



Alexandria Arlington Resource Recovery Facility

Fiscal Year 2019
Second Quarter Operations Report

February 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 _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 Second 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 second quarter of the 2019 fiscal year and summarizes Facility operations between October 1, 2018 and December 31, 2018. This report identifies the fiscal year beginning on July 1, 2018 as FY19 and the quarter beginning on October 1, 2018 as Q2FY19.

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 Q2FY19. 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 Q2FY19, the boilers experienced no unscheduled downtime, and the turbine generators experienced two (2) instances of unscheduled downtime totaling 20.0 hours. Boiler Nos. 1 and 2 experienced 200.6 hours of downtime for scheduled maintenance and no scheduled maintenance was conducted on the turbine generators. No standby downtime was experienced by the boilers, and two (2) instances of standby downtime was experienced by the turbine generators

totaling 106.0 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 930.3 tons per day, or 95.4% of nominal facility capacity. Waste deliveries averaged 898.8 tons per day, which is 3.4% lower than the burn rate. The capacity utilization of 95.4% 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 (3.5%), and electricity generated (gross) decreased (5.4%) from the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (5.1%) in waste heating value, offset by less boiler downtime (386.9 additional hours). The decrease in electricity generated (gross) in Q2FY19, is attributable to lower steam production, paired with more downtime (79.4 additional hours) experienced by the turbine generators.

3.0 Facility Inspection and Records Review

In November 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	Pressure wash of exterior siding needed on north and east sides of Facility	May 2017	C	Pressure wash exterior siding	Status Unchanged	Open
5	Pressure wash of exterior siding needed at Charging Floor Elevation Above Service Elevator	August 2017	C	Pressure wash exterior siding	Status Unchanged	Open
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	Emergency light fixture out in SDA No. 2 Penthouse	August 2018	A	Replace/Repair Emergency Light Fixture	Complete	Closed
9	Siding and steel damaged at the top of the Ash Load-out Bay Ramp	August 2018	C	Repair siding and steel and replace if necessary	Complete	Closed
10	Damaged bollard at top of Ash/Metal Load-out Ramp— See Figure 1 (Appendix B)	November 2018	C	Repair/replace damaged bollard	Status Unchanged	Open
11	Pothole and asphalt deteriorating at Tipping Floor Exit — See Figure 2 (Appendix B)	November 2018	C	Resurface Tipping Floor Exit Ramp	Status Unchanged	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 85,584 tons of MSW were processed during Q2FY19, and a total of 82,690 tons of MSW including 3,033 tons of Special Handling Waste were received. Total ash production during the quarter was 16,355 tons, which represents 19.1% of the waste processed by weight. The average uncorrected steam production rate for Q2FY19 was 2.98 tons_{steam}/ton_{waste}, which is lower (3.4%) than the corresponding quarter in FY18. The decrease in this metric is attributable to the 5.1% decrease in the average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

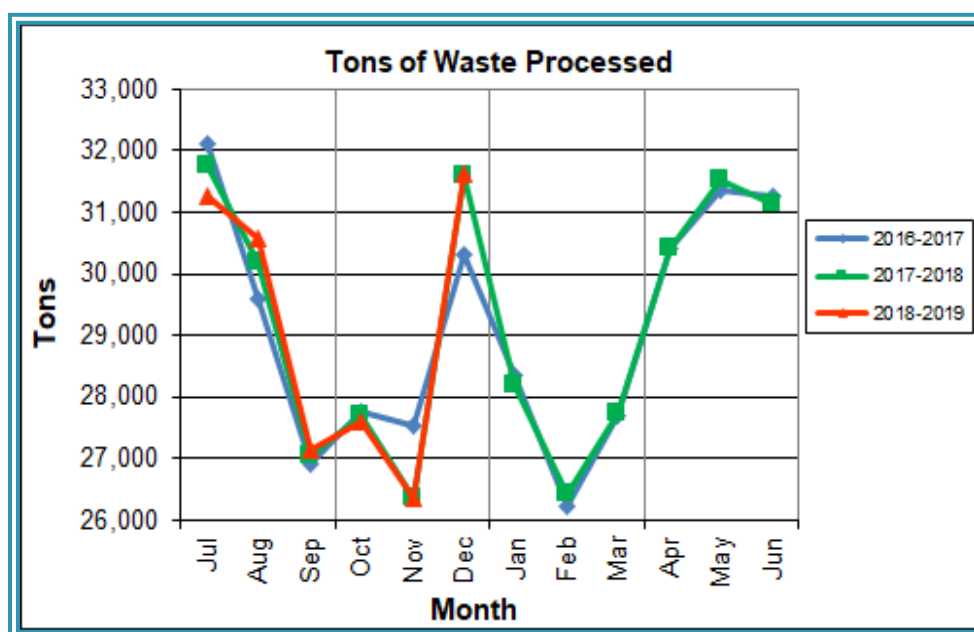


Chart 1 illustrates that Q2FY19 waste processed was slightly lower (less than 0.1%) than the corresponding quarter, Q2FY18.

CAAI reported that 426 tipping floor/MSW internal inspections were conducted during the quarter and four (4) notices of violation (NOVs) were issued to haulers for the following issues:

- October 2018 – One (1) NOV was issued for dumping concrete on the Tipping Floor
- November 2018 – Two (2) NOVs were issued for:

- One (1) NOV for opening the turnbuckles on the ramp to the Tipping Floor
- One (1) NOV for delivering hospital waste
- December 2018 – One (1) NOV was issued for excessive metal in the load

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

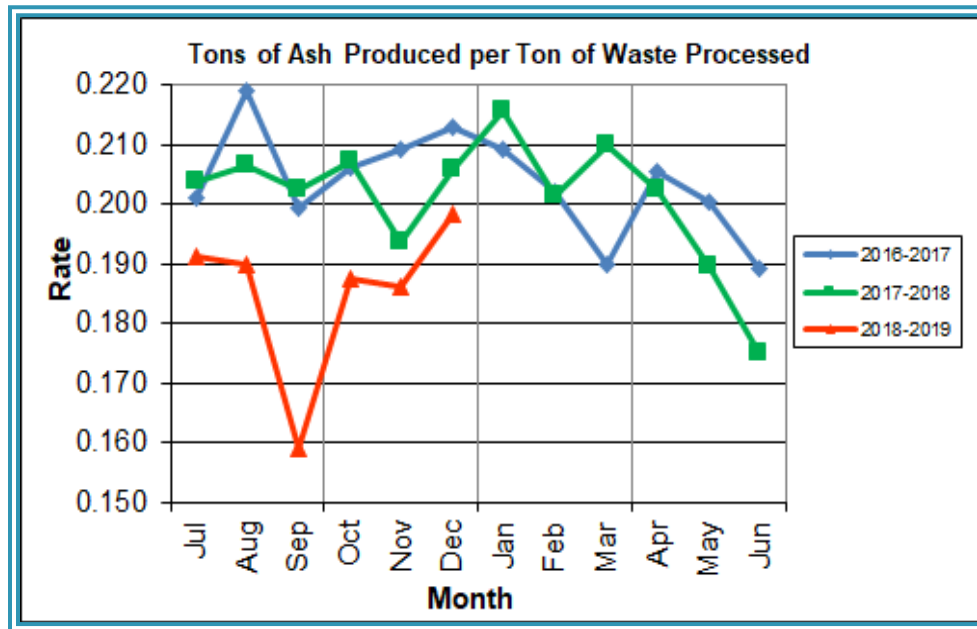


Chart 2 illustrates that the average ash production rate in Q2FY19 was lower (1.2%) at 19.1% of processed waste, compared to the corresponding quarter in FY18 when the rate was 20.3%.

Chart 3: Ferrous Recovery Rate

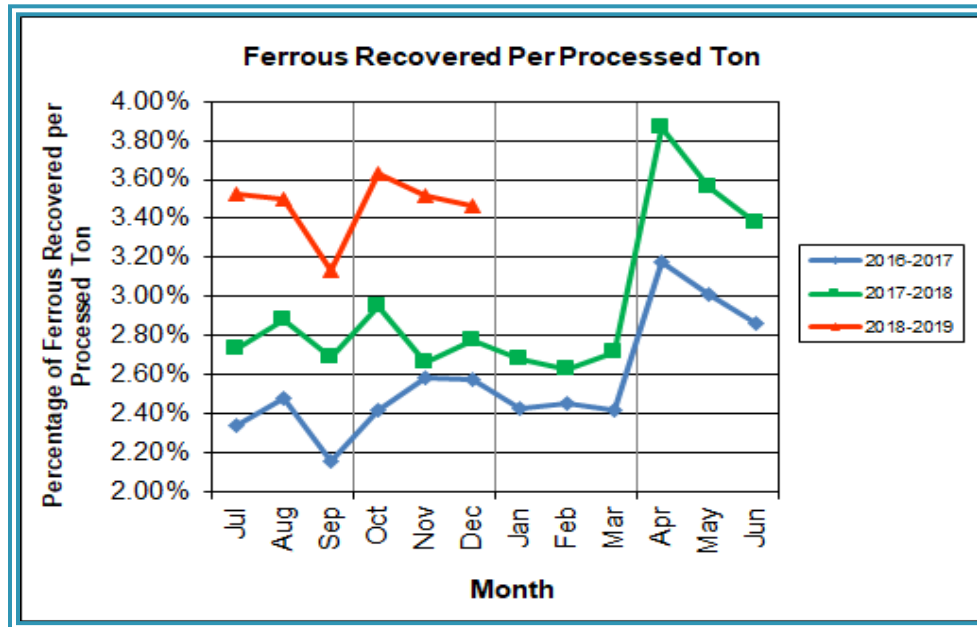
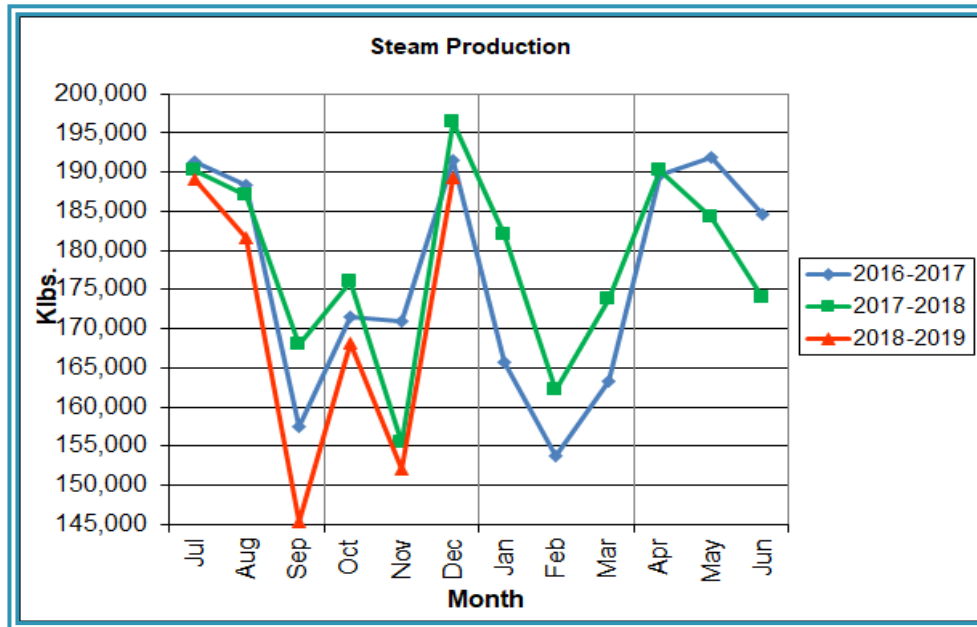


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q2FY19, 3,026 tons of ferrous metals were recovered, which is 26.4% higher than the corresponding quarter in FY18 and equivalent to 3.5% of processed waste. At the end of FY18, CAAI reported that it adjusted the gap between the pan and magnet, and replaced the edge of the pan due to wear. The positive impacts of this corrective maintenance were immediately apparent by significantly higher ferrous metal recovery that has continued through the current quarter.

Chart 4: Steam Production



In Chart 4, the total steam production for Q2FY19 was 509,442 klbs, and lower (3.5%) than the corresponding quarter in FY18. The decrease in steam generation is attributable to the decrease (5.1%) in waste heating value, offset by less boiler downtime (386.9 additional hours).

Chart 5: 12-Month Rolling Steam Production

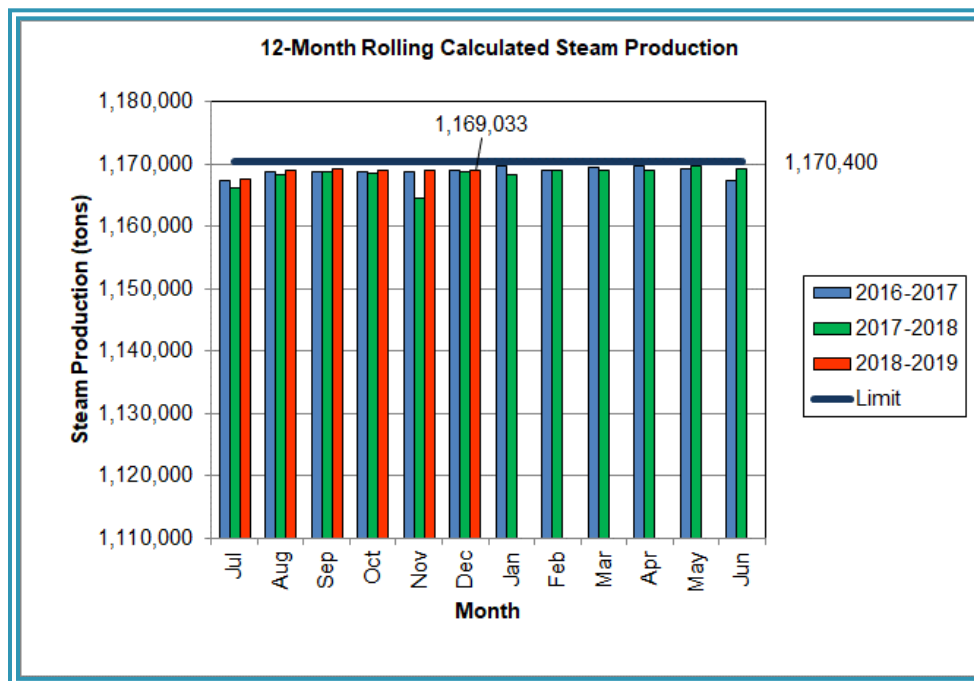
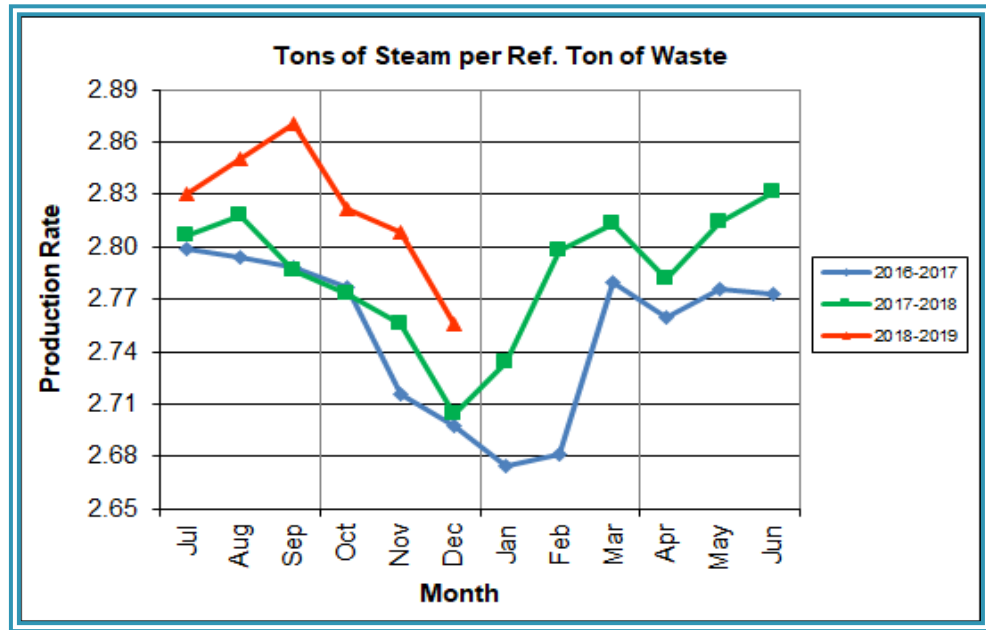


Chart 5 depicts the 12-month rolling steam production total for the period ending in December 2018. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs of steam per lb of MSW processed, calculated monthly 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 Q2FY19. The 12 month rolling total for steam production ending in December 2018 was 1,169,033 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 Q2FY19, this metric tracked higher (1.9%) at 2.85 tons_{steam}/ton_{ref} compared to the corresponding quarter in FY18.

Chart 7: Calculated Waste Heating Value

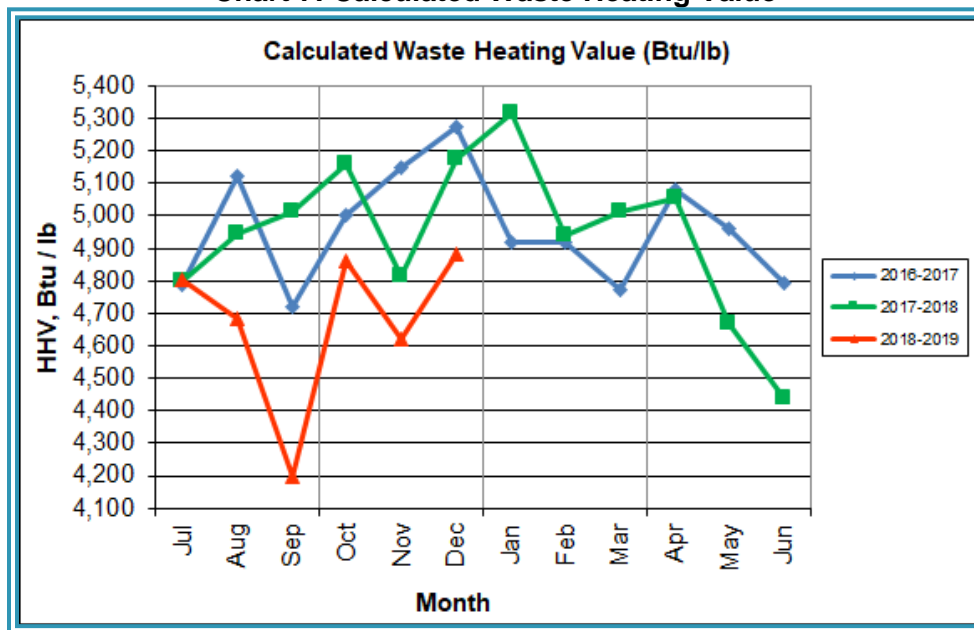


Chart 7 illustrates that Q2FY19 calculated average waste heating value was lower (5.1%) at 4,788 Btu/lb than the corresponding quarter Q2FY18, which averaged 5,048 Btu/lb. Note that the calculated waste heating value in September 2018 of 4,198 Btu/lb was a historical low, and 24.7 inches of rainfall were recorded at the Ronald Reagan National Airport¹ during the Q2FY19.

¹ <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)
Q2FY17	Quarterly Totals	85,603	0	17,953	2,902	2,163	534,113	38,588
	October -16	27,778	0	5,734	926	671	171,525	12,140
	November -16	27,525	0	5,762	941	711	170,976	12,229
	December - 16	30,300	0	6,457	1,035	781	191,612	14,219
Q2FY18	Quarterly Totals	85,642	0	17,350	4,531	2,394	527,754	37,800
	October -17	27,689	0	5,739	1,638	817	175,965	12,417
	November -17	26,359	0	5,107	1,554	701	155,341	10,777
	December - 17	31,594	0	6,504	1,339	876	196,448	14,606
Q2FY19	Quarterly Totals	85,584	0	16,355	3,033	3,026	509,442	35,419
	October -18	27,584	0	5,173	1,108	1,001	168,116	11,381
	November -18	26,367	0	4,909	992	928	152,101	10,268
	December - 18	31,633	0	6,273	933	1,097	189,225	13,770
FY19 YTD Totals		174,588	0	32,475	6,224	6,050	1,025,352	70,344
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 Q2FY19 on both a monthly and quarterly basis. For purposes of comparison, data for Q2FY17 and Q2FY18 are also shown, as well as FY17, FY18 and FY19 year to date (YTD) totals.

In comparing quarterly totals, the data shows:

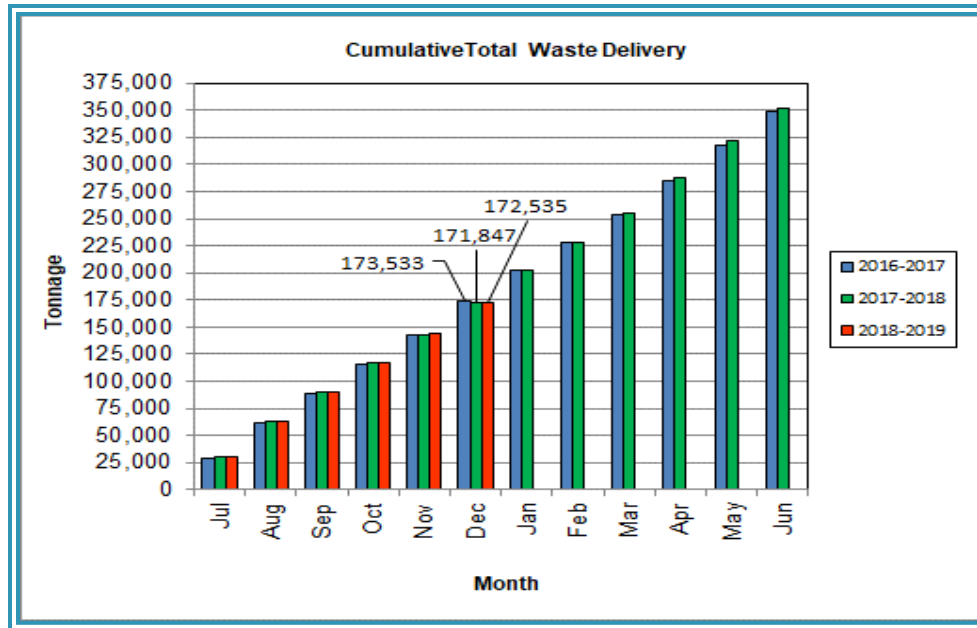
- Slightly less waste was processed in Q2FY19 than Q2FY18 and Q2FY17
- Less steam was generated in Q2FY19 than Q2FY18 and Q2FY17
- Less electricity (net) was generated in Q2FY19 than Q2FY18 and Q2FY17
- Less supplemental waste was received in Q2FY19 than Q2FY18 and more than Q2FY17.

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

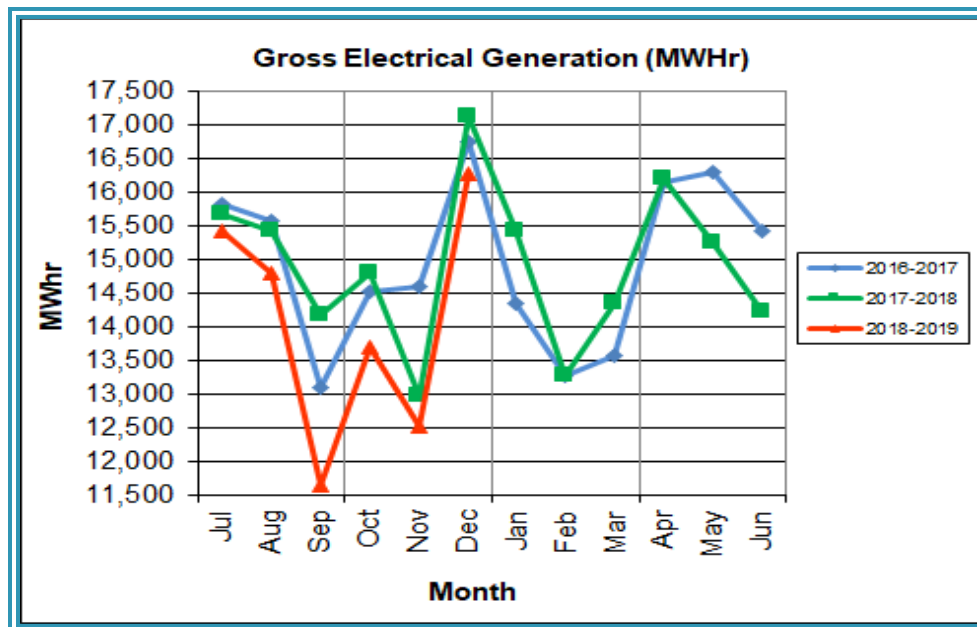
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY15	City Waste	1,814	1,497	1,699	1,737	1,518	1,770	1,411	1,209	1,648	2,155	2,059	2,045	20,562	5.91%
	County Waste	3,297	2,868	2,973	3,095	2,508	2,852	2,358	1,833	2,411	3,269	3,652	3,572	34,687	9.96%
	Municipal Solid Waste	26,661	24,466	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							11,127	6.45%
	County Waste	2,560	2,798	2,554	2,656	2,746	2,439							15,753	9.13%
	Municipal Solid Waste	25,442	25,920	21,873	21,678	21,472	23,046							139,430	80.81%
	Supplemental Waste	1,012	1,040	1,138	1,108	992	933							6,224	3.61%
	MSW Totals	30,862	31,595	27,388	27,438	27,102	28,150							172,534	100.00%

Chart 8: Cumulative Total Waste Delivery



As depicted in Table 3 and Chart 8, for the quarter ending in December 2018; cumulative total waste delivery was 0.4% higher compared to the same period in FY18.

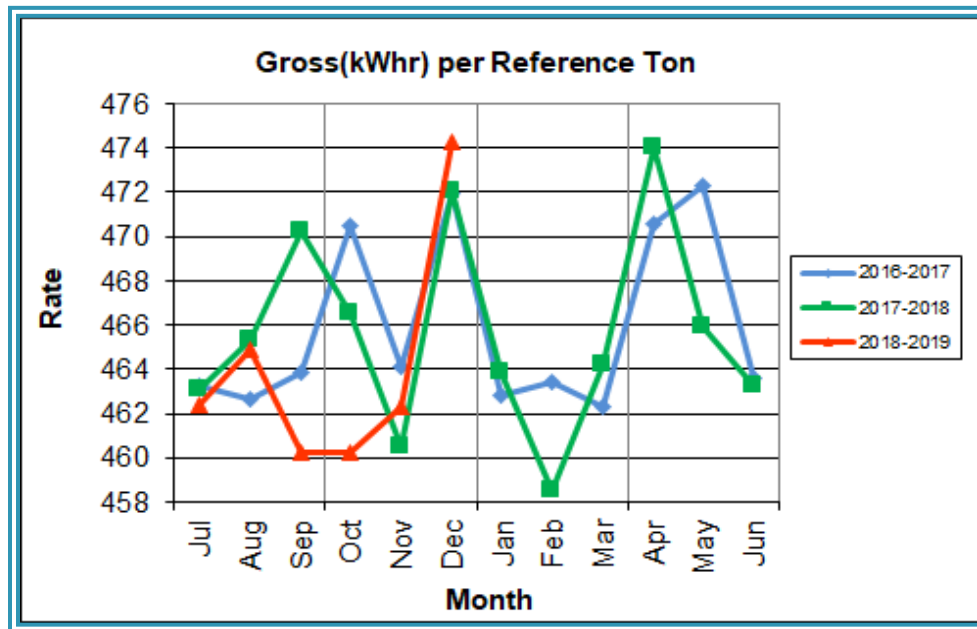
Chart 9: Gross Electrical Generation



During Q2FY19, the Facility generated 42,509 MWhrs (gross) of electricity compared to Q2FY18 generation of 44,928 MWhrs (gross), a 5.4% decrease. The

decrease in electricity generated (gross) in Q2FY19, is attributable to lower steam production, paired with more downtime (79.4 additional 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 Q2FY19 was 466 kWhr, which is slightly lower (0.2%) 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

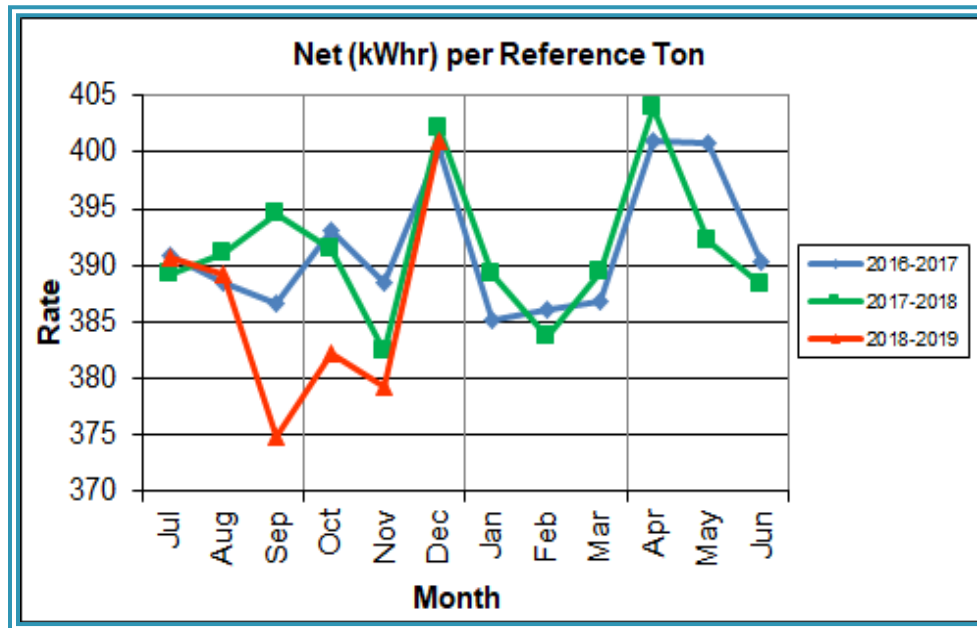


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q2FY19, the average net electrical generation per reference ton was 387 kWhr, which is 1.1% lower than the corresponding quarter in FY18.

Chart 12: Net Conversion Rate

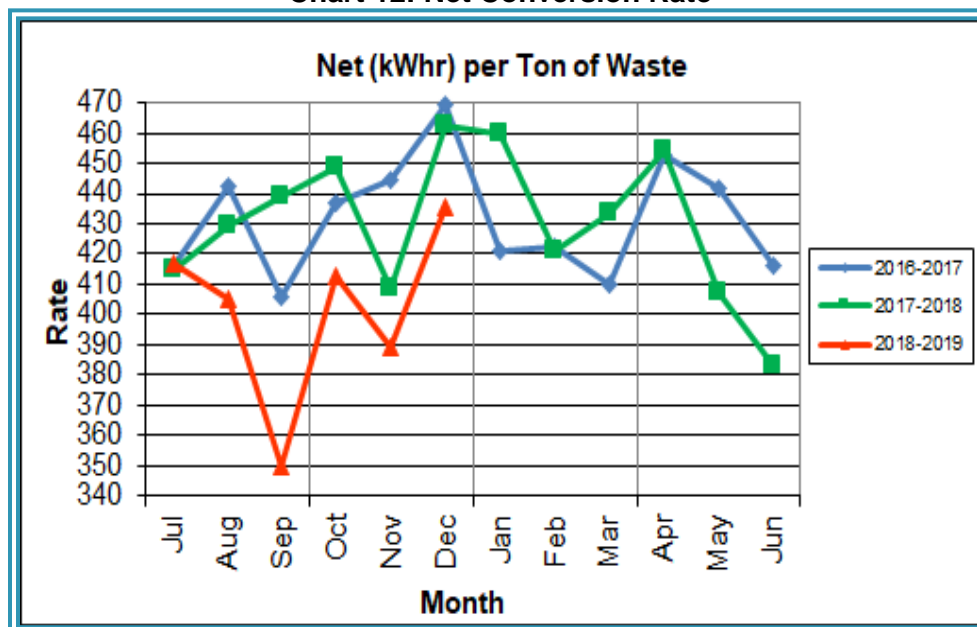


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q2FY19 was 412 kWhr, which is 6.2% lower than

the corresponding quarter in FY18 and is attributable to the decrease (5.1%) in waste heating value.

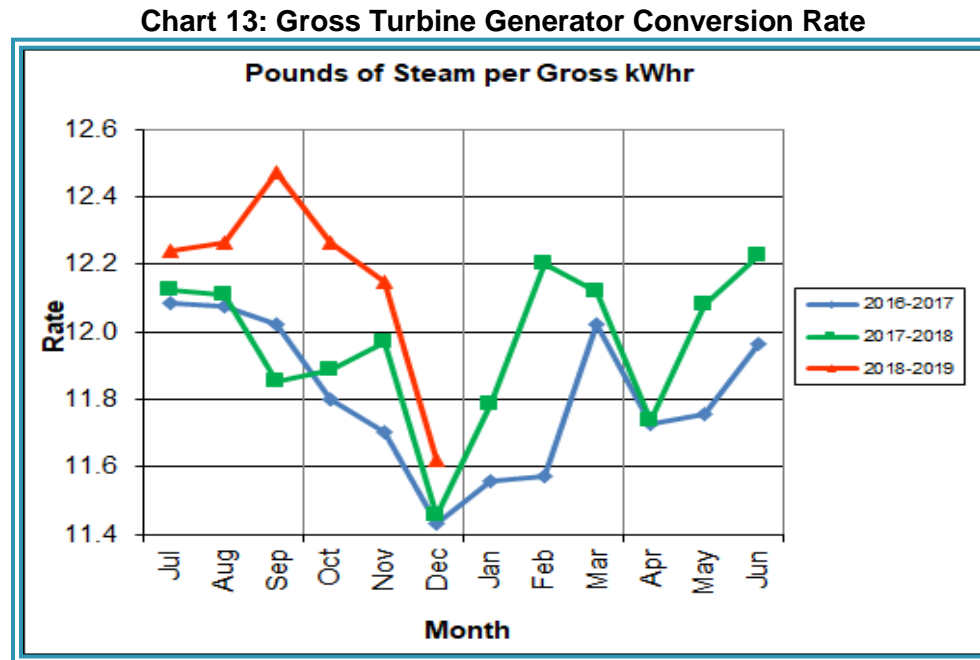


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of gross electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q2FY19 the average lbs of steam consumed per gross kWhr generated was 12.0, which is 2.0% higher (less efficient) than the corresponding quarter Q2FY18. 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 664.0°F, which is 16.3°F lower than the average main steam temperature of the

corresponding quarter last fiscal year and 28.3°F lower than design temperature of 700°F.

4.1 Utility and Reagent Consumptions

Table 4: Facility Utility and Reagent Consumptions

Utility	Units	Q2FY19 Total	Q2FY18 Total	Q2FY19"Per Processed Ton" Consumption	Q2FY18"Per Processed Ton" Consumption	FY19 YTD Total
Purchased Power	MW·hr	5,602	5,555	0.0655	0.0649	11,105
Fuel Oil	Gal.	14,340	16,640	0.17	0.19	28,990
Boiler Make-up	Gal.	1,515,000	1,340,000	17.70	15.65	2,984,000
Cooling Tower Make-up	Gal.	29,037,973	31,624,142	339.29	369.26	69,386,679
Pebble Lime	Lbs.	1,374,000	1,414,000	16.05	16.51	2,596,000
Ammonia	Lbs.	154,000	190,000	1.80	2.22	320,000
Carbon	Lbs.	78,000	92,000	0.91	1.07	156,000
Dolomitic Lime	Lbs.	116,000	168,000	1.36	1.96	338,000

Fuel oil usage during the quarter represents approximately 0.26% 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 Q2FY18 which was 0.30%. 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 2.5% of steam flow, which is slightly higher than the boiler makeup in Q2FY18 which was 2.1% and is acceptable. Pebble lime usage, at 1,374,000 lbs. is lower (2.8%) than the corresponding quarter last year.

In comparing Q2FY19 to Q2FY18 on a per processed ton consumption basis:

- the purchased power consumption rate was 0.9% higher
- the total fuel oil consumption rate was 13.8% lower
- the boiler make-up water consumption rate was 13.1% higher
- the cooling tower make-up water consumption rate was 8.1% lower
- the total pebble lime consumption rate was 2.8% lower
- the ammonia consumption rate was 18.9% lower
- the carbon consumption rate was 15.2% lower
- the total dolomitic lime consumption rate was 30.9% 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 Q2FY19 compared to Q2FY18 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 permanently 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 280 days without an OSHA recordable accident. CAAI reports that on December 10th, a first aid accident occurred when a maintenance mechanic pinched a fingertip between a metal plank and a grate bar. During the quarter, Safety and Environmental training was conducted with themes as follows:

October 2018

- Safety:
 - Walking, Working Surfaces and Fall Protection
 - Fall Hazards, Inspections and Assessments
 - Portable Ladder Safety
 - How to Handle a Situation of a person falling and becoming suspended in Fall Protection
- Environmental:
 - Spill Prevention, Control and Countermeasure Plan – Roles, Responsibilities, and Inspection
 - Spill and Release of Significant Material

November 2018

- Safety:
 - Conveyor Safety
 - Cam Lock and Chicago Fitting Safety
 - Line of Fire Injuries and Prevention

- Environmental:
 - Identifying and Reporting Unacceptable Waste
 - How to Respond if Unacceptable Waste is Received

December 2018

- Safety:
 - Hot Work
 - Hazardous Materials and Storage
 - Rigging
- Environmental:
 - Opacity
 - Odor Control

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 October 13, 2018 Boiler No. 2 experienced 101.1 hours of downtime for scheduled maintenance. Some significant activities that were completed during the outage are:

- Replacement of the feed table angular brake plates
- Re-plating of part of the wall where refractory was missing
- Replacement of the front wear plates on both feed rams
- Replacement of three (3) soot blower elements: G9B Nos. 3, 4, and 14
- Replacement of the burner slide gate
- Repair of four (4) driving beam wear strips and one (1) driving beam support roller
- Repair of several holes in the ash discharger transition piece

Beginning November 10, 2018 Boiler No. 1 experienced 99.5 hours of downtime for scheduled maintenance. Some significant activities that were completed during the outage are:

- Replacement of the front wear plates on both feed rams
- Replacement of three (3) soot blower elements: G9B Nos. 8, 11, and 15
- Repair of three (3) driving beam wear strips, and replacement of one (1) driving beam wear strip
- Replacement of three (3) driving beam support rollers, and 2 driving beam guide rollers
- Repair of the upper feed chute water jacket float valve

In addition to the scheduled outages, CAAI reports that 983 preventative maintenance actions were completed during the quarter.

5.1 Availability

Facility availabilities for Q2FY19 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q2FY19 were 95.4%, 95.5%, and 100.0%, respectively. The three-boiler average availability during the quarter was 97.0%, which is excellent and comparable to that of mature, well run waste to energy facilities.

According to CAAI reports, the average unit availabilities for Turbine Generator Nos. 1 and 2 for Q2FY19 was 99.6% during Q2FY19, noting that these reported availability metrics exclude standby time experienced which amounted to 106.0 hours for the turbine generators.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY19 Average	Q2FY19 Average	FY19 YTD Average
Boiler No. 1	98.3%	95.4%	96.9%
Boiler No. 2	98.9%	95.5%	97.2%
Boiler No. 3	94.7%	100.0%	97.4%
Avg.	97.3%	97.0%	97.1%
Turbine No. 1	100.0%	99.5%	99.8%
Turbine No. 2	100.0%	99.6%	99.8%
Avg.	100.0%	99.6%	99.8%

5.2 Downtime Summary

Table 6: Boiler Downtime – Q2FY19

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	10/13/18	10/18/18	101.1	Scheduled	Fall 2018 Scheduled Boiler Outage
1	11/10/18	11/14/18	99.5	Scheduled	Fall 2018 Scheduled Boiler Outage
Total Unscheduled Downtime			0.0 Hours		
Total Scheduled Downtime			200.6 Hours		
Total Standby Downtime			0.0 Hours		
Total Downtime			200.6 Hours		

Table 7: Turbine Generator Downtime – Q2FY19

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	10/9/18	10/9/18	8.8	Unscheduled	Condenser Tube Leak Repairs
1	10/13/18	10/15/18	43.6	Standby	Boiler Process Throughput Limitations
1	10/24/18	10/24/18	11.2	Unscheduled	Replacement of No. 87 and 40 Relays with SL700 Relays
2	11/12/18	11/14/18	62.4	Standby	Boiler Process Throughput Limitations
Total Unscheduled Downtime			20.0 Hours		
Total Scheduled Downtime			0.0 Hours		
Total Standby Downtime			106.0 Hours		
Total Downtime			126.0 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 November 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 November 2018 inspection are presented in Table 8.

Table 8: Facility Housekeeping Ratings – November 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 Q2FY19 are summarized in Appendix A. No permit deviations were reported by the Facility during Q2FY19. Note that as of December 31, 2018, the CAAI Facility has operated 440 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 Q2FY19, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 159.3 ppmdv for all three (3) boilers. 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 Q2FY19 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 0.0 ppmdv, 0.7 ppmdv, and 1.0 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 Q2FY19, the average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 27.3 ppm_{dv}, 30.7 ppm_{dv}, and 27.7 ppm_{dv}, respectively, and all are well within permit limits (100 ppm_{dv}, hourly average).

6.4 Opacity

During Q2FY19, the average opacity for Boiler Nos. 1, 2, and 3 was 0.9%, 0.7%, and 0.3% respectively. All of these averages are significantly below the 10% (6-minute) average permit limit.

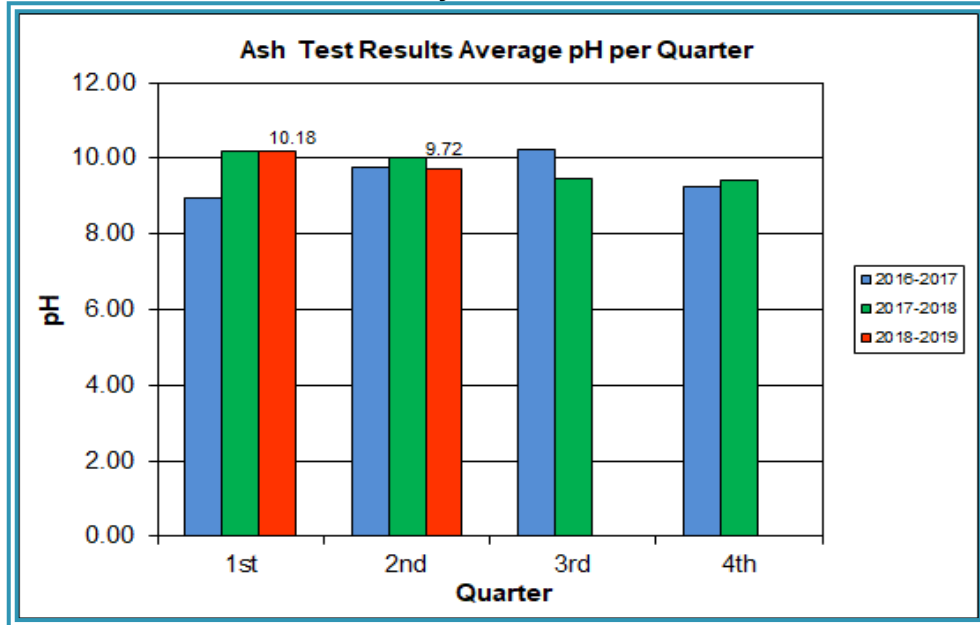
6.5 Daily Emissions Data

Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q2FY19. 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 Q2FY19. CAI 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 14 where each quarter is represented by the average of the respective monthly readings. During Q2FY19, the average ash pH for in-house tests was 9.7.

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	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
Oct - 18	AVG	78.4	30.0	0.0	31.0	159.0	0.9	294.0	13.3	2.7
	Max	88.7	42.0	2.0	46.0	161.0	1.2	299.0	13.7	3.2
	Min	62.0	15.0	0.0	14.0	147.0	0.7	288.0	13.1	2.4
Nov - 18	AVG	73.1	38.0	0.0	26.0	159.0	0.8	293.0	13.2	2.7
	Max	88.6	56.0	1.0	47.0	162.0	1.6	300.0	13.4	3.1
	Min	59.2	17.0	0.0	11.0	152.0	0.1	256.0	13.2	2.1
Dec - 18	AVG	84.9	29.0	0.0	33.0	160.0	0.8	300.0	13.3	3.5
	Max	87.7	45.0	3.0	43.0	162.0	1.3	301.0	13.6	3.8
	Min	80.8	18.0	0.0	22.0	157.0	0.2	297.0	13.2	3.0
Quarter Average		78.8	0.0	0.0	30.0	159.3	0.8	295.7	13.3	3.0
Quarter Max Value		88.7	56.0	3.0	47.0	162.0	1.6	301.0	13.7	3.8
Quarter Min Value		59.2	15.0	0.0	11.0	147.0	0.1	256.0	13.1	2.1
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 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
Oct - 18	AVG	78.6	36.0	1.0	26.0	159.0	1.7	297.0	13.3	3.1
	Max	90.7	53.0	5.0	40.0	161.0	1.9	300.0	13.4	3.5
	Min	63.7	26.0	0.0	14.0	156.0	1.3	297.0	13.1	2.8
Nov - 18	AVG	73.2	27.0	1.0	27.0	159.0	0.4	298.0	13.3	3.0
	Max	88.5	48.0	4.0	38.0	160.0	1.4	298.0	13.4	3.8
	Min	59.2	15.0	0.0	17.0	158.0	0.1	297.0	13.2	2.6
Dec - 18	AVG	84.0	12.0	0.0	39.0	160.0	0.1	298.0	13.3	3.6
	Max	86.3	21.0	2.0	50.0	161.0	0.4	298.0	13.8	3.9
	Min	79.6	7.0	0.0	27.0	159.0	0.0	297.0	13.2	3.1
Quarter Average		78.6	25.0	0.7	30.7	159.3	0.7	297.7	13.3	3.2
Quarter Max Value		90.7	53.0	5.0	50.0	161.0	1.9	300.0	13.8	3.9
Quarter Min Value		59.2	7.0	0.0	14.0	156.0	0.0	297.0	13.1	2.6
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 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
Oct - 18	AVG	78.6	41.0	2.0	22.0	160.0	0.1	297.0	13.3	3.1
	Max	91.7	68.0	6.0	38.0	163.0	0.3	299.0	13.5	3.2
	Min	63.0	27.0	0.0	10.0	159.0	0.0	297.0	13.3	2.9
Nov - 18	AVG	73.4	34.0	0.0	24.0	159.0	0.5	298.0	13.3	3.0
	Max	87.8	47.0	3.0	45.0	160.0	1.4	298.0	13.3	3.7
	Min	59.9	27.0	0.0	7.0	156.0	0.0	297.0	13.3	2.6
Dec - 18	AVG	84.3	32.0	1.0	37.0	159.0	0.4	298.0	13.4	3.5
	Max	87.2	39.0	3.0	51.0	163.0	1.0	299.0	14.1	3.8
	Min	80.2	23.0	0.0	23.0	148.0	0.0	290.0	13.3	3.0
Quarter Average		78.8	35.7	1.0	27.7	159.3	0.3	297.7	13.3	3.2
Quarter Max Value		91.7	68.0	6.0	51.0	163.0	1.4	299.0	14.1	3.8
Quarter Min Value		59.9	23.0	0.0	7.0	148.0	0.0	290.0	13.3	2.6
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 – NOVEMBER 2018



Figure 1: Damaged bollard at top of Ash/Metal Load-out Ramp – New Deficiency



Figure 2: Pothole and asphalt deteriorating at Tipping Floor Exit – New Deficiency



Figure 3: Area Staged off at Feed Table – Boiler No. 1 Outage in Progress



Figure 4: Boiler No. 1 Grates – Boiler No. 1 Outage in Progress



Figure 5: Scaffolding staged for use during Boiler Nos. 1 (November) & 2 (December) Outages



Figure 6: SDA Penthouse No. 1 – Lime Slurry Atomizer Removed for Boiler No. 1 Outage



Figure 7: Feed Chute No. 1 Taped off for Boiler No. 1 Outage



Figure 8: Main Vibrating Ash Pan and Ferrous Magnet



Figure 9: Cooling Tower, SDA Penthouse, and Stack



Figure 10: New Replacement Tines for Crane Grapple



Figure 11: Economizer, Dolomitic Lime Silo, SDA, Induced Draft Fan, and Baghouse



Figure 12: Ammonia Storage Tank and Ash Trailer Canopy



Figure 13: Tipping Floor Entrance Ramp and North side of Facility



Figure 14: Scale House and Scales



Figure 15: Metal Roll-off



Figure 16: Citizen's Drop-off Roll-off



Figure 17: General Facility Photo from UPS Entrance Road



Figure 18: General Facility Photo from southwest side of Facility



Figure 19: Ash and Ferrous Metal Load-out Ramp



Figure 20: Main Vibrating Ash Conveyor



Figure 21: Under Fire Air Coils and Forced Draft Fan



Figure 22: Deaerator



Figure 23: Cooling Towers, Ash Trailer Canopy and Carbon Storage Silo (Lower Right) – From SDA Penthouse



Figure 24: Supplemental Waste Elevator



Figure 25: Switchyard, and Scale House from Turbine Generator Enclosure Roof

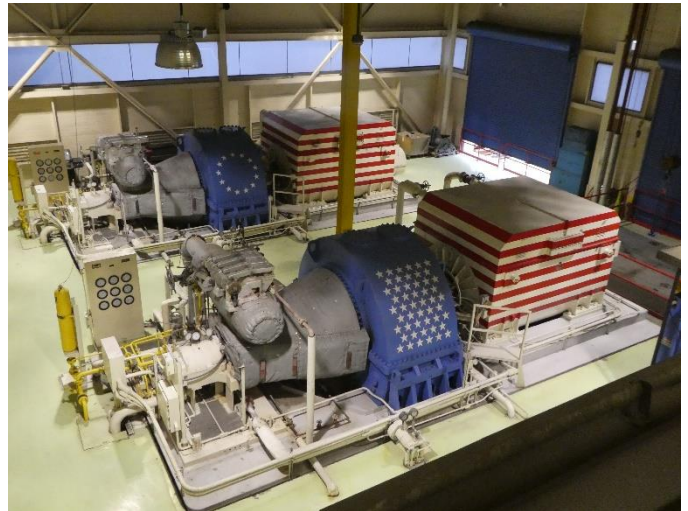


Figure 26: Turbine Generators

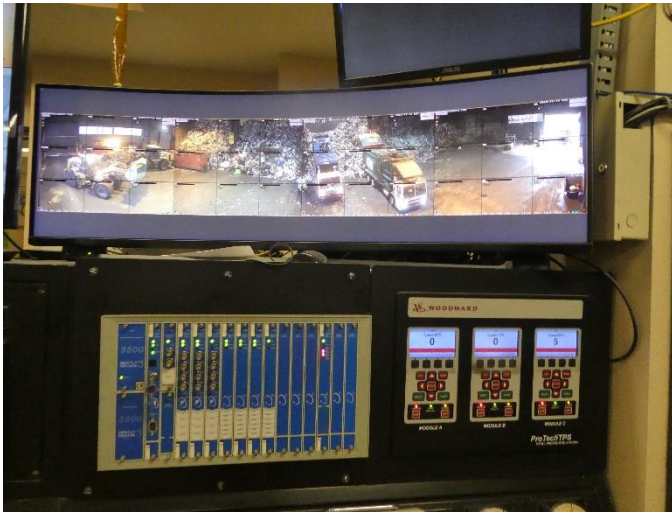


Figure 27: Infrared Detection Monitor in Control Room



Figure 28: Control Monitors in Control Room

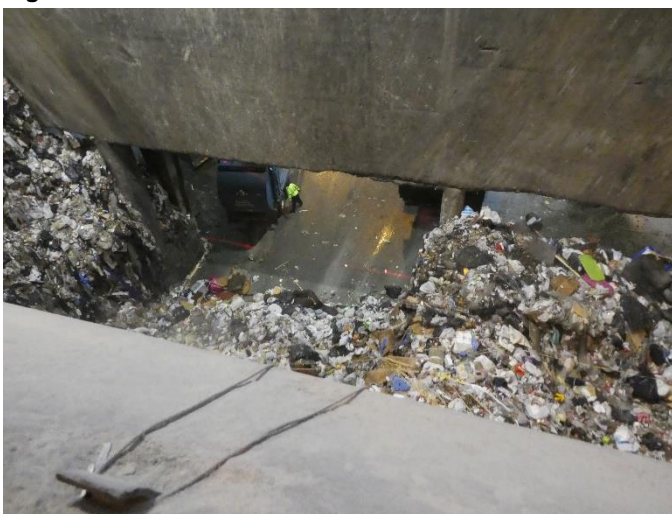


Figure 29: Tipping Floor and Red Pit Warning Line – Photo taken from Charging Floor



Figure 30: Auxiliary Burner