0.10	19.80	1,117.0	0.4	0.3	0.3	0.33	-0.32	-29.79	
1,211.0	0.20	8.20	1,211.0	0.6	0.4	0.4	0.11	0.11	-12.34	
1,303.0	0.40	37.80	1,303.0	1.0	0.6	0.6	0.27	0.22	32.17	
1,395.0	0.40	57.60	1,395.0	1.4	1.1	1.0	0.15	0.00	21.52	
1,487.0	0.40	356.80	1,487.0	1.9	1.3	1.3	0.44	0.00	-66.09	
1,579.0	0.90	348.50	1,579.0	3.0	1.2	1.1	0.55	0.54	-9.02	
1,671.0	1.00	322.50	1,671.0	4.3	0.5	0.4	0.48	0.11	-28.26	
1,763.0	1.10	296.00	1,763.0	5.3	-0.7	-0.9	0.53	0.11	-28.80	

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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)	
1,855.0	1.20	284.40	1,854.9	6.0	-2.5	-2.6	0.27	0.11	-12.61	
1,947.0	3.30	271.50	1,946.9	6.3	-6.0	-6.2	2.33	2.28	-14.02	
2,039.0	4.00	271.70	2,038.7	6.4	-11.9	-12.1	0.76	0.76	0.22	
2,131.0	4.50	247.30	2,130.4	5.1	-18.4	-18.6	2.02	0.54	-26.52	
2,221.0	5.20	223.90	2,220.1	0.8	-24.5	-24.5	2.31	0.78	-26.00	
2,317.0	4.80	228.60	2,315.8	-5.0	-30.6	-30.4	0.60	-0.42	4.90	
2,412.0	6.10	229.50	2,410.3	-10.9	-37.4	-37.1	1.37	1.37	0.95	
2,507.0	7.50	227.10	2,504.7	-18.4	-45.8	-45.2	1.50	1.47	-2.53	
2,603.0	9.20	222.10	2,599.6	-28.3	-55.5	-54.7	1.92	1.77	-5.21	
2,698.0	10.00	223.90	2,693.3	-39.9	-66.3	-65.2	0.90	0.84	1.89	
2,794.0	10.20	231.60	2,787.8	-51.2	-78.7	-77.3	1.42	0.21	8.02	
2,889.0	12.10	235.20	2,881.0	-62.1	-93.5	-91.7	2.13	2.00	3.79	
2,985.0	12.90	233.70	2,974.7	-74.2	-110.4	-108.3	0.90	0.83	-1.56	
3,080.0	13.50	233.70	3,067.2	-87.0	-127.9	-125.4	0.63	0.63	0.00	
3,176.0	12.80	232.20	3,160.7	-100.2	-145.3	-142.4	0.81	-0.73	-1.56	
3,271.0	12.80	227.20	3,253.4	-113.8	-161.4	-158.1	1.17	0.00	-5.26	
3,366.0	11.30	217.00	3,346.3	-128.4	-174.7	-171.0	2.74	-1.58	-10.74	
3,462.0	9.20	211.60	3,440.7	-142.4	-184.4	-180.3	2.40	-2.19	-5.63	
3,557.0	8.30	198.40	3,534.6	-155.4	-190.5	-186.1	2.31	-0.95	-13.89	
3,653.0	5.90	191.70	3,629.9	-166.8	-193.7	-188.9	2.64	-2.50	-6.98	
3,748.0	3.00	185.20	3,724.6	-174.1	-194.9	-189.9	3.09	-3.05	-6.84	
3,843.0	2.70	201.60	3,819.5	-178.6	-196.0	-190.8	0.91	-0.32	17.26	
3,938.0	2.50	136.90	3,914.4	-182.2	-195.4	-190.2	2.93	-0.21	-68.11	
4,034.0	1.10	348.90	4,010.4	-182.8	-194.1	-188.9	3.63	-1.46	-154.17	
4,129.0	1.20	355.90	4,105.4	-180.9	-194.4	-189.2	0.18	0.11	7.37	
4,224.0	1.40	349.20	4,200.3	-178.8	-194.7	-189.5	0.26	0.21	-7.05	
4,319.0	1.50	260.10	4,295.3	-177.9	-196.1	-191.0	2.14	0.11	-93.79	
4,414.0	1.10	280.70	4,390.3	-177.9	-198.2	-193.1	0.64	-0.42	21.68	
4,510.0	1.10	291.10	4,486.3	-177.4	-200.0	-194.9	0.21	0.00	10.83	
4,605.0	1.10	296.00	4,581.3	-176.7	-201.7	-196.6	0.10	0.00	5.16	
4,700.0	1.10	302.80	4,676.2	-175.8	-203.2	-198.2	0.14	0.00	7.16	
4,796.0	1.20	304.90	4,772.2	-174.7	-204.8	-199.8	0.11	0.10	2.19	
4,890.0	1.20	311.30	4,866.2	-173.5	-206.4	-201.4	0.14	0.00	6.81	
4,985.0	1.20	309.70	4,961.2	-172.2	-207.9	-203.0	0.04	0.00	-1.68	
5,080.0	1.40	303.50	5,056.2	-171.0	-209.6	-204.7	0.26	0.21	-6.53	
5,175.0	1.10	276.60	5,151.1	-170.2	-211.5	-206.6	0.68	-0.32	-28.32	
5,271.0	0.80	275.80	5,247.1	-170.0	-213.1	-208.2	0.31	-0.31	-0.83	
5,366.0	0.90	287.20	5,342.1	-169.7	-214.5	-209.6	0.21	0.11	12.00	
5,461.0	1.00	303.90	5,437.1	-169.1	-215.9	-211.0	0.31	0.11	17.58	
5,556.0	1.30	195.10	5,532.1	-169.6	-216.8	-212.0	1.98	0.32	-114.53	
5,651.0	0.80	196.50	5,627.1	-171.3	-217.3	-212.4	0.53	-0.53	1.47	
5,746.0	0.20	180.80	5,722.1	-172.1	-217.5	-212.5	0.64	-0.63	-16.53	
5,841.0	0.20	7.00	5,817.1	-172.1	-217.5	-212.5	0.42	0.00	-182.95	
5,937.0	0.40	354.30	5,913.1	-171.6	-217.5	-212.6	0.22	0.21	-13.23	
6,032.0	0.60	3.30	6,008.1	-170.8	-217.5	-212.6	0.23	0.21	9.47	
6,127.0	1.90	313.90	6,103.0	-169.2	-218.6	-213.7	1.66	1.37	-52.00	
6,222.0	2.20	268.90	6,198.0	-168.2	-221.6	-216.7	1.68	0.32	-47.37	
6,317.0	1.00	330.10	6,293.0	-167.5	-223.8	-219.0	2.03	-1.26	64.42	
6,412.0	1.60	250.10	6,387.9	-167.2	-225.5	-220.6	1.82	0.63	-84.21	
6,507.0	1.20	129.90	6,482.9	-168.3	-225.9	-221.1	2.56	-0.42	-126.53	
6,602.0	3.70	110.00	6,577.8	-170.0	-222.3	-217.4	2.74	2.63	-20.95	
6,649.0	9.80	99.80	6,624.5	-171.2	-216.9	-212.0	13.18	12.98	-21.70	
6,697.0	15.70	99.50	6,671.3	-172.9	-206.5	-201.5	12.29	12.29	-0.63	
6,792.0	22.80	93.10	6,760.9	-176.1	-175.4	-170.3	7.79	7.47	-6.74	

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Well:	Cannon W15-67-1HN	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)
6,887.0	27.50	96.80	6,846.9	-179.7	-135.2	-130.1	5.21	4.95	3.89
6,982.0	36.10	98.60	6,927.6	-186.5	-85.7	-80.4	9.11	9.05	1.89
7,029.0	38.10	99.60	6,965.0	-190.9	-57.7	-52.2	4.44	4.26	2.13
7,077.0	38.80	99.10	7,002.6	-195.8	-28.2	-22.7	1.60	1.46	-1.04
7,124.0	42.20	96.50	7,038.4	-199.9	2.0	7.7	8.08	7.23	-5.53
7,172.0	47.70	95.20	7,072.3	-203.3	35.7	41.5	11.62	11.46	-2.71
7,219.0	52.10	95.10	7,102.6	-206.6	71.5	77.3	9.36	9.36	-0.21
7,267.0	55.00	91.50	7,131.1	-208.8	110.1	115.9	8.54	6.04	-7.50
7,314.0	56.10	88.20	7,157.7	-208.7	148.8	154.7	6.24	2.34	-7.02
7,362.0	58.30	88.40	7,183.7	-207.5	189.1	194.9	4.60	4.58	0.42
7,409.0	61.10	88.20	7,207.4	-206.3	229.7	235.4	5.97	5.96	-0.43
7,457.0	64.60	88.00	7,229.3	-204.8	272.4	278.1	7.30	7.29	-0.42
7,504.0	66.70	89.10	7,248.7	-203.8	315.2	320.8	4.95	4.47	2.34
7,552.0	69.30	90.00	7,266.7	-203.4	359.7	365.3	5.69	5.42	1.88
7,599.0	74.20	88.90	7,281.4	-203.0	404.3	409.9	10.66	10.43	-2.34
7,647.0	79.90	88.60	7,292.1	-202.0	451.1	456.6	11.89	11.88	-0.63
7,677.0	83.90	88.70	7,296.4	-201.3	480.7	486.2	13.34	13.33	0.33
7,728.0	85.00	88.70	7,301.3	-200.1	531.5	536.9	2.16	2.16	0.00
7,744.0	85.70	87.70	7,302.6	-199.6	547.4	552.8	7.61	4.38	-6.25
7,786.6	85.79	88.33	7,305.8	-198.1	589.9	595.2	1.50	0.21	1.49
Cannon W15-67-1HN Landing Pt.									
7,791.0	85.80	88.40	7,306.1	-198.0	594.3	599.6	1.50	0.21	1.49
7,840.0	89.10	86.80	7,308.3	-196.0	643.2	648.5	7.48	6.73	-3.27
7,887.0	90.00	87.30	7,308.6	-193.5	690.1	695.3	2.19	1.91	1.06
7,935.0	90.00	87.00	7,308.6	-191.2	738.0	743.2	0.63	0.00	-0.63
8,030.0	90.00	88.00	7,308.6	-187.0	833.0	837.9	1.05	0.00	1.05
8,125.0	89.60	88.40	7,309.0	-184.0	927.9	932.7	0.60	-0.42	0.42
8,221.0	90.50	88.20	7,308.9	-181.2	1,023.9	1,028.6	0.96	0.94	-0.21
8,316.0	90.50	88.20	7,308.0	-178.2	1,118.8	1,123.4	0.00	0.00	0.00
8,411.0	90.80	87.70	7,307.0	-174.8	1,213.7	1,218.2	0.61	0.32	-0.53
8,506.0	89.70	88.00	7,306.6	-171.2	1,308.7	1,313.0	1.20	-1.16	0.32
8,601.0	90.10	88.00	7,306.7	-167.9	1,403.6	1,407.8	0.42	0.42	0.00
8,697.0	92.20	88.60	7,304.8	-165.1	1,499.6	1,503.6	2.27	2.19	0.63
8,792.0	91.50	89.60	7,301.7	-163.6	1,594.5	1,598.5	1.28	-0.74	1.05
8,887.0	90.40	88.90	7,300.2	-162.3	1,689.5	1,693.4	1.37	-1.16	-0.74
8,982.0	90.00	88.90	7,299.8	-160.5	1,784.4	1,788.3	0.42	-0.42	0.00
9,077.0	89.00	88.90	7,300.7	-158.7	1,879.4	1,883.2	1.05	-1.05	0.00
9,172.0	88.60	89.80	7,302.6	-157.6	1,974.4	1,978.1	1.04	-0.42	0.95
9,267.0	88.50	89.80	7,305.0	-157.3	2,069.4	2,073.0	0.11	-0.11	0.00
9,362.0	89.40	89.30	7,306.8	-156.5	2,164.3	2,167.9	1.08	0.95	-0.53
9,458.0	90.40	88.60	7,307.0	-154.8	2,260.3	2,263.8	1.27	1.04	-0.73
9,553.0	91.50	89.10	7,305.4	-152.9	2,355.3	2,358.7	1.27	1.16	0.53
9,648.0	90.00	89.60	7,304.1	-151.8	2,450.3	2,453.6	1.66	-1.58	0.53
9,743.0	90.10	89.10	7,304.1	-150.7	2,545.3	2,548.5	0.54	0.11	-0.53
9,838.0	88.00	90.70	7,305.6	-150.6	2,640.2	2,643.4	2.78	-2.21	1.68
9,933.0	88.10	90.50	7,308.9	-151.5	2,735.2	2,738.4	0.24	0.11	-0.21
10,028.0	89.90	88.20	7,310.5	-150.5	2,830.2	2,833.3	3.07	1.89	-2.42
10,124.0	90.70	89.80	7,310.0	-148.8	2,926.1	2,929.2	1.86	0.83	1.67
10,219.0	91.60	89.80	7,308.1	-148.5	3,021.1	3,024.1	0.95	0.95	0.00
10,314.0	91.50	89.80	7,305.5	-148.1	3,116.1	3,119.0	0.11	-0.11	0.00
10,409.0	90.80	89.30	7,303.6	-147.4	3,211.1	3,213.9	0.91	-0.74	-0.53
10,504.0	88.50	87.80	7,304.2	-145.0	3,306.0	3,308.8	2.89	-2.42	-1.58
10,599.0	89.10	88.60	7,306.2	-142.0	3,400.9	3,403.6	1.05	0.63	0.84

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10,695.0	89.00	88.20	7,307.8	-139.3	3,496.9	3,499.4	0.43	-0.10	-0.42
10,789.0	89.00	88.20	7,309.4	-136.4	3,590.8	3,593.3	0.00	0.00	0.00
10,884.0	89.70	87.70	7,310.5	-133.0	3,685.8	3,688.1	0.91	0.74	-0.53
10,979.0	89.80	89.40	7,310.9	-130.6	3,780.7	3,782.9	1.79	0.11	1.79
11,074.0	91.10	88.60	7,310.2	-128.9	3,875.7	3,877.8	1.61	1.37	-0.84
11,169.0	91.00	89.60	7,308.4	-127.4	3,970.7	3,972.7	1.06	-0.11	1.05
11,264.0	92.50	89.30	7,305.5	-126.5	4,065.6	4,067.6	1.61	1.58	-0.32
11,359.0	91.40	90.80	7,302.3	-126.6	4,160.6	4,162.5	1.96	-1.16	1.58
11,454.0	91.80	90.80	7,299.7	-127.9	4,255.5	4,257.4	0.42	0.42	0.00
11,549.0	94.50	91.00	7,294.4	-129.4	4,350.4	4,352.3	2.85	2.84	0.21
11,627.0	94.10	90.10	7,288.6	-130.1	4,428.1	4,430.0	1.26	-0.51	-1.15
11,681.0	94.10	90.10	7,284.7	-130.2	4,482.0	4,483.9	0.00	0.00	0.00
Cannon W15-67-1HN BHL 1650'FNL, 535'FEL									
11,682.0	94.10	90.10	7,284.7	-130.2	4,483.0	4,484.9	0.00	0.00	0.00

Checked By: _____ Approved By: _____ Date: _____