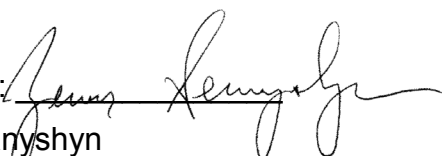
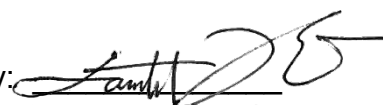



Covanta Durham York Renewable Energy Limited Partnership

Acceptance Test Report

30-DAY Reliability Test Residue Quantity Test

Approved by: 
Zenon Semanyshyn
V.P., Engineering

Submitted by: 
Lambert Xiao
Principal Operations Engineer

Approved by: 
Paul Ewald
Director, Process Engineering



This Page Intentionally Left Blank

TABLE OF CONTENTS

1 OBJECTIVE..... 1
 1.1 30-Day Reliability Test..... 1
 1.2 30-Day Residue Quantity Test..... 1

2 SUMMARY & CONCLUSIONS..... 2
 2.1 30-Day Reliability Test..... 2
 2.2 30-Day Residue Quantity Test..... 2

3 TEST PROCEDURES & MODIFICATIONS 2
 3.1 Test Modifications 2
 3.1.1 30-Day Residue Quantity Test - Residue Definition 2
 3.2 Test Procedures..... 3
 3.2.1 30-Day Reliability Test – Boiler Downtime..... 3
 3.2.2 30-Day Residue Quantity Test – Residue Weight and Collection..... 3
 3.2.3 30-Day Residue Quantity Test – Fly Ash Treatment Additives (Cement and Pozzolan)
 Delivery and Storage Silo Level Change 4
 3.2.4 30-Day Residue Quantity Test – Refuse Crane Feed Adjustment..... 4
 3.2.5 30-Day Waste HHV Estimation – Specific Steam Correlation 6
 3.2.6 30-Day Reliability Test & 30-Day Residue Quantity Test – Auxiliary Fuel Usage..... 6

4 DATA ANALYSIS & CALCULATIONS..... 6
 4.1 30-Day Reliability Test & 30-Day Residue Quantity Test - Data Collection &
 Instrument Calibration 6
 4.2 30-Day Reliability Test – Net Reference Steam Flow Calculation..... 6
 4.3 30-Day Residue Quantity Test – Bottom Ash and Un-Treated Fly Ash Quantity
 Determination 7

5 DISCUSSION 10
 5.1 Events during 37 Days of Testing 10

6 ACKNOWLEDGEMENTS..... 11

1 OBJECTIVE

1.1 *30-Day Reliability Test*

The objective of the 30-Day Reliability Test was to demonstrate the capability of the Facility to process waste and produce steam and electricity over an extended time period. The total combined steam flow from both boilers had to average at or above 95% of the Demonstrated Design Steam Flow (DDSF) of 67,280 kg/hour over the 30 days while achieving a Facility boiler availability of at least 95%. Comparisons to the DDSF were based on enthalpy corrected, 4-hour block average steam flows.

1.2 *30-Day Residue Quantity Test*

The objective of the Residue Quantity Test was to ensure the Facility met the Exhibit 2 Appendix 19 Guarantee for the total Residue generated over a 30-day period. The Residue Quantity guarantee, stated as a percentage of the Tonnage processed varies with Waste HHV as shown in Table A10-2 below and in item 4 of Exhibit 2 to Appendix 19 of the Project Agreement.

Table A10-2: Residue Guarantee Adjustment

Waste HHV	Ash Quantity
11.0 MJ/kg	33.5%
12.0 MJ/kg	31.7%
13.0 MJ/kg	30.0%
14.0 MJ/kg	28.2%
15.0 MJ/kg	26.5%

The Project Agreement defines Residue as materials remaining after the processing of waste and after metals recovery, i.e. bottom ash, grate siftings, boiler and APC fly ash, including added reagents for air pollution control purpose, i.e. hydrated lime and activated carbon. Recovered ferrous and non-ferrous metals, including recovered, over-sized, grizzly metals are not considered as part of Residue for the Residue Quantity Guarantee.

2 SUMMARY & CONCLUSIONS

The 30-Day Reliability Test and the 30-Day Residue Quantity Test were conducted in full compliance with all requirements of the environmental permit. Facility daily CEMS data are included in the Appendix.

A 7-Day (1 week) test extension was requested by the Owners on October 22, 2015. Covanta agreed to such request and extended the 30-Day Acceptance Test to 37 days which commenced on 00:00, September 27, 2015 and ended on 24:00, November 2, 2015.

2.1 30-Day Reliability Test

A 30-Day Reliability Test was performed starting 00:00 on September 27, 2015 and ending 24:00 on October 26, 2015. During the 30-Day test period, the total combined enthalpy corrected steam flow from both boilers averaged 68,359 kg/hour, which was 101.6% of the Demonstrated Design Steam Flow of 67,280 kg/hour, higher than the 95% steam flow requirement. None of the 4-hour average steam flows from either boiler during the 30-Day test period was higher than 110% of the highest 4-hour average measured steam flow during the Energy Recovery Tests. The Facility achieved a 99.93% average boiler availability which was above the 95% guarantee. Thus the Reliability of the Facility has been successfully demonstrated.

2.2 30-Day Residue Quantity Test

A 30-Day Residue Quantity Test was conducted starting 00:00 on September 27, 2015 and ending 24:00 on October 26, 2015. The test residue quantity was 26.7% of the Tonnage processed compared to a residue quantity guarantee of a maximum of 29.4% at the 30-Day average waste HHV of 13,327 kJ/kg (5,730 BTU/Lb). Consequently, the 30-Day Residue Quantity Guarantee has been met.

3 TEST PROCEDURES & MODIFICATIONS

The 30-Day Reliability and the 30-Day Residue Quantity Tests were performed in accordance with the Covanta Durham York Renewable Energy Limited Partnership ("Covanta") Acceptance Test Procedures issued in June 2014. The procedures governing these tests were agreed to by the Owners and their consulting Engineer, HDR Inc ("HDR"). Modifications made to these test procedures are described below. The original test procedure is included in the Appendix.

3.1 Test Modifications

3.1.1 30-Day Residue Quantity Test - Residue Definition

There was one modification to the test procedures concerning the 30-Day Residue Quantity Test. It was recognized that contrary to the Project Agreement definitions, the test procedures

had incorrectly defined Residue to include the Fly Ash treatment materials of cement, pozzolan and water. Cement, pozzolan and water consumption calculations are described in section 4.3. Total treated Fly Ash and Bottom Ash leaving the Facility minus the cement, pozzolan and water consumption for the 30-Day test period yields the 30-Day Residue quantity.

3.2 Test Procedures

3.2.1 30-Day Reliability Test – Boiler Downtime

During the 30-Day Reliability Test period, there was 1 hour of declared boiler downtime on Boiler 2 on October 26, 2015 between 14:05 and 15:05. The cause for this 1 hour downtime was a feed chute plug. Refuse feed was resumed as soon as the plug was cleared by the Facility operations personnel. Natural gas auxiliary burner was put in service for approximately two and half hours. This 1 hour was the only boiler downtime during the extended 37-Day Acceptance Test time period.

3.2.2 30-Day Residue Quantity Test – Residue Weight and Collection

For the 30-Day Residue Quantity Test, all bottom ash and treated fly ash were weighed on the Facility certified truck scale before they were shipped out from the Facility. Occasionally, in order to accommodate different test residue, the ash container had to be partially loaded and weighed first, then returned to the residue building to be fully filled. These “intermediate” weights were not reflected on the daily scale house Customer / Material Report which is included in the Appendix, however they were witnessed by Covanta test personnel and recorded by pictures of the scale display. All pictures were forwarded to the Owners Engineer HDR along with other test data.

The 30-Day Residue Quantity Test commenced 00:00 on September 27, 2015 and concluded 24:00 on October 26, 2015, residue collection for both bottom and fly ash was 1 hour after the test start and the end. The 1 hour lag time was to allow the waste to travel through the combustion system to reach the residue building. Prior to the test residue collection start time, the bottom ash bay was cleared to receive only the “test ash”, non-test ash was moved to the other storage bay by front end loader. At the end of the test, similar activities were performed to promptly transfer the “test ash” to the adjacent storage bay and subsequently separated the “test bottom ash” from the “non-test bottom ash”.

The Facility is equipped with two (2) fly ash conveyors and two (2) surge bins in the fly ash treatment system. Typically only one (1) conveyor and bin is required during normal operation while the other one shall be on standby. Prior to the 30-Day Residue Quantity Test start time, one (1) of two (2) fly ash surge bins was emptied before 01:00 to be ready to accept the “test fly ash”, at 01:00 the fly ash conveyor and the diverter was promptly switched to the empty surge bin to receive only the “test fly ash”. The “test fly ash” was not mixed with cement, pozzolan and water until the leftover “non-test fly ash” already in the bin was completely processed and transferred to the other bay first. At the end of the test, one (1) of the surge bins had to be run empty before the switch over. At 01:00 the fly ash conveyor and the diverter were switched to the empty surge bin to collect the “post-test fly ash”. The “test fly ash” already accumulated in the bin was processed continuously without interruption until the surge bin was completely run

out. Then the fly ash, cement, pozzolan and water mixture in the bay underneath the pug mill was moved to a different bay for treatment maturation. This procedure ensured that only the “test fly ash” was collected for the 30-Day Residue Quantity Test.

To ensure no excessive fly ash buildup in the boilers, the soot blowing and the fly ash hopper dumping schedules were kept at normal operation intervals at the beginning and the end of the 30-Day Residue Quantity Test.

3.2.3 30-Day Residue Quantity Test – Fly Ash Treatment Additives (Cement and Pozzolan) Delivery and Storage Silo Level Change

Cement and pozzolan deliveries, the additives used to treat boiler and APC fly ash, were all weighed on the Facility certified truck scale before and after the unloading. The deliveries recorded on the scale house Customer / Material Report in conjunction with the storage silo level change adjustments were used in the calculation to determine the 30-Day cement and pozzolan consumption. The silo levels were manually recorded approximately at 07:00 every day by the Facility operations personnel. The silo level change adjustment calculation used to estimate cement and pozzolan usage are detailed in the “Data Analysis and Calculations” section (Section 4.3).

Water used in the mixing of fly ash, cement and pozzolan was estimated as being 45% by weight of the sum of the cement and the pozzolan weight. Supporting information is included in Section 4.3.

3.2.4 30-Day Residue Quantity Test – Refuse Crane Feed Adjustment

The waste throughput data for the 30-Day Residue Quantity Test was adjusted for crane calibration deviation. During the 30-Day test period, 62 and 60 crane span checks were performed on Crane 1 (east) and Crane 2 (west), respectively. Two (2) additional span checks on each crane were included in the averages to overlap the hours before the first and after the last crane span check within the 30-Day test period. The crane span check data sheet is included in the Appendix. Two (2) span checks were skipped on Crane 2 (west) due to a power failure to the crane which occurred on October 9 and lasted into October 10, 2015. The crane returned to service after the repair on October 10, 2015.

For Crane 1 (east), 60 out of the 62 span checks, the displayed weights were higher than the reference weight with only 2 span checks slightly lower than the reference weight. The deviations ranged from -12.7 kg to +94.0 kg with an average of +49.2 kg, or +1.24% of the reference weight.

For Crane 2 (west), all 60 span checks the displayed weights were consistently lower than the reference weight ranging from -21.0 kg to -112.7 kg with an average of -54.0 kg, or -1.37% of the reference weight.

The absolute values of the average deviations for both cranes were less than 68 kg, within the limit specified in the test procedure. However, corrections to the waste throughput for the crane span check deviations were made to provide a higher level of accuracy in the waste throughput

quantity.

30-Day Residue Quantity Test - Crane Span Check Deviation
9/27/2015 00:00 - 10/26/2015 24:00

	Crane Span Check Count	Reference Weight (Concrete Block & Shackles)	Crane Weighing System Reading (Average)	Average Deviation	% of Average Deviation	Maximum Deviation	Minimum Deviation
	Count	kg	kg	kg	%	Kg	Kg
Crane 1 (East)	62	3,966	4,015.2	49.2	1.24%	94.0	-12.7
Crane 2 (West)	60	3,926	3,872.0	-54.0	-1.37%	-21.0	-112.7

For the 30-Day Residue Quantity Test, Crane 1 (east) fed both boilers 1,991 times, the average grapple load was 1,789 kg. Crane 2 (west) was used 5,410 times to feed the boilers with an average grapple load of 1,799 kg.

It was then determined the actual adjustment factors for Crane 1 (east) was -0.56% (1,789 / 3,966 * -1.24%), and +0.63% (1,799 / 3,926 * +1.37%) adjustment factor for Crane 2 (west). The net overall adjustment for both cranes combined was +0.31%. This adjustment resulted in a net 41,348 kg increase in waste throughput quantity.

A detailed 30-Day waste quantity throughput adjustment is tabulated in the below table.

30-Day Residue Quantity Test - Crane Feed Adjustment
9/27/2015 00:00 - 10/26/2015 24:00

	Unit	Crane 1 (East)	Crane 2 (West)	Total / Average / Net
Crane Feed by Crane Weighing System	kg	3,562,240	9,731,035	13,293,275
Crane Feed Count	Count	1,991	5,410	7,401
Average Crane Load per Feed	kg/feed	1,789	1,799	1,796
Crane Span Check Reference Weight	kg	3,966	3,926	
Average Load Percent of Span Weight	%	45.1%	45.8%	
Crane Span Check Deviation	%	+1.24%	-1.37%	
Crane Feed Adjustment Factor	%	-0.56%	+0.63%	
Crane Feed Adjustment	kg	-19,942	+61,290	+41,348
Adjusted Crane Feed	kg	3,542,298	9,792,325	13,334,623
Percentage of Net Adjustment	%			+0.31%

A total of 13,334,623 kg (13,334.6 tonnes) of MSW was processed during the 30-Day Residue Quantity Test. 13,293,275 kg (13,293.3 tonnes) of waste processed was reported by the crane weighing system before the crane span deviation adjustment.

3.2.5 30-Day Waste HHV Estimation – Specific Steam Correlation

A theoretical specific steam correlation between the waste HHV and steam heat output was developed using the design boiler operating parameters and several typical waste ultimate analyses prior to the Acceptance Test. This theoretical specific steam correlation was then validated by the five (5) 8-hour Energy Recovery Test results. An individual daily waste HHV for the 30-Day Residue Quantity Test period was then determined using this validated specific steam correlation. This is the same correlation applied in the 5-Day Throughput, Residue Quantity and Quality Test. The specific steam correlation development as well as the validation calculations were described in the 5-Day Throughput, Residue Quantity and Quality Test report. The 30-Day average waste HHV was determined to be 13,327 kJ/kg (5,730 BTU/Lb). Daily waste HHV determinations are included at the end of this report.

3.2.6 30-Day Reliability Test & 30-Day Residue Quantity Test – Auxiliary Fuel Usage

During the 30-Day Reliability and the 30-Day Residue Quantity Test, auxiliary natural gas had to be utilized to maintain environmental permit conditions as well as the environmental emission target. Steam generated by natural gas during the test period was accounted for and excluded from both boilers' daily steam production totals which were used in the daily waste HHV determination and the 4-hour average reference steam flow for Demonstrated Design Steam Flow (DDSF) comparison. It was previously agreed between Covanta and HDR that an 85% boiler efficiency would be applied when calculating steam from the natural gas combustion. The auxiliary natural gas heat input was approximately 0.18% of the total heat input from the MSW and the natural gas firing during the 30-Day test period. Calculations for the daily waste HHV determination and the 4-hour reference steam flow are included at the end of this report.

4 DATA ANALYSIS & CALCULATIONS

4.1 30-Day Reliability Test & 30-Day Residue Quantity Test - Data Collection & Instrument Calibration

For the 30-Day Reliability Test and the 30-Day Residue Quantity Test, the required process data was recorded at 1-minute intervals using the ABB distributed control system (DCS). All 37-Day (including the 7 days extension) daily 1-minute DCS data in electronic format along with other test data were forwarded to the Owner's Engineer, HDR Inc.

Critical instruments used to measure test data were calibrated two weeks prior to the Acceptance Test commencement on September 27, 2015. The instrument calibration record was forwarded to the Owner's Engineer, HDR Inc. before the test start and is included in the Appendix.

4.2 30-Day Reliability Test – Net Reference Steam Flow Calculation

For the 30-Day Reliability Test, the actual steam flows had to be corrected to the MCR design

condition for comparison with the Demonstrated Design Steam Flow (DDSF). Steam generated from auxiliary natural gas firing also had to be subtracted from the gross reference steam flow to produce the net reference steam flow. The calculated net reference steam flows were used to compare to the DDSF whether the Facility satisfied the minimum 95% steam capacity requirement. During the 30-Day test period, the sum of the net reference steam flow from both boilers were 68,359.4 kg/hour, or 101.6% of the Demonstrated Design Steam Flow. Detailed calculations are tabulated in the following table. Since the actual steam and feedwater condition during the 30-Day test period was very close to the MCR design parameters, the enthalpy correction for the actual steam flow was minimum, approximately +0.35%.

The 4-hour average net reference steam flow calculation for each individual boiler as well as the steam flow trend for the 30-Day test period are also included at the end of this report.

30-Day Reliability Test

9/27/2015 00:00 - 10/26/2015 24:00		Reference (MCR)	Boiler 1	Boiler 2	Average
Average Actual Steam Flow	kg/hour	33,640	34,117.2	34,139.6	
Average FW Temperature	°C	135.0	136.1	135.9	
Average FW Pressure	bar-g	96.5	100.7	100.9	
FW Enthalpy	kJ/kg	574.1	578.9	578.4	
Average Steam Temperature	°C	499.0	503.6	504.7	
Average Steam Pressure	bar-g	89.6	88.4	88.4	
Steam Enthalpy	kJ/kg	3,384.0	3,397.1	3,399.7	
MS Enthalpy - FW Enthalpy	kJ/kg	2,809.9	2,818.2	2,821.4	
Gross Steam Heat Output	MJ/hour	94,526.3	96,149.5	96,319.5	
Gross Reference Steam Flow	kg/hour	33,640	34,217.7	34,278.2	
Average Aux Natural Gas Heat Input	MJ/hour	0	279.74	171.04	
Assumed Boiler Efficiency - Nat. Gas Firing	%		85%	85%	
Average Aux Natural Gas Heat Output	MJ/hour	0	237.78	145.38	
Reference Steam Flow from Aux Nat. Gas	kg/hour	0	84.62	51.74	
Net Reference Steam Flow from MSW	kg/hour	33,640	34,133.0	34,226.4	
Percent of MCR Steam Flow	%		101.5%	101.7%	101.6%

4.3 30-Day Residue Quantity Test – Bottom Ash and Un-Treated Fly Ash Quantity Determination

For the 30-Day Residue Quantity Test, additives for fly ash treatment including cement, pozzolan and water had to be determined to subtract from the total treated fly ash quantity.

The following table details the cement, pozzolan and water quantities used to treat the fly ash during the 30-Day Residue Quantity Test.

During the 30-Day test period, the total cement and pozzolan consumptions were determined by deliveries and adjusted for storage silo level change at the beginning and the end of the test. There were six (6) cement deliveries totaling 245.79 tonnes. Silo level change reduced the cement consumption by 26.38 tonnes (10.7% of the cement received). Pozzolan was delivered five (5) times totaling 184.37 tonnes. Silo level change increased the pozzolan consumption by 7.18 tonnes (4.7% of the pozzolan received). The cement and pozzolan bulk density used in the silo level adjustment calculations were 1,505.7 kg/m³ (94 Lb/ft³) and 1,345.6 kg/m³ (84 Lb/ft³), respectively, identical to the densities applied in the 5-Day Throughput, Residue Quantity and Quality Test report. Facility scale house Customer / Material Reports and Facility Portland Cement and or Slag Delivery Checklist that contained the cement and pozzolan deliveries are included in the Appendix.

It was assumed that the ratio of the weight of water to the weight of cement and pozzolan is 0.45. Cement hardens as a result of the chemical reaction between cement and water (known as hydration). For every kilogram of cement, 0.42 kilogram of water is needed to fully complete the hydration reactions. However a mix with a ratio of 0.42 may not mix thoroughly, water-cement and pozzolan ratios of 0.45 to 0.60 are more typically used. Consequently, a conservative ratio of the water to the weight of cement and pozzolan of 0.45 (45%) was applied to yield the estimated water addition to the fly ash treatment process.

30-Day Residue Quantity Test

9/27/2015 00:00 - 10/26/2015 24:00

Residue Collection Period: 9/27/2015 01:00 - 10/27/2015 01:00

Waste Processed		
Waste Processed - by Crane Weighing System	Tonne	13,293.28
Waste Processed - adjusted by Crane Scale Deviation	Tonne	13,334.62
Total Residue Shipped		
Total Bottom Ash Quantity - by Truck Scale	Tonne	2,648.73
Total Treated Fly Ash Quantity - by Truck Scale	Tonne	1,505.79
Total Combined Residue Shipped - by Truck Scale	Tonne	4,154.52
Additives for Fly Ash Treatment		
Cement Delivered - by Truck Scale (6 Deliveries)	Tonne	245.79
Cement Silo Level @ 0700 9/27/2015 (from Bottom)	meter	1.9
Cement Silo Level @ 0700 10/27/2015 (from Bottom)	meter	4.4
Cement Silo Inner Diameter - from drawing	meter	2.987
Cement Density (94 Lb/cu ft)	kg/m3	1,505.7
Cement Silo Inventory Change - Calculated	Tonne	-26.38
Total Cement Consumed for 30 Days	Tonne	219.41
Pozzolan Delivered - by Truck Scale (5 Deliveries)	Tonne	184.37
Pozzolan Silo Level @ 0700 9/27/2015 - Start (from Bottom)	meter	2.6
Pozzolan Silo Level @ 0700 10/27/2015 - End (from Bottom)	meter	2.1
Pozzolan Silo Inner Diameter - from Drawing	meter	3.687
Pozzolan Density	kg/m3	1,345.6
Pozzolan Silo Inventory Change - Calculated	Tonne	7.18
Total Pozzolan Consumed for 30 Days	Tonne	191.55
Water Addition for Cement & Pozzolan Hydration - by Wikipedia	%	45%
Total Water Addition for Fly Ash Treatment	Tonne	184.93
Total Additives for Fly Ash Treatment (Cement, Pozzolan & Water)	Tonne	595.89
Total Un-treated Fly Ash Quantity (Net of Shipped and Additives)	Tonne	909.90
Total Bottom Ash and Un-treated Fly Ash Quantity	Tonne	3,558.63
Residue Percentage	%	26.7%
Average Waste HHV for the 30-Day Test Period	MJ/kg	13.327
Residue Quantity Guarantee Corresponding to Average HHV	%	29.4%

5 DISCUSSION

5.1 *Events during 37 Days of Testing*

The Facility operated extremely well over the 37-Day test period with the following minor occurrences:

On October 5, 2015, several high HHV CO spikes occurred around 16:50 resulting in 3 consecutive hours (17:00 – 20:00) of the 4-hour CO rolling average to be within permit requirements, but slightly higher than the 40 mg/Rm³ operational target.

The following 3 events stemmed from a faulty drum level switch. The switch was repaired on October 21, 2015 and has been functioning properly since.

- On October 18, 2015, approximately at 20:52, a malfunctioned Boiler 2 drum level switch sent a high-high drum level signal to the DCS, as a result, the turbine was tripped automatically.
- On October 19, 2015 around 07:50, Boiler 2 tripped on drum level low low signal while Facility instrument and control technician serviced the drum level switch which malfunctioned the previous night.
- On October 21, 2015 16:55, the Facility lost the turbine on Boiler 2 high high drum level while maintenance crews serviced the instrument.

On October 29, 2015 at 10:24, the Facility handled a full load rejection to in-house load when utility tie was opened by the utility. The turbine re-synchronized to grid at 10:50, in less than 30 minutes. It was suspected that high wind might have caused the unstable situation.

6 ACKNOWLEDGEMENTS

The Energy Recovery Tests were conducted by Covanta and witnessed by the Owner's Engineer, HDR. The participants and representatives, especially the plant staff, are gratefully acknowledged for their assistance and cooperation throughout the 37-Day test program.

HDR Inc.

John Clark
Bruce Howie
Greg Gesell
Donald (Mike) Singler
Jeff Martirano
Ryan Lichtman
Daniel Domatto

Covanta

Matt Neild
Jigar Vyas
Ken Coatham

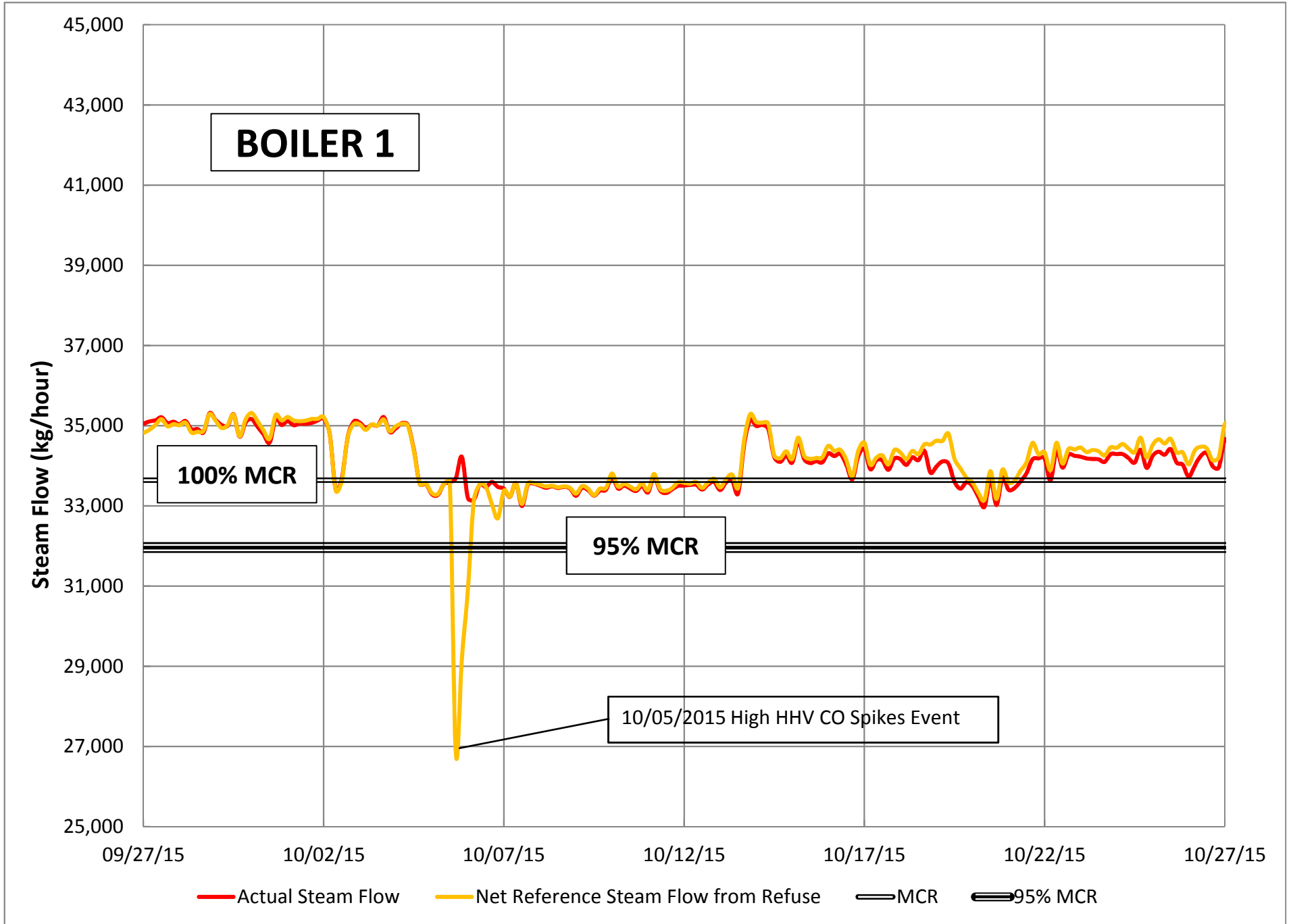
Stephen DeDuck
Lambert Xiao
Gregory Rodia
Shelly Seow
Andy Lang
William Marsden
Peter Tinaburri

Covanta Durham York
30-Day Reliability Test - Boiler 1 Net Reference Steam Flow Calculation

Reference Values	Average / Total																
	34,133	101.5%	708														
Hour start (4-Hour Block)	Actual Steam Flow	FW temp	Steam temp	FW Press	Steam Press	Aux fuel flow	Steam Enthalpy	FW Enthalpy	MS-FW Enthalpy	Gross Steam Output	Gross Reference Stm Flow	Aux Heat Input	Aux Heat Output	Aux Reference Steam Flow	Net Reference Steam Flow from Refuse	% of MCR	4-Hr >= 95% ? 1=Yes, 0=No.
	kg/hr	°C	°C	bar-g	bar-g	m3/min	kJ/kg	kJ/kg	kJ/kg	MJ/hr	kg/hr	MJ/hr	MJ/hr	kg/hr	kg/hr	%	
9/27/15 0:00	35,044	138.5	497.2	101.4	88.4	0.01	3,380.8	589.1	2,791.7	97,833	34,817	0	0	0	34,817	103.5%	1
9/27/15 4:00	35,106	138.4	497.6	101.7	88.4	0.01	3,381.9	588.7	2,793.2	98,059	34,897	0	0	0	34,897	103.7%	1
9/27/15 8:00	35,133	138.4	500.6	101.1	88.4	0.01	3,389.5	588.6	2,800.9	98,404	35,020	0	0	0	35,020	104.1%	1
9/27/15 12:00	35,209	138.1	502.4	101.5	88.5	0.01	3,393.9	587.7	2,806.2	98,802	35,162	0	0	0	35,162	104.5%	1
9/27/15 16:00	35,063	138.2	501.4	101.3	88.4	0.01	3,391.7	588.1	2,803.6	98,301	34,983	0	0	0	34,983	104.0%	1
9/27/15 20:00	35,097	138.3	502.1	101.4	88.4	0.01	3,393.2	588.2	2,805.0	98,449	35,036	0	0	0	35,036	104.2%	1
9/28/15 0:00	35,034	138.2	503.2	101.6	88.4	0.01	3,396.1	588.0	2,808.1	98,378	35,011	0	0	0	35,011	104.1%	1
9/28/15 4:00	35,115	138.2	502.6	101.6	88.4	0.01	3,394.7	587.9	2,806.8	98,562	35,076	0	0	0	35,076	104.3%	1
9/28/15 8:00	34,908	138.2	501.5	101.3	88.4	0.01	3,391.8	588.1	2,803.7	97,870	34,830	0	0	0	34,830	103.5%	1
9/28/15 12:00	34,916	138.2	501.7	101.5	88.4	0.01	3,392.3	588.0	2,804.3	97,915	34,846	0	0	0	34,846	103.6%	1
9/28/15 16:00	34,832	138.2	505.1	101.6	88.4	0.01	3,400.8	587.9	2,812.9	97,978	34,868	0	0	0	34,868	103.7%	1
9/28/15 20:00	35,311	138.3	503.4	101.8	88.4	0.01	3,396.6	588.3	2,808.2	99,161	35,289	0	0	0	35,289	104.9%	1
9/29/15 0:00	35,144	138.5	503.9	101.9	88.4	0.01	3,397.9	589.3	2,808.5	98,705	35,127	0	0	0	35,127	104.4%	1
9/29/15 4:00	35,019	138.2	501.5	101.5	88.4	0.01	3,391.9	588.1	2,803.8	98,187	34,943	0	0	0	34,943	103.9%	1
9/29/15 8:00	34,994	137.2	502.9	101.4	88.4	0.01	3,395.2	583.9	2,811.3	98,381	35,012	0	0	0	35,012	104.1%	1
9/29/15 12:00	35,285	135.8	499.5	101.2	88.4	0.01	3,386.7	577.6	2,809.1	99,119	35,274	0	0	0	35,274	104.9%	1
9/29/15 16:00	34,726	135.8	500.1	101.1	88.4	0.01	3,388.3	577.7	2,810.6	97,601	34,734	0	0	0	34,734	103.3%	1
9/29/15 20:00	35,077	136.0	502.4	101.0	88.4	0.01	3,394.1	578.4	2,815.7	98,766	35,149	0	0	0	35,149	104.5%	1
9/30/15 0:00	35,165	136.0	505.0	101.4	88.4	0.01	3,400.6	578.6	2,822.0	99,236	35,316	0	0	0	35,316	105.0%	1
9/30/15 4:00	34,968	135.9	504.5	101.1	88.4	0.01	3,399.5	578.2	2,821.4	98,656	35,110	0	0	0	35,110	104.4%	1
9/30/15 8:00	34,781	136.1	503.4	101.1	88.4	0.01	3,396.6	579.1	2,817.4	97,994	34,874	0	0	0	34,874	103.7%	1
9/30/15 12:00	34,578	136.1	503.5	101.2	88.4	0.01	3,396.8	579.2	2,817.7	97,428	34,673	0	0	0	34,673	103.1%	1
9/30/15 16:00	35,172	136.1	503.3	101.6	88.4	0.01	3,396.3	578.9	2,817.4	99,092	35,265	0	0	0	35,265	104.8%	1
9/30/15 20:00	35,016	136.1	504.1	101.1	88.4	0.01	3,398.2	579.1	2,819.2	98,717	35,131	0	0	0	35,131	104.4%	1
10/1/15 0:00	35,116	136.0	503.4	101.6	88.4	0.01	3,396.6	578.8	2,817.8	98,952	35,215	0	0	0	35,215	104.7%	1
10/1/15 4:00	35,011	136.0	503.9	101.3	88.4	0.01	3,397.9	578.6	2,819.3	98,707	35,128	0	0	0	35,128	104.4%	1
10/1/15 8:00	35,051	136.2	502.5	101.1	88.4	0.01	3,394.3	579.4	2,814.9	98,666	35,113	0	0	0	35,113	104.4%	1
10/1/15 12:00	35,044	136.2	503.2	101.2	88.4	0.01	3,396.0	579.6	2,816.3	98,696	35,124	0	0	0	35,124	104.4%	1
10/1/15 16:00	35,068	136.1	503.6	101.5	88.4	0.01	3,396.9	579.2	2,817.7	98,813	35,165	0	0	0	35,165	104.5%	1
10/1/15 20:00	35,128	136.1	501.7	101.9	88.4	0.01	3,392.2	579.0	2,813.3	98,825	35,170	0	0	0	35,170	104.5%	1
10/2/15 0:00	35,173	136.0	501.6	102.0	88.4	0.01	3,391.9	578.6	2,813.2	98,950	35,214	0	0	0	35,214	104.7%	1
10/2/15 4:00	34,800	136.3	500.5	100.9	88.4	0.01	3,389.4	579.7	2,809.7	97,778	34,797	0	0	0	34,797	103.4%	1
10/2/15 8:00	33,408	136.2	500.5	101.6	90.0	0.01	3,387.4	579.7	2,807.7	93,801	33,382	0	0	0	33,382	99.2%	1
10/2/15 12:00	33,653	136.4	499.7	101.0	88.9	0.01	3,386.7	580.5	2,806.2	94,437	33,608	0	0	0	33,608	99.9%	1
10/2/15 16:00	34,716	136.6	501.1	101.0	88.4	0.01	3,390.8	581.1	2,809.7	97,542	34,713	0	0	0	34,713	103.2%	1
10/2/15 20:00	35,099	137.4	500.6	101.2	88.4	0.01	3,389.6	584.7	2,804.9	98,450	35,036	0	0	0	35,036	104.2%	1
10/3/15 0:00	35,078	137.3	500.9	101.3	88.5	0.01	3,390.3	584.1	2,806.2	98,436	35,031	0	0	0	35,031	104.1%	1
10/3/15 4:00	34,941	137.4	501.1	101.6	88.4	0.01	3,390.7	584.5	2,806.2	98,049	34,894	0	0	0	34,894	103.7%	1
10/3/15 8:00	35,023	137.0	502.1	101.9	88.4	0.01	3,393.3	582.8	2,810.5	98,432	35,030	0	0	0	35,030	104.1%	1
10/3/15 12:00	35,005	136.8	501.5	101.1	88.4	0.01	3,391.7	582.0	2,809.7	98,354	35,002	0	0	0	35,002	104.0%	1
10/3/15 16:00	35,214	137.1	500.2	101.2	88.4	0.01	3,388.5	583.3	2,805.2	98,782	35,155	0	0	0	35,155	104.5%	1
10/3/15 20:00	34,842	137.0	502.5	101.3	88.4	0.01	3,394.2	582.7	2,811.5	97,958	34,861	0	0	0	34,861	103.6%	1
10/4/15 0:00	34,930	136.6	503.0	101.4	88.4	0.01	3,395.5	581.2	2,814.3	98,305	34,985	0	0	0	34,985	104.0%	1
10/4/15 4:00	35,062	137.2	501.7	101.2	88.5	0.01	3,392.4	583.6	2,808.8	98,481	35,048	0	0	0	35,048	104.2%	1
10/4/15 8:00	35,020	137.1	501.4	101.3	88.4	0.01	3,391.5	583.2	2,808.3	98,348	35,000	0	0	0	35,000	104.0%	1
10/4/15 12:00	34,412	136.5	500.2	100.7	88.4	0.01	3,388.5	580.7	2,807.8	96,620	34,385	0	0	0	34,385	102.2%	1
10/4/15 16:00	33,544	136.2	500.6	99.6	88.4	0.01	3,389.7	579.5	2,810.1	94,263	33,546	0	0	0	33,546	99.7%	1
10/4/15 20:00	33,553	136.2	500.9	99.6	88.4	0.01	3,390.3	579.2	2,811.1	94,322	33,567	0	0	0	33,567	99.8%	1
10/5/15 0:00	33,291	136.2	501.5	99.4	88.3	0.01	3,391.9	579.6	2,812.3	93,625	33,319	0	0	0	33,319	99.0%	1
10/5/15 4:00	33,273	136.3	501.4	99.8	88.3	0.01	3,391.7	580.0	2,811.7	93,553	33,294	0	0	0	33,294	99.0%	1
10/5/15 8:00	33,539	136.2	500.5	100.1	88.3	0.01	3,389.4	579.6	2,809.9	94,239	33,538	0	0	0	33,538	99.7%	1
10/5/15 12:00	33,593	136.3	501.6	100.1	88.3	0.01	3,392.0	579.9	2,812.2	94,469	33,619	0	0	0	33,619	99.9%	1
10/5/15 16:00	33,690	136.4	498.8	100.2	88.3	10.13	3,385.1	580.2	2,804.8	94,495	33,629	22,486	19,113	6,802	26,827	79.7%	0
10/5/15 20:00	34,223	136.5	498.8	100.2	88.4	7.42	3,385.0	580.7	2,804.3	95,969	34,154	16,482	14,009	4,986	29,168	86.7%	0
10/6/15 0:00	33,196	136.3	492.9	99.5	88.3	3.08	3,370.1	579.7	2,790.4	92,628	32,964	6,842	5,816	2,070	30,895	91.8%	0
10/6/15 4:00	33,148	136.3	500.2	99.7	88.3	0.02	3,388.7	579.8	2,808.9	93,109	33,136	0	0	0	33,136	98.5%	1
10/6/15 8:00	33,541	136.1	500.2	100.0	88.3	0.02	3,388.6	578.9	2,809.7	94,240	33,538	0	0	0	33,538	99.7%	1
10/6/15 12:00	33,472	136.1	500.4	99.9	88.3	0.02	3,389.2	579.1	2,810.2	94,061	33,475	0	0	0	33,475	99.5%	1
10/6/15 16:00	33,595	136.2	501.9	100.3	88.3	0.88	3,392.8	579.5	2,813.3	94,512	33,635	1,946	1,654	589	33,046	98.2%	1
10/6/15 20:00	33,473	136.2	500.5	100.2	88.3	1.17	3,389.4	579.3	2,810.1	94,062	33,475	2,598	2,208	786	32,689	97.2%	1
10/7/15 0:00	33,428	136.2	498.8	100.1	88.3	0.01	3,385.1	579.6	2,805.5	93,781	33,375	0	0	0	33,375	99.2%	1
10/7/15 4:00	33,224	136.2	500.6	100.1	88.3	0.01	3,389.7	579.4	2,810.4	93,371	33,229	0	0	0	33,229	98.8%	1
10/7/15 8:00	33,570	136.2	500.2	100.4	88.3	0.01	3,388.6	579.6	2,809.0	94,299	33,559	0	0	0	33,559	99.8%	1
10/7/15 12:00	32,996	136.4	502.5	99.7	88.3	0.01	3,394.5	580.3	2,814.2	92,858	33,046	0	0	0	33,046	98.2%	1
10/7/15 16:00	33,533	136.3	501.6	99.6	88.3	0.01	3,392.1	579.9	2,812.2	94,299	33,559	0</					

Covanta Durham York
30-Day Reliability Test - Boiler 1 Net Reference Steam Flow Calculation

Reference Values	Average / Total																
	135.0	499.0	96.5	89.6	37.0	3,384.0	574.1	2809.9	33,640	85.0%	34,133	101.5%	708				
	Actual Steam Flow	FW temp	Steam temp	FW Press	Steam Press	Aux fuel flow	Steam Enthalpy	FW Enthalpy	MS-FW Enthalpy	Gross Steam Output	Gross Reference Stm Flow	Aux Heat Input	Aux Heat Output	Aux Reference Steam Flow	Net Reference Steam Flow from Refuse	% of MCR	4-Hr >= 95% ? 1=Yes, 0=No.
kg/hr	°C	°C	bar-g	bar-g	m3/min	kJ/kg	kJ/kg	kJ/kg	kJ/kg	MI/hr	kg/hr	MI/hr	MI/hr	kg/hr	kg/hr	%	
10/12/15 0:00	33,505	136.2	502.9	100.7	88.3	0.01	3,395.4	579.5	2,815.9	94,344	33,575	0	0	0	33,575	99.8%	1
10/12/15 4:00	33,522	136.1	501.4	100.8	88.3	0.01	3,391.5	578.9	2,812.6	94,284	33,554	0	0	0	33,554	99.7%	1
10/12/15 8:00	33,528	136.1	502.5	100.8	88.3	0.01	3,394.4	578.9	2,815.4	94,395	33,593	0	0	0	33,593	99.9%	1
10/12/15 12:00	33,407	136.0	501.5	100.8	88.3	0.01	3,392.0	578.8	2,813.2	93,980	33,446	0	0	0	33,446	99.4%	1
10/12/15 16:00	33,534	136.0	501.8	100.8	88.3	0.01	3,392.6	578.6	2,814.1	94,367	33,583	0	0	0	33,583	99.8%	1
10/12/15 20:00	33,598	135.7	502.3	100.1	88.3	0.01	3,394.1	577.5	2,816.7	94,634	33,678	0	0	0	33,678	100.1%	1
10/13/15 0:00	33,394	135.8	502.0	99.7	88.3	0.01	3,393.1	577.7	2,815.4	94,019	33,459	0	0	0	33,459	99.5%	1
10/13/15 4:00	33,588	135.7	502.3	100.0	88.3	0.01	3,399.9	577.3	2,816.6	94,605	33,668	0	0	0	33,668	100.1%	1
10/13/15 8:00	33,630	135.3	504.0	100.1	88.3	0.01	3,398.1	575.8	2,822.4	94,916	33,779	0	0	0	33,779	100.4%	1
10/13/15 12:00	33,317	136.1	504.9	100.3	88.3	0.01	3,400.5	578.9	2,821.7	94,010	33,456	0	0	0	33,456	99.5%	1
10/13/15 16:00	34,530	136.2	504.2	101.2	88.4	0.01	3,398.6	579.6	2,819.0	97,340	34,641	0	0	0	34,641	103.0%	1
10/13/15 20:00	35,143	136.5	505.6	101.6	88.4	0.01	3,402.1	580.9	2,821.2	99,144	35,283	0	0	0	35,283	104.9%	1
10/14/15 0:00	34,994	136.9	504.8	101.5	88.4	0.01	3,400.2	582.4	2,817.8	98,605	35,091	0	0	0	35,091	104.3%	1
10/14/15 4:00	35,018	136.7	503.2	101.7	88.4	0.01	3,396.1	581.6	2,814.5	98,558	35,075	0	0	0	35,075	104.3%	1
10/14/15 8:00	34,922	136.3	504.8	101.5	88.4	0.01	3,400.2	579.8	2,820.4	98,495	35,052	0	0	0	35,052	104.2%	1
10/14/15 12:00	34,218	136.3	502.0	100.8	88.4	0.01	3,393.1	579.8	2,813.2	96,262	34,258	0	0	0	34,258	101.8%	1
10/14/15 16:00	34,097	136.0	503.1	100.9	88.4	0.01	3,396.0	578.7	2,817.3	96,060	34,186	0	0	0	34,186	101.6%	1
10/14/15 20:00	34,253	135.9	503.5	100.7	88.4	0.01	3,396.8	578.1	2,818.7	96,550	34,360	0	0	0	34,360	102.1%	1
10/15/15 0:00	34,078	136.1	503.2	100.6	88.4	0.01	3,396.1	578.9	2,817.2	96,006	34,167	0	0	0	34,167	101.6%	1
10/15/15 4:00	34,610	136.1	503.3	101.1	88.4	0.01	3,396.4	579.1	2,817.3	97,507	34,701	0	0	0	34,701	103.2%	1
10/15/15 8:00	34,164	136.1	503.1	100.9	88.4	0.01	3,395.8	579.2	2,816.6	96,224	34,244	0	0	0	34,244	101.8%	1
10/15/15 12:00	34,067	136.3	504.0	100.5	88.4	0.01	3,398.2	579.8	2,818.5	96,017	34,170	0	0	0	34,170	101.6%	1
10/15/15 16:00	34,112	136.0	502.9	100.9	88.4	0.01	3,395.5	578.7	2,816.7	96,083	34,194	0	0	0	34,194	101.6%	1
10/15/15 20:00	34,085	135.9	504.1	100.7	88.3	0.01	3,398.4	578.2	2,820.2	96,127	34,210	0	0	0	34,210	101.7%	1
10/16/15 0:00	34,310	136.1	506.5	100.8	88.4	0.01	3,404.3	579.1	2,825.3	96,936	34,497	0	0	0	34,497	102.5%	1
10/16/15 4:00	34,241	136.0	504.3	100.9	88.4	0.01	3,398.9	578.5	2,820.4	96,574	34,369	0	0	0	34,369	102.2%	1
10/16/15 8:00	34,300	135.9	503.2	101.1	88.4	0.01	3,396.2	578.2	2,818.0	96,656	34,398	0	0	0	34,398	102.3%	1
10/16/15 12:00	34,026	135.8	503.9	100.7	88.3	0.01	3,398.0	577.9	2,820.0	95,954	34,148	0	0	0	34,148	101.5%	1
10/16/15 16:00	33,660	136.0	502.6	100.3	88.4	0.01	3,394.7	578.4	2,816.3	94,799	33,737	0	0	0	33,737	100.3%	1
10/16/15 20:00	34,243	135.7	504.0	100.9	88.4	0.01	3,398.1	577.4	2,820.6	96,586	34,373	0	0	0	34,373	102.2%	1
10/17/15 0:00	34,419	135.9	505.1	100.7	88.4	0.01	3,400.9	578.2	2,822.7	97,154	34,575	0	0	0	34,575	102.8%	1
10/17/15 4:00	33,914	136.0	503.8	100.5	88.4	0.01	3,397.6	578.4	2,819.2	95,610	34,026	0	0	0	34,026	101.1%	1
10/17/15 8:00	34,137	136.1	502.5	100.8	88.4	0.01	3,394.3	579.0	2,815.2	96,105	34,202	0	0	0	34,202	101.7%	1
10/17/15 12:00	34,131	136.1	504.4	100.5	88.4	0.01	3,399.2	578.9	2,820.3	96,261	34,257	0	0	0	34,257	101.8%	1
10/17/15 16:00	33,898	136.0	504.7	100.4	88.4	0.01	3,399.9	578.7	2,821.2	95,634	34,034	0	0	0	34,034	101.2%	1
10/17/15 20:00	34,178	136.0	507.1	100.9	88.4	0.01	3,406.0	578.5	2,827.5	96,638	34,392	0	0	0	34,392	102.2%	1
10/18/15 0:00	34,164	136.0	505.7	100.6	88.4	0.01	3,402.4	578.8	2,823.6	96,467	34,331	0	0	0	34,331	102.1%	1
10/18/15 4:00	34,022	136.0	504.9	100.6	88.4	0.01	3,400.3	578.6	2,821.7	96,001	34,165	0	0	0	34,165	101.6%	1
10/18/15 8:00	34,210	136.1	505.5	100.9	88.4	0.01	3,402.0	579.0	2,823.0	96,574	34,369	0	0	0	34,369	102.2%	1
10/18/15 12:00	34,140	136.0	505.0	100.7	88.4	0.01	3,400.6	578.4	2,822.2	96,347	34,288	0	0	0	34,288	101.9%	1
10/18/15 16:00	34,374	136.0	505.3	100.5	88.4	0.01	3,401.5	578.5	2,823.0	97,036	34,533	0	0	0	34,533	102.7%	1
10/18/15 20:00	33,832	129.2	512.0	101.0	89.1	0.01	3,417.4	549.6	2,867.9	97,026	34,530	0	0	0	34,530	102.6%	1
10/19/15 0:00	33,979	128.1	508.4	101.0	89.3	0.01	3,408.2	544.9	2,863.3	97,292	34,624	0	0	0	34,624	102.9%	1
10/19/15 4:00	34,107	130.4	507.9	101.1	89.2	0.01	3,406.9	554.9	2,852.0	97,275	34,618	0	0	0	34,618	102.9%	1
10/19/15 8:00	34,059	128.6	512.4	100.7	89.3	0.01	3,418.1	547.1	2,871.0	97,785	34,800	0	0	0	34,800	103.4%	1
10/19/15 12:00	33,607	129.2	508.1	100.9	89.2	0.01	3,407.4	549.6	2,857.8	96,042	34,179	0	0	0	34,179	101.6%	1
10/19/15 16:00	33,428	129.9	507.2	100.4	89.0	0.01	3,405.4	552.9	2,852.5	95,355	33,935	0	0	0	33,935	100.9%	1
10/19/15 20:00	33,589	135.8	503.6	100.5	88.3	0.01	3,397.2	577.6	2,819.6	94,706	33,704	0	0	0	33,704	100.2%	1
10/20/15 0:00	33,495	135.8	502.6	99.8	88.3	0.01	3,394.8	577.6	2,817.2	94,361	33,581	0	0	0	33,581	99.8%	1
10/20/15 4:00	33,221	135.7	502.9	99.7	88.3	0.01	3,395.6	577.2	2,818.3	93,627	33,320	0	0	0	33,320	99.0%	1
10/20/15 8:00	32,977	135.5	505.2	100.0	88.3	0.01	3,401.3	576.5	2,824.8	93,151	33,151	0	0	0	33,151	98.5%	1
10/20/15 12:00	33,674	135.6	505.7	99.9	88.3	0.01	3,402.6	576.7	2,825.9	95,158	33,865	0	0	0	33,865	100.7%	1
10/20/15 16:00	33,021	135.7	504.7	99.9	88.3	0.01	3,400.1	577.3	2,822.7	93,209	33,171	0	0	0	33,171	98.6%	1
10/20/15 20:00	33,711	135.7	506.0	100.5	88.3	0.01	3,403.1	577.2	2,825.9	95,265	33,903	0	0	0	33,903	100.8%	1
10/21/15 0:00	33,403	135.4	505.3	100.0	88.3	0.01	3,401.6	577.0	2,825.6	94,381	33,588	0	0	0	33,588	99.8%	1
10/21/15 4:00	33,444	135.6	505.6	100.0	88.3	0.01	3,402.1	576.9	2,825.2	94,484	33,625	0	0	0	33,625	100.0%	1
10/21/15 8:00	33,607	135.7	508.5	99.9	88.3	0.01	3,409.4	577.2	2,832.2	95,181	33,873	0	0	0	33,873	100.7%	1
10/21/15 12:00	33,813	135.6	508.5	100.4	88.4	0.01	3,409.5	576.9	2,832.5	95,777	34,085	0	0	0	34,085	101.3%	1
10/21/15 16:00	34,159	131.8	507.1	101.7	89.8	0.01	3,404.4	560.6	2,843.7	97,139	34,570	0	0	0	34,570	102.8%	1
10/21/15 20:00	34,184	135.2	502.6	101.7	89.3	0.01	3,393.4	575.1	2,818.3	96,339	34,285	0	0	0	34,285	101.9%	1
10/22/15 0:00	34,186	135.6	504.5	101.0	88.3	0.01	3,399.4	576.9	2,822.5	96,491	34,339	0	0	0	34,339	102.1%	1
10/22/15 4:00	33,634	135.9	508.6	100.2	88.4	0.01	3,409.7	578.1	2,831.5	95,235	33,892	0	0	0	33,892	100.8%	1
10/22/15 8:00	34,380	136.1	506.6	100.8	88.4	0.01	3,404.8	579.1	2,825.7	97,149	34,573	0	0	0	34,573	102.8%	1
10/22/15 12:00	33,953	136.6	504.4	100.8	88.4	0.01	3,399.3	581.1	2,818.2	95,688	34,053	0	0	0	34,053	101.2%	1
10/22/15 16:00	34,275																



Covanta Durham York

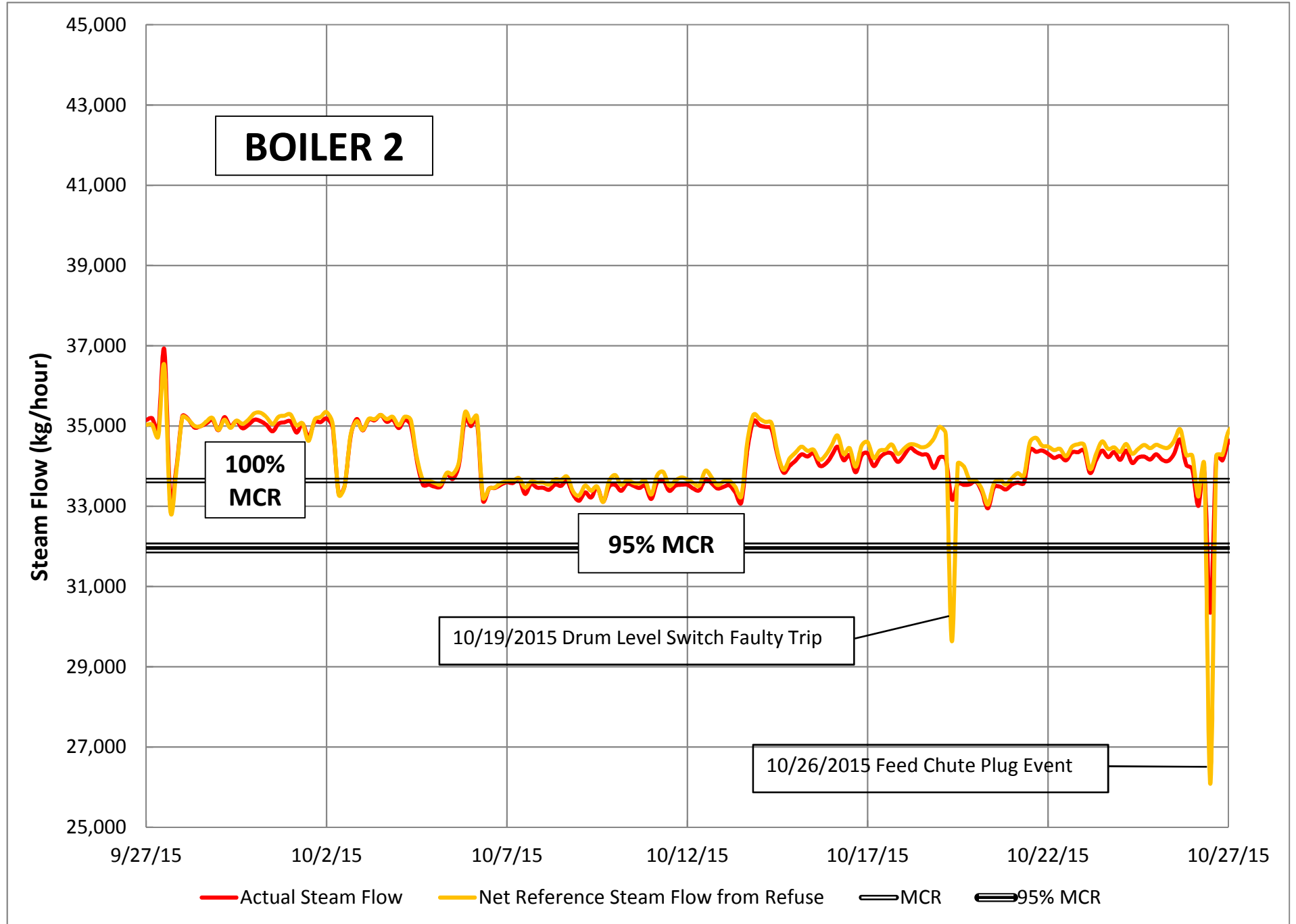
30-Day Reliability Test - Boiler 2 Net Reference Steam Flow Calculation

Reference Values	Average / Total																
	135.0	499.0	96.5	89.6	37.0	3,384.0	574.1	2809.9		33,640		85.0%			34,226	101.7%	712
Hour start (4-Hour Block)	Actual Steam Flow	FW temp	Steam temp	FW Press	Steam Press	Aux fuel flow	Steam Enthalpy	FW Enthalpy	MS-FW Enthalpy	Gross Steam Output	Gross Reference Stm Flow	Aux Heat Input	Aux Heat Output	Aux Reference Steam Flow	Net Reference Steam Flow from Refuse	% of MCR	4-Hr >= 95% ? 1=Yes, 0=No.
	kg/hr	°C	°C	bar-g	bar-g	m3/min	kJ/kg	kJ/kg	kJ/kg	kJ/hr	kg/hr	kJ/hr	kJ/hr	kg/hr	kg/hr	%	
9/27/15 0:00	35,148	138.1	500.1	101.9	88.4	0.00	3,388.2	587.7	2,800.5	98,434	35,031	0	0	0	35,031	104.1%	1
9/27/15 4:00	35,189	138.0	498.4	101.8	88.4	0.00	3,384.1	587.0	2,797.1	98,425	35,028	0	0	0	35,028	104.1%	1
9/27/15 8:00	34,916	138.0	498.7	101.8	88.4	0.02	3,384.7	587.4	2,797.3	97,670	34,759	47	40	14	34,745	103.3%	1
9/27/15 12:00	36,903	137.5	503.6	103.1	88.5	0.62	3,397.1	585.2	2,811.8	103,767	36,929	1,387	1,179	419	36,509	108.5%	1
9/27/15 16:00	33,201	137.7	492.9	100.7	88.3	0.00	3,370.2	585.9	2,784.3	92,443	32,898	0	0	0	32,898	97.8%	1
9/27/15 20:00	33,953	137.7	500.5	101.0	88.4	0.00	3,389.4	586.0	2,803.4	95,184	33,874	0	0	0	33,874	100.7%	1
9/28/15 0:00	35,241	137.7	502.4	102.0	88.4	0.00	3,394.2	586.1	2,808.1	98,960	35,218	0	0	0	35,218	104.7%	1
9/28/15 4:00	35,171	137.7	502.6	102.0	88.4	0.00	3,394.7	585.7	2,809.0	98,795	35,159	0	0	0	35,159	104.5%	1
9/28/15 8:00	34,963	137.8	504.5	101.7	88.4	0.00	3,399.3	586.1	2,813.2	98,358	35,004	0	0	0	35,004	104.1%	1
9/28/15 12:00	34,993	137.7	503.0	101.8	88.4	0.00	3,395.7	585.9	2,809.7	98,322	34,991	0	0	0	34,991	104.0%	1
9/28/15 16:00	35,060	137.7	504.7	101.8	88.4	0.00	3,399.9	585.9	2,814.0	98,660	35,111	0	0	0	35,111	104.4%	1
9/28/15 20:00	35,159	137.8	504.5	101.8	88.4	0.00	3,399.4	586.2	2,813.2	98,910	35,200	0	0	0	35,200	104.6%	1
9/29/15 0:00	34,894	138.0	503.9	101.8	88.4	0.00	3,397.9	587.2	2,810.7	98,075	34,903	0	0	0	34,903	103.8%	1
9/29/15 4:00	35,220	137.8	501.2	101.9	88.4	0.00	3,391.1	586.2	2,804.8	98,786	35,156	0	0	0	35,156	104.5%	1
9/29/15 8:00	34,987	136.7	500.3	101.7	88.4	0.00	3,388.8	581.7	2,807.2	98,215	34,953	0	0	0	34,953	103.9%	1
9/29/15 12:00	35,122	135.2	499.3	101.6	88.4	0.00	3,386.2	575.5	2,810.7	98,718	35,132	0	0	0	35,132	104.4%	1
9/29/15 16:00	34,943	135.3	502.4	101.7	88.4	0.00	3,394.2	575.5	2,818.7	98,495	35,052	0	0	0	35,052	104.2%	1
9/29/15 20:00	35,029	135.4	503.3	101.7	88.4	0.00	3,396.3	576.2	2,820.1	98,785	35,156	0	0	0	35,156	104.5%	1
9/30/15 0:00	35,155	135.5	504.5	101.8	88.4	0.00	3,399.4	576.6	2,822.8	99,235	35,316	0	0	0	35,316	105.0%	1
9/30/15 4:00	35,120	135.4	505.8	101.7	88.4	0.00	3,402.7	576.0	2,826.6	99,270	35,328	0	0	0	35,328	105.0%	1
9/30/15 8:00	35,024	135.8	506.1	101.7	88.4	0.00	3,403.4	577.6	2,825.7	98,969	35,221	0	0	0	35,221	104.7%	1
9/30/15 12:00	34,866	135.7	505.5	101.5	88.4	0.00	3,401.8	577.4	2,824.4	98,477	35,046	0	0	0	35,046	104.2%	1
9/30/15 16:00	35,056	135.7	505.2	101.6	88.4	0.00	3,401.1	577.4	2,823.7	98,987	35,228	0	0	0	35,228	104.7%	1
9/30/15 20:00	35,092	135.8	505.1	101.8	88.4	0.00	3,400.8	577.7	2,823.2	99,070	35,257	0	0	0	35,257	104.8%	1
10/1/15 0:00	35,113	135.7	505.1	101.8	88.4	0.00	3,401.0	577.2	2,823.7	99,150	35,286	0	0	0	35,286	104.9%	1
10/1/15 4:00	34,836	135.6	505.3	101.6	88.4	0.00	3,401.4	577.1	2,824.3	98,389	35,015	0	0	0	35,015	104.1%	1
10/1/15 8:00	35,054	135.7	500.1	101.3	88.4	0.00	3,388.1	577.5	2,810.7	98,525	35,063	0	0	0	35,063	104.2%	1
10/1/15 12:00	34,725	135.9	497.0	100.8	88.4	0.00	3,380.5	578.3	2,802.2	97,306	34,629	0	0	0	34,629	102.9%	1
10/1/15 16:00	35,094	135.8	501.8	101.5	88.4	0.00	3,392.6	578.0	2,814.6	98,777	35,153	0	0	0	35,153	104.5%	1
10/1/15 20:00	35,095	135.7	503.9	101.8	88.5	0.00	3,397.9	577.6	2,820.3	98,979	35,224	0	0	0	35,224	104.7%	1
10/2/15 0:00	35,187	135.6	504.6	102.0	88.5	0.00	3,399.5	577.0	2,822.5	99,315	35,344	0	0	0	35,344	105.1%	1
10/2/15 4:00	34,969	135.9	502.7	101.2	88.4	0.00	3,394.8	578.1	2,816.7	98,496	35,053	0	0	0	35,053	104.2%	1
10/2/15 8:00	33,322	135.9	499.9	101.6	90.0	0.00	3,385.9	578.3	2,807.6	93,554	33,294	0	0	0	33,294	99.0%	1
10/2/15 12:00	33,509	136.1	500.6	100.9	88.9	0.00	3,388.9	579.2	2,809.7	94,149	33,506	0	0	0	33,506	99.6%	1
10/2/15 16:00	34,749	136.3	501.8	101.2	88.4	0.00	3,392.5	579.8	2,812.7	97,739	34,783	0	0	0	34,783	103.4%	1
10/2/15 20:00	35,171	137.1	500.4	101.0	88.4	0.00	3,389.0	583.1	2,805.9	98,686	35,120	0	0	0	35,120	104.4%	1
10/3/15 0:00	34,891	136.9	502.0	101.3	88.4	0.00	3,393.1	582.2	2,810.9	98,075	34,903	0	0	0	34,903	103.8%	1
10/3/15 4:00	35,158	137.0	502.4	101.6	88.4	0.00	3,394.0	582.7	2,811.3	98,839	35,175	0	0	0	35,175	104.6%	1
10/3/15 8:00	35,143	136.6	502.0	101.9	88.4	0.00	3,393.1	581.2	2,811.9	98,816	35,167	0	0	0	35,167	104.5%	1
10/3/15 12:00	35,273	136.4	501.0	101.8	88.4	0.00	3,390.5	580.6	2,810.0	99,115	35,273	0	0	0	35,273	104.9%	1
10/3/15 16:00	35,105	136.8	503.6	101.3	88.4	0.00	3,397.0	582.0	2,815.1	98,822	35,169	0	0	0	35,169	104.5%	1
10/3/15 20:00	35,159	136.6	503.4	101.7	88.5	0.00	3,396.5	581.1	2,815.4	98,986	35,227	0	0	0	35,227	104.7%	1
10/4/15 0:00	34,948	136.2	502.8	101.8	88.4	0.00	3,395.1	579.6	2,815.5	98,394	35,016	0	0	0	35,016	104.1%	1
10/4/15 4:00	35,154	136.9	504.1	101.3	88.5	0.00	3,398.3	582.3	2,816.0	98,994	35,230	0	0	0	35,230	104.7%	1
10/4/15 8:00	35,020	136.7	505.4	101.5	88.4	0.00	3,401.7	581.6	2,820.1	98,759	35,146	0	0	0	35,146	104.5%	1
10/4/15 12:00	34,155	136.2	502.6	101.0	88.4	0.00	3,394.7	579.4	2,815.3	96,158	34,221	0	0	0	34,221	101.7%	1
10/4/15 16:00	33,540	135.9	504.1	100.0	88.4	0.00	3,398.3	578.0	2,820.3	94,596	33,665	0	0	0	33,665	100.1%	1
10/4/15 20:00	33,539	135.7	502.9	100.2	88.3	0.00	3,395.6	577.5	2,818.1	94,517	33,637	0	0	0	33,637	100.0%	1
10/5/15 0:00	33,487	135.9	502.9	100.3	88.3	0.00	3,395.6	578.1	2,817.5	94,350	33,577	0	0	0	33,577	99.8%	1
10/5/15 4:00	33,495	136.0	501.8	100.6	88.3	0.00	3,392.7	578.4	2,814.3	94,265	33,547	0	0	0	33,547	99.7%	1
10/5/15 8:00	33,813	135.9	500.6	101.0	88.3	0.00	3,389.5	578.2	2,811.4	95,062	33,831	0	0	0	33,831	100.6%	1
10/5/15 12:00	33,680	135.9	504.0	100.3	88.3	0.00	3,398.2	578.1	2,820.1	94,982	33,802	0	0	0	33,802	100.5%	1
10/5/15 16:00	34,022	136.0	502.5	100.5	88.4	0.00	3,394.5	578.7	2,815.8	95,799	34,093	0	0	0	34,093	101.3%	1
10/5/15 20:00	35,180	136.1	505.1	101.6	88.4	0.00	3,400.9	578.9	2,822.0	99,276	35,330	0	0	0	35,330	105.0%	1
10/6/15 0:00	34,995	135.9	503.2	101.0	88.4	0.00	3,396.0	578.2	2,817.8	98,608	35,093	0	0	0	35,093	104.3%	1
10/6/15 4:00	35,143	135.9	503.1	101.4	88.4	0.00	3,395.8	578.1	2,817.6	99,019	35,239	0	0	0	35,239	104.8%	1
10/6/15 8:00	33,145	135.6	501.8	100.0	88.3	0.00	3,392.6	576.7	2,815.9	93,334	33,216	0	0	0	33,216	98.7%	1
10/6/15 12:00	33,437	135.6	499.5	99.9	88.4	0.00	3,386.8	577.0	2,809.8	93,949	33,435	0	0	0	33,435	99.4%	1
10/6/15 16:00	33,454	135.7	500.1	100.1	88.4	0.00	3,388.4	577.4	2,811.1	94,041	33,467	0	0	0	33,467	99.5%	1
10/6/15 20:00	33,537	135.7	501.1	100.3	88.3	0.00	3,390.9	577.4	2,813.5	94,357	33,580	0	0	0	33,580	99.8%	1
10/7/15 0:00	33,599	135.8	500.4	100.5	88.3	0.00	3,389.2	577.7	2,811.5	94,464	33,618	0	0	0	33,618	99.9%	1
10/7/15 4:00	33,579	135.7	501.5	100.7	88.3	0.00	3,391.8	577.5	2,814.4	94,503	33,632	0	0	0	33,632	100.0%	1
10/7/15 8:00	33,691	135.7	499.9	100.9	88.3	0.00	3,387.9	577.4	2,810.5	94,688	33,697	0	0	0	33,697	100.2%	1
10/7/15 12:00	33,308	136.0	505.5	100.0	88.3	0.00	3,402.0	578.7	2,823.3	94,040	33,467	0	0	0	33,467	99.5%	1
10/7/15 16:00	33,553	136															

Covanta Durham York

30-Day Reliability Test - Boiler 2 Net Reference Steam Flow Calculation

Reference Values	Average / Total																
	135.0	499.0	96.5	89.6	37.0	3,384.0	574.1	2809.9		33,640		85.0%			34,226	101.7%	712
	Actual Steam Flow	FW temp	Steam temp	FW Press	Steam Press	Aux fuel flow	Steam Enthalpy	FW Enthalpy	MS-FW Enthalpy	Gross Steam Output	Gross Reference Stm Flow	Aux Heat Input	Aux Heat Output	Aux Reference Steam Flow	Net Reference Steam Flow from Refuse	% of MCR	4-Hr >= 95% ? 1=Yes, 0=No.
kg/hr	°C	°C	bar-g	bar-g	m3/min	kJ/kg	kJ/kg	kJ/kg	MI/hr	kg/hr	MI/hr	MI/hr	kg/hr	kg/hr	%		
10/12/15 0:00	33,535	136.3	505.1	100.7	88.3	0.01	3,400.9	579.8	2,821.1	94,604	33,668	0	0	0	33,668	100.1%	1
10/12/15 4:00	33,440	136.2	505.1	100.7	88.3	0.01	3,401.0	579.5	2,821.5	94,349	33,577	0	0	0	33,577	99.8%	1
10/12/15 8:00	33,397	136.1	504.4	100.6	88.3	0.01	3,399.2	579.2	2,820.0	94,181	33,517	0	0	0	33,517	99.6%	1
10/12/15 12:00	33,664	136.2	507.7	100.5	88.3	0.01	3,407.4	579.3	2,828.2	95,207	33,882	0	0	0	33,882	100.7%	1
10/12/15 16:00	33,579	136.1	505.2	100.7	88.3	0.01	3,401.3	578.8	2,822.5	94,777	33,729	0	0	0	33,729	100.3%	1
10/12/15 20:00	33,442	135.8	502.7	100.6	88.3	0.01	3,395.0	577.8	2,817.2	94,213	33,528	0	0	0	33,528	99.7%	1
10/13/15 0:00	33,480	135.9	504.4	100.2	88.3	0.01	3,399.2	578.2	2,821.1	94,449	33,612	0	0	0	33,612	99.9%	1
10/13/15 4:00	33,521	135.9	503.6	100.5	88.4	0.01	3,397.2	578.2	2,819.0	94,498	33,630	0	0	0	33,630	100.0%	1
10/13/15 8:00	33,337	135.5	504.1	100.3	88.3	0.01	3,398.4	576.6	2,821.8	94,070	33,478	0	0	0	33,478	99.5%	1
10/13/15 12:00	33,097	136.2	505.7	100.3	88.3	0.01	3,402.4	579.4	2,822.9	93,431	33,250	0	0	0	33,250	98.8%	1
10/13/15 16:00	34,415	136.4	507.6	101.2	88.4	0.01	3,407.1	580.3	2,826.8	97,282	34,621	0	0	0	34,621	102.9%	1
10/13/15 20:00	35,118	136.6	506.2	101.7	88.4	0.01	3,403.7	581.2	2,822.5	99,120	35,275	0	0	0	35,275	104.9%	1
10/14/15 0:00	35,015	136.9	507.1	101.7	88.5	0.01	3,405.8	582.5	2,823.3	98,857	35,181	0	0	0	35,181	104.6%	1
10/14/15 4:00	34,976	136.8	505.4	101.7	88.4	0.01	3,401.7	582.0	2,819.7	98,622	35,098	0	0	0	35,098	104.3%	1
10/14/15 8:00	34,924	136.4	505.8	101.5	88.4	0.01	3,402.7	580.5	2,822.2	98,565	35,077	0	0	0	35,077	104.3%	1
10/14/15 12:00	34,277	136.5	503.1	100.8	88.4	0.01	3,395.8	580.6	2,815.2	96,497	34,341	0	0	0	34,341	102.1%	1
10/14/15 16:00	33,839	136.2	502.8	100.7	88.4	0.01	3,395.1	579.4	2,815.7	95,280	33,908	0	0	0	33,908	100.8%	1
10/14/15 20:00	34,000	136.0	506.2	101.0	88.3	0.01	3,403.8	578.8	2,825.1	96,053	34,183	0	0	0	34,183	101.6%	1
10/15/15 0:00	34,134	136.2	507.2	100.7	88.4	0.01	3,406.2	579.4	2,826.7	96,488	34,338	0	0	0	34,338	102.1%	1
10/15/15 4:00	34,291	136.3	507.0	101.0	88.4	0.01	3,405.7	579.9	2,825.8	96,899	34,484	0	0	0	34,484	102.5%	1
10/15/15 8:00	34,239	136.3	505.2	101.2	88.4	0.01	3,401.3	579.8	2,821.4	96,604	34,379	0	0	0	34,379	102.2%	1
10/15/15 12:00	34,313	136.4	504.0	100.8	88.4	0.01	3,398.1	580.5	2,817.6	96,680	34,406	0	0	0	34,406	102.3%	1
10/15/15 16:00	34,014	136.2	505.3	100.9	88.4	0.01	3,401.4	579.6	2,821.8	95,983	34,158	0	0	0	34,158	101.5%	1
10/15/15 20:00	34,056	136.1	507.4	100.6	88.3	0.01	3,406.7	579.1	2,827.6	96,297	34,270	0	0	0	34,270	101.9%	1
10/16/15 0:00	34,256	136.3	509.1	100.9	88.4	0.01	3,410.9	580.0	2,830.9	96,974	34,511	0	0	0	34,511	102.6%	1
10/16/15 4:00	34,483	136.2	509.5	101.3	88.4	0.01	3,411.9	579.3	2,832.6	97,678	34,761	0	0	0	34,761	103.3%	1
10/16/15 8:00	34,147	136.1	505.3	101.1	88.4	0.01	3,401.4	578.8	2,822.6	96,384	34,301	0	0	0	34,301	102.0%	1
10/16/15 12:00	34,270	136.1	506.0	100.7	88.3	0.01	3,403.3	579.0	2,824.3	96,790	34,446	0	0	0	34,446	102.4%	1
10/16/15 16:00	33,846	136.2	505.1	100.8	88.4	0.01	3,400.8	579.4	2,821.4	95,494	33,984	0	0	0	33,984	101.0%	1
10/16/15 20:00	34,267	135.9	508.0	101.2	88.4	0.01	3,408.1	578.4	2,829.7	96,964	34,508	0	0	0	34,508	102.6%	1
10/17/15 0:00	34,318	136.0	509.2	100.8	88.4	0.01	3,411.3	578.7	2,832.5	97,207	34,594	0	0	0	34,594	102.8%	1
10/17/15 4:00	34,001	136.1	506.9	100.6	88.4	0.01	3,405.5	579.0	2,826.5	96,102	34,201	0	0	0	34,201	101.7%	1
10/17/15 8:00	34,210	136.2	506.2	101.0	88.4	0.01	3,403.7	579.4	2,824.2	96,618	34,384	0	0	0	34,384	102.2%	1
10/17/15 12:00	34,321	136.2	503.3	100.6	88.4	0.01	3,396.5	579.4	2,817.1	96,684	34,408	0	0	0	34,408	102.3%	1
10/17/15 16:00	34,311	136.2	507.9	100.7	88.4	0.01	3,407.9	579.3	2,828.6	97,052	34,539	0	0	0	34,539	102.7%	1
10/17/15 20:00	34,106	136.1	506.8	101.0	88.4	0.01	3,405.1	579.1	2,826.0	96,384	34,301	0	0	0	34,301	102.0%	1
10/18/15 0:00	34,254	136.2	506.2	100.5	88.4	0.01	3,403.6	579.4	2,824.2	96,740	34,428	0	0	0	34,428	102.3%	1
10/18/15 4:00	34,456	136.2	503.2	100.7	88.4	0.01	3,396.2	579.4	2,816.8	97,055	34,540	0	0	0	34,540	102.7%	1
10/18/15 8:00	34,359	136.3	506.1	101.0	88.4	0.01	3,403.5	579.8	2,823.7	97,020	34,528	0	0	0	34,528	102.6%	1
10/18/15 12:00	34,287	136.1	506.2	100.9	88.3	0.01	3,403.9	579.1	2,824.8	96,853	34,468	0	0	0	34,468	102.5%	1
10/18/15 16:00	34,269	136.1	508.3	100.5	88.4	0.01	3,409.0	579.2	2,829.8	96,976	34,512	0	0	0	34,512	102.6%	1
10/18/15 20:00	33,954	129.3	513.3	101.1	89.1	0.01	3,420.6	550.2	2,870.4	97,461	34,684	0	0	0	34,684	103.1%	1
10/19/15 0:00	34,220	128.2	512.2	101.2	89.3	0.01	3,417.9	545.5	2,872.3	98,291	34,980	0	0	0	34,980	104.0%	1
10/19/15 4:00	34,172	130.6	511.9	101.4	89.2	0.01	3,417.0	555.6	2,861.4	97,778	34,797	0	0	0	34,797	103.4%	1
10/19/15 8:00	33,173	128.8	510.4	100.4	89.2	6.23	3,413.2	548.2	2,865.0	95,041	33,823	13,836	11,761	4,185	29,638	88.1%	0
10/19/15 12:00	33,557	129.3	506.1	101.0	89.2	0.00	3,402.3	550.4	2,852.0	95,703	34,059	0	0	0	34,059	101.2%	1
10/19/15 16:00	33,532	130.0	505.7	100.6	89.0	0.00	3,401.6	553.1	2,848.5	95,515	33,992	0	0	0	33,992	101.0%	1
10/19/15 20:00	33,547	135.9	503.2	100.7	88.3	0.00	3,396.2	578.2	2,818.1	94,538	33,644	0	0	0	33,644	100.0%	1
10/20/15 0:00	33,615	135.9	500.7	100.1	88.3	0.00	3,389.8	578.2	2,811.7	94,514	33,636	0	0	0	33,636	100.0%	1
10/20/15 4:00	33,363	135.9	502.0	100.3	88.3	0.00	3,393.2	578.0	2,815.2	93,924	33,426	0	0	0	33,426	99.4%	1
10/20/15 8:00	32,949	135.7	502.7	100.3	88.3	0.00	3,395.0	577.2	2,817.8	92,842	33,041	0	0	0	33,041	98.2%	1
10/20/15 12:00	33,467	135.8	503.1	100.2	88.3	0.00	3,396.0	577.6	2,818.4	94,323	33,568	0	0	0	33,568	99.8%	1
10/20/15 16:00	33,486	136.0	505.9	100.3	88.3	0.00	3,402.9	578.4	2,824.5	94,580	33,659	0	0	0	33,659	100.1%	1
10/20/15 20:00	33,417	135.9	504.1	100.4	88.4	0.00	3,398.3	577.9	2,820.4	94,249	33,541	0	0	0	33,541	99.7%	1
10/21/15 0:00	33,539	135.7	504.9	100.5	88.3	0.00	3,400.6	579.2	2,823.4	94,694	33,700	0	0	0	33,700	100.2%	1
10/21/15 4:00	33,588	135.9	507.8	100.1	88.3	0.00	3,407.7	578.0	2,829.6	95,042	33,824	0	0	0	33,824	100.5%	1
10/21/15 8:00	33,583	135.9	506.1	100.2	88.3	0.00	3,403.5	578.1	2,825.4	94,885	33,768	0	0	0	33,768	100.4%	1
10/21/15 12:00	34,410	135.9	505.9	100.6	88.4	0.00	3,403.0	578.1	2,824.9	97,205	34,593	0	0	0	34,593	102.8%	1
10/21/15 16:00	34,357	132.0	505.4	101.9	89.8	0.00	3,400.0	561.6	2,838.4	97,519	34,705	0	0	0	34,705	103.2%	1
10/21/15 20:00	34,388	135.5	503.7	101.8	89.3	0.00	3,396.3	576.3	2,819.9	96,970	34,510	0	0	0	34,510	102.6%	1
10/22/15 0:00	34,311	135.9	505.8	100.7	88.4	0.00	3,402.6	578.2	2,824.4	96,909	34,488	0	0	0	34,488	102.5%	1
10/22/15 4:00	34,205	136.2	506.8	100.7	88.4	0.00	3,405.3	579.4	2,825.8	96,656	34,398	0	0	0	34,398	102.3%	1
10/22/15 8:00	34,250	136.4	506.7	101.0	88.4	0.00	3,405.0	580.3	2,824.7	96,745	34,430	0	0	0	34,430	102.3%	1
10/22/15 12:00	34,144	136.5	504.2	101.0	88.4	0.00	3,398.7	580.6	2,818.2	96,225	34,244	0	0	0	34,244	101.	



Covanta Durham York 30-Day Residue Quantity Test

COVANTA DURHAM / YORK

Daily HHV Calculation Sheet

REFERENCE
VALUES

930 deg F

1300 psig

275 deg F

330 deg F

200 deg F

80 deg F

1,000 BTU/cuft

1,000 BTU/cuft

1,455.71 BTU/lb

247.14 BTU/lb

54.83 %

85% Eff. on Aux Fuel

Factors

0.40 % output/10 deg F

-0.28 % output/10 deg F

-0.32 % output/10 deg F

0.52 % output/10%

1.1108 697.09

5,589 Design HHV

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
From:		9/27/15	9/28/15	9/29/15	9/30/15	10/1/15	10/2/15	10/3/15	10/4/15	10/5/15	10/6/15	10/7/15	10/8/15	10/9/15	10/10/15	10/11/15
To:		0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
		9/28/15	9/29/15	9/30/15	10/1/15	10/2/15	10/3/15	10/4/15	10/5/15	10/6/15	10/7/15	10/8/15	10/9/15	10/10/15	10/11/15	10/12/15
		0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
DATA INPUTS																
Refuse Processed Boiler 1	Tons	246.0	250.5	249.0	253.8	250.9	239.5	248.0	246.6	212.4	225.8	238.6	235.6	243.1	245.6	227.2
Refuse Processed Boiler 2	Tons	250.2	245.3	236.0	259.0	248.5	238.9	243.4	245.3	239.4	229.5	236.1	242.0	235.2	243.5	238.7
Total Operating Time - Unit 1	Hours	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Operating Time - Unit 2	Hours	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Boiler 1 Steam Production	klbs	1,858	1,853	1,854	1,849	1,856	1,824	1,853	1,821	1,778	1,767	1,766	1,771	1,765	1,772	1,770
Boiler 2 Steam Production	klbs	1,846	1,857	1,854	1,855	1,851	1,825	1,858	1,820	1,796	1,796	1,774	1,771	1,762	1,772	1,771
Boiler 1 Blowdown Flow	klbs	18.7	21.0	15.8	13.6	16.4	45.4	53.4	53.3	53.9	56.0	52.3	53.1	53.3	53.4	53.7
Boiler 2 Blowdown Flow	klbs	7.4	6.1	5.3	2.7	4.8	25.8	31.2	32.7	32.2	28.5	30.7	29.9	27.9	27.6	30.6
Boiler 1 Stm Temp	deg F	932.4	937.2	935.1	939.1	937.5	933.2	934.5	934.3	932.8	930.8	933.4	934.2	934.8	935.1	935.5
Boiler 2 Stm Temp	deg F	930.3	938.6	935.1	941.7	936.0	935.0	936.3	938.6	937.1	934.6	936.0	938.7	940.5	940.6	942.0
Boiler 1 Stm Press	psig	1,282.2	1,282.0	1,282.0	1,282.2	1,282.6	1,287.4	1,282.5	1,282.1	1,281.1	1,281.0	1,280.8	1,281.1	1,280.9	1,281.3	1,281.4
Boiler 2 Stm Press	psig	1,282.1	1,282.3	1,282.3	1,282.4	1,282.6	1,287.3	1,282.5	1,282.0	1,281.2	1,281.4	1,280.9	1,280.9	1,280.7	1,281.3	1,281.1
Boiler 1 Feedwater Temperature	deg F	280.9	280.8	278.4	276.9	277.0	277.7	278.8	277.9	277.4	277.2	277.3	277.2	276.9	276.8	276.8
Boiler 2 Feedwater Temperature	deg F	280.1	279.9	277.5	276.2	276.4	277.1	278.1	277.3	276.7	276.3	276.5	276.4	276.8	277.0	277.0
Boiler 1 Feedwater Pressure	psig	1,470.4	1,473.1	1,469.6	1,468.5	1,471.1	1,468.9	1,470.6	1,459.5	1,449.8	1,449.2	1,449.7	1,451.8	1,448.6	1,446.8	1,456.8
Boiler 2 Feedwater Pressure	psig	1,475.1	1,477.1	1,475.3	1,474.9	1,471.6	1,469.4	1,473.4	1,464.3	1,460.6	1,457.0	1,457.5	1,458.2	1,457.2	1,456.0	1,457.2
Boiler 1 Drum Pressure	psig	1,399.0	1,398.1	1,398.4	1,397.5	1,398.6	1,399.8	1,398.7	1,393.5	1,387.8	1,387.2	1,386.8	1,386.9	1,385.7	1,387.1	1,386.7
Boiler 2 Drum Pressure	psig	1,395.9	1,397.2	1,396.8	1,396.1	1,396.4	1,398.0	1,396.8	1,391.2	1,388.0	1,388.1	1,385.1	1,384.7	1,383.2	1,384.8	1,384.7
Blr 1 Econ Exit Gas Temp	deg F	328.8	329.7	328.9	329.0	329.0	328.4	329.0	327.8	329.3	329.1	328.8	329.2	328.8	328.6	329.4
Blr 2 Econ Exit Gas Temp	deg F	332.5	335.7	331.4	333.4	330.7	329.9	330.6	329.7	330.0	330.1	330.3	330.3	332.1	329.7	330.5
Blr 1 Heated Comb Air Temp	deg F	166.8	166.9	216.7	161.9	245.2	269.5	203.8	165.0	168.7	164.6	168.1	164.5	163.0	160.7	167.4
Blr 2 Heated Comb Air Temp	deg F	159.6	160.4	211.4	154.3	242.8	275.5	209.7	157.0	158.7	159.9	160.3	157.4	154.6	152.9	159.6
Boiler 1 Ambient Air Temp	deg F	78.0	81.7	81.4	73.6	69.4	68.8	69.0	72.4	74.2	76.8	77.2	73.6	73.7	71.4	81.1
Boiler 2 Ambient Air Temp	deg F	79.5	82.4	81.2	72.5	67.5	66.2	65.9	69.0	71.1	74.1	75.0	71.7	72.1	70.0	79.7
Blr 1 Econ Exit Dry O2	%	8.28	8.21	8.16	8.23	8.22	8.00	7.67	7.78	8.28	8.48	8.01	7.98	8.00	7.88	7.79
Blr 2 Econ Exit Dry O2	%	8.87	7.77	7.40	7.55	7.50	7.27	7.41	7.37	7.23	7.55	7.46	7.46	7.70	7.51	7.45
Aux Fuel Usage - Boiler 1 Natural Gas	kcuft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	149.01	43.92	0.00	0.00	0.00	0.00	0.00
Aux Fuel Usage - Boiler 2 Natural Gas	kcuft	5.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.69	0.00	0.00
ENTHALPIES																
Main Steam	BTU/lb	1,456.80	1,459.75	1,458.45	1,460.88	1,459.87	1,457.13	1,458.07	1,458.00	1,457.09	1,455.93	1,457.49	1,457.93	1,458.32	1,458.47	1,458.71
Feedwater	BTU/lb	1,455.55	1,460.53	1,458.48	1,462.40	1,458.98	1,458.20	1,459.18	1,460.57	1,459.69	1,458.19	1,459.05	1,460.65	1,461.75	1,461.81	1,462.65
Blowdown	BTU/lb	252.97	252.81	250.44	248.86	248.96	249.66	250.75	249.89	249.35	249.09	249.24	249.15	248.84	248.47	248.72
		252.16	251.93	249.51	248.12	248.32	249.03	250.06	249.24	248.66	248.27	248.45	248.32	248.73	248.95	248.96
		600.54	600.43	600.47	600.36	600.49	600.65	600.50	599.84	599.10	599.02	598.96	598.98	598.83	599.00	598.96
		600.15	600.31	600.27	600.17	600.22	600.42	600.27	599.54	599.12	599.13	598.74	598.69	598.50	598.70	598.70
CALCULATIONS																
% Excess Air from %O2	%	64.38	63.55	62.92	63.80	63.64	60.91	57.22	58.34	64.32	67.03	61.09	60.75	60.91	59.54	58.48
% Excess Air from %O2	%	72.32	58.23	54.33	55.86	55.35	52.97	54.44	54.05	52.64	55.86	54.94	54.96	57.54	55.49	54.80
Blr 1 Steam Ht Output	MBTUH	93.45	93.49	93.55	93.58	93.86	92.44	93.98	92.45	90.25	89.69	89.69	89.96	89.72	90.13	90.01
Blr 2 Steam Ht Output	MBTUH	92.66	93.61	93.45	93.88	93.45	92.30	94.08	92.32	91.10	90.98	89.94	89.90	89.45	89.95	90.02
Ht Output due to Aux Fuel	MBTUH	-	-	-	-	-	-	-	-	5.28	1.56	-	-	-	-	-
Ht Output due to Aux Fuel	MBTUH	0.20	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-
Blr 1Ht Output from Refuse	MBTUH	93.45	93.49	93.55	93.58	93.86	92.44	93.98	92.45	84.98	88.14	89.69	89.96	89.72	90.13	90.01
Blr 2Ht Output from Refuse	MBTUH	92.46	93.61	93.45	93.88	93.45	92.30	94.08	92.32	91.10	90.98	89.94	89.90	89.33	89.95	90.02
Blr 1 Spec Stm Output (BTU/lb ref fired)		4,558.52	4,477.54	4,507.84	4,424.34	4,489.00	4,631.96	4,547.69	4,498.07	4,801.67	4,684.98	4,510.42	4,581.82	4,429.46	4,402.96	4,753.80
Blr 2 Spec Stm Output (BTU/lb ref fired)		4,435.43	4,578.66	4,751.74	4,349.65	4,512.72	4,636.96	4,638.57	4,516.46	4,566.43	4,757.56	4,571.98	4,458.44	4,558.68	4,433.71	4,524.69
Weighted Average SSO	BTU/lb	4,496.5	4,527.6	4,626.5	4,386.6	4,500.8	4,634.5	4,592.7	4,507.2	4,677.0	4,721.6	4,541.0	4,519.3	4,493.0	4,418.3	4,636.4
ADJUSTMENTS																
<i>Total/Average for both Boilers</i>																
Wgt Avg Econ Gas Temp	deg F	330.6	332.7	330.1	331.2	329.8	329.1	329.8	328.8	329.6	329.6	329.6	329.8	330.4	329.1	330.0
Econ Gas Temp	BTU/lb	1.2	4.9	0.3	2.1	-0.3	-1.6	-0.3	-2.2	-0.7	-0.8	-0.8	-0.4	0.7	-1.5	0.0
Wgt Avg Htd Comb Air Temp	deg F	163.2	163.7	214.1	158.1	244.0	272.5	206.7	161.0	163.4	162.3	164.2	160.9	158.9	156.8	163.4
Wgt Avg Ambient Air Temp	deg F	78.7	82.1	81.3	73.1	68.4	67.5	67.5	70.7	72.6	75.4	76.1	72.7	72.9	70.7	80.4
Heated Combustion Air Temp	BTU/lb	44.8	48.6	-16.6	42.9	-70.0	-110.4	-24.8	37.5	38.2	43.9	40.6	40.2	42.8	41.9	48.1
Ambient Air Temp	BTU/lb	1.8	-3.0	-1.9	9.7	16.7	18.6	18.4	13.4	11.1	6.9	5.6	10.6	10.2	13.1	-0.6
Wgt Avg Excess Air	%	68.4	60.9	58.7	59.8	59.5	56.9	55.8	56.2	58.1	61.4	58.0	57.8	59.3	57.5	56.6
Excess Air	BTU/lb	31.7	14.3	9.4	11.3	11.0	5.1	2.4	3.2	8.0	16.					

Covanta Durham York 30-Day Residue Quantity Test

COVANTA DURHAM / YORK

Daily HHV Calculation Sheet

REFERENCE VALUES

930 deg F

1300 psig

275 deg F

330 deg F

200 deg F

80 deg F

1,000 BTU/cuft

1,000 BTU/cuft

1,455.71 BTU/lb

247.14 BTU/lb

54.83 %

85% Eff. on Aux Fuel

Factors

0.40 % output/10 deg F

-0.28 % output/10 deg F

-0.32 % output/10 deg F

0.52 % output/10%

1.1108 697.09

5,589 Design HHV

		Day 16	Day 17	Day 18	Day 19	Day 20	Day 21	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28	Day 29	Day 30	Sum/Avg
From:	10/12/15	10/13/15	10/14/15	10/15/15	10/16/15	10/17/15	10/18/15	10/19/15	10/20/15	10/21/15	10/22/15	10/23/15	10/24/15	10/25/15	10/26/15	10/27/15	
To:	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	
		0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	
DATA INPUTS																	
Refuse Processed Boiler 1	Tons	248.2	252.0	251.1	245.5	249.9	243.9	258.2	266.9	243.5	243.1	246.9	242.2	245.9	248.0	260.4	7,358.4
Refuse Processed Boiler 2	Tons	241.9	256.1	248.4	246.2	252.8	249.6	253.3	251.9	236.2	242.8	243.7	237.0	248.3	251.8	249.6	7,340.5
Total Operating Time - Unit 1	Hours	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	720.0
Total Operating Time - Unit 2	Hours	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	720.0
Boiler 1 Steam Production	klbs	1,773	1,795	1,830	1,809	1,806	1,805	1,806	1,788	1,765	1,787	1,805	1,809	1,809	1,811	1,801	54,155
Boiler 2 Steam Production	klbs	1,773	1,790	1,826	1,808	1,810	1,810	1,813	1,783	1,766	1,798	1,813	1,811	1,810	1,813	1,759	54,191
Boiler 1 Blowdown Flow	klbs	55.3	57.6	53.3	53.3	51.9	48.7	52.3	55.2	49.6	44.4	42.5	45.1	43.5	43.5	43.6	1,354.1
Boiler 2 Blowdown Flow	klbs	26.5	24.5	26.6	27.3	29.3	29.0	26.1	26.8	21.2	22.6	20.4	21.3	20.7	22.8	21.0	689.4
Boiler 1 Stm Temp	deg F	935.7	938.9	938.4	938.2	939.4	940.3	943.5	946.3	940.2	943.3	942.8	944.3	947.3	949.7	947.4	938.6
Boiler 2 Stm Temp	deg F	941.0	941.5	941.1	942.8	944.9	944.1	945.0	946.8	937.5	942.2	942.8	941.5	945.8	949.2	944.4	940.4
Boiler 1 Stm Press	psig	1,280.8	1,281.4	1,282.1	1,281.8	1,281.6	1,282.1	1,283.8	1,291.5	1,280.6	1,287.0	1,281.4	1,281.7	1,282.1	1,281.6	1,281.5	1,282.4
Boiler 2 Stm Press	psig	1,280.9	1,281.6	1,282.0	1,281.6	1,281.7	1,281.6	1,283.5	1,291.4	1,280.9	1,287.0	1,281.6	1,281.7	1,282.1	1,281.6	1,281.1	1,282.4
Boiler 1 Feedwater Temperature	deg F	276.8	276.7	277.4	277.0	276.7	276.8	274.8	266.6	276.2	274.8	277.1	277.3	277.2	277.4	277.4	276.9
Boiler 2 Feedwater Temperature	deg F	277.0	277.0	277.6	277.3	277.0	277.0	275.1	266.9	276.5	275.2	277.3	276.8	276.7	277.0	277.4	276.7
Boiler 1 Feedwater Pressure	psig	1,460.0	1,457.0	1,467.4	1,462.1	1,461.6	1,459.7	1,460.9	1,461.4	1,450.1	1,459.4	1,462.0	1,460.2	1,460.9	1,459.8	1,459.8	1,460.4
Boiler 2 Feedwater Pressure	psig	1,459.8	1,460.6	1,468.1	1,463.0	1,465.0	1,461.7	1,461.8	1,463.4	1,454.2	1,462.8	1,464.3	1,463.0	1,463.0	1,464.2	1,455.1	1,463.9
Boiler 1 Drum Pressure	psig	1,386.7	1,389.6	1,393.5	1,390.9	1,390.2	1,390.1	1,391.8	1,396.8	1,385.1	1,393.1	1,390.2	1,390.7	1,390.8	1,390.7	1,389.6	1,391.8
Boiler 2 Drum Pressure	psig	1,384.5	1,387.0	1,391.5	1,389.0	1,389.1	1,388.8	1,390.2	1,394.7	1,383.7	1,392.5	1,389.0	1,389.4	1,389.4	1,389.3	1,383.5	1,390.0
Blr 1 Econ Exit Gas Temp	deg F	333.8	329.2	329.2	328.7	328.9	329.0	328.3	330.3	329.0	328.7	329.7	328.6	329.1	328.7	330.2	329.2
Blr 2 Econ Exit Gas Temp	deg F	332.2	331.1	331.1	330.3	330.9	329.7	329.5	330.4	330.2	330.2	330.2	330.3	331.1	330.7	331.7	331.0
Blr 1 Heated Comb Air Temp	deg F	195.7	240.2	161.1	157.7	96.8	67.7	65.9	120.3	171.0	165.5	161.3	156.0	157.0	157.5	214.3	167.9
Blr 2 Heated Comb Air Temp	deg F	159.1	157.2	151.7	150.8	93.9	66.3	64.6	108.6	209.8	252.3	248.0	173.9	149.8	150.5	208.5	166.8
Boiler 1 Ambient Air Temp	deg F	81.4	81.9	72.3	70.5	67.3	56.8	55.0	67.0	81.2	79.4	74.6	65.5	66.9	67.2	64.8	72.4
Boiler 2 Ambient Air Temp	deg F	80.3	81.0	71.9	70.2	67.2	57.1	55.4	67.9	82.7	80.6	75.3	66.2	67.4	67.9	65.2	71.7
Blr 1 Econ Exit Dry O2	%	7.77	7.77	7.73	7.79	7.69	7.84	7.70	7.67	7.61	7.65	7.39	7.57	7.49	8.58	7.48	7.89
Blr 2 Econ Exit Dry O2	%	7.44	7.62	7.74	7.53	7.31	7.34	7.46	7.49	7.56	7.19	6.97	7.40	7.31	7.31	7.60	7.49
Aux Fuel Usage - Boiler 1 Natural Gas	kcuft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	192.93
Aux Fuel Usage - Boiler 2 Natural Gas	kcuft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.71	117.96
ENTHALPIES																	
Main Steam	BTU/lb	1,458.87	1,460.77	1,460.47	1,460.34	1,461.03	1,461.58	1,463.47	1,464.84	1,461.55	1,463.19	1,463.11	1,464.00	1,465.78	1,467.26	1,465.89	1,460.57
Feedwater	BTU/lb	1,462.08	1,462.31	1,462.09	1,463.12	1,464.35	1,463.88	1,464.37	1,465.19	1,459.96	1,462.53	1,463.08	1,462.34	1,464.87	1,466.97	1,464.08	1,461.67
Blowdown	BTU/lb	598.95	599.32	599.84	599.49	599.40	599.40	599.62	600.27	598.74	599.78	599.40	599.48	599.48	599.48	599.32	599.61
		598.66	598.99	599.58	599.25	599.26	599.23	599.41	599.99	598.56	599.71	599.25	599.31	599.30	599.28	598.54	599.38
CALCULATIONS																	
% Excess Air from %O2	%	58.26	58.26	57.83	58.52	57.44	59.09	57.49	57.19	56.48	56.93	54.21	56.10	55.22	68.24	55.12	59.60
% Excess Air from %O2	%	54.73	56.59	57.90	55.71	53.37	53.76	54.92	55.26	55.96	52.25	50.17	54.29	53.45	53.40	56.46	55.28
Blr 1 Steam Ht Output	MBTUH	90.22	91.52	93.12	92.08	91.99	91.92	92.31	92.21	89.94	91.22	91.95	92.18	92.39	92.55	91.93	91.80
Blr 2 Steam Ht Output	MBTUH	90.01	90.85	92.62	91.85	92.09	92.05	92.34	91.53	89.47	91.37	92.00	91.87	92.01	92.35	89.36	91.63
Ht Output due to Aux Fuel	MBTUH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.27
Ht Output due to Aux Fuel	MBTUH	-	-	-	-	-	-	-	-	2.21	-	-	-	-	-	-	2.36
Blr 1Ht Output from Refuse	MBTUH	90.22	91.52	93.12	92.08	91.99	91.92	92.31	92.21	89.94	91.22	91.95	92.18	92.39	92.55	91.93	91.53
Blr 2Ht Output from Refuse	MBTUH	90.01	90.85	92.62	91.85	92.09	92.05	92.34	89.32	89.47	91.37	92.00	91.87	92.01	92.35	87.00	91.47
Blr 1 Spec Stm Output (BTU/lb ref fired)		4,361.66	4,357.81	4,449.87	4,501.33	4,416.64	4,521.74	4,290.00	4,145.39	4,432.30	4,503.46	4,469.20	4,567.66	4,508.65	4,478.07	4,235.63	4,478.08
Blr 2 Spec Stm Output (BTU/lb ref fired)		4,464.53	4,257.46	4,474.40	4,476.28	4,371.00	4,425.89	4,374.63	4,254.36	4,546.41	4,516.48	4,530.64	4,651.11	4,446.01	4,400.27	4,182.96	4,485.99
Weighted Average SSO	BTU/lb	4,412.4	4,307.2	4,462.1	4,488.8	4,393.7	4,473.3	4,331.9	4,198.3	4,488.5	4,510.0	4,499.7	4,608.9	4,477.2	4,438.9	4,209.9	4,482.0
ADJUSTMENTS																	
Total/Average for both Boilers																	
Wgt Avg Econ Gas Temp	deg F	333.0	330.1	330.1	329.5	329.9	329.4	328.9	330.3	329.6	329.4	331.1	329.4	330.1	329.7	330.9	330.1
Econ Gas Temp	BTU/lb	5.3	0.2	0.2	-0.9	-0.2	-1.1	-1.9	0.6	-0.8	-1.1	1.9	-1.0	0.1	-0.5	1.6	0.1
Wgt Avg Htd Comb Air Temp	deg F	177.6	198.4	156.5	154.3	95.4	67.0	65.2	114.6	190.1	208.9	204.4	164.9	153.4	154.0	211.5	167.3
Wgt Avg Ambient Air Temp	deg F	80.9	81.5	72.1	70.4	67.2	57.0	55.2	67.4	81.9	80.0	74.9	65.8	67.1	67.5	65.0	72.1
Heated Combustion Air Temp	BTU/lb	28.7	3.7	44.5	45.3	113.0	137.8	133.4	85.6	14.9	-11.2	-11.9	27.0	42.3	41.7	-31.2	31.0
Ambient Air Temp	BTU/lb	-1.2	-2.0	11.3	13.9	17.9	33.0	34.4	16.9	-2.8	0.0	7.3	20.9	18.4	17.7	20.2	11.4
Wgt Avg Excess Air	%	56.5	57.4	57.9	57.1	55.4	56.4	56.2	56.3	56.2	54.6	52.2	55.2	54.3	60.8	55.8	57.4
Excess Air	BTU/lb	3.9	5.8	7.0	5.3</												

DYEC Acceptance Test 30-Day Residue Quantity Test

Date		Refuse Processed (By Crane)	Refuse Processed (Adjusted)	Bottom Ash Total	Total Treated Fly Ash	Total Residue Shipment	Bottom Ash 1	Bottom Ash 2	Bottom Ash 3	Bottom Ash 4	Bottom Ash 5	Bottom Ash 6	Bottom Ash 7	Fly Ash 1	Fly Ash 2	Fly Ash 3	Fly Ash 4	Fly Ash 5	Fly Ash 6	
				Tonne	Tonne	Tonne	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
09/27/2015 - 10/26/2015		13,293.3	13,334.6	2,648.7	1,505.8	4,154.5														
09/27/2015 - 10/31/2015		15,549.8		3,080.3	1,737.6	4,817.9														
09/27/2015 - 11/2/2015		16,458.5																		
9/27/2015	Sunday	448.7	450.1	0.0	0.0	0.0														
9/28/2015		448.5	449.9	73.9	0.0	73.9	39,470	34,450												
9/29/2015		438.7	440.0	111.7	0.0	111.7	39,310	39,000	33,370											
9/30/2015		463.8	465.2	70.9	0.0	70.9	35,000	35,910												
10/1/2015		451.7	453.1	69.0	0.0	69.0	33,130	35,890												
10/2/2015		432.6	434.0	146.1	0.0	146.1	37,200	40,260	35,040	33,580										
10/3/2015		444.4	445.8	0.0	55.1	55.1								21,410	33,710					
10/4/2015	Sunday	444.9	446.3	0.0	0.0	0.0														
10/5/2015		408.6	409.8	115.2	77.6	192.7	36,510	36,360	42,280					43,570	34,020					
10/6/2015		411.7	413.0	168.4	0.0	168.4	35,420	44,550	50,130	38,290										
10/7/2015		429.3	430.6	126.0	0.0	126.0	44,690	45,760	35,520											
10/8/2015		431.9	433.2	116.3	38.6	154.9	34,950	44,550	36,840					38,580						
10/9/2015		432.5	433.8	69.5	0.0	69.5	34,110	35,380												
10/10/2015		442.3	443.7	105.7	111.8	217.5	23,260	41,300	41,100					39,550	36,390	35,880				
10/11/2015	Sunday	421.4	422.7	0.0	0.0	0.0														
10/12/2015	Holiday	443.3	444.6	0.0	0.0	0.0														
10/13/2015		459.5	460.9	67.2	209.6	276.7	33,550	33,620						34,800	36,250	33,110	34,380	37,880	33,150	
10/14/2015		451.7	453.2	102.2	105.8	208.0	34,120	34,990	33,100					33,060	36,640	36,110				
10/15/2015		444.7	446.1	212.5	0.0	212.5	35,430	36,030	40,750	33,450	34,600	32,190								
10/16/2015		454.7	456.1	34.4	172.2	206.6	34,410							35,770	33,290	38,110	30,970	34,040		
10/17/2015		446.3	447.7	0.0	64.1	64.1								31,230	32,860					
10/18/2015	Sunday	462.6	464.0	0.0	0.0	0.0														
10/19/2015		469.2	470.7	0.0	101.1	101.1								31,930	33,610	35,580				
10/20/2015		433.8	435.1	0.0	67.3	67.3								33,240	34,080					
10/21/2015		439.4	440.7	0.0	62.0	62.0								30,860	31,110					
10/22/2015		443.6	445.0	153.2	0.0	153.2	35,600	38,200	44,180	35,240										
10/23/2015		433.4	434.7	254.8	31.1	285.9	36,610	39,900	34,010	33,400	40,440	37,030	33,420	31,110						
10/24/2015		447.0	448.4	200.5	0.0	200.5	33,770	39,370	38,220	39,920	49,220									
10/25/2015	Sunday	452.1	453.5	0.0	0.0	0.0														
10/26/2015		461.2	462.7	146.4	72.3	218.6	35,590	43,190	33,330	34,250				38,360	33,890					
10/27/2015		460.6	462.0	69.1	72.2	141.3	33,460	35,630						33,690	38,490					
10/28/2015		449.3	450.7	163.3	9.1	172.4	34,920	44,990	41,700	41,670				9,100						
10/29/2015		454.3	455.7	72.6	0.0	72.6	32,530	35,350	4,740	30-Day End										
10/30/2015		449.5	450.9	133.5	0.0	133.5	35,460	35,210	33,250	29,580										
10/31/2015		442.9	444.2	88.9	63.1	152.0	46,840	42,050						31,250	31,860					
11/1/2015	Sunday	478.0	479.5	0.0	0.0	0.0														
11/2/2015		430.6	432.0	76.4	33.4	109.8	2,080	34,570	39,720					33,390						
11/3/2015				69.0	159.5	228.5	35,050	33,940						34,590	37,180	41,710	36,510	9,490		30-Day End
11/4/2015				63.8	201.8	265.6	35,820	28,010	35-Day End				24,020	36,700	35,040	38,500	33,300	34,230		
11/5/2015				0.0	30.0	30.0								29,970						35-Day End

**Covanta Durham York
30-Day Residue Quantity Test**

Date	Cement Delivery	Cement Silo Level		Pozzolan Delivery	Pozzolan Silo Level
	Tonne	Meter from bottom		Tonne	Meter from bottom
9/18/2015	39.05				
9/19/2015					
9/20/2015					
9/21/2015		3.4		33.54	4.7
9/22/2015		3.3			3.8
9/23/2015		2.8			3.6
9/24/2015		2.2			3.5
9/25/2015		1.9			3.0
9/26/2015		1.9			2.8
9/27/2015		1.9			2.6
9/28/2015	41.21	0.8		34.42	1.8
9/29/2015		4.3			3.9
9/30/2015		3.5			3.2
10/1/2015		2.6			2.5
10/2/2015	38.12	2.1		38.36	2.4
10/3/2015		5.1			4.6
10/4/2015		4.3			4.5
10/5/2015		3.0			4.5
10/6/2015		2.2			4.5
10/7/2015		1.5			3.6
10/8/2015	40.99	0.5			3.0
10/9/2015		4.1			2.4
10/10/2015		3.5		30.78	1.7
10/11/2015		2.5			3.9
10/12/2015		1.5			2.9
10/13/2015		1.4			2.4
10/14/2015	43.48	5.1			2.1
10/15/2015		4.1		40.99	1.5
10/16/2015		3.4			4.6
10/17/2015		2.7			3.6
10/18/2015		1.6			3.1
10/19/2015		1.8			3.3
10/20/2015	42.1	0.4			2.1
10/21/2015		4.5			1.9
10/22/2015		3.6		39.82	1.6
10/23/2015	39.89	2.6			4.6
10/24/2015		6.3			3.5
10/25/2015		5.4			3.0
10/26/2015		5.1			2.3
10/27/2015		4.4			2.1
10/28/2015		3.7			1.9
10/29/2015		3.2			1.6
10/30/2015		2.7		33.78	0.8
10/31/2015		2.3			3.2
11/1/2015		2.0			3.1
11/2/2015	28.79	1.7			2.9
11/3/2015		4.2			2.2
9/27/2015 0000 - 10/26/2015 2400	245.79	-26.38		184.37	7.18
	Cement Delivery	Silo Level Adjustment		Pozzolan Delivery	Silo Level Adjustment

**Covanta Durham York
30-Day Residue Quantity Test
Crane Load Summary**

	Crane Feed Count			Boiler Feed Count			Crane Feed Weight			Boiler Feed Weight		
	Crane 1 East	Crane 2 West	Total	Boiler 1	Boiler 2	Total	Crane 1 East	Crane 2 West	Total	Boiler 1	Boiler 2	Total
	Count	Count	Count	Count	Count	Count	kg	kg	kg	kg	kg	kg
9/27/2015 0000 - 10/26/2015 2400	1,991	5,410	7,401	3,756	3,645	7,401	3,562,240	9,731,035	13,293,275	6,654,773	6,638,502	13,293,275
9/27/2015	2	248	250	128	122	250	4,105	444,605	448,710	222,474	226,236	448,710
9/28/2015	0	252	252	126	126	252	0	448,456	448,456	226,586	221,870	448,456
9/29/2015	4	246	250	128	122	250	7,167	431,484	438,651	225,224	213,427	438,651
9/30/2015	4	274	278	139	139	278	8,964	454,796	463,760	229,540	234,220	463,760
10/1/2015	4	243	247	123	124	247	5,796	445,855	451,651	226,917	224,734	451,651
10/2/2015	14	230	244	119	125	244	28,600	404,006	432,606	216,574	216,032	432,606
10/3/2015	0	243	243	124	119	243	0	444,378	444,378	224,276	220,102	444,378
10/4/2015	0	247	247	123	124	247	0	444,904	444,904	223,062	221,842	444,904
10/5/2015	74	163	237	114	123	237	130,018	278,548	408,566	192,056	216,510	408,566
10/6/2015	13	249	262	132	130	262	25,280	386,418	411,698	204,162	207,536	411,698
10/7/2015	2	244	246	124	122	246	2,771	426,523	429,294	215,798	213,496	429,294
10/8/2015	9	250	259	127	132	259	14,471	417,426	431,897	213,067	218,830	431,897
10/9/2015	98	137	235	122	113	235	169,221	263,265	432,486	219,815	212,671	432,486
10/10/2015	182	70	252	128	124	252	303,188	139,142	442,330	222,147	220,183	442,330
10/11/2015	219	17	236	116	120	236	392,782	28,608	421,390	205,489	215,901	421,390
10/12/2015	199	34	233	119	114	233	374,513	68,757	443,270	224,478	218,792	443,270
10/13/2015	174	71	245	124	121	245	333,511	125,988	459,499	227,920	231,579	459,499
10/14/2015	3	237	240	124	116	240	4,791	446,956	451,747	227,096	224,651	451,747
10/15/2015	8	224	232	118	114	232	13,867	430,828	444,695	222,000	222,695	444,695
10/16/2015	6	230	236	120	116	236	10,188	444,492	454,680	226,026	228,654	454,680
10/17/2015	4	239	243	125	118	243	7,439	438,900	446,339	220,621	225,718	446,339
10/18/2015	70	174	244	125	119	244	136,281	326,304	462,585	233,509	229,076	462,585
10/19/2015	247	37	284	143	141	284	410,760	58,483	469,243	241,401	227,842	469,243
10/20/2015	93	148	241	124	117	241	152,128	281,667	433,795	220,220	213,575	433,795
10/21/2015	124	112	236	123	113	236	223,879	215,494	439,373	219,817	219,556	439,373
10/22/2015	26	199	225	119	106	225	38,335	405,300	443,635	223,272	220,363	443,635
10/23/2015	70	175	245	126	119	245	120,497	312,863	433,360	219,005	214,355	433,360
10/24/2015	25	231	256	132	124	256	48,982	398,000	446,982	222,384	224,598	446,982
10/25/2015	70	179	249	126	123	249	143,183	308,867	452,050	224,297	227,753	452,050
10/26/2015	247	7	254	135	119	254	451,523	9,722	461,245	235,540	225,705	461,245
10/27/2015	242	38	280	140	140	280	399,679	60,938	460,617	233,624	226,993	460,617
10/28/2015	86	162	248	125	123	248	159,003	290,258	449,261	223,764	225,497	449,261
10/29/2015	10	218	228	114	114	228	23,926	430,358	454,284	230,272	224,012	454,284
10/30/2015	4	230	234	115	119	234	7,472	442,060	449,532	222,747	226,785	449,532
10/31/2015	18	206	224	115	109	224	44,400	398,469	442,869	223,746	219,123	442,869
11/1/2015	65	165	230	117	113	230	133,980	344,050	478,030	237,824	240,206	478,030
11/2/2015	182	70	252	128	124	252	306,320	124,315	430,635	215,904	214,731	430,635

Covanta Durham / York East Crane (Crane 1) Scale Span Check Record Sheet

Date	Time	Crane	Test Weight (kg)	Zero Initial (kg)	Zero End (kg)	Lift (kg)				Average (kg)	Deviation (kg)	Remarks / Initial
						1	2	3	Redutant (Parking)			
9/26/2015	18:58	East	3,966	0	20	4,035	4,045	4,035	4,030	4,038.3	72.3	DD
9/27/2015	07:09	East	3,966	15	35	4,045	4,045	4,045	4,030	4,045.0	79.0	RL
9/27/2015	17:16	East	3,966	0	25	4,055	4,055	4,070	4,040	4,060.0	94.0	
9/28/2015	07:09	East	3,966	0	30	4,050	4,045	4,045	4,035	4,046.7	80.7	
9/28/2015	17:06	East	3,966	0	25	4,045	4,035	4,030	4,030	4,036.7	70.7	
9/29/2015	07:08	East	3,966	0	20	4,060	4,050	4,050	4,025	4,053.3	87.3	
9/29/2015	17:11	East	3,966	-5	15	4,040	4,040	4,040	4,030	4,040.0	74.0	
9/30/2015	07:12	East	3,966	-5	5	4,035	4,025	4,015	4,005	4,025.0	59.0	
9/30/2015	17:02	East	3,966	0	5	4,025	4,010	4,025	4,015	4,020.0	54.0	
10/1/2015	07:16	East	3,966	-5	15	4,020	4,000	4,015	4,015	4,011.7	45.7	
10/1/2015	17:14	East	3,966	-5	10	4,010	4,020	4,020	4,015	4,016.7	50.7	
10/2/2015	07:19	East	3,966	-20	0	4,000	3,980	3,985	3,980	3,988.3	22.3	
10/2/2015	17:09	East	3,966	0	10	4,015	4,005	4,020	4,000	4,013.3	47.3	
10/3/2015	07:37	East	3,966	5	15	4,010	4,000	4,010	3,995	4,006.7	40.7	
10/3/2015	17:03	East	3,966	-5	20	4,005	4,015	4,025	4,005	4,015.0	49.0	
10/4/2015	07:34	East	3,966	-5	15	4,030	4,020	4,020	4,010	4,023.3	57.3	
10/4/2015	17:08	East	3,966	10	15	4,035	4,025	4,035	3,995	4,031.7	65.7	
10/5/2015	07:17	East	3,966	-5	10	4,030	4,030	4,040	4,015	4,033.3	67.3	
10/5/2015	17:14	East	3,966	0	15	4,025	4,025	4,025	4,020	4,025.0	59.0	
10/6/2015	07:29	East	3,966	0	25	4,025	4,020	4,030	4,030	4,025.0	59.0	Re-Tare
10/6/2015	17:12	East	3,966	-5	25	4,035	4,040	4,040	4,030	4,038.3	72.3	
10/7/2015	07:32	East	3,966	-5	15	4,030	4,025	4,025	4,025	4,026.7	60.7	
10/7/2015	18:27	East	3,966	-5	10	4,035	4,035	4,035	4,030	4,035.0	69.0	Re-Tare
10/8/2015	07:23	East	3,966	5	15	4,000	4,000	4,000	3,985	4,000.0	34.0	
10/8/2015	17:39	East	3,966	5	15	4,050	4,045	4,035	4,025	4,043.3	77.3	
10/9/2015	07:25	East	3,966	-5	0	4,000	3,995	3,995	3,980	3,996.7	30.7	
10/9/2015	17:27	East	3,966	5	15	4,020	4,020	4,020	4,010	4,020.0	54.0	
10/10/2015	07:23	East	3,966	-5	10	4,010	3,990	3,990	3,990	3,996.7	30.7	
10/10/2015	17:16	East	3,966	-25	-20	3,960	3,950	3,950	3,945	3,953.3	-12.7	
10/11/2015	07:41	East	3,966	0	15	4,025	4,025	4,015	4,010	4,021.7	55.7	
10/11/2015	17:30	East	3,966	0	0	4,050	4,035	4,045	4,025	4,043.3	77.3	
10/12/2015	07:26	East	3,966	0	20	4,030	4,030	4,030	4,020	4,030.0	64.0	
10/12/2015	17:55	East	3,966	-10	5	4,025	4,020	4,030	4,015	4,025.0	59.0	
10/13/2015	07:25	East	3,966	5	20	4,050	4,040	4,040	4,020	4,043.3	77.3	
10/13/2015	17:40	East	3,966	0	5	4,015	4,020	4,020	4,020	4,018.3	52.3	
10/14/2015	07:30	East	3,966	0	30	4,040	4,040	4,035	4,025	4,038.3	72.3	Re-Tare
10/14/2015	17:15	East	3,966	-5	10	4,020	4,020	4,020	4,005	4,020.0	54.0	
10/15/2015	07:24	East	3,966	-5	20	4,025	4,025	4,020	4,005	4,023.3	57.3	
10/15/2015	17:12	East	3,966	-5	0	4,010	4,010	4,005	3,995	4,008.3	42.3	
10/16/2015	07:26	East	3,966	-10	10	4,015	4,015	4,010	4,000	4,013.3	47.3	
10/16/2015	17:07	East	3,966	-15	0	4,025	4,015	4,015	3,985	4,018.3	52.3	
10/17/2015	07:26	East	3,966	-5	10	3,995	3,980	3,980	3,975	3,985.0	19.0	
10/17/2015	17:05	East	3,966	-15	0	3,995	4,005	3,995	3,975	3,998.3	32.3	
10/18/2015	07:21	East	3,966	-20	0	3,990	3,985	3,980	3,955	3,985.0	19.0	
10/18/2015	17:06	East	3,966	-5	5	3,990	4,000	3,985	3,970	3,991.7	25.7	
10/19/2015	07:42	East	3,966	0	15	4,005	4,005	4,005	3,970	4,005.0	39.0	
10/19/2015	17:37	East	3,966	-25	-15	4,005	3,995	3,995	3,980	3,998.3	32.3	
10/20/2015	07:23	East	3,966	0	0	4,015	4,020	4,025	4,005	4,020.0	54.0	
10/20/2015	17:15	East	3,966	-15	5	4,025	4,015	4,015	4,000	4,018.3	52.3	
10/21/2015	07:40	East	3,966	-10	0	4,015	4,015	4,015	4,005	4,015.0	49.0	
10/21/2015	17:13	East	3,966	-5	15	4,025	4,035	4,035	4,015	4,031.7	65.7	
10/22/2015	07:28	East	3,966	-20	-5	4,010	4,010	4,010	3,995	4,010.0	44.0	
10/22/2015	17:04	East	3,966	-20	5	4,015	4,020	4,010	3,990	4,015.0	49.0	
10/23/2015	07:20	East	3,966	-15	10	3,990	3,990	3,990	4,000	3,990.0	24.0	
10/23/2015	17:07	East	3,966	-20	0	4,010	4,010	4,010	3,985	4,010.0	44.0	
10/24/2015	07:57	East	3,966	-30	-30	3,965	3,955	3,950	3,915	3,956.7	-9.3	
10/24/2015	17:15	East	3,966	-25	-10	3,990	3,975	3,975	3,980	3,980.0	14.0	
10/25/2015	07:18	East	3,966	-45	-10	3,990	4,005	3,975	3,970	3,990.0	24.0	
10/25/2015	17:08	East	3,966	-20	0	3,995	3,985	3,995	3,985	3,991.7	25.7	
10/26/2015	07:45	East	3,966	-10	5	4,000	4,000	4,000	3,980	4,000.0	34.0	
10/26/2015	17:23	East	3,966	-5	0	4,010	3,990	3,990	3,995	3,996.7	30.7	
10/27/2015	07:40	East	3,966	-10	10	3,990	3,985	3,985	3,980	3,986.7	20.7	
10/27/2015	17:21	East	3,966	-30	0	4,015	4,005	3,995	3,985	4,005.0	39.0	
10/28/2015	07:48	East	3,966	-10	0	4,005	4,005	3,995	4,000	4,001.7	35.7	
10/28/2015	17:02	East	3,966	0	30	4,055	4,060	4,060	4,035	4,058.3	92.3	Re-Tare
10/29/2015	07:30	East	3,966	-5	0	4,010	4,010	4,000	4,005	4,006.7	40.7	
10/29/2015	17:07	East	3,966	-15	-5	4,000	3,980	3,995	3,955	3,991.7	25.7	
10/30/2015	07:25	East	3,966	-10	10	4,000	4,000	4,000	3,985	4,000.0	34.0	
10/30/2015	17:02	East	3,966	-15	0	3,985	4,005	4,015	3,980	4,001.7	35.7	
10/31/2015	07:25	East	3,966	0	5	4,010	4,015	3,995	3,985	4,006.7	40.7	
10/31/2015	17:04	East	3,966	-20	-5	3,985	3,990	3,990	3,975	3,988.3	22.3	
11/1/2015	07:26	East	3,966	-15	-5	3,990	3,990	3,995	3,980	3,991.7	25.7	
11/1/2015	17:09	East	3,966	-15	-5	4,015	4,010	4,015	3,995	4,013.3	47.3	
11/2/2015	07:45	East	3,966	-5	0	4,015	4,015	4,020	4,000	4,016.7	50.7	
11/2/2015	17:13	East	3,966	-15	-20	4,015	4,025	4,010	4,000	4,016.7	50.7	
Average		East	3,966	-7.7	7.5				3,999.6	4,013.9	47.9	1.21%
30-Day Average		East	3,966	-6.9	9.0				4,001.5	4,015.2	49.2	1.24%
5-Day Average		East	3,966	-2.1	17.1				4,020.8	4,031.8	65.8	1.66%

Covanta Durham / York West Crane (Crane 2) Scale Span Check Record Sheet

Date	Time	Crane	Test Weight (kg)	Zero Initial (kg)	Zero End (kg)	Lift (kg)				Average (kg)	Deviation (kg)	Remarks / Initial
						1	2	3	Redutant (Parking)			
9/26/2015	19:19	West	3,926	0	20	3,885	3,890	3,890	3,865	3,888.3	-37.7	DD
9/27/2015	07:30	West	3,926	0	20	3,890	3,895	3,895	3,870	3,893.3	-32.7	RL
9/27/2015	17:35	West	3,926	0	25	3,890	3,900	3,900	3,885	3,896.7	-29.3	RL
9/28/2015	07:32	West	3,926	0	15	3,900	3,900	3,900	3,880	3,900.0	-26.0	
9/28/2015	17:25	West	3,926	0	15	3,895	3,905	3,905	3,880	3,901.7	-24.3	
9/29/2015	07:27	West	3,926	0	5	3,880	3,890	3,890	3,875	3,886.7	-39.3	
9/29/2015	17:31	West	3,926	5	20	3,895	3,915	3,905	3,890	3,905.0	-21.0	
9/30/2015	07:30	West	3,926	15	25	3,885	3,875	3,885	3,865	3,881.7	-44.3	
9/30/2015	17:26	West	3,926	5	30	3,895	3,895	3,895	3,875	3,895.0	-31.0	
10/1/2015	07:31	West	3,926	5	20	3,875	3,875	3,895	3,850	3,881.7	-44.3	
10/1/2015	17:31	West	3,926	0	-15	3,870	3,890	3,870	3,860	3,876.7	-49.3	
10/2/2015	07:34	West	3,926	-5	20	3,860	3,860	3,855	3,840	3,858.3	-67.7	
10/2/2015	17:21	West	3,926	15	30	3,890	3,890	3,885	3,880	3,888.3	-37.7	
10/3/2015	07:58	West	3,926	-20	0	3,840	3,840	3,850	3,820	3,843.3	-82.7	
10/3/2015	17:19	West	3,926	5	45	3,885	3,890	3,880	3,875	3,885.0	-41.0	
10/4/2015	07:52	West	3,926	5	15	3,865	3,895	3,865	3,840	3,875.0	-51.0	
10/4/2015	17:20	West	3,926	0	20	3,870	3,870	3,875	3,865	3,871.7	-54.3	
10/5/2015	07:32	West	3,926	0	25	3,860	3,860	3,860	3,860	3,860.0	-66.0	
10/5/2015	17:31	West	3,926	0	10	3,870	3,870	3,865	3,835	3,868.3	-57.7	
10/6/2015	07:45	West	3,926	-5	25	3,860	3,870	3,870	3,850	3,866.7	-59.3	
10/6/2015	17:25	West	3,926	-10	25	3,850	3,865	3,850	3,840	3,855.0	-71.0	
10/7/2015	07:49	West	3,926	5	0	3,850	3,850	3,850	3,840	3,850.0	-76.0	
10/7/2015	18:40	West	3,926	5	35	3,890	3,885	3,885	3,895	3,886.7	-39.3	
10/8/2015	07:38	West	3,926	-5	5	3,860	3,860	3,850	3,845	3,856.7	-69.3	
10/8/2015	17:58	West	3,926	-5	20	3,860	3,870	3,870	3,845	3,866.7	-59.3	
10/9/2015	07:38	West	3,926	5	15	3,870	3,890	3,880	3,850	3,880.0	-46.0	
10/9/2015	17:30	West	3,926									
10/10/2015	07:33	West	3,926									
10/10/2015	17:37	West	3,926	0	35	3,860	3,885	3,875	3,865	3,873.3	-52.7	
10/11/2015	07:23	West	3,926	0	15	3,870	3,860	3,870	3,860	3,866.7	-59.3	
10/11/2015	17:15	West	3,926	0	15	3,880	3,890	3,895	3,880	3,888.3	-37.7	
10/12/2015	07:13	West	3,926	15	30	3,875	3,880	3,875	3,865	3,876.7	-49.3	
10/12/2015	17:45	West	3,926	5	15	3,870	3,865	3,865	3,850	3,866.7	-59.3	
10/13/2015	07:12	West	3,926	0	20	3,870	3,875	3,870	3,880	3,871.7	-54.3	
10/13/2015	17:20	West	3,926	0	20	3,875	3,875	3,880	3,865	3,876.7	-49.3	
10/14/2015	07:43	West	3,926	5	45	3,890	3,890	3,890	3,855	3,890.0	-36.0	
10/14/2015	17:34	West	3,926	0	20	3,875	3,875	3,885	3,840	3,878.3	-47.7	
10/15/2015	07:40	West	3,926	0	15	3,860	3,855	3,875	3,845	3,863.3	-62.7	
10/15/2015	17:26	West	3,926	5	25	3,865	3,870	3,880	3,865	3,871.7	-54.3	
10/16/2015	07:46	West	3,926	0	-5	3,825	3,820	3,815	3,810	3,820.0	-106.0	Re-Tare
10/16/2015	17:21	West	3,926	15	45	3,870	3,870	3,860	3,865	3,866.7	-59.3	
10/17/2015	07:44	West	3,926	15	30	3,860	3,880	3,880	3,845	3,873.3	-52.7	
10/17/2015	17:22	West	3,926	0	30	3,845	3,855	3,870	3,835	3,856.7	-69.3	
10/18/2015	07:38	West	3,926	0	0	3,820	3,810	3,810	3,810	3,813.3	-112.7	Re-Tare
10/18/2015	17:22	West	3,926	25	25	3,860	3,860	3,860	3,850	3,860.0	-66.0	
10/19/2015	07:27	West	3,926	15	35	3,850	3,855	3,865	3,860	3,856.7	-69.3	
10/19/2015	17:18	West	3,926	20	40	3,865	3,880	3,880	3,880	3,875.0	-51.0	
10/20/2015	07:39	West	3,926	-5	15	3,855	3,865	3,865	3,860	3,861.7	-64.3	
10/20/2015	17:29	West	3,926	5	35	3,875	3,875	3,885	3,870	3,878.3	-47.7	
10/21/2015	07:27	West	3,926	0	25	3,875	3,880	3,880	3,875	3,878.3	-47.7	Re-Tare
10/21/2015	17:30	West	3,926	-5	15	3,840	3,840	3,845	3,845	3,841.7	-84.3	
10/22/2015	07:41	West	3,926	15	40	3,880	3,905	3,900	3,865	3,895.0	-31.0	
10/22/2015	17:21	West	3,926	-5	15	3,840	3,865	3,855	3,850	3,853.3	-72.7	
10/23/2015	07:40	West	3,926	10	45	3,850	3,860	3,870	3,860	3,860.0	-66.0	
10/23/2015	17:20	West	3,926	-55	0	3,845	3,810	3,835	3,810	3,830.0	-96.0	
10/24/2015	08:20	West	3,926	0	0	3,820	3,855	3,860	3,850	3,845.0	-81.0	
10/24/2015	17:30	West	3,926	0	10	3,870	3,895	3,890	3,860	3,885.0	-41.0	
10/25/2015	07:35	West	3,926	25	35	3,885	3,885	3,875	3,860	3,881.7	-44.3	
10/25/2015	17:20	West	3,926	15	50	3,900	3,890	3,900	3,865	3,896.7	-29.3	
10/26/2015	07:30	West	3,926	-5	0	3,885	3,910	3,910	3,880	3,901.7	-24.3	
10/26/2015	17:04	West	3,926	-25	15	3,860	3,880	3,880	3,870	3,873.3	-52.7	
10/27/2015	07:26	West	3,926	10	-5	3,875	3,885	3,870	3,865	3,876.7	-49.3	
10/27/2015	17:08	West	3,926	0	45	3,885	3,890	3,905	3,880	3,893.3	-32.7	
10/28/2015	07:29	West	3,926	0	-30	3,870	3,880	3,880	3,865	3,876.7	-49.3	Re-Tare
10/28/2015	17:21	West	3,926	40	50	3,905	3,900	3,895	3,880	3,900.0	-26.0	
10/29/2015	07:47	West	3,926	10	35	3,910	3,905	3,900	3,880	3,905.0	-21.0	
10/29/2015	17:25	West	3,926	10	35	3,875	3,870	3,860	3,850	3,868.3	-57.7	
10/30/2015	07:40	West	3,926	-10	0	3,850	3,850	3,850	3,835	3,850.0	-76.0	
10/30/2015	17:22	West	3,926	20	0	3,900	3,880	3,900	3,865	3,893.3	-32.7	
10/31/2015	07:41	West	3,926	15	5	3,880	3,870	3,870	3,850	3,873.3	-52.7	
10/31/2015	17:21	West	3,926	15	5	3,880	3,890	3,900	3,860	3,890.0	-36.0	
11/1/2015	07:47	West	3,926	-25	-15	3,860	3,860	3,870	3,830	3,863.3	-62.7	
11/1/2015	17:23	West	3,926	5	40	3,890	3,910	3,910	3,865	3,903.3	-22.7	
11/2/2015	07:27	West	3,926	15	15	3,890	3,915	3,915	3,885	3,906.7	-19.3	
11/2/2015	17:02	West	3,926	35	45	3,920	3,910	3,915	3,885	3,915.0	-11.0	
Average		West	3,926	3.4	19.9				3,859.1	3,874.8	-51.2	-1.30%
HHV Test		West	3,926	3.0	16.0				3,873.0	3,891.8	-34.2	-0.87%
30-Day Average		West	3,926	2.0	20.3				3,858.1	3,872.0	-54.0	-1.37%
5-Day Average		West	3,926	2.1	16.7				3,869.6	3,888.8	-37.3	-0.95%

Water–cement ratio

From Wikipedia, the free encyclopedia

The **water–cement ratio** is the ratio of the weight of water to the weight of cement used in a concrete mix. A lower ratio leads to higher strength and durability, but may make the mix difficult to work with and form. Workability can be resolved with the use of plasticizers or super-plasticizers.

Often, the ratio refers to the ratio of water to cement plus pozzolan ratio, $w/(c+p)$. The pozzolan is typically a fly ash, or blast furnace slag. It can include a number of other materials, such as silica fume, rice husk ash or natural pozzolans. Pozzolans can be added to strengthen concrete.

The notion of water–cement ratio was first developed by Duff A. Abrams and published in 1918. Refer to concrete slump test.

Concrete hardens as a result of the chemical reaction between cement and water (known as hydration, this produces heat and is called the heat of hydration). For every pound (or kilogram or any unit of weight) of cement, about 0.42 pounds (or 0.42 kg or corresponding unit) of water is needed to fully complete hydration reactions.

However, a mix with a ratio of 0.42 may not mix thoroughly, and may not flow well enough to be placed. More water is therefore used than is technically necessary to react with cement. Water-cement ratios of 0.45 to 0.60 are more typically used. For higher-strength concrete, lower ratios are used, along with a plasticizer to increase flowability.

Too much water will result in segregation of the sand and aggregate components from the cement paste. Also, water that is not consumed by the hydration reaction may leave concrete as it hardens, resulting in microscopic pores (bleeding) that will reduce final strength of concrete. A mix with too much water will experience more shrinkage as excess water leaves, resulting in internal cracks and visible fractures (particularly around inside corners), which again will reduce the final strength.

The 1997 Uniform Building Code specifies a maximum of 0.50 ratio when concrete is exposed to freezing and thawing in a moist condition or to de-icing chemicals, and a maximum of 0.45 ratio for concrete in a severe or very severe sulfate condition.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Water–cement_ratio&oldid=689347449"

Categories: Cement | Concrete | Engineering ratios

-
- This page was last modified on 6 November 2015, at 15:14.
 - Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.