



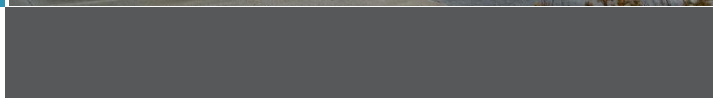
# Alexandria Arlington Resource Recovery Facility

Fiscal Year 2019  
Third Quarter Operations Report

May 2019



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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 Third 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 third quarter of the 2019 fiscal year and summarizes Facility operations between January 1, 2019 and March 31, 2019. This report identifies the fiscal year beginning on July 1, 2018 as FY19 and the quarter beginning on January 1, 2019 as Q3FY19.

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 Q3FY19. 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 Q3FY19, the boilers experienced no unscheduled downtime, and the turbine generators experienced two (2) instances of unscheduled downtime totaling 53.4 hours. All three (3) boilers experienced downtime for scheduled maintenance totaling 404.4 hours. Turbine Generator No. 2 experienced one (1) instance of unscheduled downtime totaling 6.8 hours and no scheduled maintenance was conducted on either of the turbine generators during the quarter. No standby downtime was experienced by the boilers, and one (1) instance of

standby downtime was experienced by Turbine Generator No. 2 totaling 106.9 hours. A detailed listing of downtime is provided in Section 5.2 of this report.

Average waste processed during the quarter was 914.7 tons per day, or 93.8% of nominal facility capacity. Waste deliveries averaged 914.5 tons per day, which is nearly identical to 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 was nearly identical (3 tons lower) to the corresponding quarter in FY18; steam production decreased (4.5%), and electricity generated (gross) decreased (2.7%) from the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (4.2%) in waste heating value, offset by less boiler downtime (170.1 fewer hours). The decrease in electricity generated (gross) in Q3FY19, is attributable to lower steam production, offset by less downtime (126.7 fewer hours) experienced by the turbine generators.

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

In February 2019, 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	Complete	Closed
4	Pressure wash of exterior siding needed on north and east sides of Facility	May 2017	C	Pressure wash exterior siding	Complete	Closed
5	Pressure wash of exterior siding needed at Charging Floor Elevation Above Service Elevator	August 2017	C	Pressure wash exterior siding	Complete	Closed
6	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
7	Pipe corroded on west side of SDA No. 1	March 2018	C	Conduct proper painting preservation measures	Status Unchanged	Open
8	Damaged bollard at top of Ash/Metal Load-out Ramp	November 2018	C	Repair/replace damaged bollard	Complete	Closed
9	Pothole and asphalt deteriorating at Tipping Floor Exit	November 2018	C	Resurface Tipping Floor Exit Ramp	Complete	Closed
10	Road Striping Missing on Entrance Road indicating Two-Way Road– See Figure 1 (Appendix B)	February 2019	A	Paint road striping on Entrance Road leading up to scales	Status Unchanged	Open



## 4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 82,325 tons of MSW were processed during Q3FY19, and a total of 82,307 tons of MSW including 2,592 tons of Special Handling Waste were received. Total ash production during the quarter was 16,787 tons, which represents 20.4% of the waste processed by weight. The average uncorrected steam production rate for Q3FY19 was 3.00 tons<sub>steam</sub>/ton<sub>waste</sub>, which is lower (4.5%) than the corresponding quarter in FY18. The decrease in this metric is attributable to the 4.2% decrease in the average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

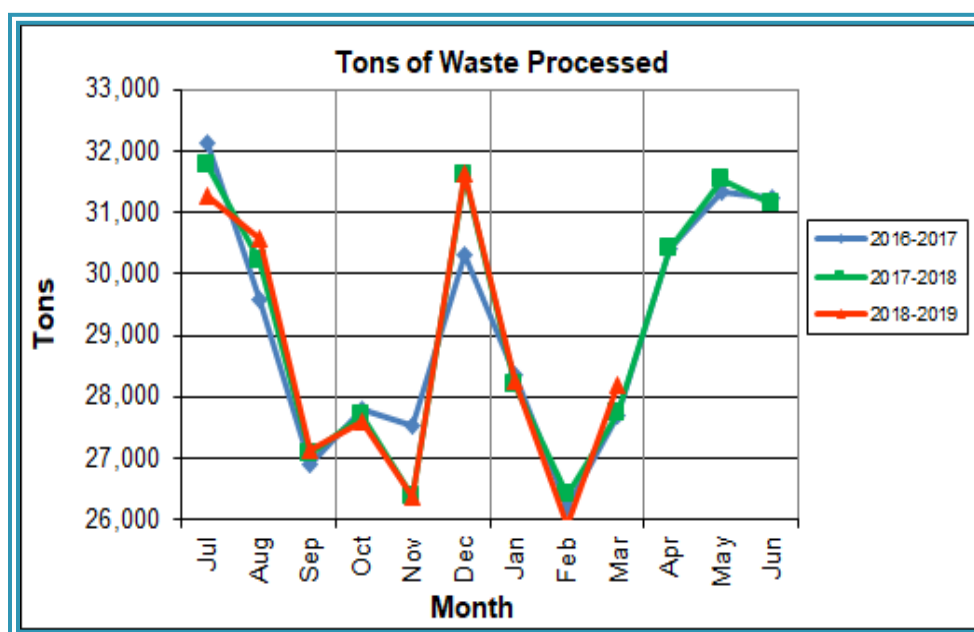


Chart 1 illustrates that Q3FY19 waste processed was nearly identical (3 tons lower) than the corresponding quarter, Q3FY18.

CAAI reported that 407 tipping floor/MSW internal inspections were conducted during the quarter and no notices of violation (NOVs) were issued to haulers.

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

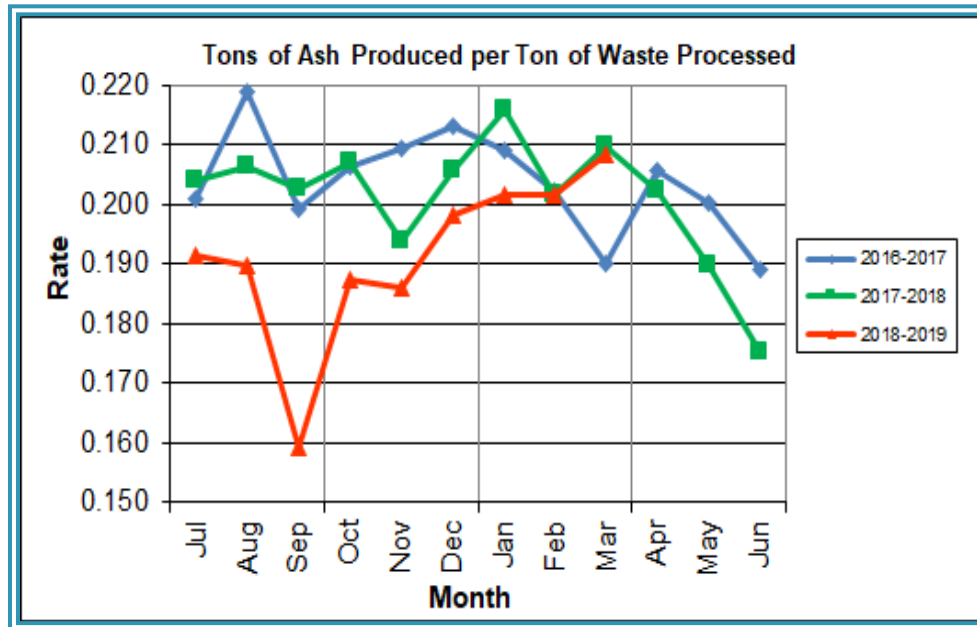


Chart 2 illustrates that the average ash production rate in Q3FY19 was lower (0.5%) at 20.4% of processed waste, compared to the corresponding quarter in FY18 when the rate was 20.9%. The decrease in this metric is attributable to the significant increase (29.7%) in ferrous metal recovery in Q3FY19 when compared to the corresponding quarter in FY18.

Chart 3: Ferrous Recovery Rate

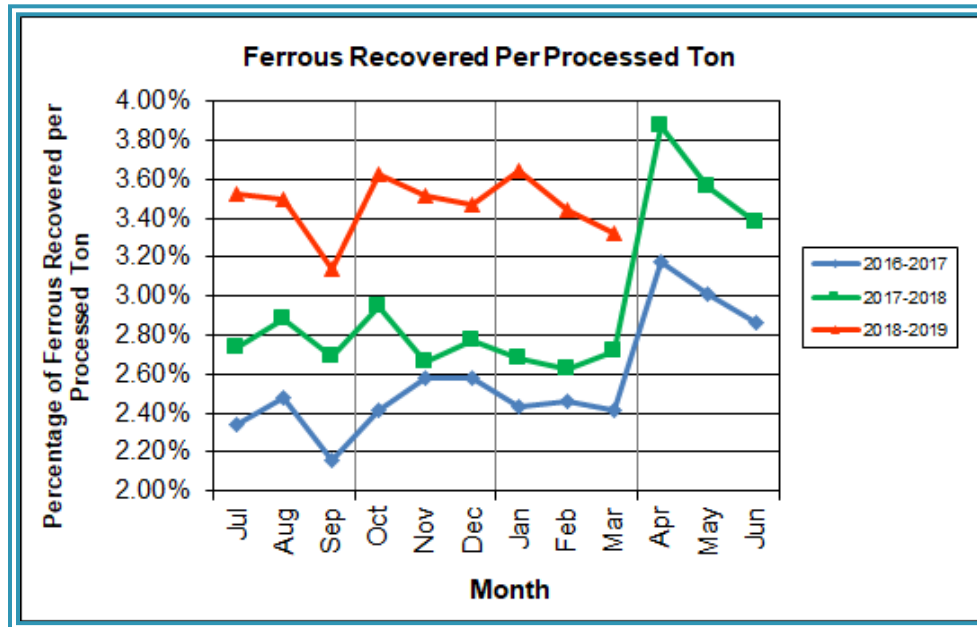
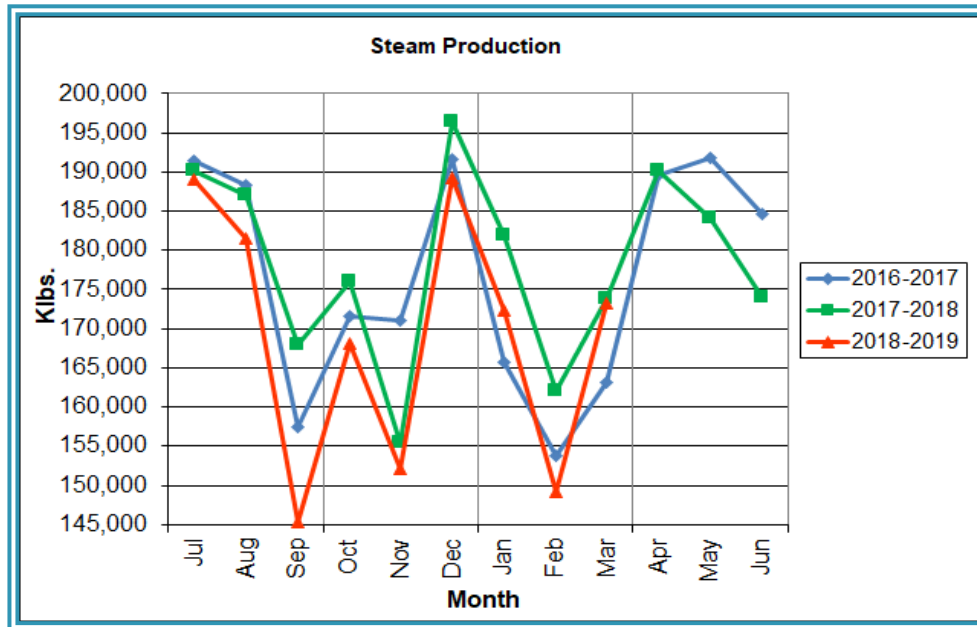


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q3FY19, 2,856 tons of ferrous metals were recovered, which is 29.7% higher than the corresponding quarter in FY18 and equivalent to 3.5% of processed waste. At the end of FY18, CAAI reported that it adjusted the gap between the pan and magnet, and replaced the edge of the pan due to wear. The positive impacts of this corrective maintenance continued through the current quarter with a significant increase in recovered ferrous metals.

**Chart 4: Steam Production**



In Chart 4, the total steam production for Q3FY19 was 494,761 klbs, and lower (4.5%) than the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (4.2%) in waste heating value, offset by less boiler downtime (170.1 fewer hours).

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

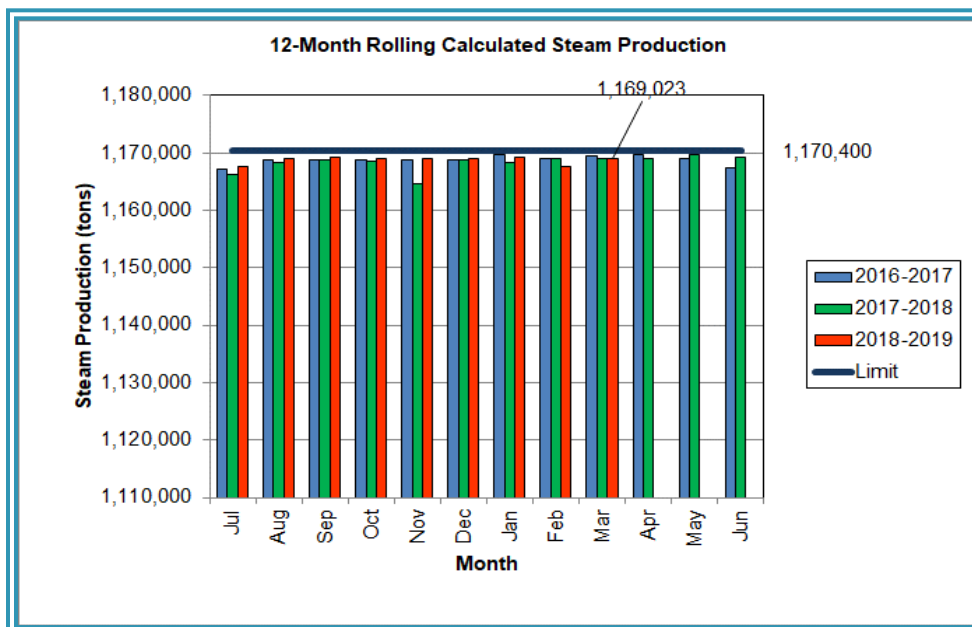
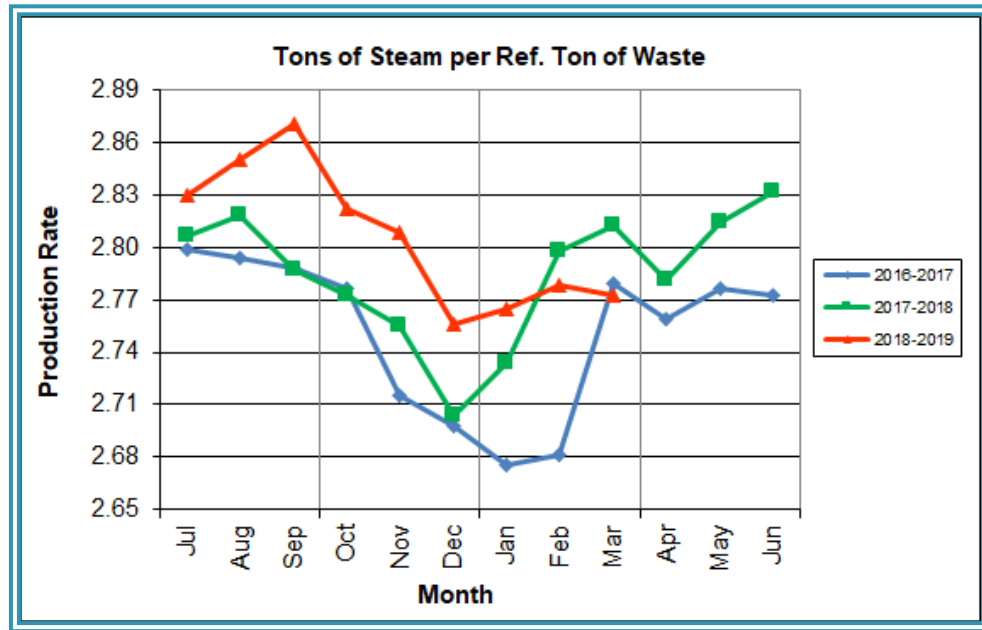


Chart 5 depicts the 12-month rolling steam production total for the period ending in March 2019. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs of steam per lb of MSW processed, calculated monthly 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 Q3FY19. The 12-month rolling total for steam production ending in March 2019 was 1,169,023 tons which is 99.9% of the limit. Chart 5 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 Q3FY19, this metric tracked slightly lower (0.3%) at 2.77 tons<sub>steam/ton<sub>ref</sub></sub> compared to the corresponding quarter in FY18.

**Chart 7: Calculated Waste Heating Value**

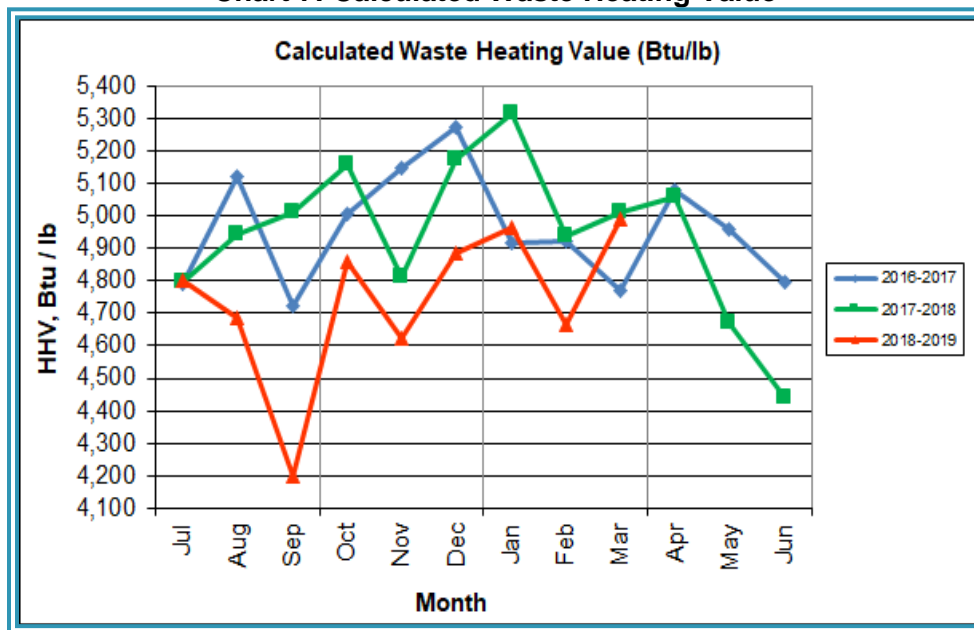


Chart 7 illustrates that Q3FY19 calculated average waste heating value was lower (4.2%) at 4,873 Btu/lb than the corresponding quarter Q3FY18, which averaged 5,088 Btu/lb. Note that the calculated waste heating value in September 2018 of 4,198 Btu/lb was a historical low.



**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)
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
Q3FY19	Quarterly Totals	82,325	0	16,787	2,592	2,856	494,761	34,931
	January -18	28,251	0	5,696	964	1,029	172,350	12,314
	February -18	25,895	0	5,218	743	891	149,123	10,284
	March - 18	28,179	0	5,873	885	936	173,288	12,333
FY19 YTD Totals		256,913	0	49,262	8,816	8,906	1,520,113	105,275
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 Q3FY19 on both a monthly and quarterly basis. For purposes of comparison, data for Q3FY17 and Q3FY18 are also shown, as well as FY17, FY18 and FY19 year to date (YTD) totals.

In comparing quarterly totals, the data shows:

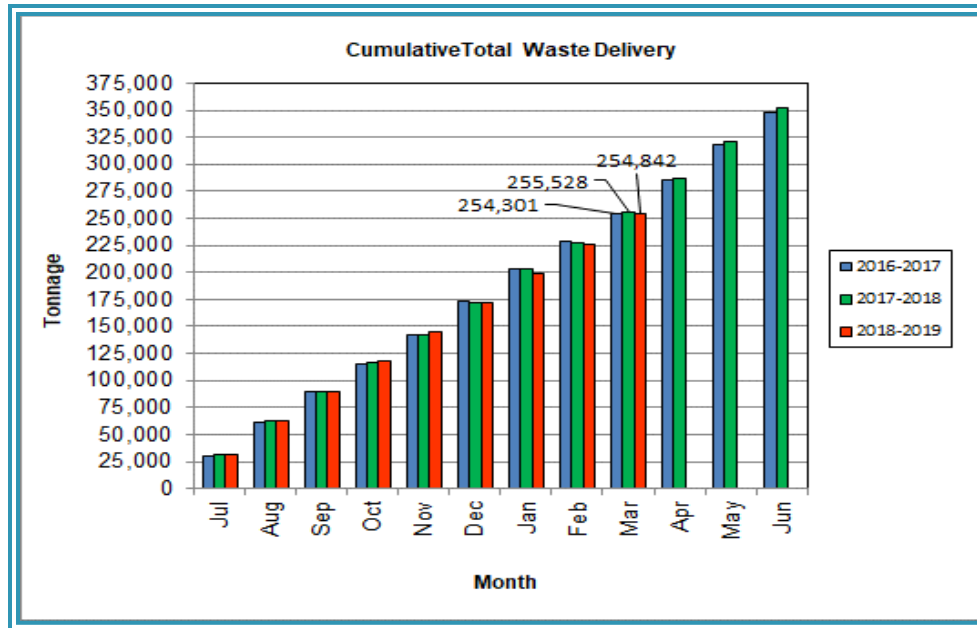
- Slightly less waste was processed in Q3FY19 than Q3FY18 and slightly more than Q3FY17
- Less steam was generated in Q3FY19 than Q3FY18 and more than Q3FY17
- Less electricity (net) was generated in Q3FY19 than Q3FY18 and more than Q3FY17
- Less supplemental waste was received in Q3FY19 than Q3FY18 and Q3FY17.

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.

**Table 3: Waste Delivery Classification**

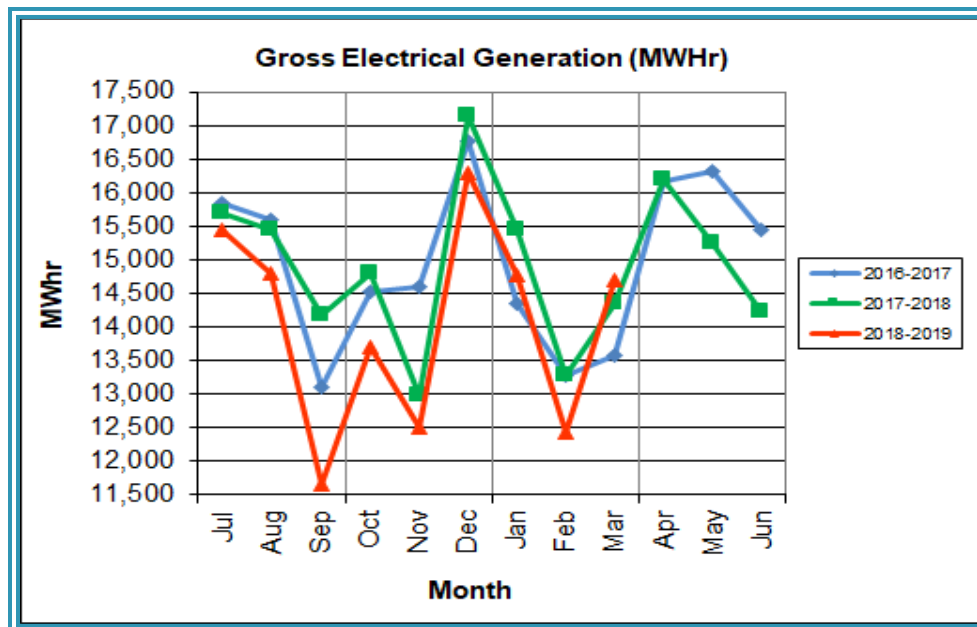
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY15	City Waste	1,814	1,497	1,699	1,737	1,518	1,770	1,411	1,209	1,648	2,155	2,059	2,045	20,562	5.91%
	County Waste	3,297	2,868	2,973	3,095	2,508	2,852	2,358	1,833	2,411	3,269	3,652	3,572	34,687	9.96%
	Municipal Solid Waste	26,661	24,466	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	1,996	1,892	1,732	1,823	1,458	1,614				16,022	6.29%
	County Waste	2,560	2,798	2,554	2,656	2,746	2,439	2,567	2,165	2,336				22,820	8.95%
	Municipal Solid Waste	25,442	25,920	21,873	21,678	21,472	23,046	21,455	21,975	24,323				207,184	81.30%
	Supplemental Waste	1,012	1,040	1,138	1,108	992	933	964	743	885				8,816	3.46%
	MSW Totals	30,862	31,595	27,388	27,438	27,102	28,150	26,808	26,342	29,157				254,842	100.00%

**Chart 8: Cumulative Total Waste Delivery**



As depicted in Table 3 and Chart 8, for the quarter ending in March 2019; cumulative total waste delivery was 0.3% lower compared to the same period in FY18.

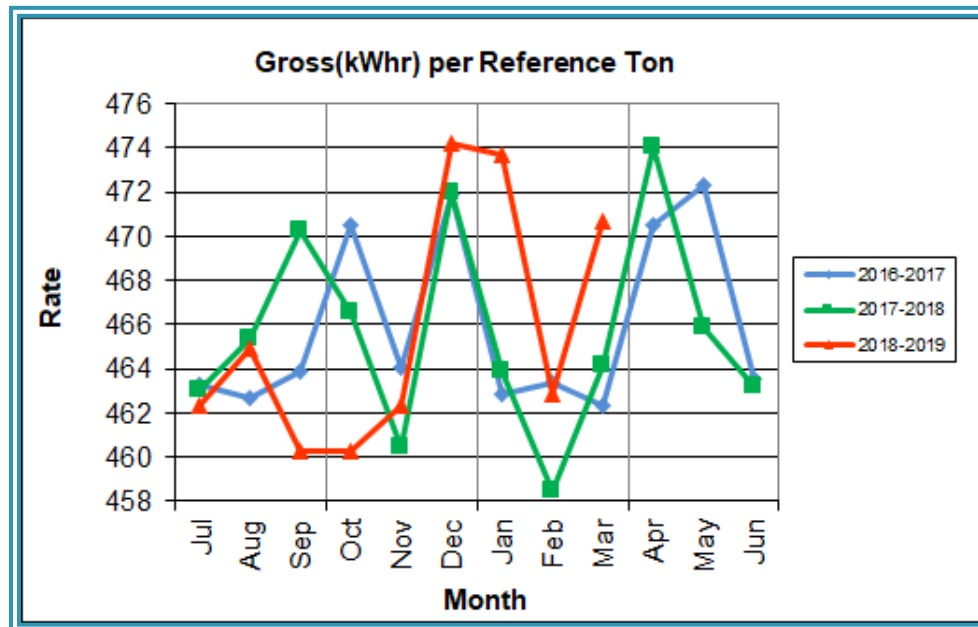
**Chart 9: Gross Electrical Generation**



During Q3FY19, the Facility generated 41,894 MWhrs (gross) of electricity compared to Q3FY18 generation of 43,065 MWhrs (gross), a 2.7% decrease. The

decrease in electricity generated (gross) in Q3FY19, is attributable to lower steam production, offset by less downtime (126.7 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 Q3FY19 was 469 kWhr, which is slightly higher (1.5%) 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

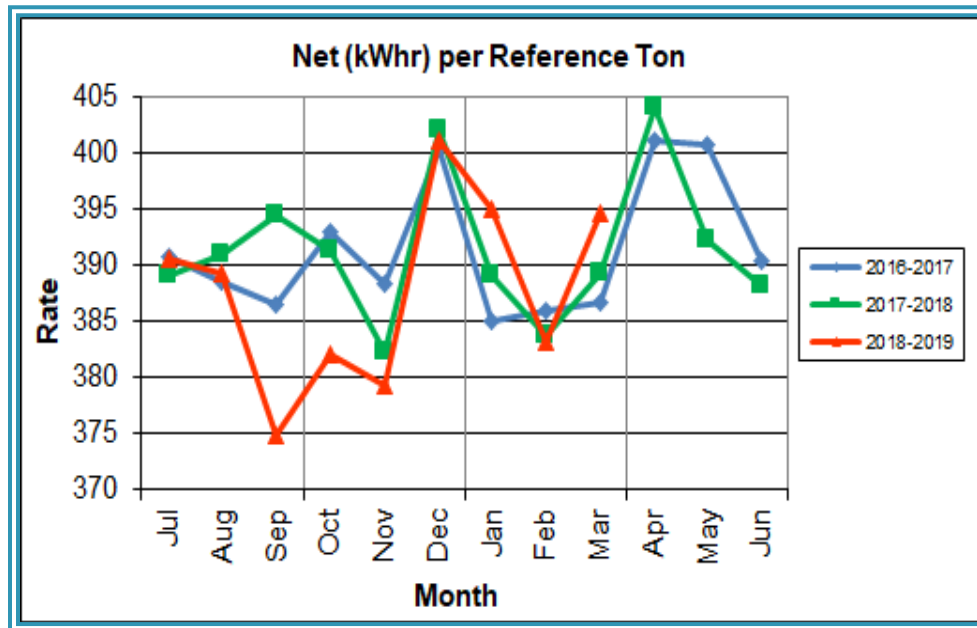


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q3FY19, the average net electrical generation per reference ton was 391 kWhr, which is 0.9% higher than the corresponding quarter in FY18.

Chart 12: Net Conversion Rate

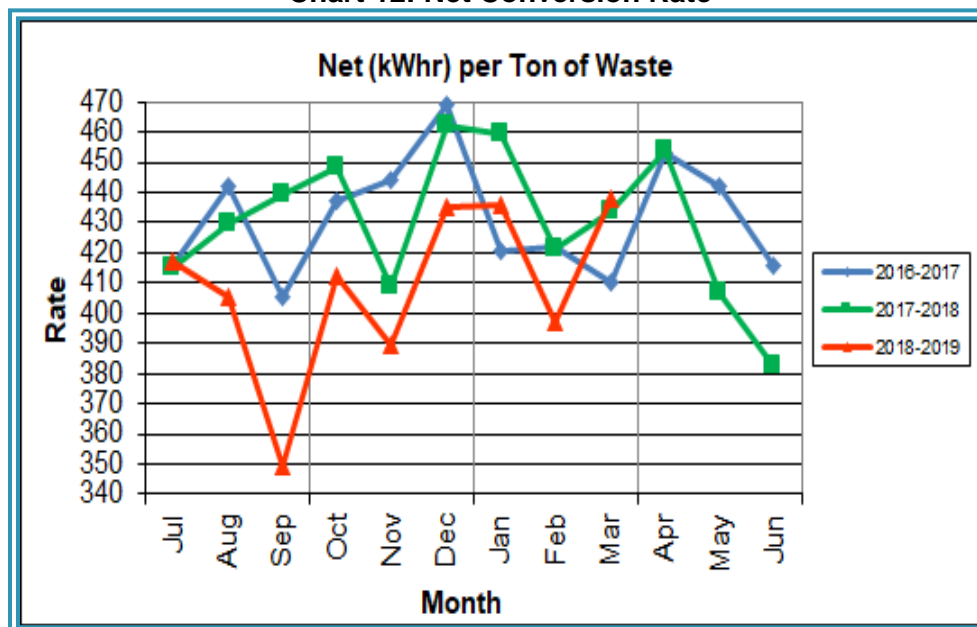


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q3FY19 was 424 kWhr, which is 3.3% lower than

the corresponding quarter in FY18 and is attributable to the decrease (4.2%) in waste heating value.

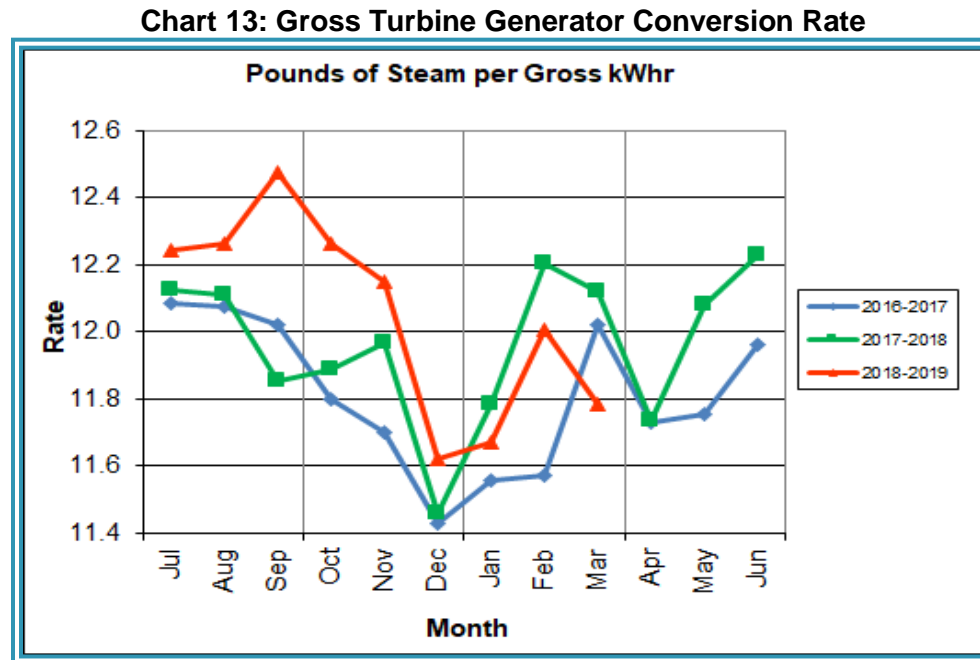


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of gross electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q3FY19 the average lbs of steam consumed per gross kWhr generated was 11.8, which is 1.8% lower (more efficient) than the corresponding quarter Q3FY18. A factor that negatively impacts this metric is Turbine Generator No. 2 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 681°F, which is 9.7°F lower than the average main steam temperature of the corresponding quarter last fiscal year and 19°F lower than design temperature of 700°F.

## 4.1 Utility and Reagent Consumptions

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

Utility	Units	Q3FY19 Total	Q3FY18 Total	Q3FY19"Per Processed Ton" Consumption	Q3FY18"Per Processed Ton" Consumption	FY19 YTD Total
<b>Purchased Power</b>	MW/hr	5,496	5,458	0.0668	0.0663	16,601
<b>Fuel Oil</b>	Gal.	8,420	9,120	0.10	0.11	37,410
<b>Boiler Make-up</b>	Gal.	1,588,000	1,358,000	19.29	16.49	4,572,000
<b>Cooling Tower Make-up</b>	Gal.	27,065,631	29,546,941	328.77	358.89	96,452,310
<b>Pebble Lime</b>	Lbs.	1,370,000	1,254,000	16.64	15.23	3,966,000
<b>Ammonia</b>	Lbs.	160,000	178,000	1.94	2.16	480,000
<b>Carbon</b>	Lbs.	80,000	90,000	0.97	1.09	236,000
<b>Dolomitic Lime</b>	Lbs.	8,000	48,000	0.10	0.58	346,000

Fuel oil usage during the quarter represents approximately 0.16% of the total heat input to the boilers, which compares favorably with industry averages, and is slightly lower than the percentage of heat input in Q3FY18 which was 0.17%. 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 2.7% of steam flow, which is slightly higher than the boiler makeup in Q3FY18 which was 2.2% and is acceptable. Pebble lime usage, at 1,370,000 lbs. is significantly higher (9.3%) than the corresponding quarter last year. During Q2FY19, CAAI reported that it was discontinuing dolomitic lime feed, while increasing lime slurry feed in an effort to stabilize the ash pH to levels that will minimize dolomitic lime to condition the ash going forward. Ash pH levels in the range of 8 to 11 are desirable to minimize leaching potential of heavy metals. This operational change explains the significant increase in pebble lime usage during the quarter.

In comparing Q3FY19 to Q3FY18 on a per processed ton consumption basis:

- the purchased power consumption rate was 0.7% higher
- the total fuel oil consumption rate was 7.7% lower
- the boiler make-up water consumption rate was 16.9% higher
- the cooling tower make-up water consumption rate was 8.4% lower
- the total pebble lime consumption rate was 9.3% higher
- the ammonia consumption rate was 10.1% lower



- the carbon consumption rate was 11.1% lower
- the total dolomitic lime consumption rate was 83.3% lower

The significant decrease in carbon consumption during the quarter was primarily attributable to the Facility demonstrating compliance with mercury and dioxin/furan emissions limits during 2018 Stack Testing (March 2018) at a minimum feed rate of 13.0 lbs. per hour, rather than a minimum of 14.0 lbs. per hour which was demonstrated in 2017. CAAI reports that the significant decrease in dolomitic lime consumption during Q3FY19 compared to Q3FY18 was attributable to discontinuing dolomitic lime feed, while increasing lime slurry feed in an effort to stabilize the ash pH to levels that will allow eliminating dolomitic lime to condition the ash going forward. CAAI indicated that the significant decrease in ammonia consumption was partly attributable to operating at reduced loads during the quarter.

## 4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents during the quarter and has operated 370 days without an OSHA recordable accident as of March 31, 2019. CAAI reports that in January 2019 a first aid accident occurred when a CAAI employee slipped in the boiler during outage while cleaning the grates and twisting their ankle. CAAI reports that another first aid accident occurred in March 2019 when a CAAI employee bruised their leg on a trap door opening. During the quarter, Safety and Environmental training was conducted with themes as follows:

### **January 2019**

- Safety:
  - Accident Prevention and The Three (3) Steps for Safety
  - Safety and Health Roles and Responsibilities
  - Chemicals in the Workplace
  - Chemical Exposure – What if Scenario
- Environmental:
  - Environmental Mission Statement
  - Sustainability at Covanta Protecting Tomorrow

## **February 2019**

- Safety:
  - Heavy Metals and Respiratory Protection
  - Disposal of Potentially Contaminated Debris
- Environmental:
  - Stack Testing – Maintenance and Pre-stack Testing
  - Stack Testing – Communication, Compliance, and Continual Improvement

## **March 2019**

- Safety:
  - Control of Hazardous Energy – Group Lock-Out-Tag-Out
  - Control of Hazardous Energy – Personal Lock-Out-Tag-Out
  - Field Remote Lock Box
- Environmental:
  - Universal Waste

## **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 19, 2019 Boiler No. 3 experienced 147.2 hours of downtime for scheduled maintenance. Some significant activities that were completed during the outage are:

- Change-out of the grate bars on Step Nos. 1 through 12 on both Runs
- Change-out of J-bars on both runs
- Replacement of 75 division blocks
- Replacement of carrier beams on Run No. 1, Step Nos. 1, 2, 3, 5, 7, 9, 13 and 15

- Replacement of carrier beams on Run No. 2, Step Nos. 1, 3, 5, 7, 10, 11, and 13
- Change-out of nine (9) compensation plates on Run No. 1 Side
- Change-out of 13 compensation plates on Run No. 2 Side
- Change-out of 16 front clinker dam plates in both Run Nos. 1 and 2 (32 total)
- Replacement of four (4) angular brake plates
- Replacement of some of the feed table side skirting and repair of both round access doors
- Repair feed chute water jacket leaks
- Repair of holes in Baghouse Hoppers A, C, and F

Beginning February 16, 2019 Boiler No. 1 experienced 144.0 hours of downtime for scheduled maintenance. Some significant activities that were completed during the outage are:

- Change-out of 15 grate bars: 12 on the Run No. 1 Side and three (3) on the Run No. 2 Side
- Replacement of two (2) curved blocks
- Replacement of 12 triangular brake plates
- Replacement of the feed table side skirting on the left wall
- Replacement of a section of the lower feed ram skirting
- Re-plating of the left side round feed table access door
- Repair of three (3) feed chute water jacket leaks
- Re-plating of many holes throughout the Induced Draft Fan Duct
- Re-plating of several areas inside the baghouse inlet duct where it ties into the expansion joint
- Repair of several holes in the ash discharger transition chute

Beginning March 2, 2019 Boiler No. 2 experienced 113.2 hours of downtime for scheduled maintenance. Some significant activities that were completed during the outage are:

- Change-out of the Seal Air Fan Motor and cleaning of the fan wheel
- Replacement of four (4) soot blower elements: G9B Nos. 1, 2, 5 and 9
- Replacement of two (2) driving beam guide rollers on the Run No. 2 Side in Zone No. 3
- Replacement of the leaking carbon piping at the 90 degree bend on the top elevation of the economizer platform
- Replacement of all the stack testing ports on the Air Pollution Control Deck under the Opacity Monitors
- Replacement of the superheater safety valve drain line
- Replacement of the riddling flap air cylinders on Zone No. 5 in both runs
- Replacement of one (1) of the baghouse screw conveyor trough covers and change-out of the oil on all the gear boxes and rotary valves
- Repair of several holes in the Induced Draft Fan Duct

In addition to the scheduled outages, CAAI reports that 1,197 preventative maintenance actions were completed during the quarter.

## 5.1 Availability

Facility availabilities for Q3FY19 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q3FY19 were 91.7%, 93.7%, and 93.4%, respectively. The three-boiler average availability during the quarter was 92.9%, which is excellent and comparable to that of mature, well run waste to energy facilities. Note that the boiler availability during the quarter was negatively impacted by significant downtime (404.4 hours) for scheduled maintenance.

According to CAAI reports, the average unit availabilities for Turbine Generator Nos. 1 and 2 for Q3FY19 was 100.0%, and 99.7%, respectively. The two-turbine generator average availability during Q3FY19 was 99.9% which is excellent. Note that the reported availability metrics exclude standby time experienced which amounted to 106.9 hours for Turbine Generator No. 2.

**Table 5: Quarterly Facility Unit Availabilities**

Availability	Q1FY19 Average	Q2FY19 Average	Q3FY19 Average	FY19 YTD Average
Boiler No. 1	98.3%	95.4%	91.7%	95.1%
Boiler No. 2	98.9%	95.5%	93.7%	96.0%
Boiler No. 3	94.7%	100.0%	93.4%	96.0%
<b>Avg.</b>	<b>97.3%</b>	<b>97.0%</b>	<b>92.9%</b>	<b>95.7%</b>
Turbine No. 1	100.0%	99.5%	100.0%	99.8%
Turbine No. 2	100.0%	99.6%	99.7%	99.8%
<b>Avg.</b>	<b>100.0%</b>	<b>99.6%</b>	<b>99.9%</b>	<b>99.8%</b>

## 5.2 Downtime Summary

**Table 6: Boiler Downtime – Q3FY19**

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	1/11/19	1/12/19	28.0	Unscheduled	Induced Draft Fan repairs, bearing replacements, coupling replacement, and alignment
3	1/19/19	1/25/19	147.2	Scheduled	Scheduled Boiler No. 3 Outage
1	2/16/19	2/22/19	144.0	Scheduled	Scheduled Boiler No. 1 Outage
1	2/28/19	3/1/19	25.4	Unscheduled	Grate bar failure repairs
2	3/2/19	3/7/19	113.2	Scheduled	Scheduled Boiler No. 2 Outage
<b>Total Unscheduled Downtime</b>					<b>53.4 Hours</b>
<b>Total Scheduled Downtime</b>					<b>404.4 Hours</b>
<b>Total Standby Downtime</b>					<b>0.0 Hours</b>
<b>Total Downtime</b>					<b>457.8 Hours</b>

**Table 7: Turbine Generator Downtime – Q3FY19**

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	1/21/19	1/25/19	106.9	Standby	Scheduled Boiler No. 3 Outage and lack of Steam
2	3/15/19	3/15/19	6.8	Unscheduled	Failed electrical relay
<b>Total Unscheduled Downtime</b>					<b>6.8 Hours</b>
<b>Total Scheduled Downtime</b>					<b>0.0 Hours</b>
<b>Total Standby Downtime</b>					<b>106.9 Hours</b>
<b>Total Downtime</b>					<b>113.7 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 February 2019. 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 February 2019 inspection are presented in Table 8.

**Table 8: Facility Housekeeping Ratings – February 2019**

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 Q3FY19 are summarized in Appendix A. No permit deviations were reported by the Facility during Q3FY19. Note that as of March 31, 2019, the CAAI Facility has operated 530 days without an environmental excursion.

### 6.1 Low NO<sub>x</sub> Technology Implementation

The Virginia Department of Environmental Quality (VADEQ) has issued the final RACT permits for the installation and operation of LN<sup>TM</sup> Technology. CAAI has notified the Jurisdictions that the installation of LN<sup>TM</sup> Technology is planned on the first of the three (3) boilers in the second quarter of Fiscal Year 2020, with subsequent unit installations in the second quarters of Fiscal Years 2021 and 2022.

### 6.2 Nitrogen Oxide Emissions

During Q3FY19, the monthly emission concentrations of nitrogen oxides (NO<sub>x</sub>) averaged 159.7 ppmdv, 158.7 ppmdv, and 159.3 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.

### 6.3 Sulfur Dioxide Emissions

During Q3FY19 the monthly emission concentration of stack sulfur dioxide (SO<sub>2</sub>) averaged 1.3 ppmdv, 1.3 ppmdv, and 2.0 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>.



## 6.4 Carbon Monoxide Emissions

During Q3FY19, the monthly average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 34.0 ppm<sub>dv</sub>, 34.3 ppm<sub>dv</sub>, and 27.3 ppm<sub>dv</sub>, respectively, and all are well within permit limits (100 ppm<sub>dv</sub>, hourly average).

## 6.5 Opacity

During Q3FY19, the average opacity was 0.6% for all three (3) boilers, which is significantly below the 10% (6-minute) average permit limit.

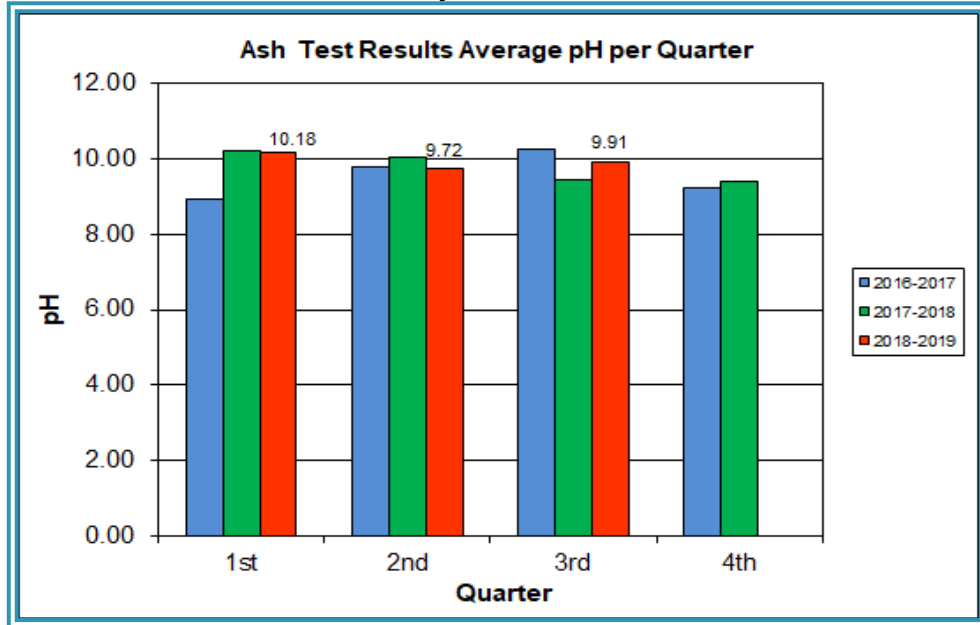
## 6.6 Daily Emissions Data

Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q3FY19. 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.

## 6.7 Ash System Compliance

During Q2FY19, CAAI reported that it was discontinuing dolomitic lime feed, while increasing lime slurry feed in an effort to stabilize the ash pH to levels that will allow eliminating dolomitic lime to condition the ash going forward. The desired ash pH level ranges from 8.0 to 11.0. During Q3FY19, CAAI reported that the dolomitic lime feed rate was 0.1 lbs per ton, while pebble lime consumption rate was 16.6 lbs per ton, which is 9.3% higher than Q3FY18. Ash Toxicity (TCLP) tests were not performed during Q3FY19, but in-house ash testing conducted by CAAI yielded a quarterly average pH of 9.9. 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.

**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 <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
Jan - 19	AVG	84.9	27.0	2.0	34.0	160.0	1.2	300.0	13.3	3.6
	Max	88.0	67.0	19.0	45.0	161.0	2.6	300.0	13.6	4.6
	Min	76.7	11.0	0.0	26.0	158.0	0.4	298.0	13.2	3.0
Feb - 19	AVG	78.6	28.0	1.0	31.0	159.0	0.6	300.0	13.4	3.6
	Max	89.4	74.0	10.0	64.0	161.0	1.8	302.0	15.0	4.1
	Min	68.1	1.0	0.0	18.0	155.0	0.0	296.0	13.3	3.2
Mar - 19	AVG	83.0	23.0	1.0	37.0	160.0	0.0	300.0	13.0	3.7
	Max	90.0	49.0	3.0	58.0	163.0	0.1	301.0	13.3	4.1
	Min	71.9	11.0	0.0	25.0	159.0	0.0	300.0	12.1	3.2
Quarter Average		82.2	26.0	1.3	34.0	159.7	0.6	300.0	13.2	3.6
Quarter Max Value		90.0	74.0	19.0	64.0	163.0	2.6	302.0	15.0	4.6
Quarter Min Value		68.1	1.0	0.0	18.0	155.0	0.0	296.0	12.1	3.0
Limits:		98	NA	29	100	205	10	331	13(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 <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
Jan - 19	AVG	80.3	23.0	2.0	35.0	159.0	0.3	297.0	13.3	3.6
	Max	88.9	44.0	8.0	45.0	160.0	0.7	298.0	13.7	4.1
	Min	66.9	12.0	0.0	27.0	154.0	0.0	295.0	13.1	3.1
Feb - 19	AVG	78.9	21.0	0.0	34.0	159.0	0.2	298.0	13.4	3.8
	Max	90.0	29.0	5.0	49.0	161.0	1.4	299.0	13.9	4.1
	Min	66.1	12.0	0.0	23.0	158.0	0.0	297.0	13.2	3.4
Mar - 19	AVG	82.3	30.0	2.0	34.0	158.0	1.4	299.0	13.1	4.0
	Max	89.9	42.0	7.0	44.0	160.0	1.8	299.0	13.5	4.2
	Min	70.8	14.0	0.0	25.0	156.0	0.5	298.0	12.2	3.4
Quarter Average		80.5	24.7	1.3	34.3	158.7	0.6	298.0	13.3	3.8
Quarter Max Value		90.0	44.0	8.0	49.0	161.0	1.8	299.0	13.9	4.2
Quarter Min Value		66.1	12.0	0.0	23.0	154.0	0.0	295.0	12.2	3.1
Limits:		97	NA	29	100	205	10	331	13(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 <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
Jan - 19	AVG	85.4	44.0	2.0	34.0	159.0	0.6	298.0	13.3	3.5
	Max	90.2	91.0	9.0	48.0	161.0	1.4	298.0	13.6	4.0
	Min	77.4	23.0	1.0	25.0	157.0	0.1	297.0	13.3	3.0
Feb - 19	AVG	81.4	54.0	2.0	25.0	159.0	0.4	298.0	13.4	3.7
	Max	91.2	84.0	6.0	38.0	161.0	1.3	301.0	13.7	4.1
	Min	68.2	40.0	0.0	12.0	157.0	0.0	297.0	13.3	3.4
Mar - 19	AVG	82.1	28.0	2.0	23.0	160.0	0.9	298.0	13.1	3.8
	Max	89.9	40.0	6.0	38.0	161.0	2.0	298.0	13.4	4.1
	Min	70.5	20.0	0.0	12.0	159.0	0.1	297.0	12.1	3.3
Quarter Average		83.0	42.0	2.0	27.3	159.3	0.6	298.0	13.3	3.7
Quarter Max Value		91.2	91.0	9.0	48.0	161.0	2.0	301.0	13.7	4.1
Quarter Min Value		68.2	20.0	0.0	12.0	157.0	0.0	297.0	12.1	3.0
Limits:		98	NA	29	100	205	10	332	13(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 – FEBRUARY 2019

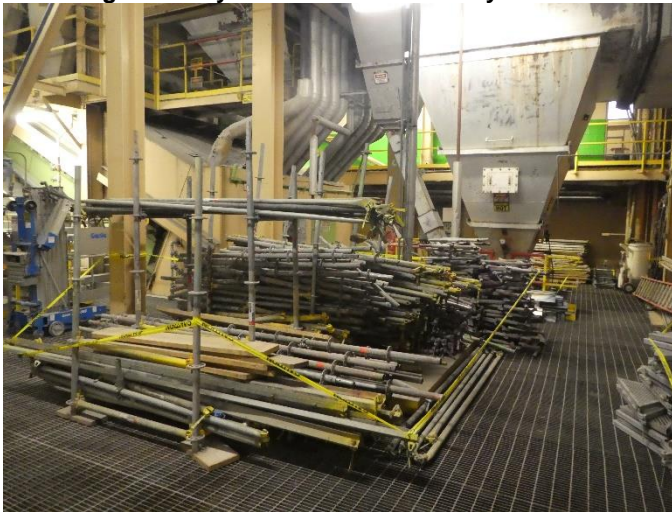




**Figure 1: Road Striping Missing on Entrance Road indicating Two-Way Road – New Deficiency**



**Figure 2: Ferrous Drum Magnet**



**Figure 3: Scaffolding Staged for Boiler No. 1 Outage in February 2019**



**Figure 4: Water Chemistry Lab**



**Figure 5: Boiler Feed Pumps**



**Figure 6: Condensate Pumps**





**Figure 7: Main Vibrating Ash Conveyor**



**Figure 8: Cooling Towers**



**Figure 9: Metal Roll-off**



**Figure 10: Citizen's Drop-off Roll-off**



**Figure 11: Scaffolding Installed for Structural Stiffening of East wall above Refuse Pit**



**Figure 12: Switchyard and General Facility Photo from Tipping Floor Entrance Road**





**Figure 13: Scale House and Scales**



**Figure 14: General Facility Photos from Scale Entrance**



**Figure 15: General Facility Photo – East side of Facility**



**Figure 16: Tipping Floor Exit – New Concrete and Speed Bump**



**Figure 17: General Facility Photo from South Side of Facility on Eisenhower Sidewalk**



**Figure 18: General Facility Photo from Southwest up Eisenhower**





**Figure 19: Steam Coil Air Heaters and Forced Draft Fan**



**Figure 20: Scaffolding Installed Around Tipping Floor Column – Siding Stiffening Project**



**Figure 21: Dolomitic Lime Silo from Turbine Generator Enclosure Roof**



**Figure 22: Crane Pulpit**



**Figure 23: Refuse Pit Edge Warning Lights Projected on Tipping Floor**



**Figure 24: Air Pollution Control System Electrical Room**





Figure 25: Lime Slaker Screen



Figure 26: Baghouse Compartment Aisle

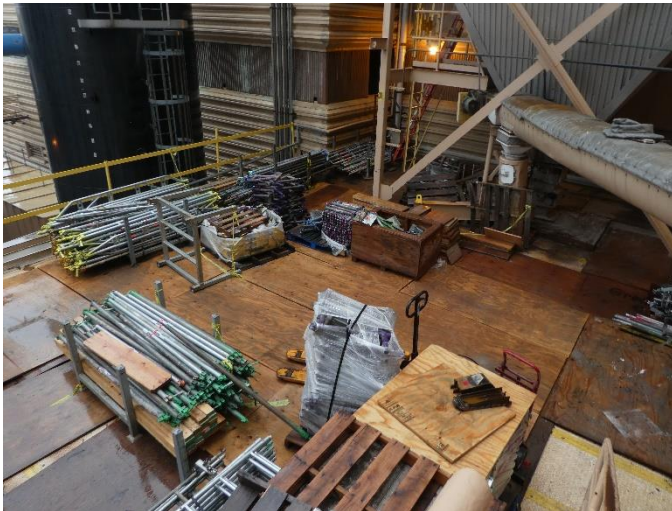


Figure 27: Scaffolding and Outage Materials Staged Beneath Economizer No. 3.

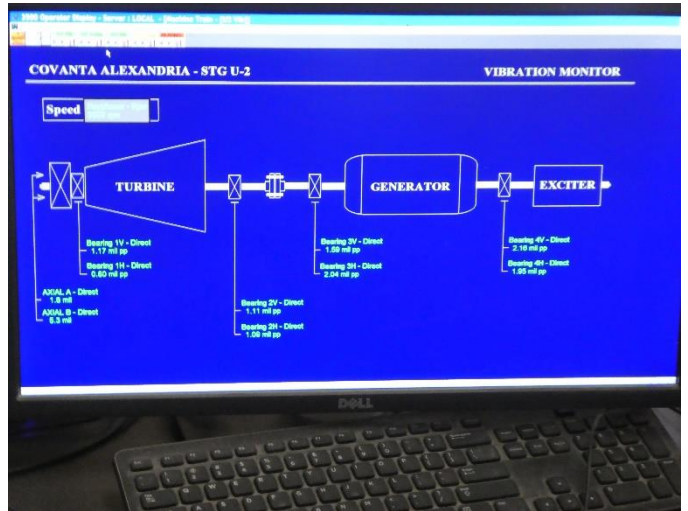


Figure 28: Turbine Generator Vibration Monitor Screen Display in Control Room



Figure 29: Control Room Display Screens



Figure 30: Feed Chute No. 1