



Alexandria Arlington Resource Recovery Facility

Fiscal Year 2021

First Quarter Operations Report



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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
HCI	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
MWhr	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
Third	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 First Quarter Operations Report – Fiscal Year 2021

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 First Quarter of the 2021 Fiscal Year. This report summarizes Facility operations between July 1, 2020 and September 30, 2020 and identifies the fiscal year beginning on July 1, 2020 as FY21 and the quarter beginning on July 1, 2020 as Q1FY21.

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 Q1FY21. The entire quarter was subject to additional protocols per Covanta corporate direction to address the Covid-19 Pandemic. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. Environmental performance included two (2) reportable non-exempt environmental excursions experienced during the quarter. Also experienced during the quarter was a failed (in open position) medium pressure relief valve, which required the shutdown of all three (3) boilers and both turbine generators to repair and rectify the excessive noise issue that generated complaints from the surrounding residential communities.

During Q1FY21, the boilers experienced eight (8) instances of unscheduled downtime totaling 178.5 hours, and the turbine generators experienced four (4) instances of unscheduled downtime totaling 61.1 hours. Boiler No. 3 experienced

22.1 hours of downtime and Boiler No. 2 experienced 62.5 hours for scheduled cleaning outages. The Facility experienced a black plant outage due to a utility transformer failure causing the boilers to experience one (1) instance each of standby downtime totaling 356.7 hours and the turbine generators to experience one (1) instance each of standby downtime totaling 239.4 hours. A detailed listing of downtime is provided in Section 5.2 of this report.

Average waste processed during the quarter was 968.5 tons per day, or 99.3% of nominal facility capacity. Waste deliveries averaged 979.9 tons per day, which is higher (1.2%) than the burn rate.

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 slightly higher (less than 0.1%) compared to the corresponding quarter in FY20; steam production decreased (5.1%), and electricity generated (gross) decreased (6.3%) from the corresponding quarter in FY20. The decrease in steam generation is attributable to the decrease (5.5%) in waste heating value, paired with more boiler downtime (387.3 additional hours). The decrease in electricity generated (gross) in Q1FY21, is partly due to lower (5.1%) steam production, paired with more turbine generator downtime (289.3 additional hours).

3.0 Facility Inspection and Records Review

In August 2020, HDR met with the Facility management and other plant personnel to discuss Facility operations and maintenance, perform an independent visual inspection of the operating Facility, photograph areas of interest, and perform a review of recent Facility activity. HDR obtained operating data and monthly reports electronically from CAAI throughout the quarter and 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	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
4	Roof Ventilation Fan Not Working above Deaerator	May 2019	C	Repair roof ventilation fan	Status Unchanged	Open
5	Diamond Plate Deck Corroded at Boiler No. 3 Opacity Monitor	May 2019	C	Sand, Prime, Paint, and Preserve	Complete	Closed
6	Deterioration behind lime slurry piping in SDA Penthouse No. 2	August 2019	C	Replace kick-plate and conduct painting preservation measures	Status Unchanged	Open
7	Siding deteriorated beneath Baghouse No. 3 Hoppers	August 2019	C	Replace siding	Status Unchanged	Open
8	Siding on north side of Baghouse No. 2 Deteriorated	February 2020	C	Replace siding and conduct painting preservation measures	Status Unchanged	Open
9	Two-way Traffic Sign uprooted on Facility Entrance Road	February 2020	A	Re-install/secure uprooted traffic sign	Complete	Closed
10	Light Fixtures (typical of 2) out at Penthouse Elevation of Boiler House	February 2020	C	Replace/Repair light fixtures	Complete	Closed
11	Warning signs on Tipping Floor Columns missing/faded	February 2020	A	Replace missing signs and pressure wash existing signs for improved visibility	Complete	Closed
12	Light fixtures (typical of 2) out, north end of Tipping Floor Enclosure	February 2020	C	Replace/Repair light fixtures	Complete	Closed
13	Siding on east side of Tipping Floor Enclosure corroded	February 2020	C	Patch siding and conduct painting preservation measures	Status Unchanged	Open
14	Damaged/Missing insulation and lagging throughout Facility - Photo at top of Ash/Metals Recovery Loading Ramp – See Figure 1	August 2020	C	Replace damaged/missing insulation and lagging throughout the Facility	Status Unchanged	Open
15	Damaged/Missing insulation and lagging throughout Facility - Photo at Steam Coil Air Hear No. 2 – See Figure 2	August 2020	C	Replace damaged/missing insulation and lagging throughout the Facility	Status Unchanged	Open
16	Damaged overhead roll-up door at Main Condenser Enclosure – See Figure 3	August 2020	C	Repair Roll-up Door	Status Unchanged	Open

Item No.	Inspection Report Deficiencies	Issue Reported	Priority*	HDR Recommendation	Status	Open / Closed
17	Steam valve leaking, northwest corner of Boiler No. 3 at Penthouse Elevation – See Figure 4	August 2020	C	Repair/Repack steam valve	Status Unchanged	Open
18	Emergency backup generator is out of service – See Figure 5	August 2020	A	Repair or replace Emergency Backup Generator	Status Unchanged	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 89,106 tons of MSW were processed during Q1FY21, and a total of 90,149 tons of MSW including 2,757 tons of Special Handling Waste (3.1% by weight) were received. Total ash production during the quarter was 18,068 tons, which represents 20.3% of the waste processed by weight. The average uncorrected steam production rate for Q1FY21 was 2.87 tons_{steam}/ton_{waste}, which is lower (5.1%) than the corresponding quarter in FY20. The decrease in this metric is attributable to the 5.5% decrease in the quarterly average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

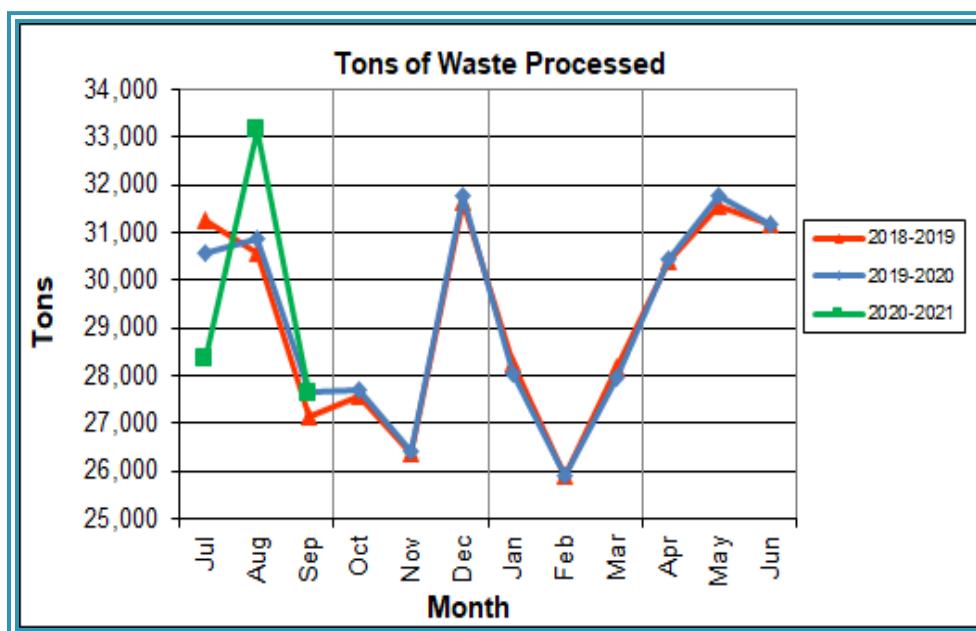


Chart 1 illustrates that Q1FY21 waste processed was slightly lower (less than 0.1%) than the corresponding quarter, Q1FY20. The slight decrease is partly attributable to more (387.3 additional hours) downtime experienced by the boilers. CAAI reported that 410 tipping floor/MSW internal inspections were conducted during the quarter and three (3) notices of violation (NOVs) were issued to haulers for the following issues:

- August 2020 – one (1) NOV was issued for not securing the tailgate
- September 2020 – two (2) NOVs were issued for excessive drywall in the load

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

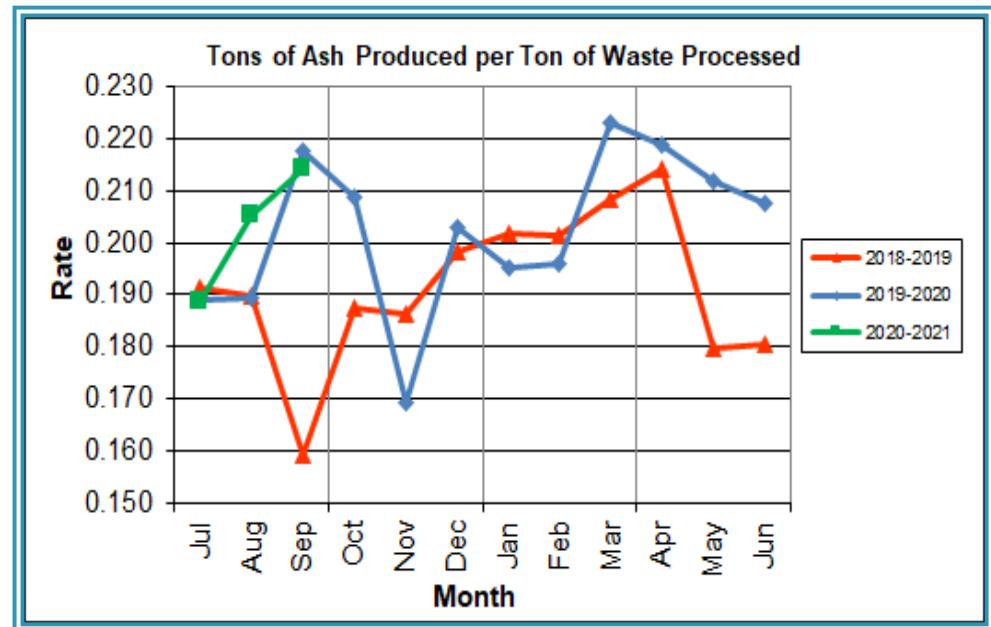


Chart 2 illustrates that the average ash production rate in Q1FY21 was higher (0.5%) at 20.3% of processed waste, compared to the corresponding quarter in FY20 when the rate was 19.8%. CAAI reports that it continues to process recovered metals through a trommel screen to remove some of the residual ash, which is quantified and added back into the monthly ash totals.

Chart 3: Ferrous Recovery Rate

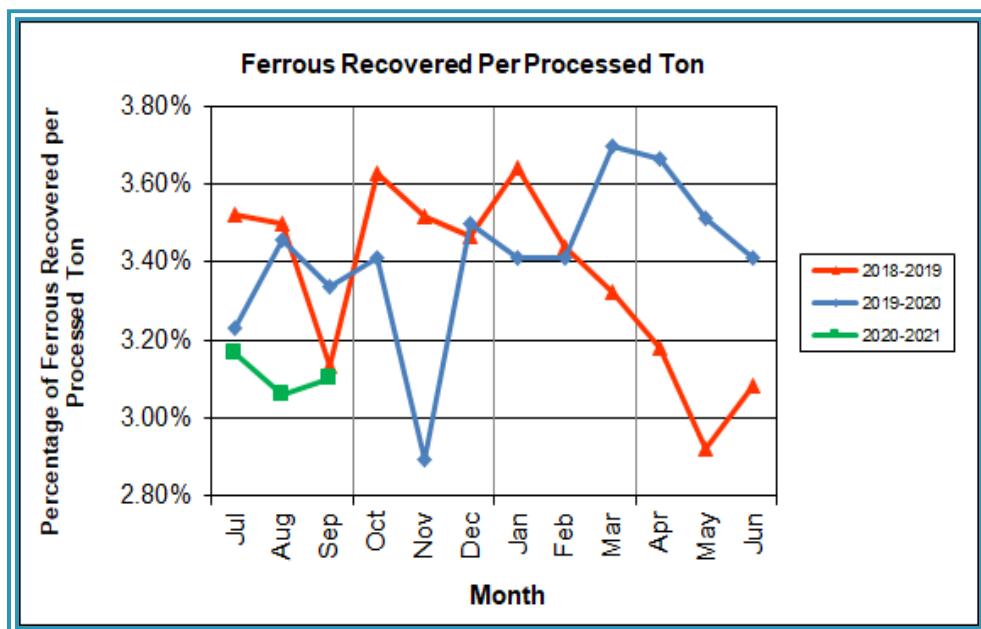
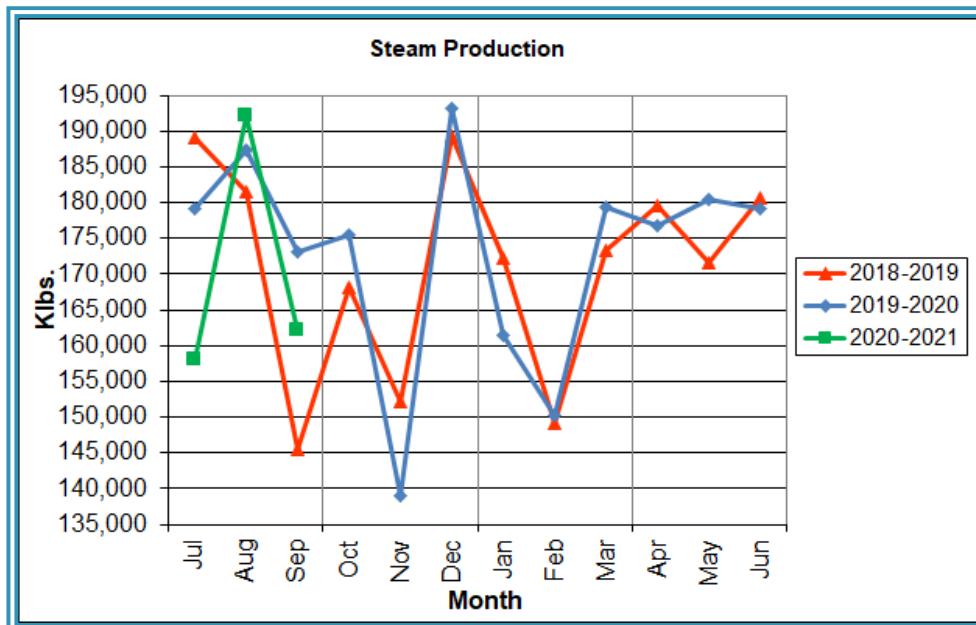


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q1FY21, 2,768 tons of ferrous metals were recovered, which is 7.0% lower than the corresponding quarter in FY20 and equivalent to 3.1% of processed waste.

Chart 4: Steam Production



In Chart 4, the total steam production for Q1FY21 was 512,284 klbs, and lower (5.1%) than the corresponding quarter in FY20. The decrease in steam generation is attributable to the decrease (5.5%) in waste heating value, paired with more boiler downtime (387.3 additional hours).

Chart 5: 12-Month Rolling Steam Production

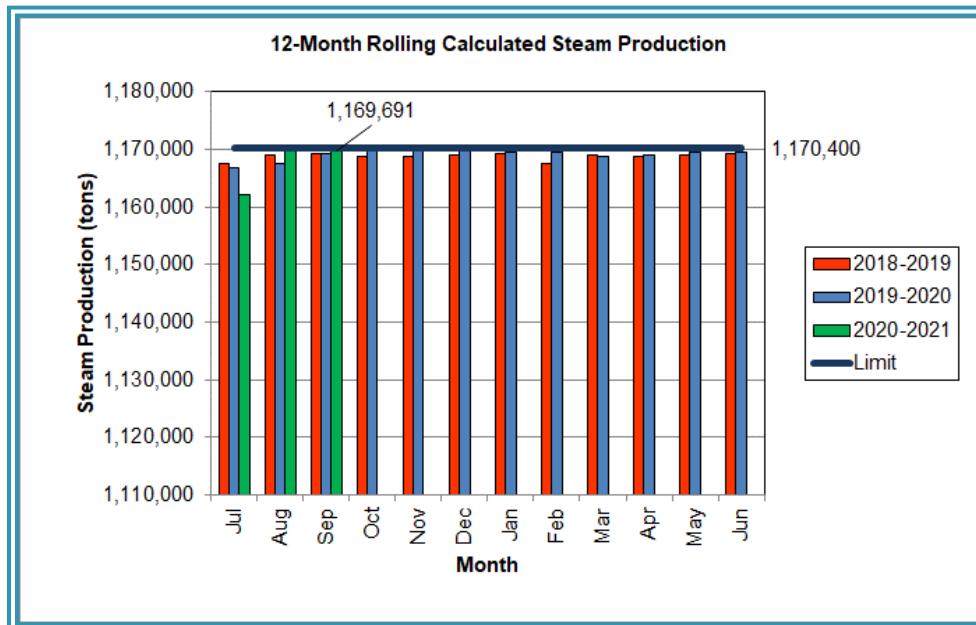
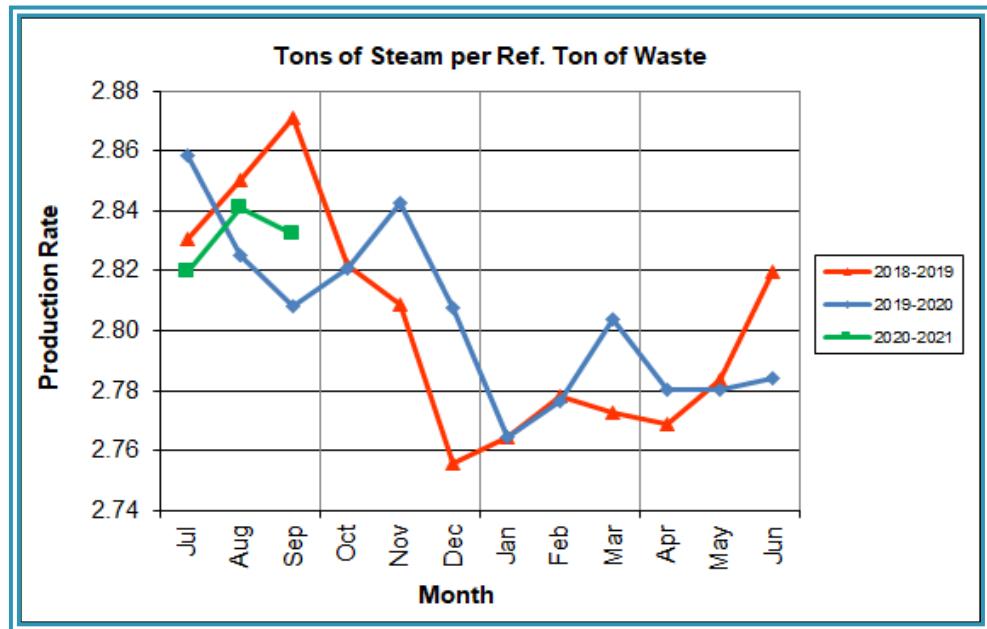


Chart 5 depicts the 12-month rolling steam production total for the quarter ending in September 2020, and for the prior two (2) fiscal years. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs. of 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 Q1FY21. The 12-month rolling total for steam production ending in September 2020 was 1,169,691 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 in August and September 2020, while July performance is an outlier due to the aforementioned downtime associated with the black plant condition.

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 Q1FY21, this metric tracked lower (less than 0.1%) at 2.83 tons_{steam}/ton_{ref} compared to the corresponding quarter in FY20.

Chart 7: Calculated Waste Heating Value

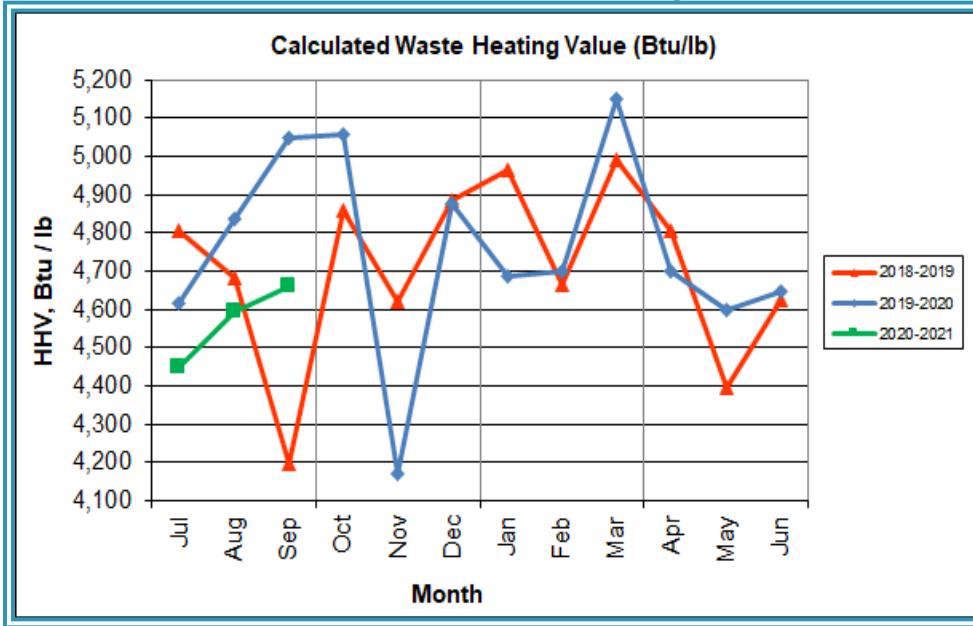


Chart 7 illustrates that Q1FY21 calculated average waste heating value was lower (5.5%) at 4,568 Btu/lb than the corresponding quarter Q1FY20, which averaged 4,833 Btu/lb. Note that 20.8 inches of precipitation were recorded at Ronald Reagan National Airport in Q1FY21 compared to 8.6 inches of precipitation in Q1FY20 which is 141.8% higher¹. The significant increase in precipitation in the Washington, D.C. Area negatively impacted the quarterly average waste heating value.

¹ <https://www.wunderground.com/>

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)
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
Q1FY20	Quarterly Totals	89,046	0	17,636	3,826	2,976	539,648	37,239
	July-19	30,563	0	5,777	1,269	987	179,207	12,162
	August-19	30,849	0	5,845	1,321	1,067	187,278	13,088
	September-19	27,634	0	6,014	1,236	922	173,163	11,989
Q1FY21	Quarterly Totals	89,106	0	18,068	2,757	2,768	512,284	34,846
	July-20	28,359	0	5,349	691	898	158,046	10,629
	August-20	33,126	0	6,804	1,139	1,013	192,144	13,278
	September-20	27,621	0	5,915	927	857	162,094	10,939
FY21 YTD Totals		89,106	0	18,068	2,757	2,768	512,284	34,846
FY20 Totals		350,147	0	70,964	13,226	11,966	2,074,819	143,282
FY19 Totals		350,057	0	67,068	11,778	11,756	2,052,153	142,430

Table 2 presents the production data provided to HDR by CAAI for Q1FY21 on both a monthly and quarterly basis. For purposes of comparison, data for Q1FY19 and Q1FY20 are also shown, as well as FY19, FY20 and FY21 year-to-date (YTD) totals.

In comparing quarterly totals, the data shows:

- Slightly more waste was processed in Q1FY21 than Q1FY20 and Q1FY19
- Less steam was generated in Q1FY21 than Q1FY20 and Q1FY19
- Less electricity (net) was generated in Q1FY21 than Q1FY20 and Q1FY19
- Less supplemental waste was received in Q1FY21 than Q1FY20 and Q1FY19.

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

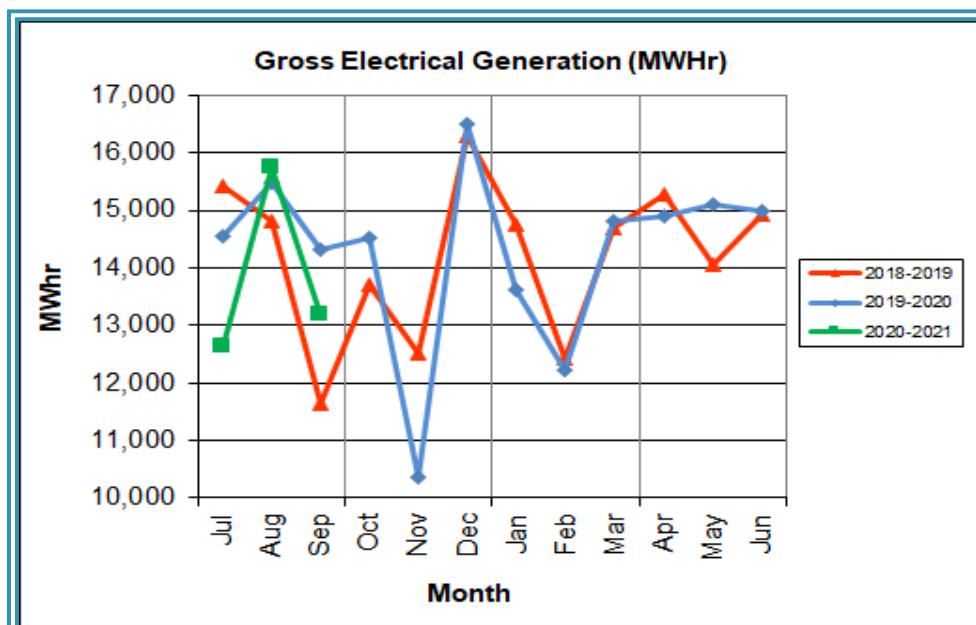
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY17	City Waste	1,678	1,836	1,668	1,722	1,817	1,708	1,597	1,452	1,604	1,882	2,170	2,002	21,136	6.06%
	County Waste	2,386	2,469	2,370	2,184	2,321	2,289	2,287	2,016	2,517	2,371	2,877	2,889	28,976	8.31%
	Municipal Solid Waste	24,862	26,976	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	351,693	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	2,063	2,442	1,882	22,409	6.43%
	County Waste	2,560	2,798	2,554	2,656	2,746	2,439	2,567	2,165	2,336	2,586	2,989	2,686	31,081	8.92%
	Municipal Solid Waste	25,442	25,920	21,873	21,678	21,472	23,046	21,455	21,975	24,323	28,361	25,444	22,197	283,185	81.27%
	Supplemental Waste	1,012	1,040	1,138	1,108	992	933	964	743	885	895	1,038	1,029	11,777	3.38%
	MSW Totals	30,862	31,595	27,388	27,438	27,102	28,150	26,808	26,342	29,157	33,904	31,913	27,793	348,454	100.00%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY20	City Waste	2,070	1,771	1,726	1,894	1,742	1,844	1,870	1,489	1,925	1,931	1,849	2,051	22,160	6.30%
	County Waste	3,069	2,600	2,544	2,664	2,507	2,575	2,694	2,195	2,509	2,518	2,663	2,861	31,399	8.93%
	Brokered Waste	-	-	-	-	-	-	120	114	67	58	-	-	359	0.10%
	Municipal Solid Waste	26,033	23,287	22,129	23,644	20,837	23,822	24,859	20,472	20,333	24,220	27,605	27,375	284,614	80.91%
	Supplemental Waste	1,269	1,321	1,236	1,340	1,238	1,246	1,239	1,102	1,106	582	627	920	13,226	3.76%
	MSW Totals	32,440	28,979	27,634	29,541	26,324	29,487	30,781	25,371	25,939	29,309	32,745	33,207	351,757	100.00%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY21	City Waste	1,583	1,905	2,121										5,609	6.22%
	County Waste	2,377	2,713	2,711										7,801	8.65%
	Brokered Waste	-	-	-	-	-	-	-	-	-	-	-	-	0.00%	
	Municipal Solid Waste	22,517	26,941	24,523										73,982	82.07%
	Supplemental Waste	691	1,139	927										2,757	3.06%
	MSW Totals	27,169	32,698	30,282										90,149	100.00%

Chart 8: Cumulative Total Waste Delivery



As depicted in Table 3 and Chart 8, for the quarter ending September 2020, cumulative total waste delivery was 1.2% higher compared to the same period in FY20.

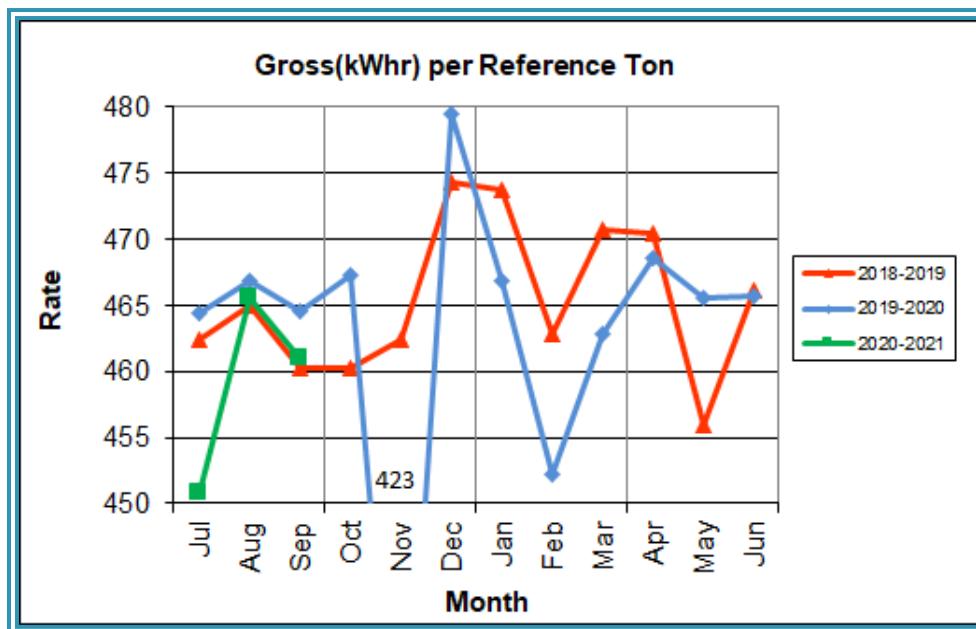
Chart 9: Gross Electrical Generation



During Q1FY21, the Facility generated 41,568 MWhrs (gross) of electricity compared to Q1FY20 generation of 44,352 MWhrs (gross), a 6.3% decrease. The decrease in electricity generated (gross) in Q1FY21, is partly due to lower (5.1%)

steam production, paired with more turbine generator downtime (289.3 additional hours). Note that the sharp spikes depicted in Chart Nos. 9 through 13 for November 2019 are a result of significant downtime (635.0 hours) experienced by Turbine Generator No. 1 for a Scheduled Major Overhaul.

Chart 10: Gross Conversion Rate



As shown in Chart 10, the average gross electrical generation per reference ton of refuse processed during Q1FY21 was 459 kWhr, which is lower (1.3%) than the corresponding quarter in FY20. 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

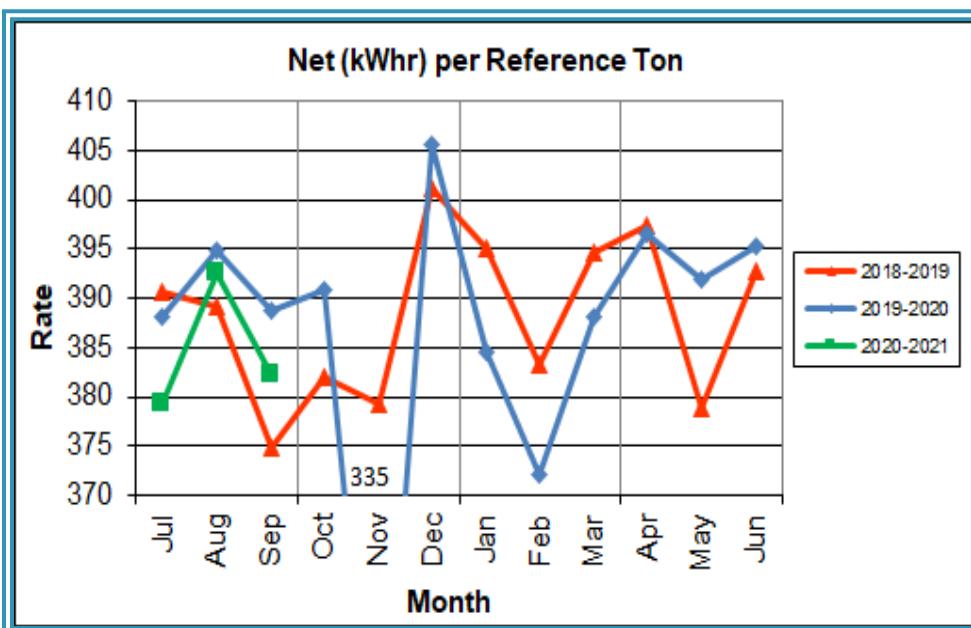


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q1FY21, the average net electrical generation per reference ton was 385 kWhr, which is 1.5% lower than the corresponding quarter in FY20.

Chart 12: Net Conversion Rate

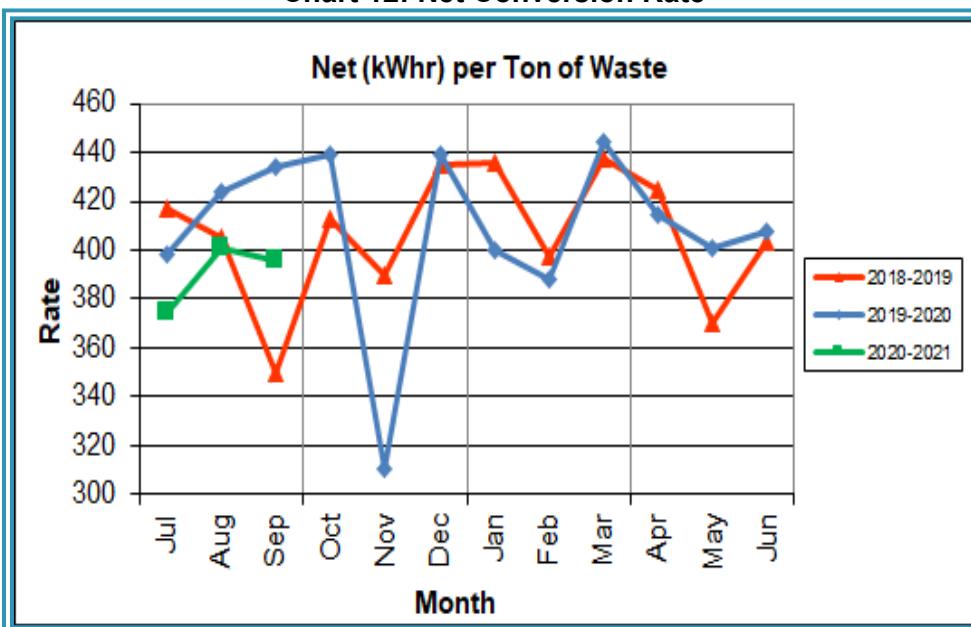


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q1FY21 was 391 kWhr, which is 6.7% lower than

the corresponding quarter in FY20 and is partly due to lower (5.1%) steam production, paired with more turbine generator downtime (289.3 additional hours).

Chart 13: Gross Turbine Generator Conversion Rate

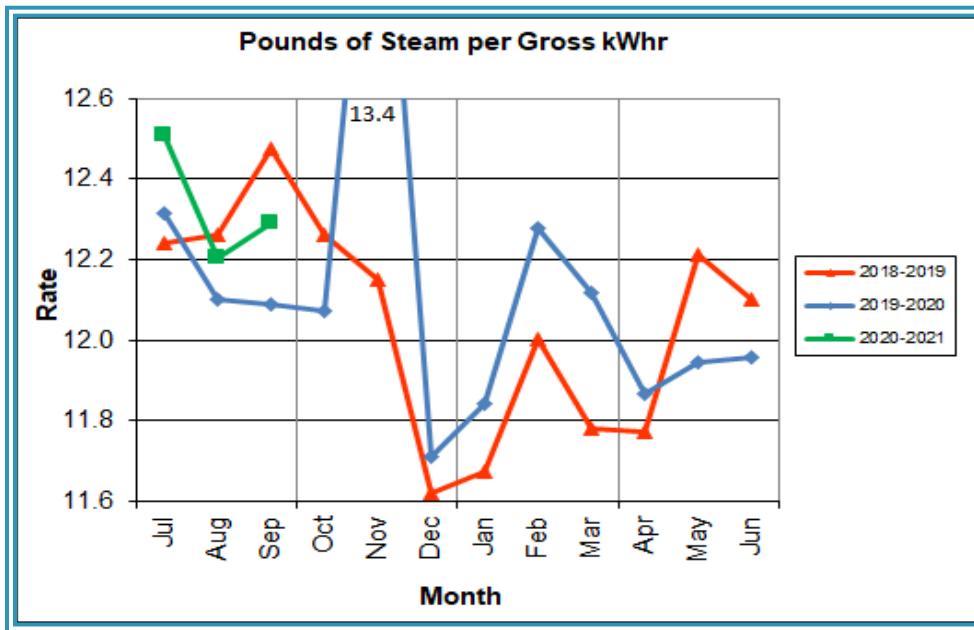


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q1FY21 the average pounds of steam consumed per gross kWhr generated was 12.3, which is 1.3% higher (less efficient) than the corresponding quarter Q1FY20. A factor that negatively impacts this metric is Turbine Generator No. 2 continues to operate with its Stage 9 blades removed from the rotor². Another factor is the diversion of steam to heat under-grate air to improve the combustion of low Btu (wet) fuel. This steam diversion decreases power generation. The average main steam temperature during the quarter was 677.3°F, which is 2.3°F lower than the average main steam temperature of the corresponding quarter last fiscal year and 22.7°F lower than

² 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.

design temperature of 700°F. Lower main steam temperature decreases power generation, all other factors being equal.

4.1 Utility and Reagent Consumptions

Table 4: Facility Utility and Reagent Consumptions

Utility	Units	Q1FY21 Total	Q1FY20 Total	Q1FY21 "Per Processed Ton" Consumption	Q1FY20 "Per Processed Ton" Consumption	FY21 YTD Total
Purchased Power	MWhr	5,268	5,562	0.0591	0.0625	5,268
Fuel Oil	Gal.	21,870	14,820	0.25	0.17	21,870
Boiler Make-up	Gal.	1,348,000	1,465,000	15.13	16.45	1,348,000
Cooling Tower Make-up	Gal.	43,263,144	45,662,716	485.52	512.80	43,263,144
Pebble Lime	Lbs.	1,562,000	1,434,000	17.53	16.10	1,562,000
Ammonia	Lbs.	183,000	178,000	2.05	2.00	183,000
Carbon	Lbs.	74,000	72,000	0.83	0.81	74,000

Fuel oil usage during the quarter represents approximately 0.38% of the total heat input to the boilers, which compares favorably with industry averages, and is slightly higher than the percentage of heat input in Q1FY20 which was 0.26%. Fuel oil is used to stabilize combustion of wet fuel, as well as during start-up and shutdown of the boilers for maintenance. Boiler makeup water usage during the quarter represents 2.2% of steam flow, which is slightly lower than the boiler makeup in Q1FY20 which was 2.3% of steam flow. Higher boiler makeup quantities is indicative of increased steam leakage. Pebble lime usage, at 1,562,000 lbs. is higher (8.9%) than the corresponding quarter last year. During Q2FY19, CAAI reported that it was discontinuing dolomitic lime feed, while increasing lime slurry feed (pebble lime) to stabilize ash pH levels. Ash pH levels in the range of 8 to 11 are desirable to minimize leaching potential of heavy metals.

In comparing Q1FY21 to Q1FY20 on a per processed ton consumption basis:

- the purchased power consumption rate was 5.4% lower
- the total fuel oil consumption rate was 47.5% higher
- the boiler make-up water consumption rate was 8.1% lower
- the cooling tower make-up water consumption rate was 5.3% lower
- the total pebble lime consumption rate was 8.9% higher
- the ammonia consumption rate was 2.7% higher
- the carbon consumption rate was 2.7% higher

4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents and one (1) First Aid accident (heat related observation in July 2020). CAAI has operated 919 days without an OSHA recordable accident as of September 30, 2020. Safety and Environmental training was conducted with themes as follows:

July 2020

- Safety:
 - Mobile Equipment
 - Tipping Floor and Loading Operations
 - Hot Load Procedure
- Environmental:
 - No environmental training themes were reported

August 2020

- Safety:
 - Medical Surveillance
 - Safe Drum Handling
 - Ergonomics and Brute Force
- Environmental:
 - No environmental training themes were reported

September 2020

- Safety:
 - Medical surveillance and access to records
 - Inspections by regulatory agencies
 - Safe Drum Handling
 - Ergonomics
- Environmental:
 - Self-Paced Review of Storm Water Pollution Prevention Plan
 - Review of Profiled Waste Standing Operating Procedures (SOP) and Animal and Plant Health Inspection Service Waste Compliance Agreement

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 August 3, 2020, Boiler No. 3 experienced 21.1 hours of downtime for a scheduled boiler cleaning outage and beginning September 1, 2020, Boiler No. 2 experienced 62.5 hours of downtime for a scheduled boiler cleaning outage.

In addition to the scheduled cleaning outages, CAAI reports that 1,246 preventative maintenance actions were completed during the quarter.

5.1 Availability

Facility availabilities for Q1FY21 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q1FY21 were 97.4%, 96.4%, and 94.6%, respectively. The three-boiler average availability during the quarter was 96.1%, 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 Q1FY21 was 98.6%. Average generator availability during the quarter was negatively impacted by the downtime experienced as a result of the medium pressure relief valve replacement.

Note that the Facility experienced a black plant outage due to a utility transformer failure causing the boilers to experience one (1) instance each of standby downtime totaling 356.7 hours and the turbine generators to experience one (1) instance each of standby downtime totaling 239.4 hours. Note that standby time does not impact reported availability.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY21 Average
Boiler No. 1	97.4%
Boiler No. 2	96.4%
Boiler No. 3	94.6%
Avg.	96.1%
Turbine No. 1	98.6%
Turbine No. 2	98.6%
Avg.	98.6%

Table 6: Boiler Downtime – Q1FY21

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	7/7/20	7/8/20	28.7	Unscheduled	Medium pressure relief valve replacement
2	7/8/20	7/8/20	16.2	Unscheduled	Medium pressure relief valve replacement
3	7/8/20	7/8/20	16.3	Unscheduled	Medium pressure relief valve replacement
1	7/12/20	7/17/20	122.3	Standby	Utility transformer failure – Black Plant Outage
2	7/12/20	7/17/20	119.3	Standby	Utility transformer failure – Black Plant Outage
3	7/12/20	7/17/20	115.1	Standby	Utility transformer failure – Black Plant Outage
1	7/22/20	7/23/20	29.4	Unscheduled	Grate bar failure
3	8/3/20	8/4/20	22.1	Scheduled	Scheduled boiler cleaning outage
3	8/7/20	8/7/20	1.8	Unscheduled	Ash discharger pluggage
3	8/15/20	8/16/20	23.1	Unscheduled	Superheater safety relief valve replacement
2	9/1/20	9/3/20	56.0	Scheduled	Scheduled boiler cleaning outage
2	9/4/20	9/4/20	6.5	Unscheduled	Unscheduled extension of boiler cleaning outage
3	9/20/20	9/22/20	56.5	Unscheduled	No. 1 grate run drive yoke failure
Total Unscheduled Downtime				178.5 Hours	
Total Scheduled Downtime				78.1 Hours	
Total Standby Downtime				356.7 Hours	
Total Downtime				613.3 Hours	

Table 7: Turbine Generator Downtime – Q1FY21

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	7/6/20	7/6/20	3.2	Unscheduled	Noise ordinance and medium pressure relief valve replacement
2	7/6/20	7/6/20	3.1	Unscheduled	Noise ordinance and medium pressure relief valve replacement
1	7/7/20	7/8/20	27.6	Unscheduled	Noise ordinance and medium pressure relief valve replacement
2	7/7/20	7/8/20	27.2	Unscheduled	Noise ordinance and medium pressure relief valve replacement
1	7/12/20	7/17/20	123.8	Standby	Utility transformer failure – Black Plant Outage
2	7/12/20	7/17/20	115.6	Standby	Utility transformer failure – Black Plant Outage
Total Unscheduled Downtime				61.1 Hours	
Total Scheduled Downtime				0.0 Hours	
Total Standby Downtime				239.4 Hours	
Total Downtime				300.5 Hours	

5.2 Facility Housekeeping

CAAI is performing Facility housekeeping and maintaining plant cleanliness in accordance with acceptable industry practices. A site inspection was conducted in August 2020. 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 2020 inspection are presented in Table 8.

Table 8: Facility Housekeeping Ratings – August 2020

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 Q1FY21 are summarized in Appendix A. The Facility experienced two (2) non-exempt permit exceedances during Q1FY21. On August 3, 2020 Boiler No. 1 experienced an excess emissions event when 4-hour (0400-0759) Carbon Monoxide (CO) levels averaged 109 ppm (100 ppm limit), due to processing high Btu waste that caused a sudden increase in steam flow, drastic drop in O₂ below 4% and CO in excess of 1,800 ppm for several minutes. On August 4, 2020 Boiler No. 3 experienced an excess emissions event when 4-hour (1200-1559) CO levels averaged 119 ppm (100 ppm limit), due to overfeeding wet waste. As of September 30, 2020 the Facility operated 57 days without an environmental excursion.

As previously reported, on July 8th the Facility experienced an excess noise event when the medium pressure (auxiliary) relief valve lifted and would not re-seat

creating noise. CAAI reports that due to the complaints from the surrounding residential community, the decision was made to take all three boilers and both turbine generators offline so the valve could be replaced.

6.1 Low NO_x Technology Implementation

The Virginia Department of Environmental Quality (VADEQ) has issued the final RACT permits for the installation and operation of LN™ Technology. During November 2019, Boiler No. 2 was retrofitted with LN™ Technology, including the installation of all associated ductwork, nozzles, and controls and CAAI reports that final calibration of instrumentation was scheduled for Q3FY20 and Q1FY21. On June 30, 2020 CAAI notified the VADEQ that Boiler No. 2 Low NO_x System testing and optimization period concluded on June 28th and that Boiler No. 2 is now operating under the lower NO_x limits of 110 ppm (24 hr) and 90 ppm (annual rolling average). CAAI indicated that it plans to install the LN™ Technology on subsequent units in the second quarter of Fiscal Years 2021 and 2022.

6.2 Nitrogen Oxide Emissions

During Q1FY21, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 160.3 ppmdv, 80.0 ppmdv, and 158.7 ppmdv for Boiler Nos. 1, 2, and 3, respectively. As previously mentioned, the LN™ Technology was installed on Boiler No. 2 in November 2019, and CAAI has indicated that the system concluded its period of calibration and optimization on June 28, 2020. CAAI continued to operate the Boiler Nos. 1 and 3 at the lower (160 ppmdv) set-points through Q1FY21, and beginning April 28th operated Boiler No. 2 at the lower NO_x limit of 110 ppm. In comparing Q1FY21 to the corresponding quarter last year, ammonia usage only increased 2.8% while Boiler No. 2 operated at 50% NO_x reduction.

6.3 Sulfur Dioxide Emissions

During Q1FY21 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 1.0 ppmdv, 1.3 ppmdv, and 2.0 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.

6.4 Carbon Monoxide Emissions

During Q1FY21, the monthly average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 27.7 ppmdv, 35.7 ppmdv, and 22.7 ppmdv, respectively, and all are well within permit limits (100 ppmdv, 4-hour average).

6.5 Opacity

During Q1FY21, the average opacity on Boiler Nos. 1, 2, and 3 were 0.4%, 1.5%, and 0.6%, respectively, which are all significantly below the 10% (6-minute) average permit limit.

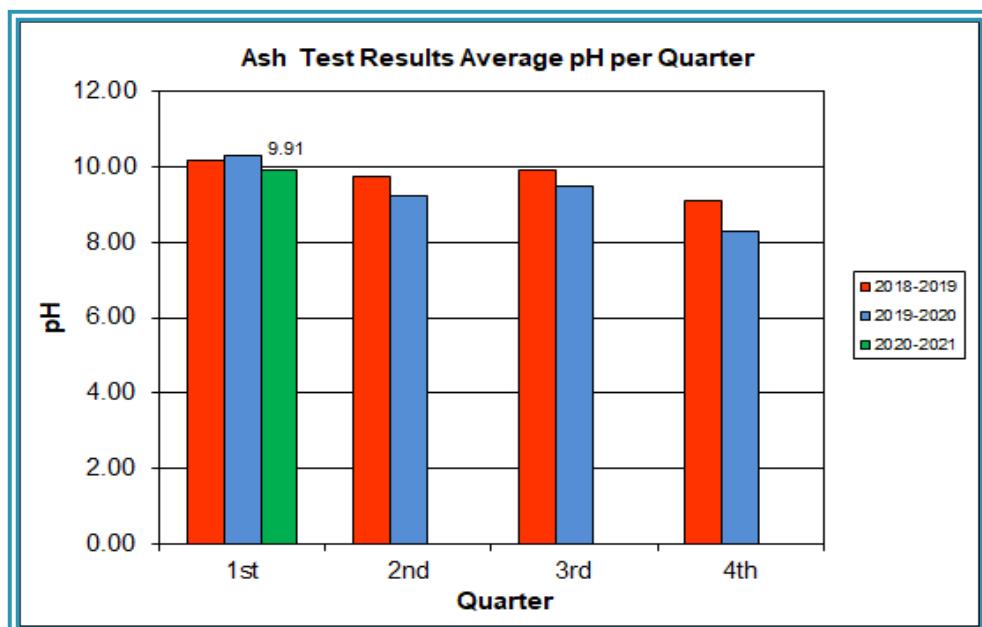
6.6 Daily Emissions Data

Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q1FY21. 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. Ash Toxicity (TCLP) tests were not performed during Q1FY21. In addition to periodic TCLP tests, CAAI samples ash monthly in-house, and documents pH reading to adjust dolomitic lime feed rate. The results for the ash pH tests are found below in Chart 14 where each quarter is represented by the average of the respective monthly readings. During Q1FY21, the average ash pH for in-house tests was 9.9.

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.	SteamFl	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	
Jul - 20	AVG	86.6	46.0	1.0	31.0	161.0	0.0	296.0	12.3	4.0
	Max	91.1	67.0	6.0	42.0	168.0	0.3	305.0	12.5	5.2
	Min	66.0	29.0	0.0	18.0	154.0	0.0	289.0	12.1	3.0
Aug - 20	AVG	87.1	35.0	1.0	28.0	159.0	0.4	296.0	12.3	4.3
	Max	90.6	51.0	4.0	38.0	165.0	1.1	302.0	12.5	4.5
	Min	82.7	23.0	0.0	21.0	156.0	0.0	288.0	12.2	3.9
Sep - 20	AVG	78.3	26.0	1.0	24.0	161.0	0.9	300.0	12.3	3.7
	Max	90.7	35.0	3.0	35.0	168.0	1.2	302.0	12.4	4.2
	Min	65.4	14.0	0.0	15.0	156.0	0.6	296.0	12.2	3.0
Quarter Average		84.0	35.7	1.0	27.7	160.3	0.4	297.3	12.3	4.0
Quarter Max Value		91.1	67.0	6.0	42.0	168.0	1.2	305.0	12.5	5.2
Quarter Min Value		65.4	14.0	0.0	15.0	154.0	0.0	288.0	12.1	3.0
Limits:		99	NA	29	100	205	10	331	12(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.	SteamFl	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	
Jul - 20	AVG	87.6	37.0	1.0	38.0	79.0	1.7	303.0	12.3	4.0
	Max	91.8	56.0	3.0	47.0	83.0	2.0	304.0	12.5	4.4
	Min	69.4	24.0	0.0	27.0	75.0	1.3	302.0	12.1	3.3
Aug - 20	AVG	86.4	22.0	1.0	37.0	78.0	1.8	303.0	12.4	4.4
	Max	90.4	37.0	6.0	47.0	79.0	2.3	304.0	12.6	4.6
	Min	70.7	14.0	0.0	23.0	77.0	0.9	302.0	12.2	3.7
Sep - 20	AVG	80.3	58.0	2.0	32.0	83.0	1.0	303.0	12.2	3.9
	Max	86.3	82.0	5.0	50.0	93.0	1.3	304.0	12.6	4.1
	Min	71.3	38.0	0.0	18.0	76.0	0.7	296.0	12.1	3.5
Quarter Average		84.8	39.0	1.3	35.7	80.0	1.5	303.0	12.3	4.1
Quarter Max Value		91.8	82.0	6.0	50.0	93.0	2.3	304.0	12.6	4.6
Quarter Min Value		69.4	14.0	0.0	18.0	75.0	0.7	296.0	12.1	3.3
Limits:		98	NA	29	100	110	10	330	12(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.	SteamFl	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
Jul - 20	AVG	88.7	44.0	3.0	25.0	158.0	0.2	297.0	12.3
	Max	92.9	63.0	6.0	51.0	161.0	0.7	298.0	12.8
	Min	71.9	31.0	1.0	12.0	135.0	0.0	294.0	12.1
Aug - 20	AVG	89.3	54.0	1.0	27.0	159.0	0.5	297.0	12.3
	Max	92.5	90.0	4.0	45.0	163.0	1.3	298.0	12.4
	Min	82.2	33.0	0.0	15.0	151.0	0.0	292.0	12.1
Sep - 20	AVG	78.0	47.0	2.0	16.0	159.0	1.1	298.0	12.2
	Max	90.4	63.0	3.0	29.0	160.0	1.3	298.0	12.3
	Min	64.9	36.0	0.0	3.0	157.0	1.0	295.0	12.2
Quarter Average		85.3	48.3	2.0	22.7	158.7	0.6	297.3	12.3
Quarter Max Value		92.9	90.0	6.0	51.0	163.0	1.3	298.0	12.8
Quarter Min Value		64.9	31.0	0.0	3.0	135.0	0.0	292.0	12.1
Limits:		98	NA	29	100	205	10	332	12(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 2020



Figure 1: Damaged/Missing insulation and lagging throughout Facility - Photo at top of Ash/Metals Recovery Loading Ramp – New Deficiency



Figure 2: Damaged/Missing insulation and lagging throughout Facility - Photo at Steam Coil Air Hear No. 2 – New Deficiency



Figure 3: Damaged overhead roll-up door at Main Condenser Enclosure – New Deficiency



Figure 4: Steam valve leaking, northwest corner of Boiler No. 3 at Penthouse Elevation – New Deficiency



Figure 5: Emergency backup generator is out of service – New Deficiency



Figure 6: Main Vibrating Ash Conveyor



Figure 7: Overhead photo of Tipping Floor/Pit Edge Warning Lights from Charging Floor Elevation



Figure 8: Recently painted diamond plate deck near Boiler No. 3 Opacity Monitors – Resolution to Deficiency Item No. 5



Figure 9: Firing Aisle looking north



Figure 10: Turbine Generator Enclosure



Figure 11: Deaerator



Figure 12: Refuse pit – photo from north end of Charging Floor looking south



Figure 13: SDA Inlet Ducts from Catwalk, east of SDA Penthouse No. 1



Figure 14: Cooling Towers and Ash Trailer Canopy - Photo from SDA Penthouse No. 3



Figure 15: Baghouse No. 2 Hopper Access Deck



Figure 16: General Area Photo between SDA Hoppers and Economizer



Figure 17: Lime Slaker



Figure 18: Cooling Towers – Photo on West Side



Figure 19: Ash Trailer Canopy on north side of Facility



Figure 20: Emergency Backup Generator just west of Tipping Floor Entrance Road



Figure 21: Tipping Floor – Warning signs posted on columns – Resolution of Deficiency Item No. 11



Figure 22: Baghouse Nos. 1 and 2 Rooftop – Consider pressure washing to remove lime and prevent corrosion



Figure 23: Feed Chute No. 2 & LN System Ductwork



Figure 24: Condensate Pump No. 4 Removed for Maintenance