

Alexandria Arlington Resource Recovery Facility

Fiscal Year 2018
Third Quarter Operations Report

May 2018



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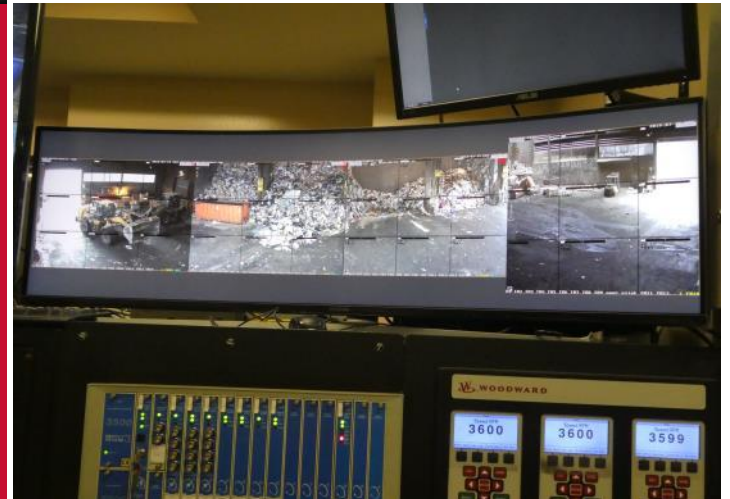


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Definition of Abbreviations & Acronyms

<u>Abbreviation/Acronym</u>	<u>Definition</u>
APC	Air Pollution Control
Apr	April
Aug	August
Avg	Average
Btu	British thermal unit
CAAI	Covanta Alexandria Arlington, Inc.
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
Dec	December
ECOM	Emergency Communications
Feb	February
FMG	Facility Monitoring Group
FY	Fiscal Year
gal	Gallon
GAT	Guaranteed Annual Tonnage
HCl	Hydrochloric (Hydrogen Chlorides)
HDR	HDR Engineering Inc
HHV	Estimated Waste Heating Value (Btu/lb)
ID	Induced Draft
Jan	January
Jul	July
Jun	June
klbs	Kilo-pounds (1,000 lbs)
kWhr	Kilowatt hours (1,000 watt-hours)
lbs	Pounds
LOA	Letter of Agreement
Mar	March
Max	Maximum
May	May
Min	Minimum
MSW	Municipal Solid Waste
MW hr	Megawatt hours
No	Number
NOV	Notice of Violation
Nov	November
NO _x	Nitrogen Oxide
Oct	October
OSHA	Occupational Safety and Health Administration
PDS	Potomac Disposal Services
ppm	Parts per million
ppmdv	Parts per million dry volume
PSD	Prevention of Significant Deterioration
Q1	First Quarter
Q2	Second Quarter
Q3	Third Quarter
Q4	Fourth Quarter
RE	Reportable Exempt
RNE	Reportable Non-Exempt
SDA	Spray Dryer Absorber
Sep	September
SO ₂	Sulfur Dioxide
TCLP	Toxicity Characteristic Leaching Procedure
VADEQ	Virginia Department of Environmental Quality
WL	Warning Letter
yr	Year
YTD	Year to date

Alexandria/Arlington Waste-to-Energy Facility Third Quarter Operations Report – Fiscal Year 2018

1.0 Purpose of Report

HDR Engineering, Inc. (HDR) was authorized by the Facility Monitoring Group (FMG) to conduct quarterly inspections and provide quarterly reports regarding the operation and maintenance of the Covanta Alexandria/Arlington Waste-to-Energy Facility (Facility) for the 2018 Fiscal Year. This report is prepared for the third quarter of the 2018 fiscal year and summarizes Facility operations between January 1, 2018 and March 31, 2018. This report identifies the fiscal year beginning on July 1, 2017 as FY18 and the quarter beginning on January 1, 2018 as Q3FY18.

This report is based upon HDR's experience in the waste-to-energy industry, upon site observation visits and previous reports provided by HDR, and upon data provided by Covanta Alexandria / Arlington, Inc. (CAAI), the Facility owner and operator.

2.0 Executive Summary

CAAI operated the Facility in an acceptable manner and in accordance with established waste-to-energy industry practices during Q3FY18. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. Environmental performance was excellent with no reportable environmental excursion throughout the quarter.

During Q3FY18, the boilers experienced one (1) instance of unscheduled downtime totaling 17.0 hours, and the turbine generators experienced two (2) instances of unscheduled downtime totaling 18.6 hours. All three boilers experienced scheduled major outages totaling 610.9 hours of downtime during the quarter. No standby downtime was experienced by the boilers and two (2) instances of standby downtime were experienced by the Turbine Generators totaling 221.8 hours during the quarter. Note that standby time is not factored into

overall availability. A detailed listing of downtime is provided in Section 5.2 of this report.

Average waste processed during the quarter was 914.8 tons per day, or 93.8% of nominal facility capacity. Waste deliveries averaged 929.8 tons per day, which is 1.6% higher than the burn rate. The capacity utilization of 93.8% is excellent when compared to that of mature, well run waste to energy facilities.

Performance trends for various measurements are presented in Section 4. In general, the Facility continues to demonstrate reasonable consistency in month to month performance throughout the most recent three-year period tracked for detailed comparisons.

During the quarter, MSW processed slightly increased (less than 0.1%) from the corresponding quarter in FY17; steam production increased (7.3%), and electricity generated (gross) increased (4.5%) from the corresponding quarter in FY17. The increase in steam generation is attributable to the increase (4.5%) in waste heating value, paired with less boiler downtime (60.1 fewer hours). The increased in electricity generated (gross) in Q3FY18, is attributable to higher steam production, paired with less downtime (186.7 fewer hours) experienced by the turbine generators.

3.0 Facility Inspection and Records Review

In March 2018, HDR met with the Facility management and other plant personnel to discuss Facility operations and maintenance, acquire data and reports, perform an independent visual inspection of the operating Facility, photograph areas of interest, and perform a review of recent Facility activity. This visit followed the February 2018 scheduled FMG meeting. At the time of the inspection, HDR reviewed CAAI records and discussed performance issues with CAAI staff. HDR maintains a running tabulation of the status of corrective actions and plant performance trends. CAAI provides the following documents for each month:

- Facility Monthly Operating Reports

- Monthly Continuous Emissions Monitoring System (CEMS) Reports

Table 1 summarizes maintenance, repair, and plant condition issues reported during this and prior reporting periods. An “A” indicates an issue of the highest priority and worthy of immediate attention. Such items are usually safety or operability issues. A “B” indicates that the issue needs to be dealt with as quickly as possible, but is not urgent. These items will usually result in a process improvement or will help avoid future “urgent” issues. A “C” indicates that the issue should be dealt with at the earliest convenience, but is not a priority issue. This category might include issues related to aesthetics, non-urgent maintenance, or housekeeping improvements which are not safety related.

Note that HDR inspections are generally performed while equipment is operating, and are not intended to address the internal condition, performance or life expectancy of mechanical, electrical and electronic equipment and structures. HDR inspections are only performed quarterly, generally representing findings on the day of the inspection. CAAI is responsible, without limitation, for operations, maintenance, environmental performance and safety and should not rely on HDR observations or inspection reports which are overviews of Facility external conditions only.

Table 1: Summary of Inspection Report Deficiencies

*A is highest priority & demands immediate attention; B needs attention, but is not urgent; C can be addressed at earliest opportunity & is not urgent.

Item No.	Inspection Report Deficiencies	Issue Reported	Priority*	HDR Recommendation	Status	Open / Closed
1	Pot hole, southeast corner of Ash Trailer Canopy	August 2015	C	Repair road surface	Status Unchanged	Open
2	Pavement spider-cracking at Tipping Floor Entrance	November 2016	C	Resurface section of pavement at Tipping Floor Entrance	Status Unchanged	Open
3	Concrete slab damaged that Citizen's Drop-off Roll-off is on	November 2016	C	Repair concrete slab	Complete	Closed
4	Tipping Floor Center Bay concrete apron eroded and rebar exposed	February 2017	C	Resurface eroded section of Tipping Floor near refuse pit	Status Unchanged	Open
5	Ceiling panels deteriorated above Boiler Nos. 2 and 3	May 2017	C	Replace deteriorated ceiling tiles and conduct painting preservation measures	Status Unchanged	Open
6	Siding on north and east side of Facility dirty	May 2017	C	Pressure Wash Siding	Status Unchanged	Open
7	Windshield cracked on Roll-off Truck No. 103	August 2017	A	Report to hauler contractor and monitor repair process	Complete	Closed
8	Pressure wash of exterior siding needed at Charging Floor Elevation Above Service Elevator	August 2017	C	Pressure wash exterior siding	Status Unchanged	Open
9	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
10	Drainage pipe damaged and water build up against east wall of Tipping Floor	November 2017	C	Repair drainage pipe and verify proper drainage in area near east wall of Tipping Floor	Complete	Closed
11	Damaged curbing on west side of Cooling Towers — See Figure 1 (Appendix B)	March 2018	C	Repair damaged curbing	Status Unchanged	Open
12	Pipe corroded on west side of SDA No. 1 — See Figure 2 (Appendix B)	March 2018	C	Conduct proper painting preservation measures	Status Unchanged	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 82,328 tons of MSW were processed during Q3FY18, and a total of 83,681 tons of MSW including 3,014 tons of Special Handling Waste were received. Total ash production during the quarter was 17,229 tons, which represents 20.9% of the waste processed by weight. The average uncorrected steam production rate for Q3FY18 was 3.15 tons_{steam}/ton_{waste}, which is higher (7.2%) than the corresponding quarter in FY17. The increase in this metric is attributable to the 4.5% increase in the average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

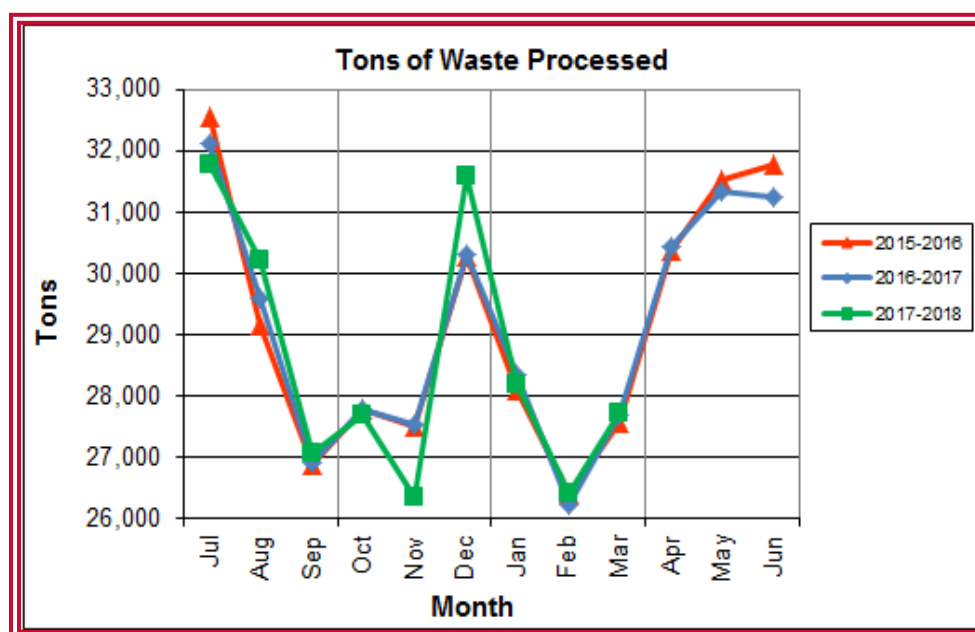


Chart 1 illustrates that Q3FY18 waste processed was slightly lower (less than 0.1%) than the corresponding quarter, Q3FY17.

CAAI reported that 446 tipping floor/MSW internal inspections were conducted during the quarter and one (1) notice of violation (NOV) was issued to haulers in January 2018 for talking on the cell phone on the Facility premises.

Chart 2: Tons of Ash Produced per Ton of Waste Processed

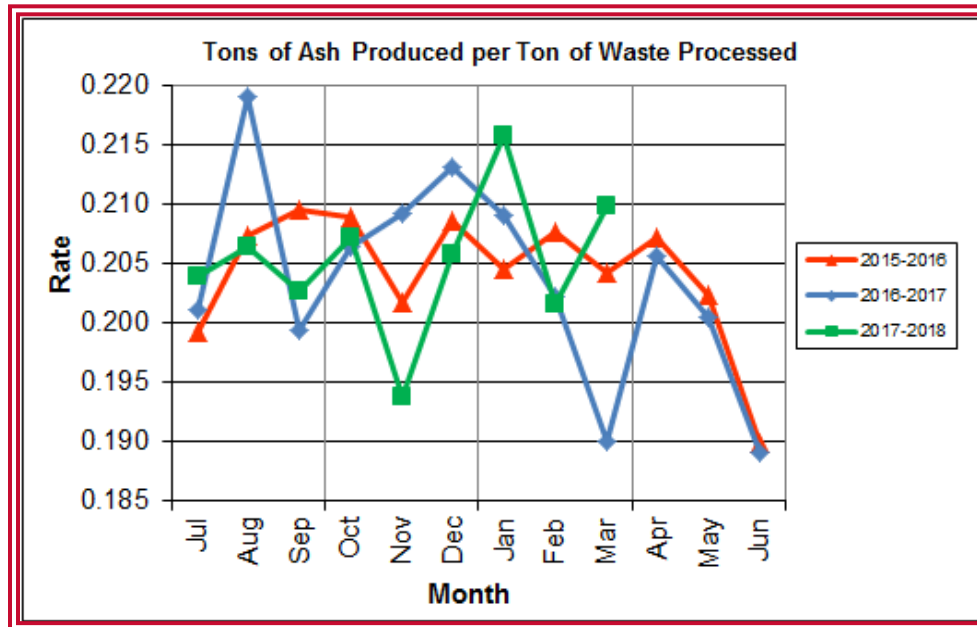


Chart 2 illustrates that the average ash production rate in Q3FY18 was slightly higher (0.8%) at 20.9% of processed waste, compared to the corresponding quarter in FY17 when the rate was 20.1%. Ash production rates remain significantly lower than comparable facilities, mainly due to less water in the ash stream, coupled with good metal removal.

Chart 3: Ferrous Recovery Rate

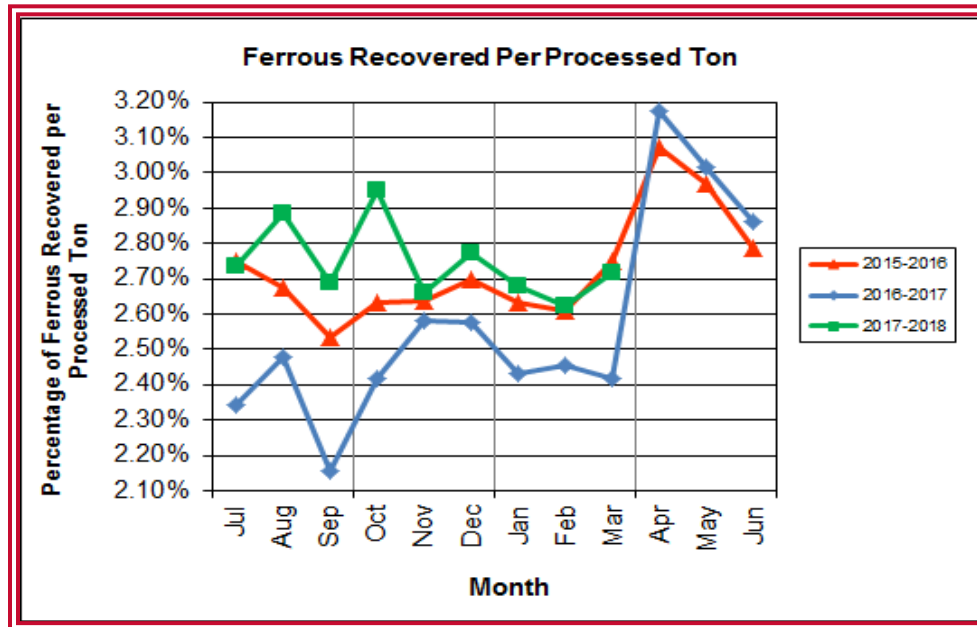
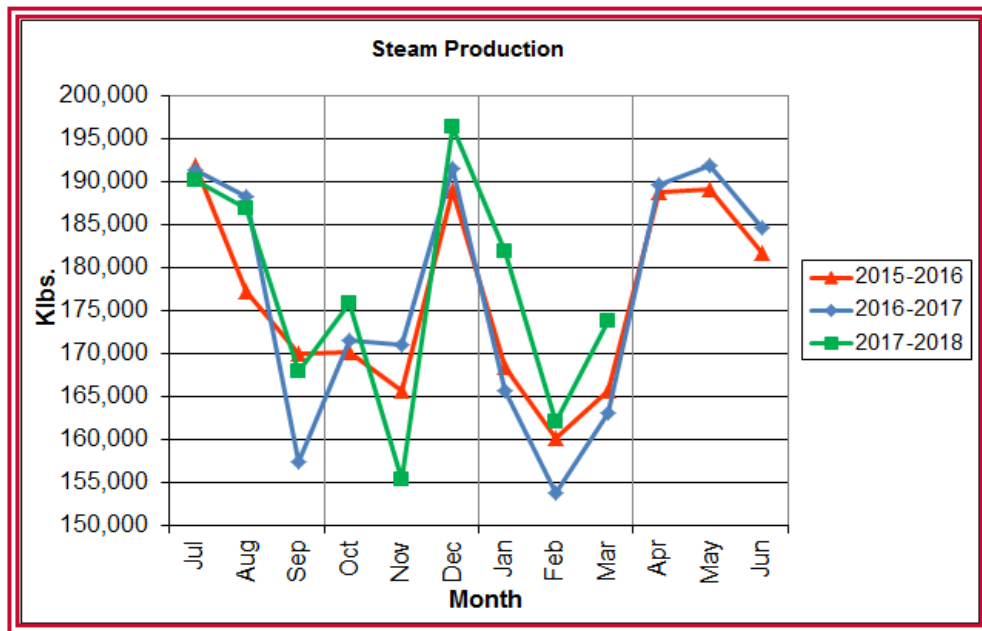


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q3FY18, 2,202 tons of ferrous metals were recovered, which is 10.0% higher than the corresponding quarter in FY17 and equivalent to 2.7% of processed waste. CAAI indicated that it replaced the last 8 inches of the main vibrating ash pan at the magnet during Q4FY17, which positively impacted the ferrous recovery.

Chart 4: Steam Production



In Chart 4, the total steam production for Q3FY18 was 517,901 klbs., and higher (7.3%) than the corresponding quarter in FY17. The increase in steam generation is attributable to the increase (4.5%) in waste heating value, paired with less boiler downtime (60.1 fewer hours).

Chart 5: 12-Month Rolling Steam Production

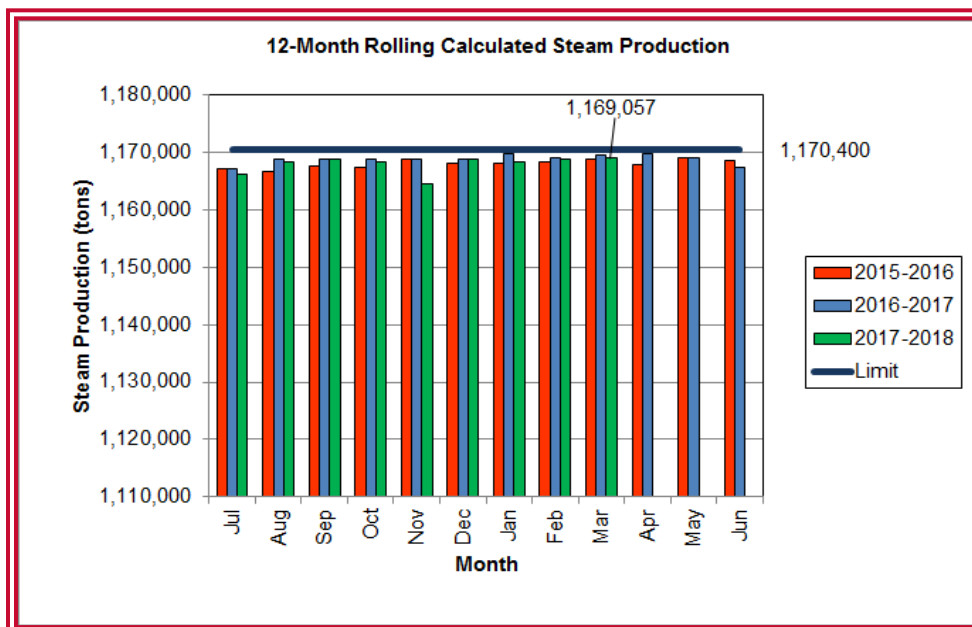
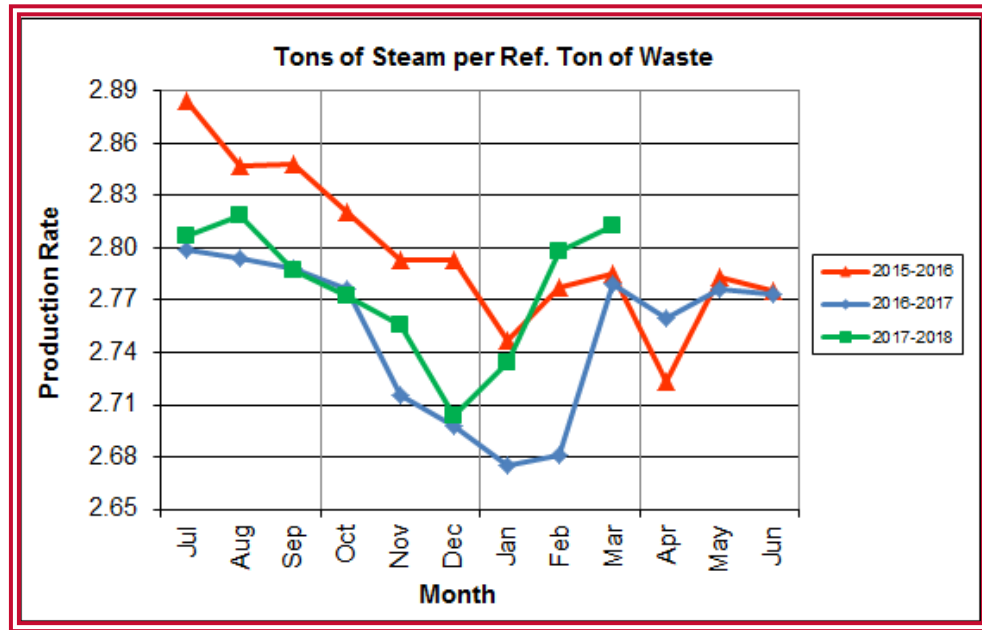


Chart 5 depicts the 12-month rolling steam production total for the period ending in March 2018. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs of steam per lb of MSW processed, calculated monthly as the sum of each consecutive 12 month period. The Facility was in compliance with the 12-month rolling steam production total every month in Q3FY18. The 12-month rolling total for steam production ending in March 2018 was 1,169,057 tons which is 99.9% of the limit. Chart 5 clearly shows that Facility throughput, and in turn, steam and electricity production are being throttled to stay ever so slightly below the steam production limit nearly every month.

Chart 6: Steam Production Rate



In Chart 6, the conversion of raw waste tonnages into “reference tons” is another way of analyzing steam production, and helps to determine whether changes are related to boiler performance or to fuel issues. “Reference tons” are adjusted to account for the calculated average fuel heating value, so that lower Btu fuel raw tonnages are adjusted upwards and vice versa. In Q3FY18, this metric tracked higher (2.5%) at 2.78 tons_{steam}/ton_{ref.}, compared to the corresponding quarter in FY17.

Chart 7: Calculated Waste Heating Value

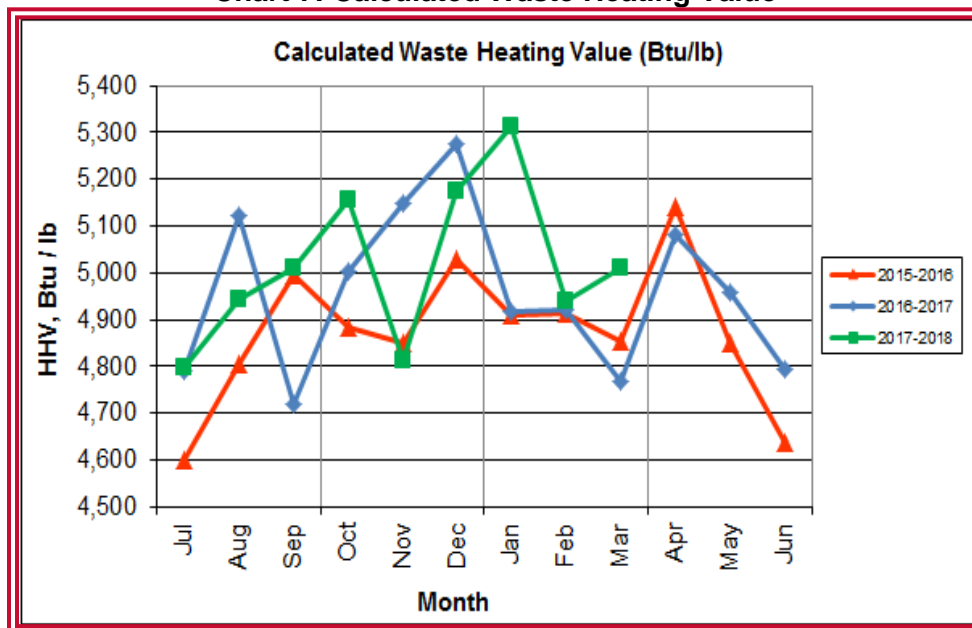


Chart 7 illustrates that Q3FY18 calculated average waste heating value was higher (4.5%) at 5,088 Btu/lb than the corresponding quarter Q3FY17, which averaged 4,870 Btu/lb.

Table 2: Quarterly Performance Summaries

Month		Waste Processed (tons)	Waste Diverted (tons)	Ash Shipped (tons)	Special Handling (Supplemental) (tons)	Ferrous Recovered (tons)	Steam Produced (klbs)	Net Electrical Generation (MWhr)
Q3FY16	Quarterly Totals	82,085	0	16,867	2,284	2,187	494,295	34,595
	January – 16	28,091	0	5,748	642	740	168,391	11,902
	February – 16	26,414	0	5,487	850	689	160,228	11,192
	March – 16	27,580	0	5,632	792	758	165,676	11,501
Q3FY17	Quarterly Totals	82,267	0	16,497	3,787	2,002	482,727	34,355
	January – 17	28,353	0	5,931	1,083	689	165,770	11,933
	February – 17	26,217	0	5,302	1,413	644	153,757	11,067
	March – 17	27,697	0	5,264	1,291	669	163,200	11,355
Q3FY18	Quarterly Totals	82,328	0	17,229	3,014	2,202	517,901	36,100
	January – 18	28,181	0	6,084	1,301	755	181,955	12,951
	February – 18	26,407	0	5,322	884	693	162,127	11,120
	March – 18	27,740	0	5,823	829	754	173,819	12,029
FY18 YTD Totals		256,993	0	52,776	12,993	7,064	1,590,737	111,938
FY17 Totals		349,516	0	71,208	13,411	9,036	2,120,115	150,935
FY16 Totals		349,881	0	71,019	5,413	9,864	2,109,442	145,085

Table 2 presents the production data provided to HDR by CAAI for Q3FY18 on both a monthly and quarterly basis. For purposes of comparison, data for Q3FY16 and Q3FY17 are also shown, as well as FY16, FY17 and FY18 Year-to-Date (YTD) totals.

In comparing quarterly totals, the data shows:

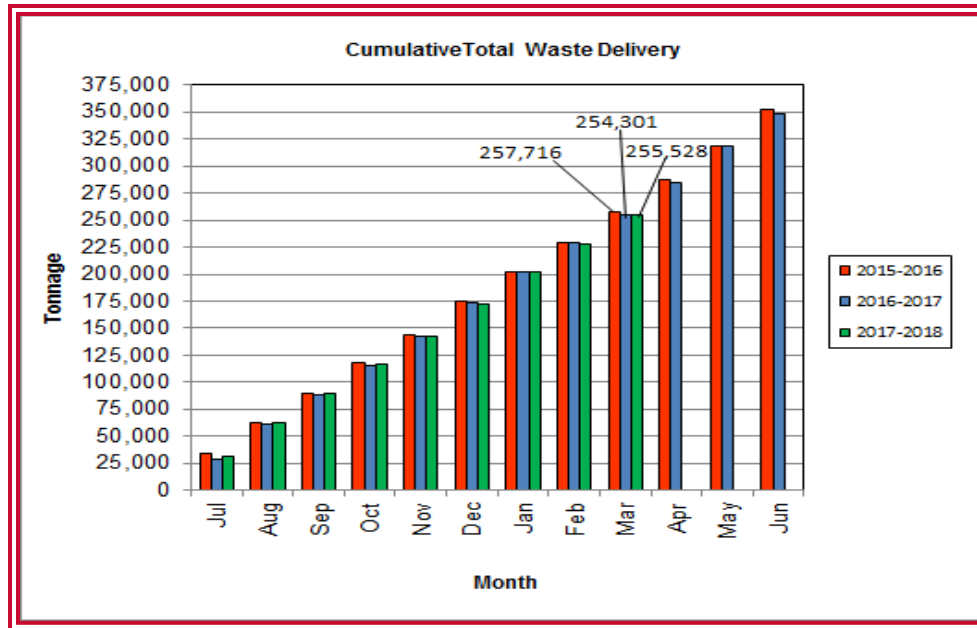
- Slightly more waste was processed in Q3FY18 than Q3FY17 and Q3FY16
- More steam was generated in Q3FY18 than Q3FY17 and Q3FY16
- More electricity was generated in Q3FY18 than Q3FY17 and Q3FY16
- Less supplemental waste was received in Q3FY18 than Q3FY17 and more than Q3FY16.

Please note that the total steam generation figures presented in Table 2 do not correlate with the annual steam production limit from the Facility Permit; such limits apply on a rolling average monthly basis, and not a fiscal year basis. It is also worth noting that the quantity of waste processed during Q3FY18 continues to be limited by the steam production permit restrictions (refer to Chart 5).

Table 3: Waste Delivery Classification

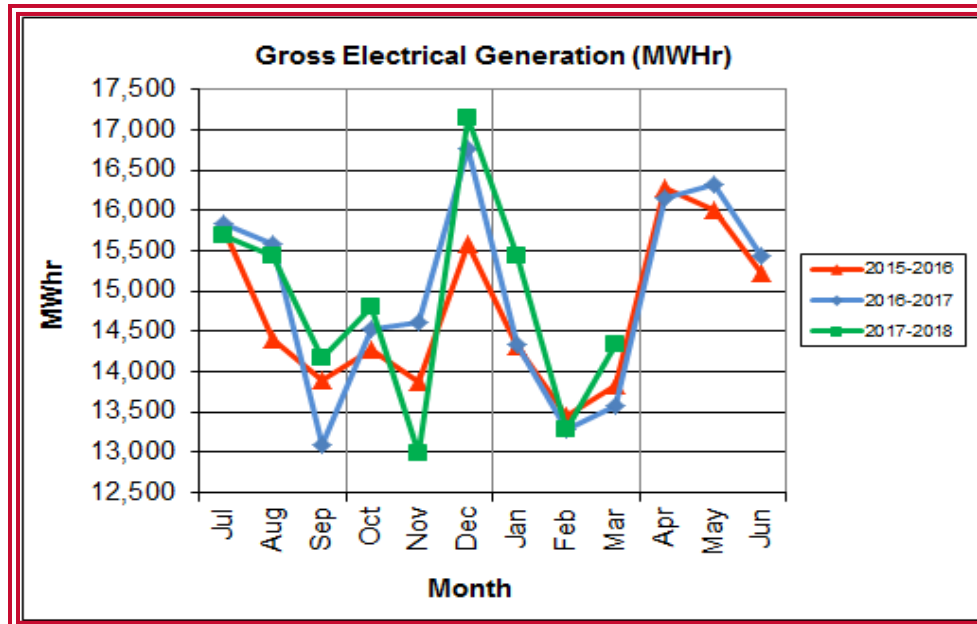
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY14	City Waste	2,065	1,693	1,702	1,924	1,566	1,780	1,529	1,231	1,556	2,256	2,203	1,883	21,389	6.11%
	County Waste	3,459	3,079	2,784	3,091	2,707	2,802	2,568	1,957	2,272	3,326	3,987	3,387	35,419	10.12%
	Municipal Solid Waste	26,167	23,604	22,034	23,354	21,879	25,531	23,869	22,523	23,198	25,414	27,206	24,812	289,590	82.75%
	Supplemental Waste	546	676	248	410	188	268	275	192	231	253	151	110	3,548	1.01%
	MSW Totals	32,237	29,053	26,768	28,779	26,340	30,380	28,241	25,903	27,256	31,249	33,546	30,193	349,946	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY15	City Waste	1,814	1,497	1,699	1,737	1,518	1,770	1,411	1,209	1,648	2,155	2,059	2,045	20,562	5.91%
	County Waste	3,297	2,868	2,973	3,095	2,508	2,852	2,358	1,833	2,411	3,269	3,652	3,572	34,687	9.96%
	Municipal Solid Waste	26,661	24,466	21,887	21,241	21,678	27,906	24,611	20,915	24,094	25,189	23,126	25,667	287,442	82.57%
	Supplemental Waste	141	275	329	521	764	529	389	351	272	613	531	698	5,413	1.55%
	MSW Totals	31,913	29,106	26,888	26,595	26,468	33,057	28,769	24,308	28,424	31,225	29,369	31,982	348,105	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY16	City Waste	1,960	1,563	1,723	1,645	1,685	1,872	1,147	1,619	1,811	2,024	1,950	2,220	21,219	6.03%
	County Waste	3,627	2,880	2,832	2,869	2,682	2,891	2,025	2,389	2,694	2,406	2,508	2,661	32,465	9.22%
	Municipal Solid Waste	27,933	22,999	22,552	22,850	20,679	26,138	22,632	22,781	22,935	24,388	26,561	27,355	289,801	82.32%
	Supplemental Waste	676	427	771	684	676	787	642	850	792	996	605	661	8,565	2.43%
	MSW Totals	34,196	27,869	27,878	28,047	25,722	31,687	26,446	27,639	28,232	29,814	31,623	32,896	352,049	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY17	City Waste	1,678	1,836	1,668	1,722	1,817	1,708	1,597	1,452	1,604	1,882	2,170	2,002	21,136	6.06%
	County Waste	2,386	2,469	2,370	2,184	2,321	2,289	2,287	2,016	2,517	2,371	2,877	2,889	28,976	8.31%
	Municipal Solid Waste	24,862	26,976	22,760	22,110	21,598	25,996	24,218	20,888	20,401	25,004	26,143	24,135	285,091	81.78%
	Supplemental Waste	504	642	734	926	941	1,036	1,083	1,413	1,291	1,420	1,705	1,717	13,412	3.85%
	MSW Totals	29,430	31,922	27,532	26,941	26,677	31,030	29,185	25,769	25,814	30,677	32,895	30,743	348,615	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals (YTD)</u>	<u>% of Total (YTD)</u>
FY18	City Waste	1,699	1,876	1,642	1,719	1,849	1,541	1,621	1,365	1,569				14,881	5.82%
	County Waste	2,458	2,654	2,513	2,529	2,635	2,321	2,502	2,110	2,391				22,113	8.65%
	Municipal Solid Waste	24,950	25,303	21,518	20,885	19,108	24,668	25,302	20,826	22,980				205,540	80.44%
	Supplemental Waste	1,807	1,835	1,805	1,638	1,553	1,339	1,301	884	829				12,992	5.08%
	MSW Totals	30,914	31,668	27,478	26,772	25,146	29,869	30,726	25,185	27,770				255,527	100.00%

Chart 8: Cumulative Total Waste Delivery



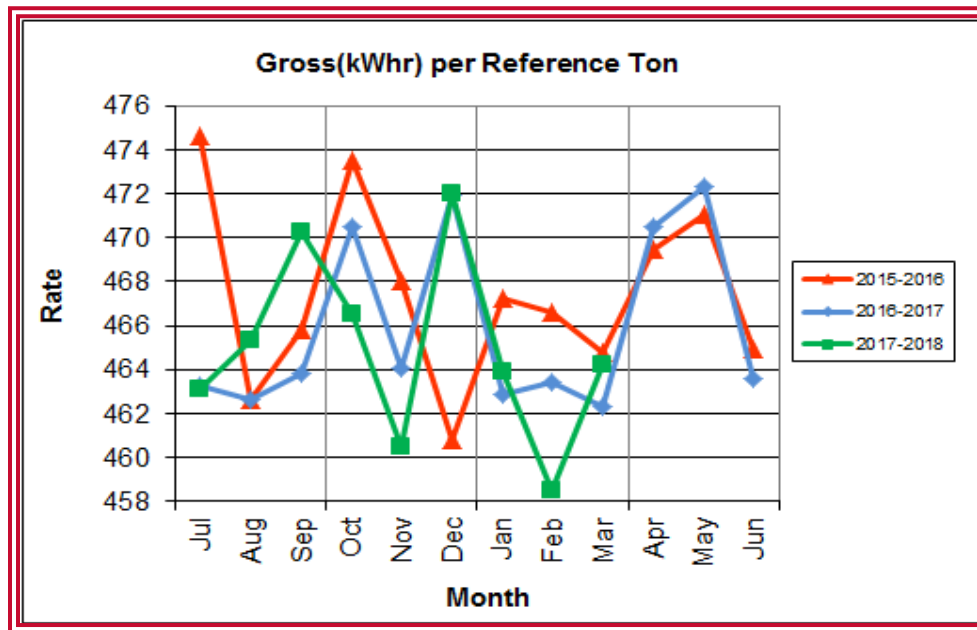
As depicted in Table 3 and Chart 8, for the quarter ending in March 2018; cumulative total waste delivery was 0.5% higher compared to the same period in FY17.

Chart 9: Gross Electrical Generation



During Q3FY18, the Facility generated 43,065 MWhrs (gross) of electricity compared to Q3FY17 generation of 41,202 MWhrs (gross), a 4.5% increase. The increase in electricity generated (gross) in Q3FY18, is attributable to higher steam production and less downtime (186.7 fewer hours) experienced by the turbine generators.

Chart 10: Gross Conversion Rate



As shown in Chart 10, the average gross electrical generation per reference ton of refuse processed during Q3FY18 was 462 kWhr, which is slightly lower (0.2%) than the corresponding quarter in FY17. Since this calculated value uses reference or normalized tonnages of waste, it should cancel the effect of MSW heating value (Btu content) variability.

Chart 11: Net Conversion Rate

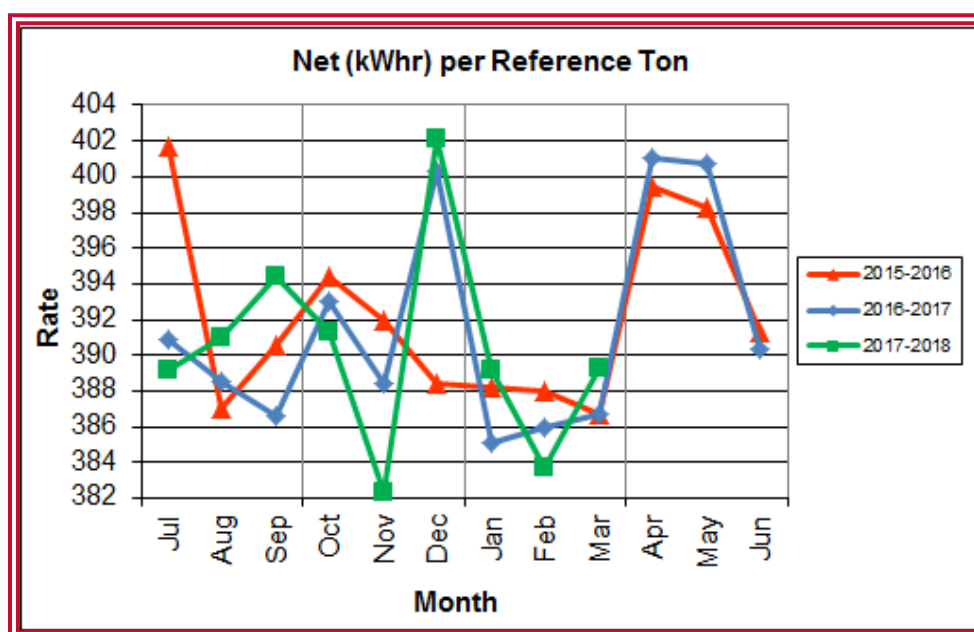


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q3FY18, the average net electrical generation per reference ton was 387 kWhr, which is 0.4% higher than the corresponding quarter in FY17.

Chart 12: Net Conversion Rate

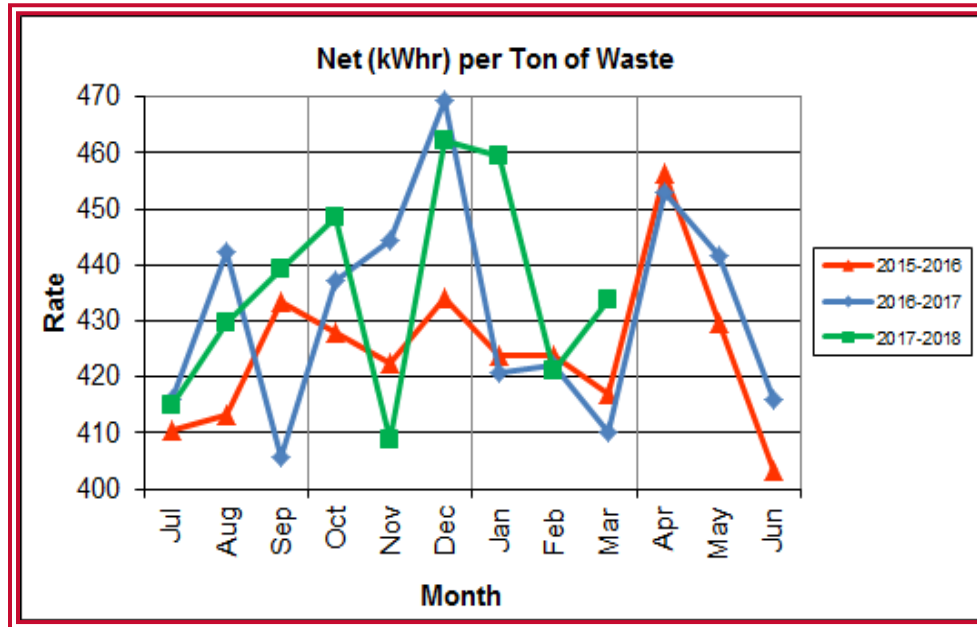


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q3FY18 was 438 kWhr, which is 4.9% higher than the corresponding quarter in FY17, and is attributable to higher steam production and average waste HHV during the quarter.

Chart 13: Gross Turbine Generator Conversion Rate

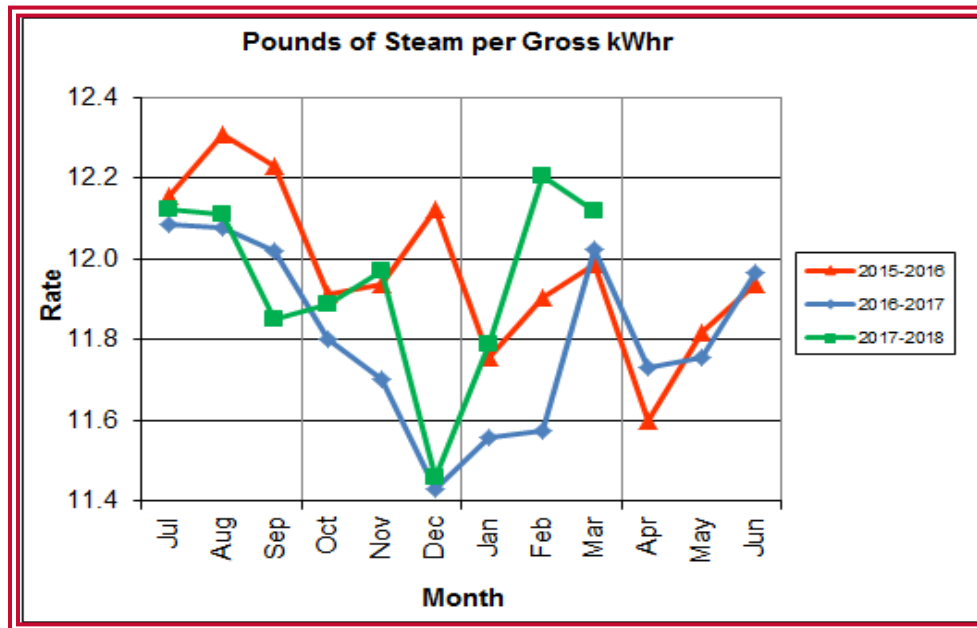


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of gross electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q3FY18 the average lbs of steam consumed per gross kWhr generated was 12.0, which is 2.7% higher (less efficient) than the corresponding quarter Q3FY17. A factor that negatively impacts this metric is Turbine Generator No. 2, which continues to operate with its Stage 9 blades removed from the rotor. CAAI reported that during the Turbine Generator No. 2 overhaul in November 2013, some cracking was observed on the Stage 9 blades of the rotor, and the blading in that row was removed as a precautionary measure. CAAI originally indicated that a new set of blades would be manufactured and installed during a Turbine Generator No. 2 Outage in 2016, but advised in May 2015, that the implementation of the replacement blades installation would be delayed, and did not provide a date for repair. The average main steam temperature during the quarter was 671.3°F, which is 7.5°F lower than the average main steam temperature of the corresponding quarter last fiscal year and 28.7°F lower than design temperature of 700°F.

4.1 Utility and Reagent Consumptions

Table 4: Facility Utility and Reagent Consumptions

Utility	Units	Q3FY18 Total	Q3FY17 Total	Q3FY18"Per Processed Ton" Consumption	Q3FY17"Per Processed Ton" Consumption	FY18 YTD Total	FY17 Total
Purchased Power	MWhr	5,458	5,405	0.07	0.07	16,683	22,906
Fuel Oil	Gal.	9,120	13,390	0.11	0.16	40,000	58,890
Boiler Make-up	Gal.	1,358,000	1,642,000	16.49	19.96	4,060,000	6,257,000
Cooling Tower Make-up	Gal.	29,546,941	29,064,732	358.89	353.30	101,539,959	152,993,251
Pebble Lime	Lbs.	1,254,000	1,174,000	15.23	14.27	4,072,000	5,042,000
Ammonia	Lbs.	178,000	169,000	2.16	2.05	547,000	710,000
Carbon	Lbs.	90,000	94,000	1.09	1.14	272,000	374,000
Dolomitic Lime	Lbs.	48,000	154,000	0.58	1.87	468,000	784,000

Fuel oil usage during the quarter represents approximately 0.17% of the total heat input to the boilers, which compares favorably with industry averages, and

somewhat lower than the percentage of heat input in Q3FY17 which was 0.25%. Fuel oil is used to stabilize combustion of wet fuel, as well as during start-up and shut-down of the boilers for maintenance. Boiler makeup water usage during the quarter represents 2.2% of steam flow, which is slightly lower than the boiler makeup in Q3FY17 which was 2.8%, and is acceptable. Pebble lime usage, at 1,254,000 lbs. is higher (6.8%) than the corresponding quarter last year.

In comparing Q3FY18 to Q3FY17 on a per processed ton consumption basis:

- the purchased power consumption rate was 0.9% higher
- the total fuel oil consumption rate was 31.9% lower
- the boiler make-up water consumption rate was 17.4% lower
- the cooling tower make-up water consumption rate was 1.6% higher
- the total pebble lime consumption rate was 6.7% higher
- the ammonia consumption rate was 5.3% higher
- the carbon consumption rate was 4.3% lower
- the total dolomitic lime consumption rate was 68.9% lower

The significant decrease in fuel oil consumption during the quarter is attributable to fewer start-up and shut-down activities of the boilers for scheduled and unscheduled downtime. CAAI reports that the significant decrease in dolomitic lime consumption during Q3FY18 when compared to the corresponding quarter in FY17, was a result of flow issues.

4.2 Safety & Environmental Training

The Facility experienced one (1) OSHA recordable accident during the quarter and prior to the incident had operated 133 days without an OSHA recordable accident. CAAI reports that on March 26, 2018, A Loader/Equipment Operator received help from a Utility Operator to manually remove metal and pieces of granite (2ft/2.5ft/6inches weighing approximately 70lbs) from a load of trash on the Tipping Floor. As they were walking, the Loader Operator slipped and a piece of granite

fell on his right ankle on the Tipping Floor. Immediate swelling occurred and the employee was taken to the hospital for x-rays which were negative. The injury was classified as “Recordable” because the employee received prescription medications from the Emergency Room and took time off, and returned with restricted duty. The injury experienced by the employee was a contusion to the ankle. The injury resulted in one (1) day away and seven (7) days restricted duty. The employee has since returned to work full duty.

During the quarter, Safety and Environmental training was conducted with themes as follows:

January 2018

- Safety:
 - Hazard Recognition
 - Pre-Job Planning
 - Hand and Finger Injuries
 - Review of Safety and Health Policy and Employees Rights under OSHA
- Environmental:
 - Sustainability at Covanta – Protecting Tomorrow
 - Review of Covanta’s Environmental Mission Statement

February 2018

- Safety:
 - Heavy Metals & Respiratory Protection
 - Ergonomics
 - Disposal of Potentially Contaminated Debris
- Environmental:
 - Continuous Emissions Monitoring and Black Plant

March 2018

- Safety:
 - Personal Protective Equipment and Cold Weather Clothing

- Housekeeping, Emergency Exits and Walkways
- Angle Grinder Safety
- Environmental:
 - Universal Waste and Environmental Compliance during Maintenance Outages

5.0 Facility Maintenance

Throughout the quarter, significant routine and preventative maintenance was performed. HDR considers that the Facility is implementing an effective maintenance regimen, and is performing routine and preventative maintenance, along with selected equipment replacements in a timely manner. CAAI monthly maintenance reports provide a detailed account of maintenance performed.

Beginning January 20, 2018 Boiler No. 3 experienced 148.5 hours of downtime for scheduled maintenance. Some significant maintenance items completed during the outage are as follows:

- Clean-out of the Seal Air Fan wheel housing, cover, and replacement of motor
- Replacement of seven (7) soot blower elements: G9B Nos. 2, 3, 4, 9, 11, 12, 19 and rebuilt goosenecks
- Repair of the Run No. 2 side of the feed table understructure and replacement of the 16 feed table bars
- Replacement of the coupling hubs and sleeves and re-aligned the motor on the Over Fire Air Fan
- Replacement of the SDA drain line rubber hose
- Replacement of six (6) broken grate bars; five (5) on Run No. 1, and one (1) on Run No. 2
- Change-out of one (1) screw conveyor trough cover, and all the oil on the five (5) gearboxes and two (2) rotaries
- Repair of the bull nose access door

- Welding of the split in the vertical seam on the south west corner of the generating bank hopper
- Change-out of the inboard bearing, adapter, housing, hub, sleeve, and coupling bolts on the Induced Draft Fan
- Replacement of Ash Discharger

Beginning February 1, 2018, Boiler No. 2 experienced 197.7 hours of downtime for scheduled maintenance. Some significant maintenance items completed during the outage are as follows:

- Clean-out of the Seal Air Fan wheel housing, cover, and wheel
- Replacement of four (4) soot blower elements and rebuild of the goosenecks on G9B Nos. 4, 5, 12, and 15
- Replacement of one (1) broken grate bar on Run No 2, Step No. 1, Bar No. 1-4881
- Change-out of five (5) curved blocks, Position Nos. 3, 4, 5, 14, and 15.
- Replacement of mud flap in the Ash Discharger
- Repair of the horizontal bracing on the Convection Hopper
- Repair of several leaks on the upper and lower feed chute water jackets
- Repair of a hole in the north side low drum safety exhaust pipe
- Replacement of Induced Draft Fan

Beginning March 2, 2018, Boiler No. 1 experienced 264.7 hours of downtime for scheduled maintenance. Some significant maintenance items completed during the outage are as follows:

- Replacement of six (6) soot blower elements and rebuilt goosenecks on G9B Nos. 2, 3, 4, 5, 12 and 14
- Replacement of one (1) bent carrier beam on Run No. 1, Side Step No. 2
- Change-out of a total of seven (7) grate bars, five (5) on Run No. 1, and two (2) on Run No. 2

- Repair of several leaks on the lower feed chute water jacket
- Re-plating of seven (7) feet from the top down and all the way across the feed chute hopper
- Replacement of two (2) of the baghouse screw conveyor trough covers, and also repair of the spool piece between the screw trough and the baghouse hopper
- Repair of several holes in the Induced Draft Fan Ductwork
- Replacement of the ash discharger and transition chute

In addition to the scheduled maintenance, CAAI reports that 1,219 preventative maintenance actions were completed during the quarter.

5.1 Availability

Facility availabilities for Q3FY18 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q3FY18 were 87.4%, 90.2%, and 93.3%, respectively. The three-boiler average availability during the quarter was 92.8%, which is excellent and comparable to that of mature, well run waste to energy facilities. Note that the boiler availability was negatively impacted by the scheduled maintenance conducted on all three (3) boilers (610.9 hours of downtime total) during the quarter.

According to CAAI reports, the average unit availabilities for Turbine Generator Nos. 1 and 2 for Q3FY18 was 99.7%, and 99.5%, respectively during Q3FY18. Note that standby time (221.8 hours) was not factored into overall availability.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY18 Average	Q2FY18 Average	Q3FY18 Average	FY18 YTD Average
Boiler No. 1	93.5%	88.1%	87.4%	89.6%
Boiler No. 2	99.2%	92.3%	90.2%	93.9%
Boiler No. 3	98.2%	93.0%	93.3%	94.8%
Avg.	96.9%	91.1%	90.3%	92.8%

Turbine No. 1	100.0%	100.0%	99.7%	99.9%
Turbine No. 2	96.1%	100.0%	99.5%	98.5%
Avg.	98.1%	100.0%	99.6%	99.2%

5.2 Downtime Summary

Table 6: Boiler Downtime – Q3FY18

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	1/3/18	1/4/18	17.0	Unscheduled	Damaged Grate Bars
3	1/20/18	1/27/18	148.5	Scheduled	Scheduled Boiler Outage
2	2/1/18	2/10/18	197.7	Scheduled	Scheduled Boiler Outage
1	3/2/18	3/13/18	264.7	Scheduled	Scheduled Boiler Outage
Total Unscheduled Downtime			17.0 Hours		
Total Scheduled Downtime			610.9 Hours		
Total Standby Downtime			0.0 Hours		
Total Downtime			627.9 Hours		

Table 7: Turbine Generator Downtime – Q3FY18

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	1/22/18	1/26/18	109.3	Standby	Boiler No. 3 Outage and charred insulator on the Dominion Side of a transformer in the switch yard
2	3/4/18	3/4/18	11.1	Unscheduled	Condenser Tube Leak
2	3/5/18	3/10/18	112.5	Standby	Boiler No.1 Outage
1	3/13/18	3/13/18	7.5	Unscheduled	Condenser Tube Leak
Total Unscheduled Downtime			18.6 Hours		
Total Scheduled Downtime0			0.0 Hours		
Total Standby Downtime			221.8 Hours		
Total Downtime			240.4 Hours		

5.3 Facility Housekeeping

CAAI is performing Facility housekeeping and maintaining plant cleanliness in accordance with acceptable industry practices. A site inspection was conducted in March 2018. At the time of the inspection, new deficiencies were recorded and prior deficiencies were given a status update. Photos of interest from the inspection are depicted in Appendix B. The Facility housekeeping ratings from the March 2018 inspection are presented in Table 8.

Table 8: Facility Housekeeping Ratings – March 2018

Facility Area	Acceptable	Needs Improvement	Unacceptable
Tipping Floor	√		
Citizen's Drop-off Area	√		
Tipping Floor Truck Exit	√		
Front Parking Lot	√		
Rear Parking Lot	√		
Boiler House Pump Room	√		
Lime Slurry Pump Room	√		
Switchgear Area	√		
Ash Load-out Area	√		
Vibrating Conveyor Area	√		
Ash Discharger Area	√		
Cooling Tower Area	√		
Truck Scale Area	√		
SDA/FF Conveyor Area	√		
SDA Penthouses	√		
Lime Preparation Area	√		
Boiler Drum Levels	√		
Turbine Room	√		
Electrical Room	√		

6.0 Environmental

The air pollution control equipment maintained emission concentrations well within the established regulations. Average Continuous Emission Monitoring System (CEMS) data collected for each monthly period during Q3FY18 are summarized in Appendix A. No permit deviations were reported by the Facility during Q3FY18. Note that as of March 31, 2018, the CAAI Facility has operated 165 days without an environmental excursion.

On August 8, 2014, CAAI sent a letter to the Virginia Department of Environmental Quality (VADEQ) requesting relief from the steam permit limit requirements in the Facility's Title V and PSD permits. These requested changes relate to the permit values established for the calculated steam-to-waste ratio, which has resulted in a reduction of MSW throughput. In recent discussions, CAAI indicated that it is re-evaluating options to the proposed permit changes, and will provide further updates on this issue.

6.1 Nitrogen Oxide Emissions

During Q3FY18, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 159.7 ppmdv, 159.0 ppmdv and 159.0 ppmdv for Boiler Nos. 1, 2, and 3, respectively. CAAI continues to operate the units at the lower (160 ppmdv) set-points, except immediately following a scheduled outage and associated boiler cleaning.

6.2 Sulfur Dioxide Emissions

During Q3FY18 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 2.0 ppmdv, 1.4 ppmdv, and 2.3 ppmdv for Boiler Nos. 1, 2, and 3, respectively. All of these stack SO₂ concentrations are significantly below the permit limit of 29 ppmdv @ 7% O₂.

6.3 Carbon Monoxide Emissions

During Q3FY18, the average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 45.3 ppm_{dv}, 33.7 ppm_{dv}, and 34.0 ppm_{dv}, respectively, and all are well within permit limits (100 ppm_{dv}, hourly average). However, as reported by HDR during the May 2016 FMG Meeting, and continuing through Q3FY18, CO averages have been trending higher over the past year of operations on all three boilers, and CAAI has been requested to investigate and mitigate this uptrend. While not a permit issue, it is indicative of poorer boiler performance and combustion efficiency.

6.4 Opacity

During Q3FY18, the average opacity for Boiler Nos. 1, 2, and 3 was 1.4%, 1.1%, and 1.4% respectively. All of these averages are significantly below the 10% (6-minute) average permit limit.

6.5 Daily Emissions Data

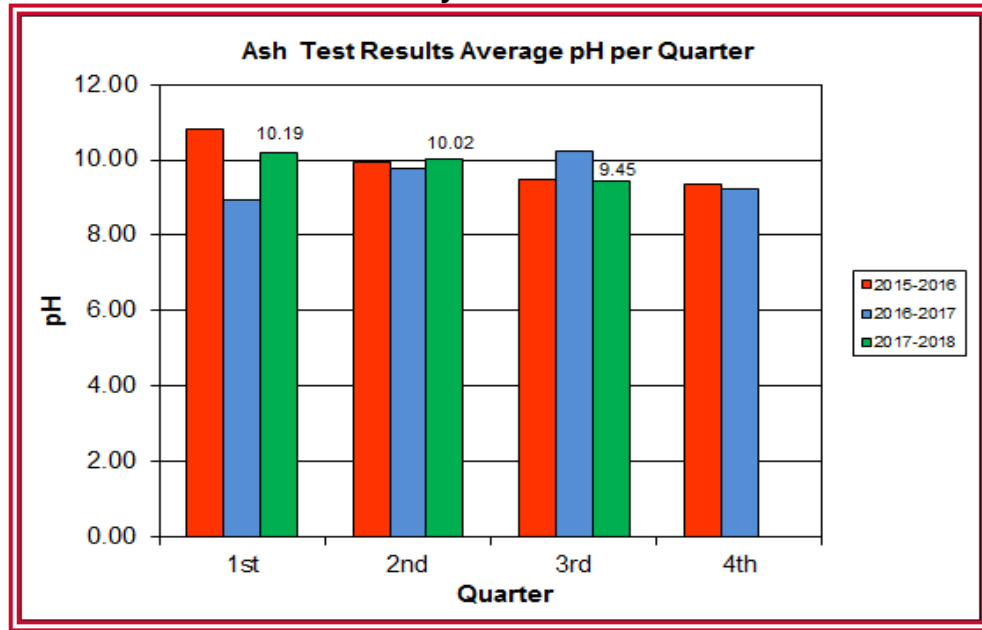
Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q3FY18. Excursions, if any, would appear in bold print. It should be noted that these tabulations of monthly averages, reported here for informational purposes, are based on tabulations of daily averages. These averages do not correlate with official reports to the regulatory agencies because of differences in averaging times and other technical differences required by agency report formats.

6.6 Ash System Compliance

The dolomitic lime feed rate is adjusted periodically in order to maintain a desired ash pH level in the range of 8.0 to 11.0. Since initial startup, the feed rate has varied from between 1 to 9 lbs per ton each month. Ash Toxicity (TCLP) tests were not performed during Q3FY18. CAAI samples ash monthly in-house and documents pH reading to adjust dolomitic lime feed rate. The results for the ash

pH tests are found below in Chart 14 where each quarter is represented by the average of the respective monthly readings. During Q3FY18, the average ash pH for in-house tests was 9.5.

Chart 14: Quarterly Ash Test Results



APPENDIX A FACILITY CEMS DATA

Table 9: Unit #1 Monthly Summary for Reportable Emissions Data

Group#-Channel#		G8-C35	G8-C28	G8-C8	G8-C4	G8-C12	G8-C34	G8-C37	G8-C40	G8-C39
Long Descrip.		U-1 Steam	U-1 Econ	U-1 Stack	U-1 Stack	U-1 Stack	U-1 Opaci	U-1 FF In	U-1 Carbo	U-1 Lime
Short Descrip.		SteamFI	SO ₂ ec	SO ₂ sc	COsc	NO _x sc	Opacity	FF InTemp	Carblnj	LimeFlow
Units		K#/Hr	ppmc	ppm	ppmc	ppmc	%	deg F	#/hr	gpm
Range		0-100	0-2000	0-500	0-4000	0-1000	0-100	100-500	0-50	0-20
Jan - 18	AVG	87.8	23.0	1.0	49.0	159.0	1.6	300.0	15.3	3.1
	Max	91.5	38.0	5.0	64.0	164.0	2.3	302.0	15.6	3.3
	Min	79.3	13.0	0.0	38.0	150.0	0.9	296.0	15.0	2.4
Feb - 18	AVG	85.6	24.0	1.0	48.0	158.0	1.4	300.0	15.1	3.2
	Max	91.0	59.0	7.0	63.0	162.0	2.0	301.0	15.3	3.9
	Min	79.9	5.0	0.0	36.0	152.0	1.1	299.0	15.0	3.0
Mar - 18	AVG	82.2	59.0	4.0	39.0	162.0	1.3	291.0	15.1	3.1
	Max	89.9	96.0	7.0	46.0	165.0	1.9	300.0	16.6	3.6
	Min	0.0	36.0	0.0	29.0	158.0	0.9	116.0	14.1	0.0
Quarter Average		85.2	35.3	2.0	45.3	159.7	1.4	297.0	15.2	3.1
Quarter Max Value		91.5	96.0	7.0	64.0	165.0	2.3	302.0	16.6	3.9
Quarter Min Value		0.0	5.0	0.0	29.0	150.0	0.9	116.0	14.1	0.0
Limits:		98	NA	29	100	205	10	331	14(a)	

(a) Carbon flow limit is a minimum value

* Note: The data reported herein represent 24 hour average data for all parameters. Emissions excursions that are measured on shorter time intervals (i.e., 4-hour block averages for CO) do not correlate with the 24 hour average data reported above.

Table 10: Unit #2 Monthly Summary for Reportable Emissions Data

Group#-Channel#		G8-C35	G8-C28	G8-C8	G8-C4	G8-C12	G8-C34	G8-C37	G8-C40	G8-C39
Long Descrip.		U-2 Steam	U-2 Econ	U-2 Stack	U-2 Stack	U-2 Stack	U-2 Opaci	U-2 FF In	U-2 Carbo	U-2 Lime
Short Descrip.		SteamFI	SO ₂ ec	SO ₂ sc	COsc	NO _x sc	Opacity	FF InTemp	Carblnj	LimeFlow
Units		K#/Hr	ppmc	ppm	ppmc	ppmc	%	deg F	#/hr	gpm
Range		0-100	0-2000	0-500	0-4000	0-1000	0-100	100-500	0-50	0-20
Jan - 18	AVG	88.0	25.0	2.0	39.0	159.0	1.0	298.0	15.5	3.1
	Max	90.6	38.0	8.0	49.0	163.0	1.8	299.0	16.3	3.7
	Min	82.3	17.0	0.0	23.0	156.0	0.2	291.0	14.8	2.5
Feb - 18	AVG	91.4	60.0	2.0	29.0	159.0	1.0	299.0	15.1	3.3
	Max	92.6	100.0	4.0	44.0	161.0	1.5	299.0	15.5	3.9
	Min	87.9	30.0	0.0	19.0	155.0	0.6	298.0	14.6	3.1
Mar - 18	AVG	88.8	47.0	0.2	33.0	159.0	1.4	299.0	15.0	3.1
	Max	92.3	66.0	11.0	43.0	167.0	1.7	300.0	16.2	3.6
	Min	81.5	30.0	0.0	24.0	156.0	1.0	295.0	14.1	2.8
Quarter Average		89.4	44.0	1.4	33.7	159.0	1.1	298.7	15.2	3.2
Quarter Max Value		92.6	100.0	11.0	49.0	167.0	1.8	300.0	16.3	3.9
Quarter Min Value		81.5	17.0	0.0	19.0	155.0	0.2	291.0	14.1	2.5
Limits:		97	NA	29	100	205	10	331	14(a)	

(a) Carbon flow limit is a minimum value

* Note: The data reported herein represent 24 hour average data for all parameters. Emissions excursions that are measured on shorter time intervals (i.e., 4-hour block averages for CO) do not correlate with the 24 hour average data reported above.

Table 11: Unit #3 Monthly Summary for Reportable Emissions Data

Group#-Channel#		G8-C35	G8-C28	G8-C8	G8-C4	G8-C12	G8-C34	G8-C37	G8-C40	G8-C39
Long Descrip.		U-3 Steam	U-3 Econ	U-3 Stack	U-3 Stack	U-3 Stack	U-3 Opaci	U-3 FF In	U-3 Carbo	U-3 Lime
Short Descrip.		SteamFI	SO ₂ ec	SO ₂ sc	COsc	NO _x sc	Opacity	FF InTemp	CarbInj	LimeFlow
Units		K#/Hr	ppmc	ppm	ppmc	ppmc	%	deg F	#/hr	gpm
Range		0-100	0-2000	0-500	0-4000	0-1000	0-100	100-500	0-50	0-20
Jan - 18	AVG	87.3	30.0	2.0	41.0	159.0	1.5	298.0	15.2	3.1
	Max	92.9	86.0	9.0	56.0	160.0	1.7	301.0	15.6	3.8
	Min	81.5	6.0	0.0	22.0	157.0	1.0	296.0	15.0	2.6
Feb - 18	AVG	90.4	56.0	3.0	31.0	159.0	1.4	299.0	15.2	3.2
	Max	93.1	110.0	16.0	50.0	162.0	1.9	302.0	15.6	4.4
	Min	85.4	33.0	0.0	19.0	158.0	1.2	295.0	15.0	2.9
Mar - 18	AVG	88.7	38.0	2.0	30.0	159.0	1.2	298.0	15.1	3.1
	Max	92.8	55.0	11.0	39.0	163.0	1.6	304.0	15.9	3.4
	Min	83.3	25.0	0.0	20.0	158.0	0.5	289.0	14.2	2.8
Quarter Average		88.8	41.3	2.3	34.0	159.0	1.4	298.3	15.2	3.1
Quarter Max Value		93.1	110.0	16.0	56.0	163.0	1.9	304.0	15.9	4.4
Quarter Min Value		81.5	6.0	0.0	19.0	157.0	0.5	289.0	14.2	2.6
Limits:		99	NA	29	100	205	10	339	14(a)	

(a) Carbon flow limit is a minimum value

* Note: The data reported herein represent 24 hour average data for all parameters. Emissions excursions that are measured on shorter time intervals (i.e., 4-hour block averages for CO) do not correlate with the 24 hour average data reported above.

APPENDIX B

SITE PHOTOS – MARCH 2018



Figure 1: Damaged curbing on west side of Cooling Towers – New Deficiency



Figure 2: Pipe corroded on west side of SDA No. 1 – New Deficiency



Figure 3: Cooling Towers, Stack, and APC Area



Figure 4: Dolomitic Lime Silo and Induced Draft Fan No. 1



Figure 5: Cooling Towers from SDA Penthouse No. 3



Figure 6: Turbine Generator No. 1 Lube Oil Skid



Figure 7: Condensate Pumps



Figure 8: General Facility Photo – from Tipping Floor Entrance Road



Figure 9: Scale House & Scales



Figure 10: General Facility Photo – from Truck Entrance Road



Figure 11: Citizen's Drop-off Roll-Off



Figure 12: White Goods (Metal) Roll-off



Figure 13: New FLIR Thermal Imaging Cameras (Typical of 4) mounted on Center Column, east side of Tipping Floor



Figure 14: New Thermal Imaging Camera Display Monitor in Control Room



Figure 15: New Thermal Imaging Camera Display Monitor in Control Room – Close-up



Figure 16: Ash Trailer Canopy



Figure 17: General Tipping Floor Photo – from entrance



Figure 18: Ash & Metal Loading Bay



Figure 19: General Facility Photo – from Front Parking Area



Figure 20: General Facility Photo – from west side of Facility up Eisenhower Avenue



Figure 21: Ferrous Magnet and Pan



Figure 22: Air Compressor Enclosure



Figure 23: Turbine Generators



Figure 24: De-commissioned Ash Discharger to be scrapped

