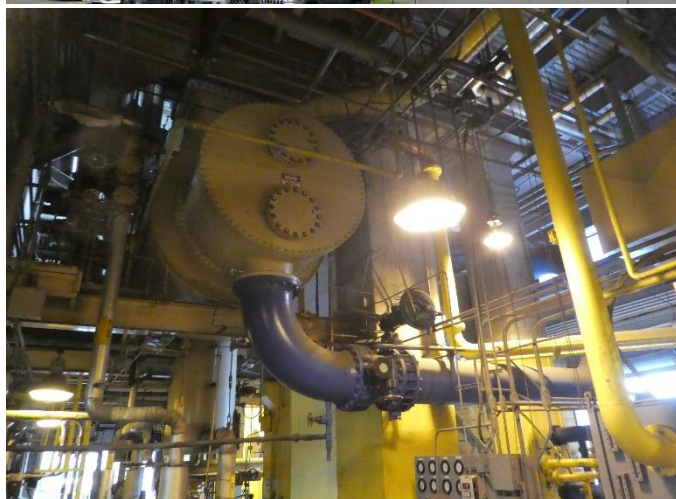




# Alexandria Arlington Resource Recovery Facility

Fiscal Year 2019  
First Quarter Operations Report

November 2018



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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 <sub>x</sub>	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 <sub>2</sub>	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 First Quarter Operations Report – Fiscal Year 2019

## 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 2019 Fiscal Year. This report is prepared for the first quarter of the 2019 fiscal year and summarizes Facility operations between July 1, 2018 and September 30, 2018. This report identifies the fiscal year beginning on July 1, 2018 as FY19 and the quarter beginning on July 1, 2018 as Q1FY19.

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 Q1FY19. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. Environmental performance was excellent with no reportable environmental excursions throughout the quarter.

During Q1FY19, the boilers experienced one (1) instance of unscheduled downtime totaling 13.0 hours, and the turbine generators experienced no unscheduled downtime. Boiler Nos. 1 and 2 experienced mini scheduled cleaning outages totaling 47.3 hours of downtime, and Boiler No. 3 experienced 114.0 hours of downtime for a scheduled major outage. No scheduled maintenance was conducted on the turbine generators. Five (5) instances of standby downtime was experienced by the boilers totaling 175.1 hours, and two (2) instances of standby

downtime was experienced by the turbine generators totaling 80.3 hours during the quarter. A detailed listing of downtime is provided in Section 5.2 of this report.

Average waste processed during the quarter was 967.4 tons per day, or 99.2% of nominal facility capacity. Waste deliveries averaged 976.6 tons per day, which is 1.0% higher than the burn rate. The capacity utilization of 99.2% 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 decreased (less than 0.1%) from the corresponding quarter in FY18; steam production decreased (5.4%), and electricity generated (gross) decreased (7.5%) from the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (7.2%) in waste heating value, paired with more boiler downtime (140.9 additional hours). The decrease in electricity generated (gross) in Q1FY19, is attributable to lower steam production, offset by less downtime (18.5 fewer hours) experienced by the turbine generators.

### **3.0 Facility Inspection and Records Review**

In August 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 was coordinated with the 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 in due course, 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	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
4	Ceiling panels deteriorated above Boiler Nos. 2 and 3	May 2017	C	Replace deteriorated ceiling tiles and conduct painting preservation measures	Complete	Closed
5	Pressure wash of exterior siding needed on north and east sides of Facility	May 2017	C	Pressure wash exterior siding	Status Unchanged	Open
6	Pressure wash of exterior siding needed at Charging Floor Elevation Above Service Elevator	August 2017	C	Pressure wash exterior siding	Status Unchanged	Open
7	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
8	Damaged curbing on west side of Cooling Towers	March 2018	C	Repair damaged curbing	Complete	Closed
9	Pipe corroded on west side of SDA No. 1	March 2018	C	Conduct proper painting preservation measures	Status Unchanged	Open
10	Perimeter fence is leaning at northeast corner of Facility Property	May 2018	C	Straighten fence and properly support posts	Complete	Closed
11	Cooling Tower stair treads (typical of 3) are detached	May 2018	A	Glue or mechanically fasten stair treads down	Complete	Closed
12	Emergency light fixture out in SDA No. 2 Penthouse – See Figure 1 (Appendix B)	August 2018	A	Replace/Repair Emergency Light Fixture	Status Unchanged	Open
13	Siding and steel damaged at the top of the Ash Load-out Bay Ramp — See Figure 2 (Appendix B)	August 2018	C	Repair siding and steel and replace if necessary	Status Unchanged	Open



## 4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 89,004 tons of MSW were processed during Q1FY19, and a total of 89,845 tons of MSW including 3,191 tons of Special Handling Waste were received. Total ash production during the quarter was 16,120 tons, which represents 18.1% of the waste processed by weight. The average uncorrected steam production rate for Q1FY19 was 2.90 tons<sub>steam</sub>/ton<sub>waste</sub>, which is lower (5.3%) than the corresponding quarter in FY18. The decrease in this metric is attributable to the 7.2% decrease in the average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

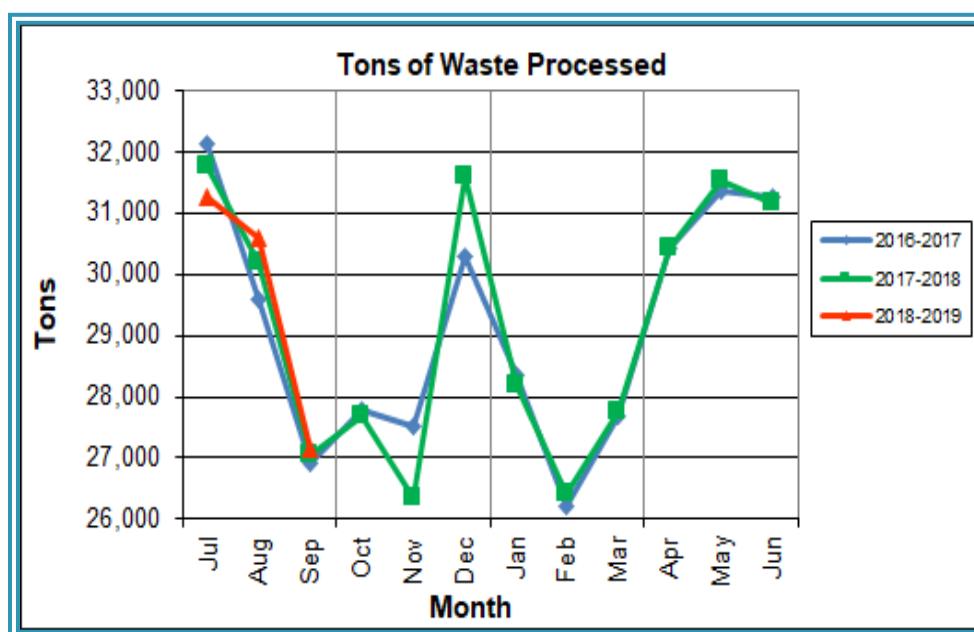


Chart 1 illustrates that Q1FY19 waste processed was slightly lower (less than 0.1%) than the corresponding quarter, Q1FY18.

CAAI reported that 464 tipping floor/MSW internal inspections were conducted during the quarter and two (2) notices of violation (NOVs) were issued to haulers for the following issues:

- July 2018 – No NOVs issued
- August 2018 – two (2) NOVs were issued for:
  - One (1) NOV for the driver sleeping in his truck on the entrance ramp to the tipping floor

- One (1) NOV for failure to obey the stop sign at the tipping floor entrance and breaking the gate arm
- September 2018 - No NOVs issued

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

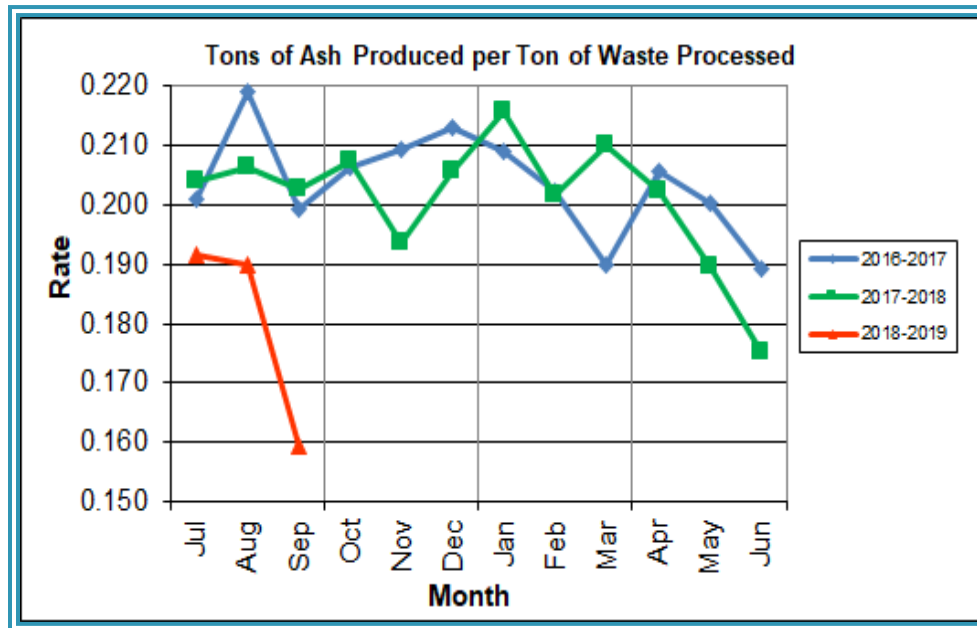


Chart 2 illustrates that the average ash production rate in Q1FY19 was substantially lower (2.3%) at 18.1% of processed waste, compared to the corresponding quarter in FY18 when the rate was 20.4%.

Chart 3: Ferrous Recovery Rate

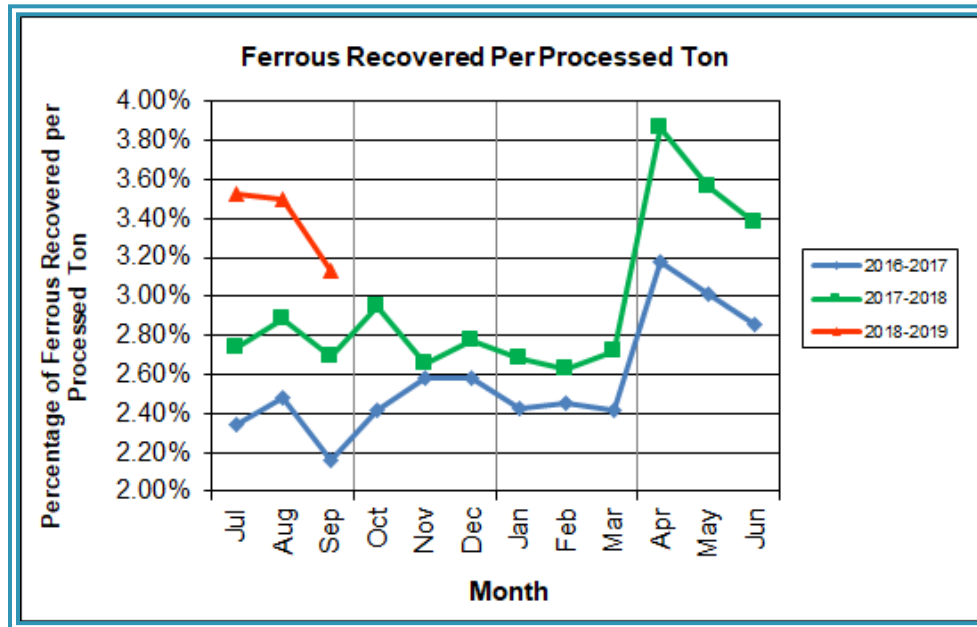
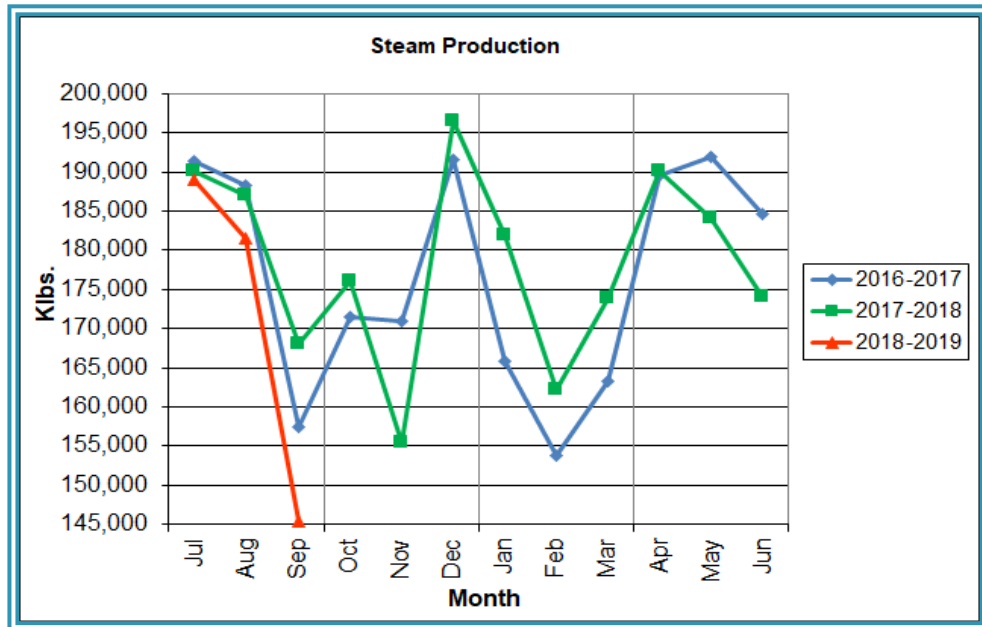


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q1FY19, 3,024 tons of ferrous metals were recovered, which is 22.5% higher than the corresponding quarter in FY18 and equivalent to 3.4% of processed waste. Last quarter CAAI reported that it adjusted the gap between the pan and magnet, and replaced the edge of the pan due to wear. The positive impacts of this corrective maintenance were immediately apparent by significantly higher ferrous metal recovery that has prevailed through the current quarter. However, HDR suspects some data anomaly may be responsible for a portion of the spike in ferrous recovery, which is viewed as highly unusual. Discussions with CAAI are continuing to rationalize the significant pickup in ferrous recovery that does not correlate with what has been observed at similar facilities.

**Chart 4: Steam Production**



In Chart 4, the total steam production for Q1FY19 was 515,910 klbs, and lower (5.4%) than the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (7.2%) in waste heating value, paired with more boiler downtime (140.9 additional hours).

**Chart 5: 12-Month Rolling Steam Production**

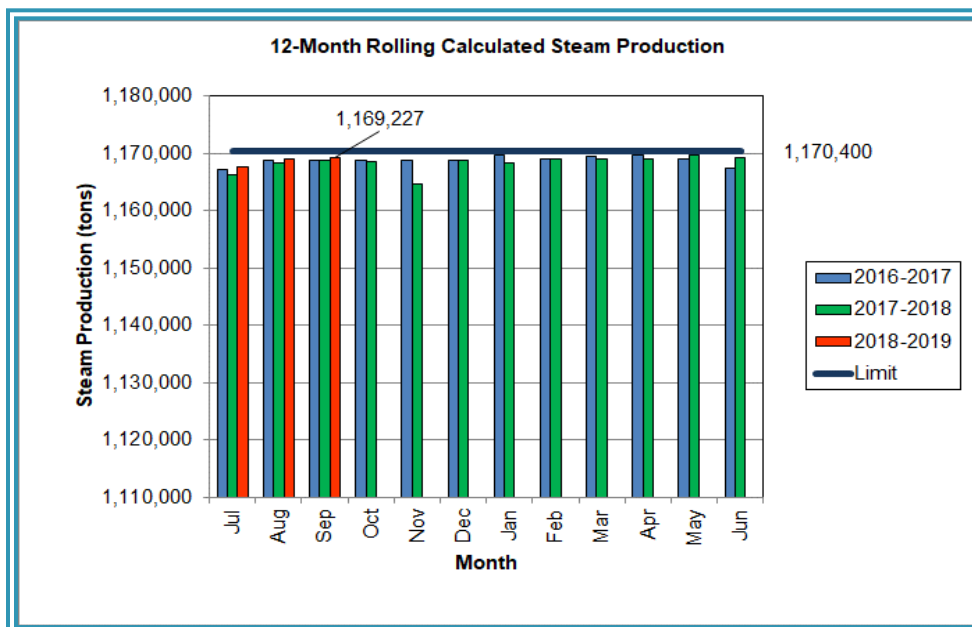
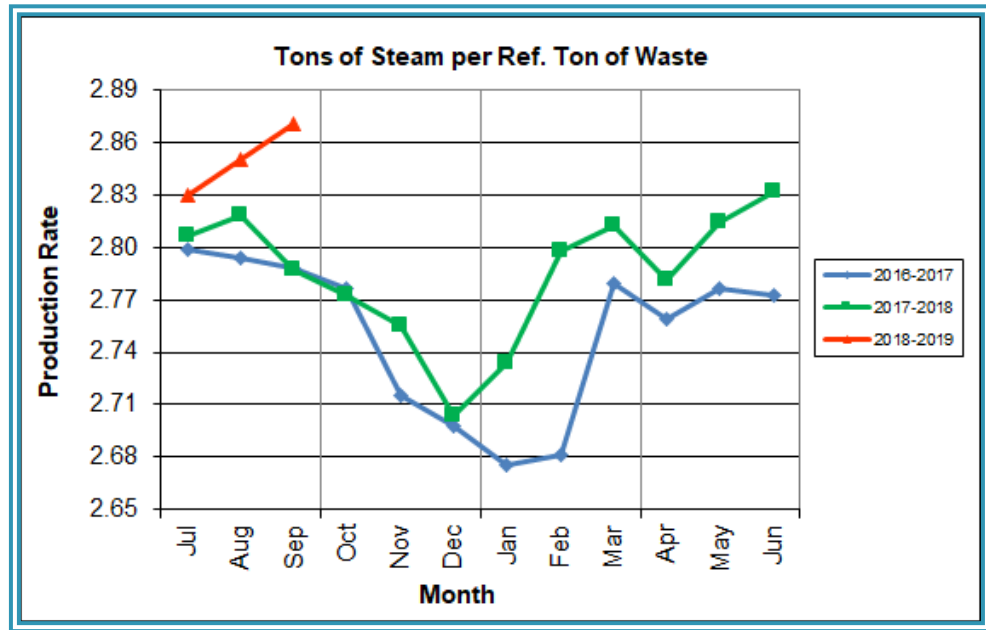


Chart 5 depicts the 12-month rolling steam production total for the period ending in September 2018. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs of steam per lb of MSW processed, calculated 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 Q1FY19. The 12 month rolling total for steam production ending in September 2018 was 1,169,227 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 Q1FY19, this metric tracked higher (1.6%) at 2.85 tons<sub>steam/ton<sub>ref</sub></sub> compared to the corresponding quarter in FY18.

**Chart 7: Calculated Waste Heating Value**

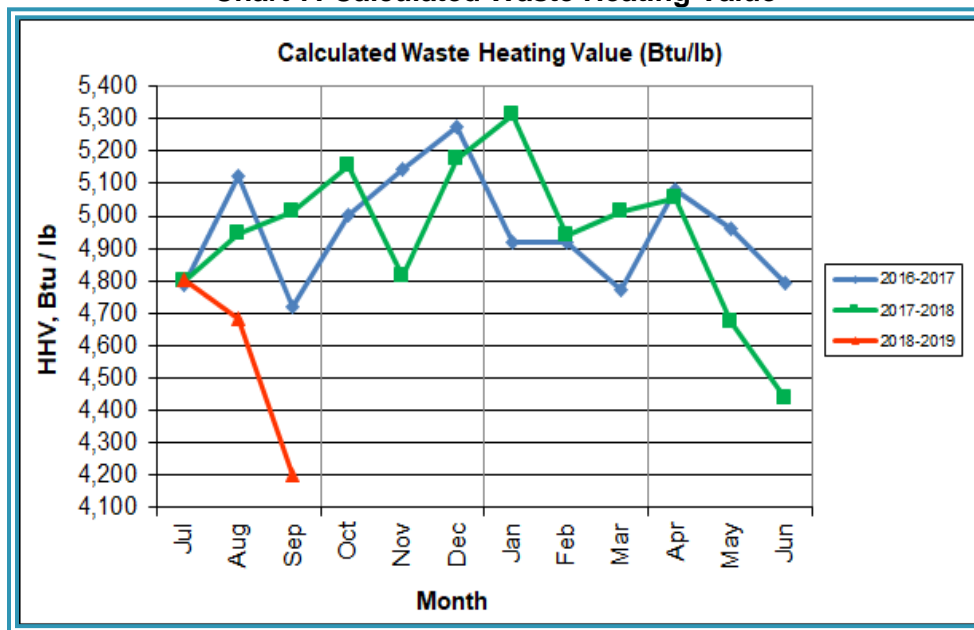


Chart 7 illustrates that Q1FY19 calculated average waste heating value was lower (7.2%) at 4,722 Btu/lb than the corresponding quarter Q1FY18, which averaged 4,946 Btu/lb. Note that the waste heating value in September 2018 of 4,198 Btu/lb was a historical low and 24.7 inches of rainfall was recorded at the Ronald Reagan National Airport<sup>1</sup> during the Q1FY19.

<sup>1</sup> <https://www.wunderground.com/history/monthly>



**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)
Q1FY17	Quarterly Totals	88,622	0	18,307	1,880	2,066	537,123	37,367
	July -16	32,121	0	6,459	504	752	191,425	13,363
	August -16	29,593	0	6,482	642	734	188,295	13,092
	September - 16	26,908	0	5,366	734	580	157,403	10,912
Q1FY18	Quarterly Totals	89,023	0	18,197	5,448	2,468	545,082	38,038
	July -17	31,763	0	6,476	1,807	869	190,170	13,182
	August -17	30,200	0	6,237	1,836	871	186,971	12,970
	September - 17	27,060	0	5,484	1,805	728	167,941	11,886
Q1FY19	Quarterly Totals	89,004	0	16,120	3,191	3,024	515,910	34,925
	July -18	31,273	0	5,989	1,013	1,102	188,996	13,042
	August -18	30,590	0	5,808	1,040	1,071	181,530	12,393
	September - 18	27,141	0	4,323	1,138	851	145,384	9,490
FY19 YTD Totals		89,004	0	16,120	3,191	3,024	515,910	34,925
FY18 Totals		350,087	0	70,368	16,431	10,418	2,139,023	150,506
FY17 Totals		349,516	0	71,208	13,411	9,036	2,120,115	150,935

Table 2 presents the production data provided to HDR by CAAI for Q1FY19 on both a monthly and quarterly basis. For purposes of comparison, data for Q1FY17 and Q1FY18 are also shown, as well as FY17, FY18 and FY19 year to date (YTD) totals.

In comparing quarterly totals, the data shows:

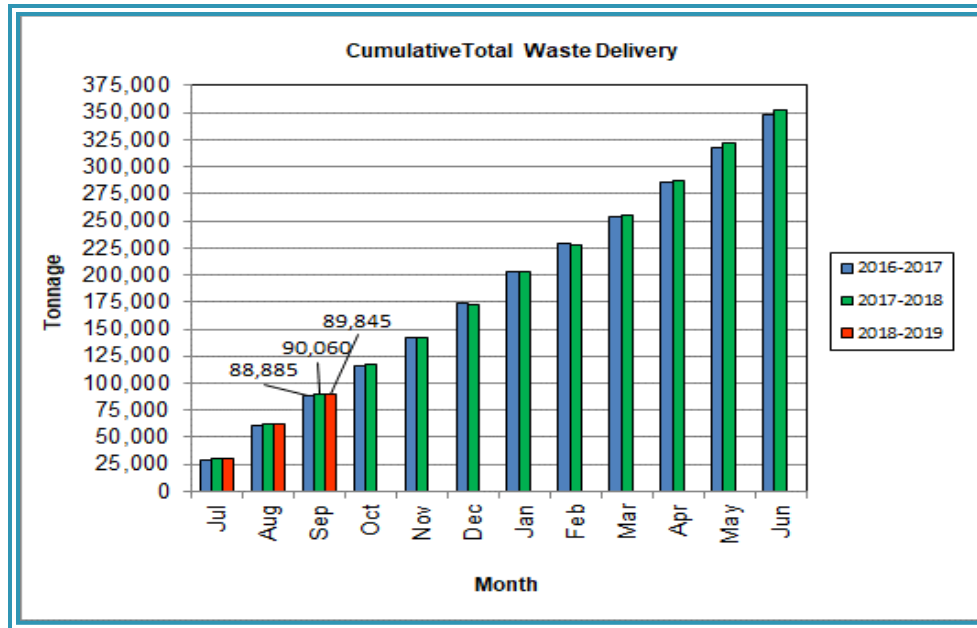
- Slightly less waste was processed in Q1FY19 than Q1FY18 and slightly more than Q1FY17
- Less steam was generated in Q1FY19 than Q1FY18 and Q1FY17
- Less electricity (net) was generated in Q1FY19 than Q1FY18 and Q1FY17
- Less supplemental waste was received in Q1FY19 than Q1FY18 and more than Q1FY17.

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 Q1FY19 continues to be limited by the steam production permit restrictions (refer to Chart 5).

**Table 3: Waste Delivery Classification**

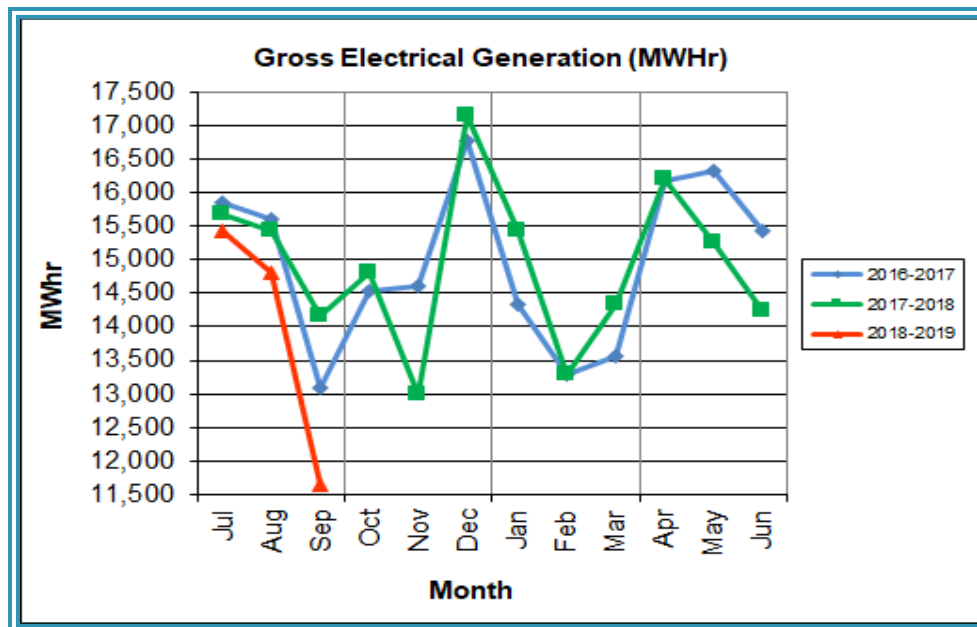
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY15	City Waste	1,814	1,497	1,699	1,737	1,518	1,770	1,411	1,209	1,648	2,155	2,059	2,045	20,562	5.91%
	County Waste	3,297	2,868	2,973	3,095	2,508	2,852	2,358	1,833	2,411	3,269	3,652	3,572	34,687	9.96%
	Municipal Solid Waste	26,661	24,466	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%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
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%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
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%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY18	City Waste	1,699	1,876	1,642	1,719	1,849	1,541	1,621	1,365	1,569	2,000	2,298	2,011	21,191	6.03%
	County Waste	2,458	2,654	2,513	2,529	2,635	2,321	2,502	2,110	2,391	2,509	2,959	2,776	30,356	8.63%
	Municipal Solid Waste	24,950	25,303	21,518	20,885	19,108	24,668	25,302	20,826	22,980	26,645	27,438	24,091	283,714	80.67%
	Supplemental Waste	1,807	1,835	1,805	1,638	1,553	1,339	1,301	884	829	886	1,391	1,161	16,430	4.67%
	MSW Totals	30,914	31,668	27,478	26,772	25,146	29,869	30,726	25,185	27,770	32,040	34,086	30,039	351,691	100.00%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY19	City Waste	1,848	1,836	1,823										5,507	6.13%
	County Waste	2,560	2,798	2,554										7,913	8.81%
	Municipal Solid Waste	25,442	25,920	21,873										73,235	81.51%
	Supplemental Waste	1,012	1,040	1,138										3,190	3.55%
	MSW Totals	30,862	31,595	27,388										89,844	100.00%

**Chart 8: Cumulative Total Waste Delivery**



As depicted in Table 3 and Chart 8, for the quarter ending in September 2018; cumulative total waste delivery was 0.2% lower compared to the same period in FY18.

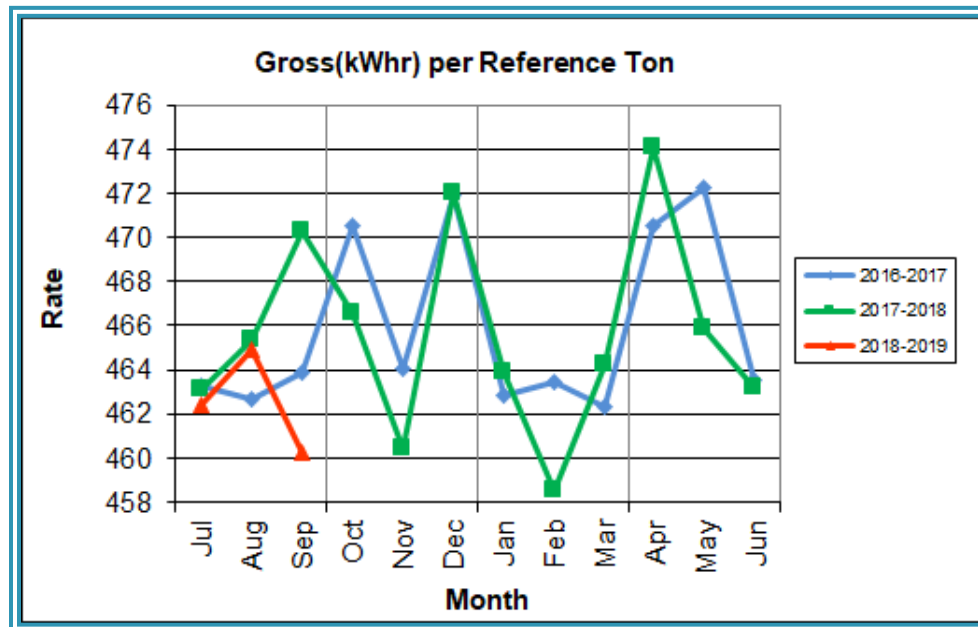
**Chart 9: Gross Electrical Generation**



During Q1FY19, the Facility generated 41,894 MWhrs (gross) of electricity compared to Q1FY18 generation of 45,293 MWhrs (gross), a 7.5% decrease. The

decrease in electricity generated (gross) in Q1FY19, is attributable to lower steam production, offset by less downtime (18.5 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 Q1FY19 was 463 kWhr, which is slightly lower (0.8%) than the corresponding quarter in FY18. 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**

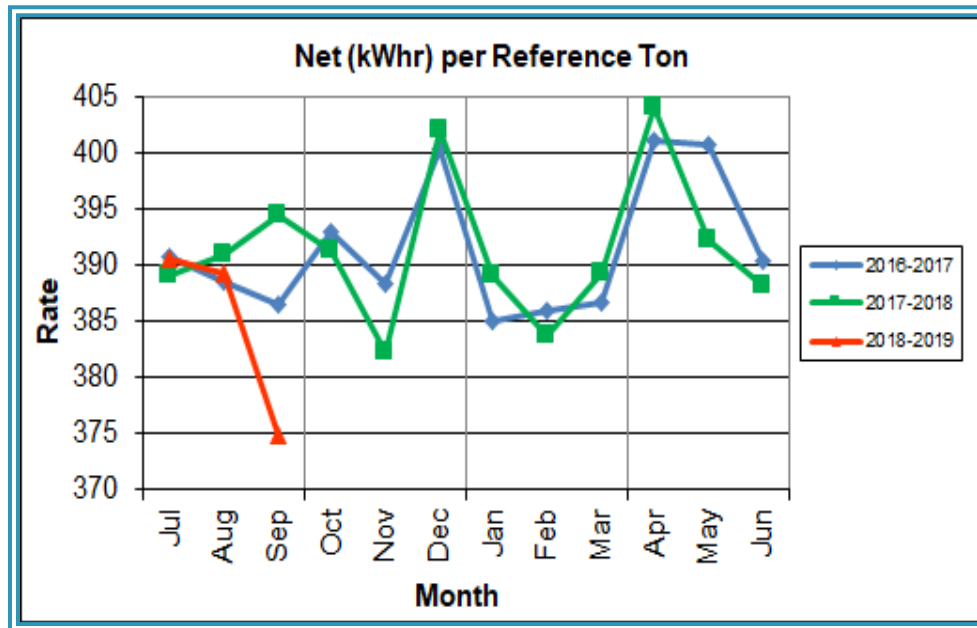


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q1FY19, the average net electrical generation per reference ton was 385 kWhr, which is 1.7% lower than the corresponding quarter in FY18.

**Chart 12: Net Conversion Rate**

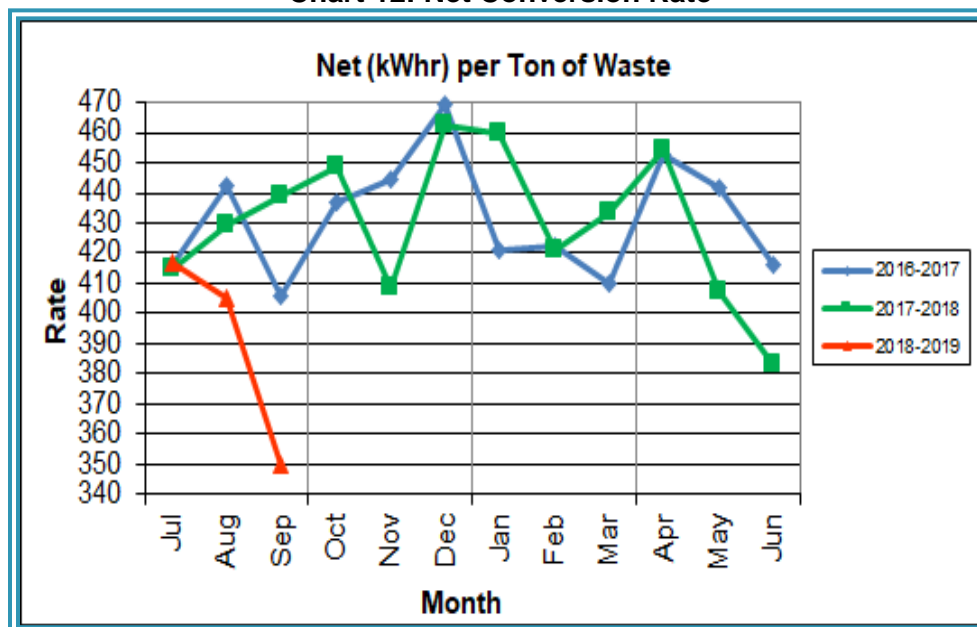


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q1FY19 was 391 kWhr, which is 8.7% lower than

the corresponding quarter in FY18 and is attributable to the decrease (7.2%) in waste heating value.

**Chart 13: Gross Turbine Generator Conversion Rate**

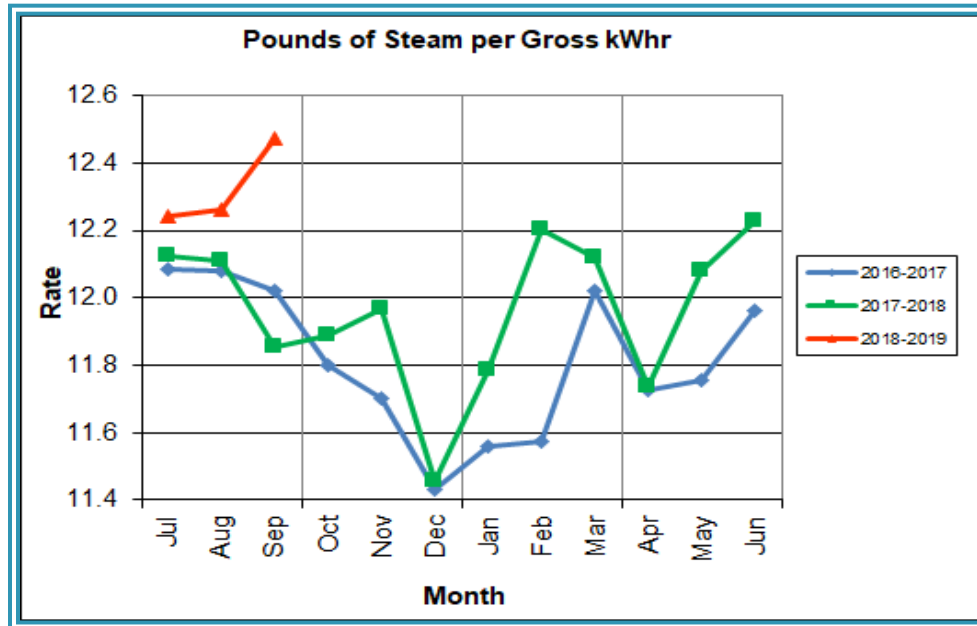


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of gross electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q1FY19 the average lbs of steam consumed per gross kWhr generated was 12.3, which is 2.3% higher (less efficient) than the corresponding quarter Q1FY18. 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. CAAL 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. CAAL 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 680.8°F, which is 3.6°F lower than the average main steam temperature of the

corresponding quarter last fiscal year and 19.2°F lower than design temperature of 700°F.

#### 4.1 Utility and Reagent Consumptions

**Table 4: Facility Utility and Reagent Consumptions**

Utility	Units	Q1FY19 Total	Q1FY18 Total	Q1FY19"Per Processed Ton" Consumption	Q1FY18"Per Processed Ton" Consumption
Purchased Power	MW/hr	5,503	5,670	0.062	0.064
Fuel Oil	Gal.	14,650	14,240	0.16	0.16
Boiler Make-up	Gal.	1,469,000	1,362,000	16.50	15.30
Cooling Tower Make-up	Gal.	40,348,706	40,368,876	453.34	453.47
Pebble Lime	Lbs.	1,222,000	1,404,000	13.73	15.77
Ammonia	Lbs.	166,000	179,000	1.87	2.01
Carbon	Lbs.	78,000	90,000	0.88	1.01
Dolomitic Lime	Lbs.	222,000	252,000	2.49	2.83

Fuel oil usage during the quarter represents approximately 0.25% of the total heat input to the boilers, which compares favorably with industry averages, and is identical to the percentage of heat input in Q1FY18. 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 2.4% of steam flow, which is slightly higher than the boiler makeup in Q1FY18 which was 2.1% and is acceptable. Pebble lime usage, at 1,222,000 lbs. is significantly lower (13.0%) than the corresponding quarter last year.

In comparing Q1FY19 to Q1FY18 on a per processed ton consumption basis:

- the purchased power consumption rate was 2.9% lower
- the total fuel oil consumption rate was 2.9% higher
- the boiler make-up water consumption rate was 7.9% higher
- the cooling tower make-up water consumption rate was less than 0.1% lower
- the total pebble lime consumption rate was 12.9% lower
- the ammonia consumption rate was 7.2% lower
- the carbon consumption rate was 13.3% lower
- the total dolomitic lime consumption rate was 12.0% lower



## 4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents during the quarter and has operated 188 days without an OSHA recordable accident. During the quarter, Safety and Environmental training was conducted with themes as follows:

### **July 2018**

- Safety:
  - Scaffolding
  - Heat Stress
  - What If? Heat Stress
  - Three (3) Points of Contact
  - Safety Procedure 43: Personal Protective Equipment
- Environmental:
  - Profiled Waste Roles and Responsibilities
  - Profiled Waste Inspections

### **August 2018**

- Safety:
  - Lock-Out-Tag-Out (LOTO) : Control of Hazardous Energy
  - Electrical Safety and Safe Body Positioning
  - Lock-Out-Tag-Out (LOTO): Energy Isolation Devices
- Environmental:
  - What If? Air Permit Violation
  - Stack Testing – Keys to Successful Test

### **September 2018**

- Safety:
  - Confined Space Entry
  - Barricading and Flagging
  - Medical Surveillance and Access to Records
  - Confined Space Rescue
- Environmental:
  - Ash Generation, Treatment, and Disposal

## 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.

On July 17, 2018 Boiler No. 2 experienced 23.7 hours of downtime for a scheduled cleaning mini outage and on August 21, 2018 Boiler No. 1 experienced 23.6 hours of downtime for a scheduled cleaning mini outage. Beginning September 15, 2018 Boiler No. 3 experienced 114.0 hours of downtime for a scheduled major outage. Some significant activities that were completed during the outage are:

- Replacement of the top cover at the top of the No. 3 transfer conveyor
- Installation of the new stack test port bank located under the opacity monitor
- Replacement of two (2) broken grate bars
- Repair of many holes on the baghouse hoppers and also the hopper screw conveyor troughs
- Replacement of the feed table angular brake plates
- Replacement of the front wear plates on both feed rams
- Replacement of the entire lower skirting above the feed rams
- Replacement of three (3) curve blocks
- Replacement of four (4) Sootblower elements: G9B Nos. 2, 3, 8, and 10
- Replacement of five (5) tube shields

In addition to the scheduled outages, CAAI reports that 969 preventative maintenance actions were completed during the quarter.

## 5.1 Availability

Facility availabilities for Q1FY19 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q1FY19 were 98.3%, 98.9%, and 94.7%, respectively. The three-boiler average availability during the

quarter was 97.3%, which is excellent and comparable to that of mature, well run waste to energy facilities. Note that these reported availability metrics exclude standby time experienced during the quarter which amounted to 175.1 hours for the boilers.

According to CAAI reports, the average unit availabilities for Turbine Generator Nos. 1 and 2 for Q1FY19 was 100.0% during Q1FY19, noting that these reported availability metrics exclude standby time experienced which amounted to 80.3 hours for the turbine generators.

**Table 5: Quarterly Facility Unit Availabilities**

Availability	Q1FY19 Average
Boiler No. 1	98.3%
Boiler No. 2	98.9%
Boiler No. 3	94.7%
<b>Avg.</b>	<b>97.3%</b>
Turbine No. 1	100.0%
Turbine No. 2	100.0%
<b>Avg.</b>	<b>100.0%</b>

## 5.2 Downtime Summary

**Table 6: Boiler Downtime – Q1FY19**

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	7/17/18	7/17/18	4.5	Standby	Facility Trip from Severe Weather
2	7/17/18	7/18/18	23.7	Scheduled	Scheduled Boiler Cleaning Outage
3	7/17/18	7/17/18	2.2	Standby	Facility Trip from Severe Weather
1	8/21/18	8/22/18	23.6	Scheduled	Scheduled Boiler Cleaning Outage
3	9/15/18	9/20/18	114.0	Scheduled	Schedule Fall 2018 Major Boiler Outage
1	9/18/18	9/18/18	13.0	Unscheduled	Replacement of 480 Volt Transformer Cooling Fans
3	9/20/18	9/21/18	18.7	Standby	Process Throughput Limitations
3	9/23/18	9/28/18	101.0	Standby	Process Throughput Limitations
3	9/28/18	9/30/18	48.7	Standby	Process Throughput Limitations
<b>Total Unscheduled Downtime</b>			<b>13.0 Hours</b>		
<b>Total Scheduled Downtime</b>			<b>161.3 Hours</b>		
<b>Total Standby Downtime</b>			<b>175.1 Hours</b>		
<b>Total Downtime</b>			<b>349.4 Hours</b>		

**Table 7: Turbine Generator Downtime – Q1FY19**

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	7/17/18	7/17/18	5.5	Standby	Facility Trip from Severe Weather
1	9/16/18	9/18/18	74.8	Standby	Boiler Process Throughput Limitations and Replacement of 480 Volt Transformer Cooling Fans
<b>Total Unscheduled Downtime</b>			<b>0.0 Hours</b>		
<b>Total Scheduled Downtime</b>			<b>0.0 Hours</b>		
<b>Total Standby Downtime</b>			<b>80.3 Hours</b>		
<b>Total Downtime</b>			<b>80.3 Hours</b>		

### 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 August 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 August 2018 inspection are presented in Table 8.

**Table 8: Facility Housekeeping Ratings – August 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 Q1FY19 are summarized in Appendix A. No permit deviations were reported by the Facility during Q1FY19. Note that as of September 30 2018, the CAAI Facility has operated 348 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 Q1FY19, the monthly emission concentrations of nitrogen oxides (NO<sub>x</sub>) averaged 160.0 ppmdv, 158.7 ppmdv and 158.3 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 Q1FY19 the monthly emission concentration of stack sulfur dioxide (SO<sub>2</sub>) averaged 1.0 ppmdv, 1.7 ppmdv, and 0.7 ppmdv for Boiler Nos. 1, 2, and 3, respectively. All of these stack SO<sub>2</sub> concentrations are significantly below the permit limit of 29 ppmdv @ 7% O<sub>2</sub>.

### 6.3 Carbon Monoxide Emissions

During Q1FY19, the average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 27.3 ppm<sub>dv</sub>, 26.7 ppm<sub>dv</sub>, and 24.0 ppm<sub>dv</sub>, respectively, and all are well within permit limits (100 ppm<sub>dv</sub>, hourly average).

### 6.4 Opacity

During Q1FY19, the average opacity for Boiler Nos. 1, 2, and 3 was 0.9%, 1.7%, and 1.1% respectively. All of these averages are significantly below the 10% (6-minute) average permit limit.

### 6.5 Daily Emissions Data

Appendix A, Tables 10, 11, and 12 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q1FY19. 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

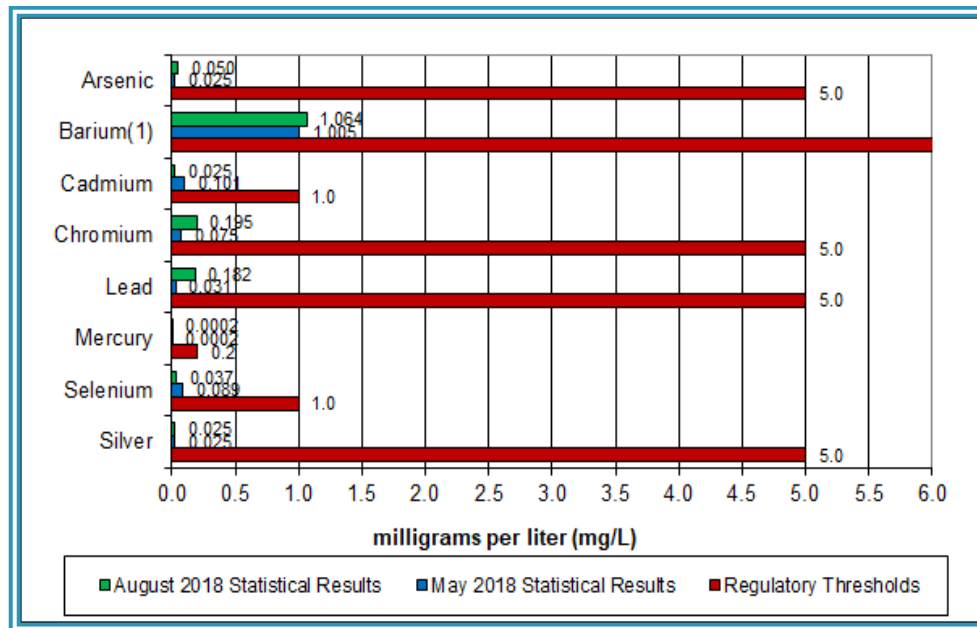
The dolomitic lime feed rate is adjusted periodically in order to maintain a desired ash pH level in the range of 8.0 to 11.0. Since initial startup, the feed rate has varied from between 1 to 9 lbs per ton each month. Ash Toxicity (TCLP) tests were performed for field samples collected over a seven (7) day period in August 2018, and results indicated that the average pH during testing was 10.1. Results from the TCLP testing conducted in May 2018 and August 2018 are depicted in Table 9 and Chart 14 below.



**Table 9: Comparison of Statistical Results and Regulatory Thresholds for Metal Analytes**

Metals	90% Upper Confidence (August 2018)	90% Upper Confidence (May 2018)	Regulatory Threshold (mg/L)	% of Threshold (August 2018)	% of Threshold (May 2018)
Arsenic	0.050	0.025	5.0	1.00%	0.50%
Barium	1.064	1.005	100.0	1.06%	1.01%
Cadmium	0.025	0.101	1.0	2.50%	10.10%
Chromium	0.195	0.075	5.0	3.90%	1.50%
Lead	0.182	0.031	5.0	3.64%	0.62%
Mercury	0.0002	0.0002	0.2	0.10%	0.10%
Selenium	0.037	0.089	1.0	3.70%	8.90%
Silver	0.025	0.025	5.0	0.50%	0.50%

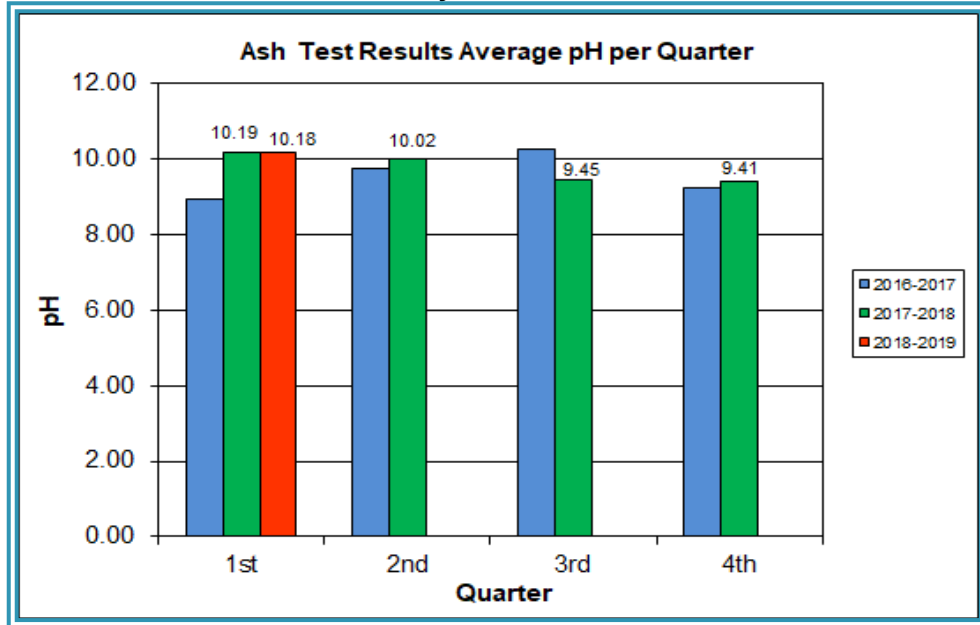
**Chart 14: Ash Toxicity Characteristic Leaching Procedure (TCLP) Results**



Note: The regulatory threshold for Barium is 100 mg/L

CAAI also 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 15 where each quarter is represented by the average of the respective monthly readings. During Q1FY19, the average ash pH for in-house tests was 10.2.

**Chart 15: Quarterly Ash Test Results**



## APPENDIX A FACILITY CEMS DATA

**Table 10: 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 <sub>2</sub> ec	SO <sub>2</sub> sc	COsc	NO <sub>x</sub> 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
Jul - 18	AVG	84.1	25.0	1.0	27.0	161.0	1.0	299.0	13.3	3.1
	Max	88.4	40.0	6.0	35.0	164.0	1.3	301.0	13.7	3.2
	Min	76.6	16.0	0.0	19.0	157.0	0.8	297.0	13.3	2.8
Aug - 18	AVG	81.0	33.0	1.0	28.0	160.0	0.9	299.0	13.3	3.1
	Max	84.2	68.0	3.0	38.0	168.0	1.2	302.0	13.5	3.4
	Min	74.5	14.0	0.0	19.0	157.0	0.7	290.0	13.2	2.7
Sep - 18	AVG	77.0	35.0	1.0	27.0	159.0	0.8	298.0	13.3	3.0
	Max	85.2	52.0	3.0	38.0	160.0	0.9	301.0	13.7	3.2
	Min	65.5	25.0	0.0	16.0	151.0	0.7	294.0	13.2	2.6
Quarter Average		80.7	31.0	1.0	27.3	160.0	0.9	298.7	13.3	3.1
Quarter Max Value		88.4	68.0	6.0	38.0	168.0	1.3	302.0	13.7	3.4
Quarter Min Value		65.5	14.0	0.0	16.0	151.0	0.7	290.0	13.2	2.6
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 11: 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 <sub>2</sub> ec	SO <sub>2</sub> sc	COsc	NO <sub>x</sub> 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
Jul - 18	AVG	86.4	38.0	3.0	27.0	159.0	1.8	296.0	13.3	3.1
	Max	90.2	68.0	7.0	50.0	169.0	2.0	299.0	13.7	4.2
	Min	80.2	15.0	1.0	20.0	155.0	1.3	285.0	13.1	2.8
Aug - 18	AVG	82.8	41.0	1.0	28.0	158.0	1.7	296.0	13.3	3.1
	Max	86.8	57.0	4.0	39.0	160.0	2.0	299.0	13.3	3.3
	Min	75.6	27.0	0.0	15.0	156.0	1.3	291.0	13.2	2.7
Sep - 18	AVG	78.1	31.0	1.0	25.0	159.0	1.5	297.0	13.3	3.1
	Max	85.7	46.0	3.0	38.0	163.0	1.9	301.0	14.3	3.2
	Min	66.8	17.0	0.0	9.0	158.0	1.3	293.0	13.0	2.9
Quarter Average		82.4	36.7	1.7	26.7	158.7	1.7	296.3	13.3	3.1
Quarter Max Value		90.2	68.0	7.0	50.0	169.0	2.0	301.0	14.3	4.2
Quarter Min Value		66.8	15.0	0.0	9.0	155.0	1.3	285.0	13.0	2.7
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 12: 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 <sub>2</sub> ec	SO <sub>2</sub> sc	COsc	NO <sub>x</sub> 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
Jul - 18	AVG	86.2	36.0	1.0	25.0	159.0	1.4	298.0	13.3	2.9
	Max	90.0	57.0	4.0	34.0	167.0	1.7	302.0	13.7	3.4
	Min	76.4	12.0	0.0	18.0	155.0	0.9	293.0	13.3	2.6
Aug - 18	AVG	82.0	36.0	1.0	25.0	158.0	1.2	298.0	13.3	3.0
	Max	87.1	53.0	3.0	38.0	160.0	1.5	302.0	13.6	3.2
	Min	74.2	26.0	0.0	15.0	155.0	1.0	291.0	13.2	2.7
Sep - 18	AVG	77.0	36.0	0.0	22.0	158.0	0.8	297.0	13.3	3.1
	Max	85.8	62.0	1.0	37.0	161.0	1.4	300.0	13.4	3.3
	Min	64.6	12.0	0.0	5.0	150.0	0.1	291.0	13.3	3.0
Quarter Average		81.7	36.0	0.7	24.0	158.3	1.1	297.7	13.3	3.0
Quarter Max Value		90.0	62.0	4.0	38.0	167.0	1.7	302.0	13.7	3.4
Quarter Min Value		64.6	12.0	0.0	5.0	150.0	0.1	291.0	13.2	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 – AUGUST 2018





**Figure 1: Emergency light fixture out in SDA No. 2 Penthouse – New Deficiency**



**Figure 2: Siding and steel damaged at the top of the Ash Load-out Bay Ramp – New Deficiency**



**Figure 3: New LED Light Fixtures over Refuse Pit – Facility Enhancement**



**Figure 4: New LED Light Fixtures in Stairwells – Facility Enhancement**



**Figure 5: New Access Platforms Installed at Man-Doors in Upper Boiler Elevations– Facility Enhancement**



**Figure 6: Modified Platform between Condensers for Safety – Facility Enhancement**





**Figure 7: Main Vibrating Pan & Ferrous Magnet – Very Slight Gap for Improved Ferrous Recovery**



**Figure 8: Superheater Hopper at Barn Door Access Elevation**



**Figure 9: Economizers**



**Figure 10: Baghouse Compartment Aisle – No Issues Observed on Any Boilers**



**Figure 11: Cooling Tower from SDA Penthouse Platform**



**Figure 12: Steam Drum**





Figure 13: Deaerator



Figure 14: Refuse Pit – Photo from North End of Charging Floor



Figure 15: Ash Trailer Canopy



Figure 16: Facility Entrance Road, Scalehouse, and Haulers Lined up Tipping Floor Entrance

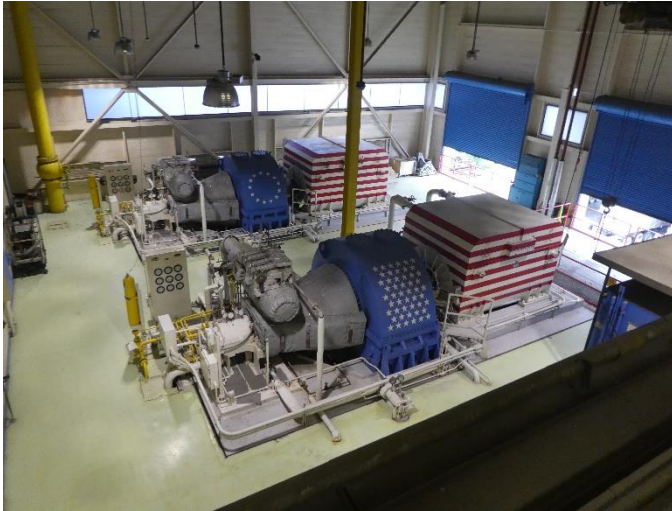


Figure 17: Retractable Sootblower



Figure 18: Auxiliary Burner





**Figure 19: Turbine Generators**



**Figure 20: Main Condenser**



**Figure 21: Ash Samples for Ash Toxicity Characteristic Leaching Procedure (TCLP) conducted in August 2018**



**Figure 22: Spare Crane Grapple Tines**



**Figure 23: Haulers Exiting Facility Scales**



**Figure 24: Metal Roll-off**





**Figure 25: Citizens Drop-off Roll-off**



**Figure 26: General Facility Photo – Southwest from up Eisenhower Avenue**



**Figure 27: Front (south side) of Facility from Parking Lot**



**Figure 28: Firing Aisle**



**Figure 29: Induced Draft Fan & Continuous Emissions Monitoring System (CEMS) Enclosure**



**Figure 30: Tipping Floor Operations**