



Alexandria Arlington Resource Recovery Facility

Fiscal Year 2023
First Quarter Operations Report

November 2022



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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
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 2023

1.0 Purpose of Report

HDR Engineering, Inc. (HDR) was authorized by the Facility Monitoring Group (FMG) to conduct quarterly site assessments and provide quarterly reports regarding the operation and maintenance of the Covanta Alexandria/Arlington Waste-to-Energy Facility (Facility) for the 2023 Fiscal Year. This report is prepared for the first quarter of the 2023 fiscal year and summarizes Facility operations between July 1, 2022, and September 30, 2022. This report identifies the fiscal year beginning on July 1, 2022, as FY23 and the quarter beginning on July 1, 2022 as Q1FY23.

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 Q1FY23. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. There was one reportable environmental excursion experienced during the quarter.

During Q1FY23, the boilers experienced eight (8) instances of unscheduled downtime totaling 101.5 hours, and the turbine generators experienced no unscheduled downtime. Boiler Nos. 1 and 3 experienced scheduled cleaning outages during the quarter totaling 142.8 hours of downtime and Turbine No. 2 experienced one (1) instance of scheduled downtime totaling 148.0 hours. Boiler No. 2 experienced one (1) instance of standby downtime totaling 100.0 hours. A detailed listing of downtime is provided in Section 5.1 of this report.

Average waste processed during the quarter was 990.6 tons per day, or 101.6% of nominal facility capacity. Waste deliveries averaged 980.5 tons per day, which is lower (1.0%) 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 lower (0.4%) compared to the corresponding quarter in FY22; steam production slightly decreased (0.2%), and electricity generated (gross) decreased (1.0%) from the corresponding quarter in FY22. The decrease in steam generation is attributable to the decrease in waste heating value (1.1%) paired with more boiler downtime (205.2 additional hours). The decrease in electricity generated (gross) in Q1FY23 is attributable to the slightly lower (0.2%) steam production and more turbine generator downtime (136.0 more hours).

3.0 Facility Inspection and Records Review

In August 2022, 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 site assessments 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 site assessments are only performed quarterly, generally representing findings on the day of the assessment. 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	Pavement spider-cracking at Tipping Floor Entrance	November 2016	C	Resurface section of pavement at Tipping Floor Entrance	Status Unchanged	Open
2	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
3	Deterioration behind lime slurry piping in SDA Penthouse No. 2	August 2019	C	Conduct painting preservation measures	Status Unchanged	Open
4	Siding deteriorated beneath Baghouse No. 3 Hoppers	August 2019	C	Replace siding	Status Unchanged	Open
5	Siding on north side of Baghouse No. 2 Deteriorated	February 2020	C	Replace siding and conduct painting preservation measures	Status Unchanged	Open
6	Damaged/Missing insulation and lagging throughout Facility	August 2020	C	Perform audit of all steam piping and replace damaged/missing insulation and lagging throughout the Facility as needed	Status Unchanged	Open
7	Roof Ventilation Fan above Boiler No. 3 is not operating	November 2020	C	Repair roof ventilation fan	Re-opening this item. The vent fan is not operational.	Open
8	Steam leaks (multiple at various locations) around packing and valve stems around Boiler No. 3	February 2021	C	Repair steam leaks or repack valves	During HDR's November site visit, it appears that this item was addressed.	Closed
9	Insulation and lagging damaged/deteriorated around Boiler No. 3 Steam Drum	February 2021	C	Replace insulation and lagging	Status Unchanged	Open
10	Baghouse No. 3 hopper heaters set to manual; heater off but signaling low temperature	February 2021	B	Repair hopper heaters	Status Unchanged	Open
11	Feed Chute Cooling Jacket Water Level Boxes (lower) empty on Boilers No. 2 and No. 3	May 2021	B	Repair feed chute cooling jacket water level boxes	Status Unchanged	Open
12	Steam leak on gland steam regulating valve on TG No. 2	May 2021	B	Repair leak on the TG No. 2 Gland Steam Regulating Valve.	During HDR's November site visit, it appears that this item was addressed.	Closed
13	Uneven water flow from Cooling Tower nozzle/distribution on southeast side of tower	August 2021	C	Repair nozzle	Status Unchanged	Open
14	When the upper level furnace camera on Boiler No. 3 was removed. The port that the camera was installed remains open.	November 2021	C	Fabricate temporary cover for open ports when cameras are out.	Status Unchanged	Open

Item No.	Inspection Report Deficiencies	Issue Reported	Priority*	HDR Recommendation	Status	Open / Closed
15	A few overhead lights, on tipping floor, are out.	February 2022	C	Replace light bulb.	Status Unchanged	Open
16	There is a minor leak on an overhead process pipe within the boiler building. The leak is located on a pipe underneath the Boiler No. 2 generation bank hoppers (under the platform grates - Martin door elevation).	November 2022	B	Address the leak.	During HDR's November Site Visit, this item was observed.	Open
17	A temporary pump is set up on the ground floor of the Turbine Hall to transport wastewater from the trench drains to the Cooling Tower basin.	November 2022	B	If this pump is needed and used regularly, permanent equipment and piping should be installed.	During HDR's November Site Visit, this item was observed.	Open
18	A roadway bollard, near the stack on the west side of the Facility's access road, is damaged.	November 2022	C	Replace bollard.	During HDR's November Site Visit, this item was observed.	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 91,131 tons of MSW were processed during Q1FY23, and a total of 90,205 tons of MSW including 2,135 tons of Special Handling Waste (2.4% by weight) were received. Total ash production during the quarter was 17,655 tons, which represents 19.4% of the waste processed by weight. The average uncorrected steam production rate for Q1FY23 was 3.02 tons_{steam}/ton_{waste}, which is slightly higher (0.2%) than the corresponding quarter in FY22.

Chart 1: Tons of Waste Processed

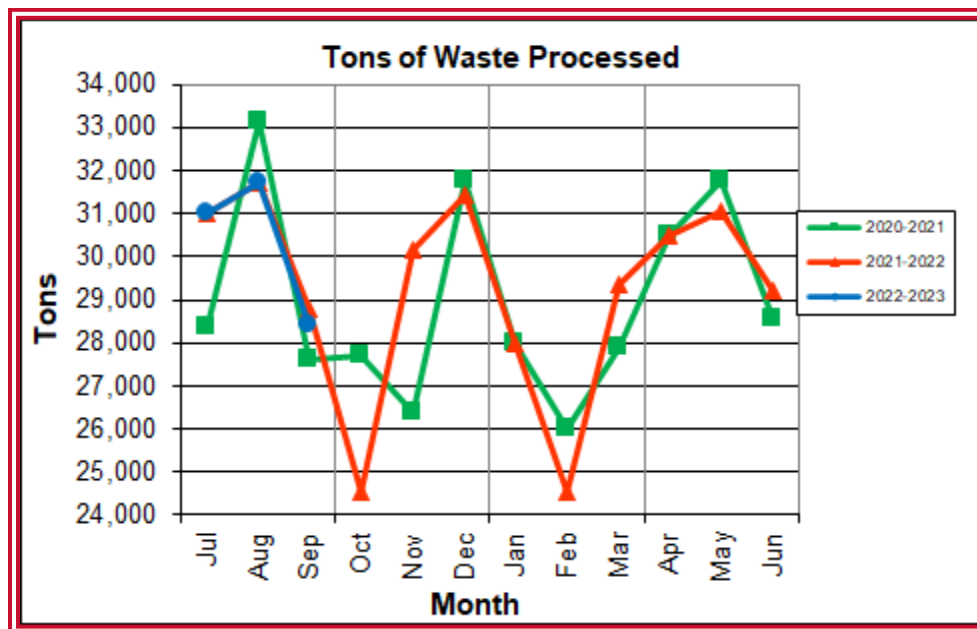


Chart 1 illustrates that Q1FY23 waste processed was slightly lower (0.4%) than the corresponding quarter, Q1FY22. The decrease is attributable to more boiler downtime (205.2 additional hours). CAAI reported that 420 tipping floor/MSW internal inspections were conducted during the quarter and one (1) notices of violation (NOV) were issued to haulers for:

- **September 2022:** One (1) NOV was issued for delivering a hot load to the Tipping Floor

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

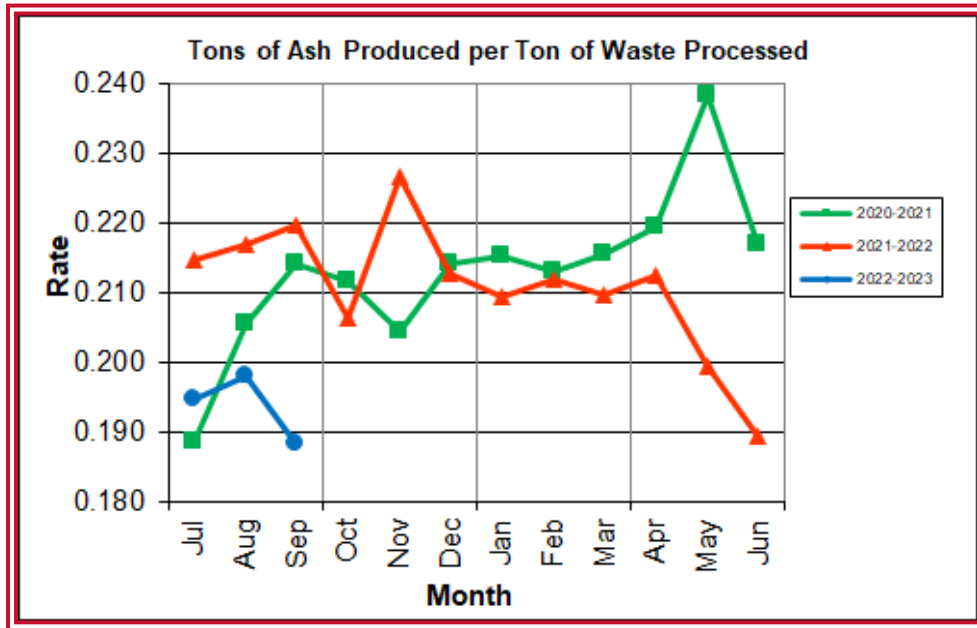


Chart 2 illustrates that the average ash production rate in Q1FY23 was lower (2.3 percentage points) at 19.4% of processed waste, compared to the corresponding quarter in FY22 when the rate was 21.7%. The decrease in ash production is attributable to the new magnet installed in February 2022, as the metals recovery rate increased (reduction in the amount of metals in the ash material).

Chart 3: Ferrous Recovery Rate

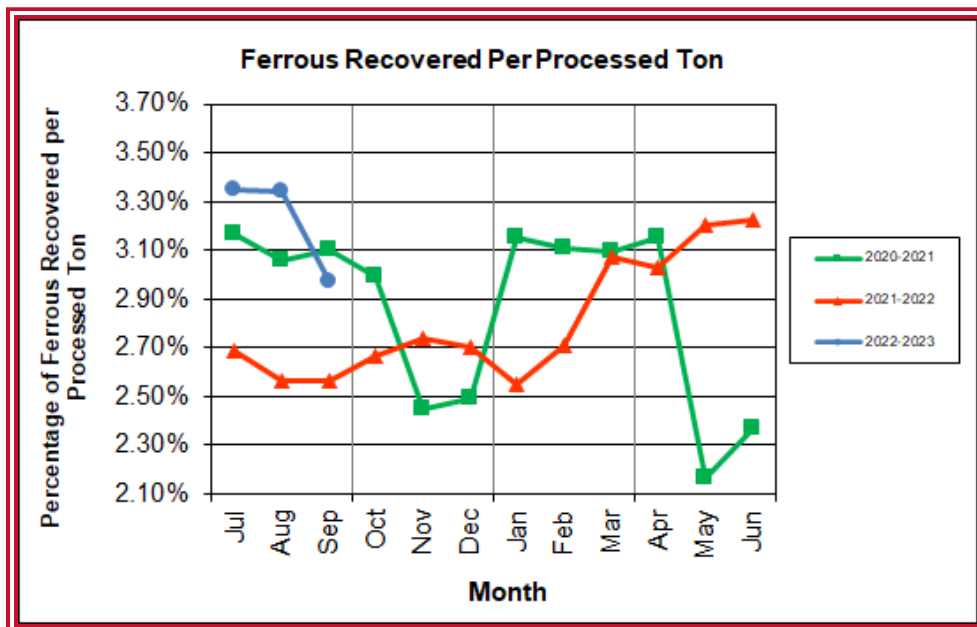
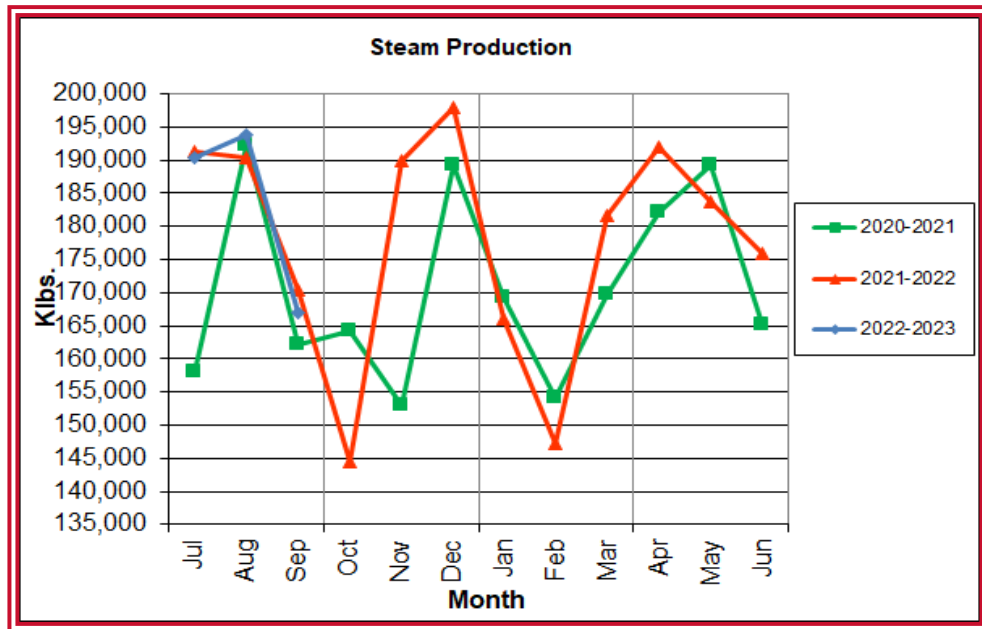


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q1FY23, 2,941 tons of ferrous metals were recovered, which is 23.3% higher than the corresponding quarter in FY22 and equivalent to 3.2% of processed waste. In May 2021, the ferrous magnet failed and was taken out of service. The Facility installed a smaller temporary magnet that generated a lower ferrous recovery rate. In February 2022, the new magnet was installed, and ferrous recovery rates returned slightly above previous averages.

Chart 4: Steam Production



In Chart 4, the total steam production for Q1FY23 was 550,954 klbs, and slightly lower (0.2%) than the corresponding quarter in FY22. The slight decrease in steam generation is attributable to the decrease in waste heating value (1.1%) paired with more boiler downtime (205.15 additional hours).

Chart 5: 12-Month Rolling Steam Production

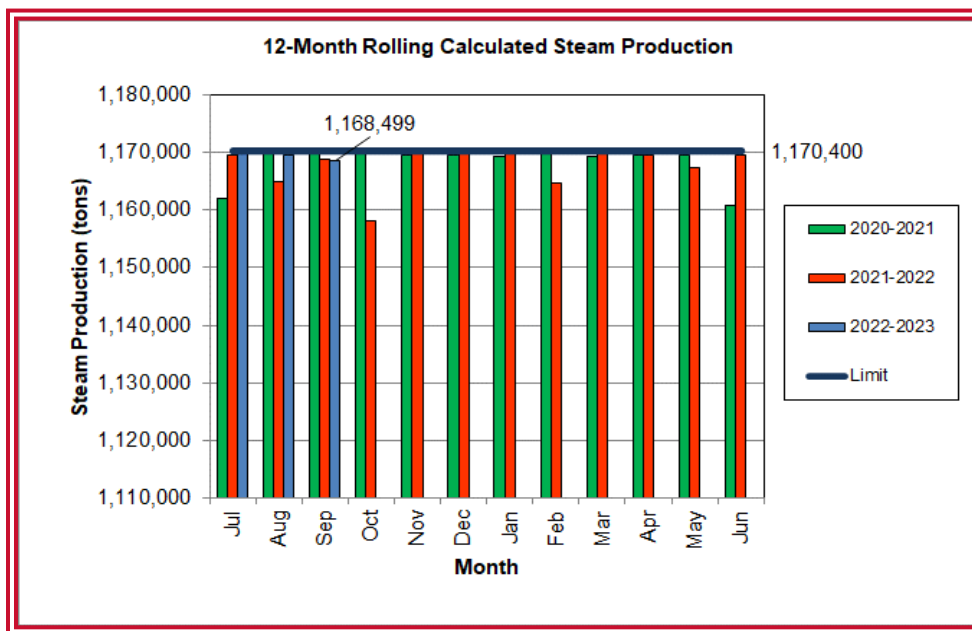
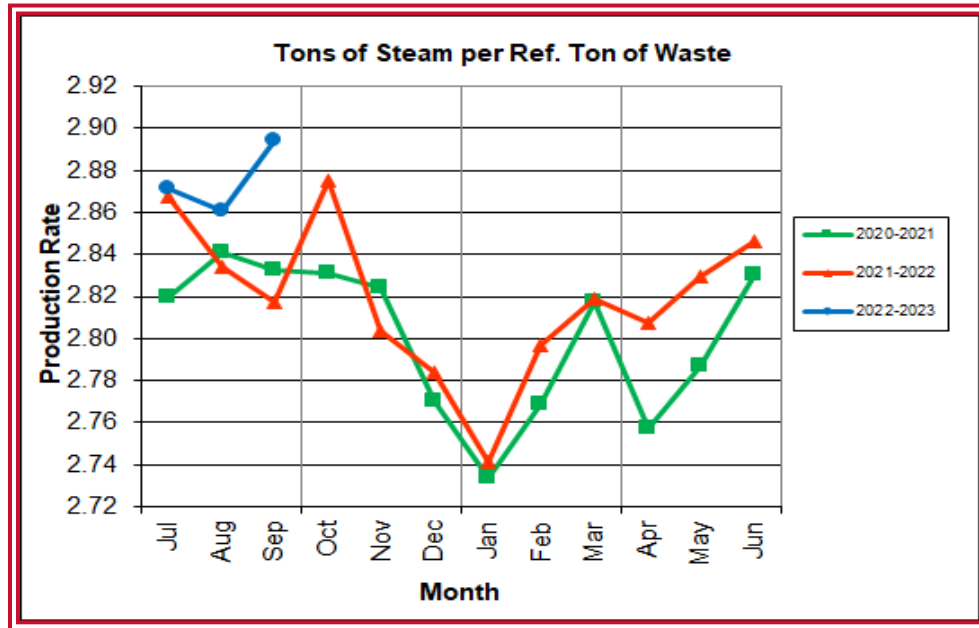


Chart 5 depicts the 12-month rolling steam production total for the quarter ending in September 2022, and for the prior two (2) fiscal years. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons based on an average value of 3.34 lbs. of steam per lb. of MSW processed, calculated monthly as the sum of each consecutive 12-month period. The Facility complied with the 12-month rolling steam production total every month in Q1FY23. The 12-month rolling total for steam production ending in September 2022 was 1,168,499 tons which is 99.8% of the limit. Chart 5 shows that Facility throughput, and in turn, steam and electricity production are being throttled to stay slightly below the steam production permit limitation each 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 Q1FY23, this metric tracked higher (1.2%) at 2.87 tons_{Steam}/ton_{ref} compared to the corresponding quarter in FY22. The increase in this metric indicates a slight improvement in boiler performance.

Chart 7: Calculated Waste Heating Value

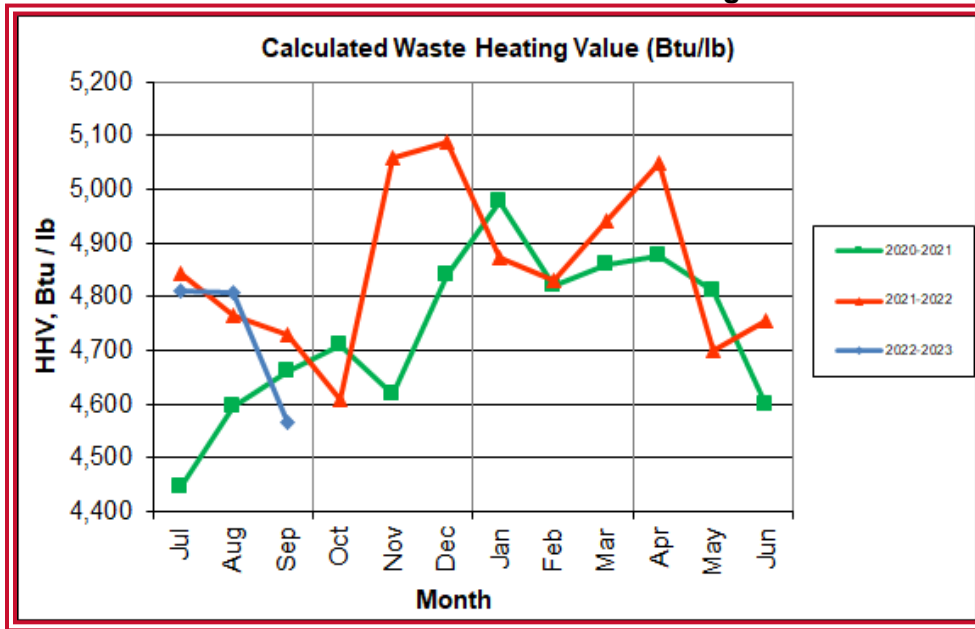


Chart 7 illustrates that Q1FY23 calculated average waste heating value was slightly lower (1.1%) at 4,727 Btu/lb than the corresponding quarter in Q1FY22, which averaged 4,780 Btu/lb. Note that 12.1¹ inches of precipitation were recorded at Ronald Reagan National Airport, which is 30.3% lower than the corresponding quarter in FY22, however, minimally impacted the average quarterly 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)
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
Q1FY22	Quarterly Totals	91,485	0	19,845	1,945	2,385	552,108	37,600
	July – 21	30,993	0	6,649	688	833	191,289	13,000
	August – 21	31,713	0	6,876	778	814	190,385	12,998
	September – 21	28,779	0	6,320	479	738	170,434	11,602
Q1FY23	Quarterly Totals	91,131	0	17,655	2,135	2,941	550,954	39,072
	July – 22	31,004	0	6,032	656	1,038	190,292	14,748
	August – 22	31,701	0	6,274	797	1,058	193,697	13,305
	September – 22	28,426	0	5,349	682	845	166,965	11,019
FY23 YTD Totals		91,131	0	17,655	2,135	2,941	550,954	39,072
FY22 YTD Totals		91,485	0	19,845	1,945	2,385	552,108	37,600
FY21 YTD Totals		89,106	0	18,068	2,757	2,768	512,284	34,846

Table 2 presents the production data provided to HDR by CAAI for Q1FY23 on both a monthly and quarterly basis. For purposes of comparison, data for Q1FY21 and Q1FY22 are shown, as well as FY21, FY22 and FY23 year to date (YTD) totals.

In comparing quarterly totals, the data shows:

- Slightly Less waste was processed in Q1FY23 than Q1FY22, and more than Q1FY21
- Less steam was generated in Q1FY23 than Q1FY22, and more than Q1FY21
- More electricity (net) was generated in Q1FY23 than Q1FY22 and Q1FY21
- More supplemental waste was received in Q1FY23 than Q1FY22 and less than Q1FY21

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 an annual rolling average, evaluated monthly.

Table 3: Waste Delivery Classification

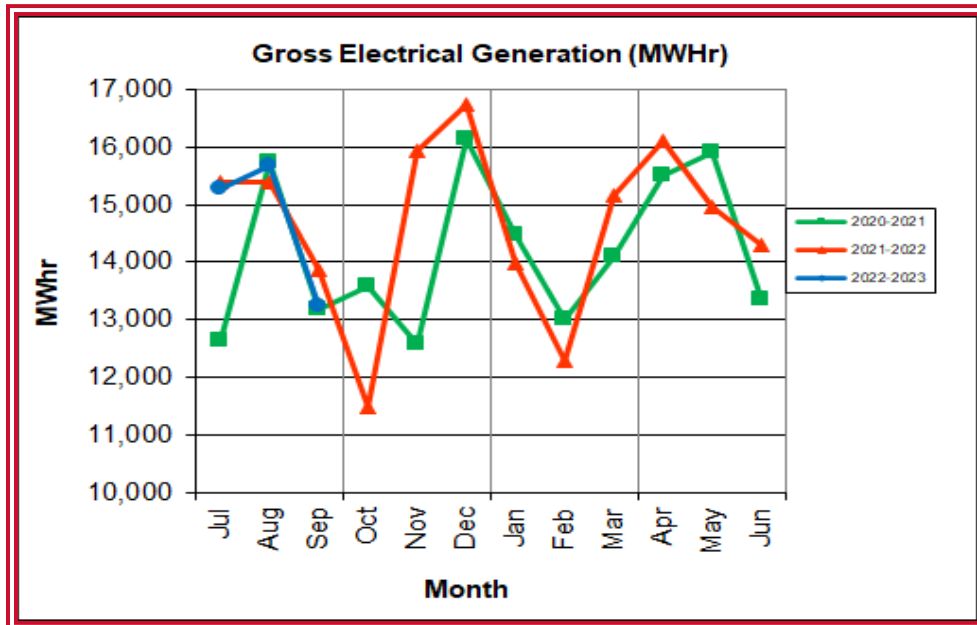
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY19	City Waste	1,848	1,836	1,823	1,996	1,892	1,732	1,823	1,458	1,614	2,063	2,442	1,882	22,409	6.43%
	County Waste	2,560	2,798	2,554	2,656	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%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
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%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY21	City Waste	1,583	1,905	2,121	1,906	1,970	1,999	1,556	1,393	2,038	2,102	2,042	2,197	22,811	6.55%
	County Waste	2,377	2,713	2,711	2,589	2,550	2,646	2,365	2,054	2,441	2,472	2,542	2,682	30,143	8.66%
	Municipal Solid Waste	22,517	26,941	24,523	22,102	19,209	25,831	22,419	20,046	25,980	25,621	25,260	24,603	285,053	81.88%
	Supplemental Waste	691	1,139	927	1,045	930	859	895	1,070	747	653	519	641	10,117	2.91%
	MSW Totals	27,169	32,698	30,282	27,642	24,659	31,336	27,234	24,562	31,207	30,848	30,363	30,123	348,124	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY22	City Waste	1,853	2,080	2,042	1,855	2,002	1,914	1,628	1,570	1,900	1,895	2,107	2,203	23,049	6.58%
	County Waste	2,516	2,403	2,457	2,184	2,463	2,489	2,232	2,192	2,519	2,394	2,761	2,717	29,326	8.38%
	Municipal Solid Waste	24,682	26,646	25,378	24,682	26,646	25,378	19,376	23,834	27,424	24,212	19,114	23,465	25,745	83.01%
	Supplemental Waste	688	778	479	688	778	479	514	534	499	448	349	626	685	2.03%
	MSW Totals	29,740	31,907	30,356	29,740	31,907	30,356	23,929	28,832	32,326	28,520	23,225	28,510	30,719	100.00%
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY23	City Waste	1,841	2,020	1,874											6.43%
	County Waste	2,339	2,471	2,454											8.15%
	Municipal Solid Waste	24,434	25,937	23,660											83.03%
	Supplemental Waste	656	797	682											2.39%
	MSW Totals	29,270	31,224	28,670											100.00%

Chart 8: Cumulative Total Waste Delivery



As depicted in Table 3 and Chart 8, through Q1FY23, cumulative total waste delivery was 2.0% lower compared to Q1FY22.

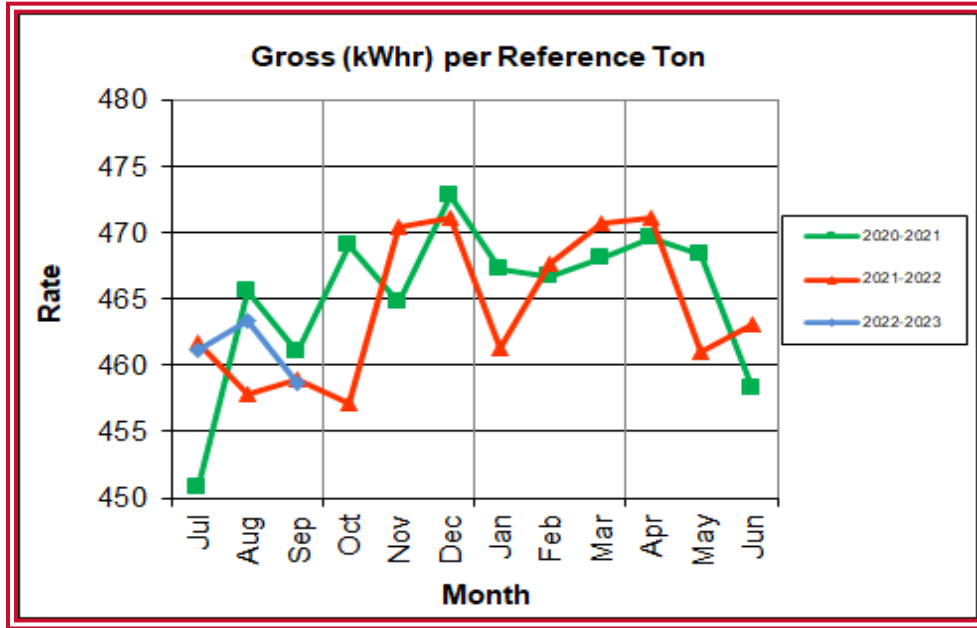
Chart 9: Gross Electrical Generation



During Q1FY23, the Facility generated 44,199 MWhrs (gross) of electricity compared to Q1FY22 generation of 44,659 MWhrs (gross), a 1.0% decrease. The decrease in electricity generated (gross) in Q1FY23 is attributable to the decrease (0.2%) in steam production and more turbine generator downtime (136.0 additional

hours). Note that Turbine Generator No. 2 experienced 148.0 hours of downtime for scheduled maintenance in September 2022.

Chart 10: Gross Conversion Rate



As shown in Chart 10, the average gross electrical generation per reference ton of refuse processed during Q1FY23 was 459 kWhr, which is slightly higher (less than 0.1%) than the corresponding quarter in FY22. 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

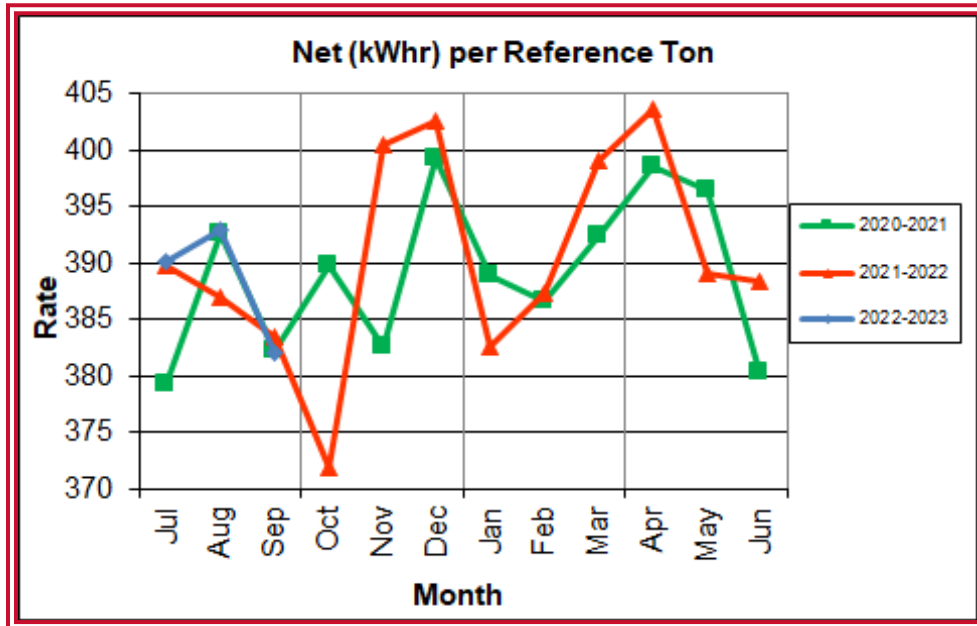


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q1FY23, the average net electrical generation per reference ton was 388 kWhr, which is 0.4% higher than the corresponding quarter in FY22.

Chart 12: Net Conversion Rate

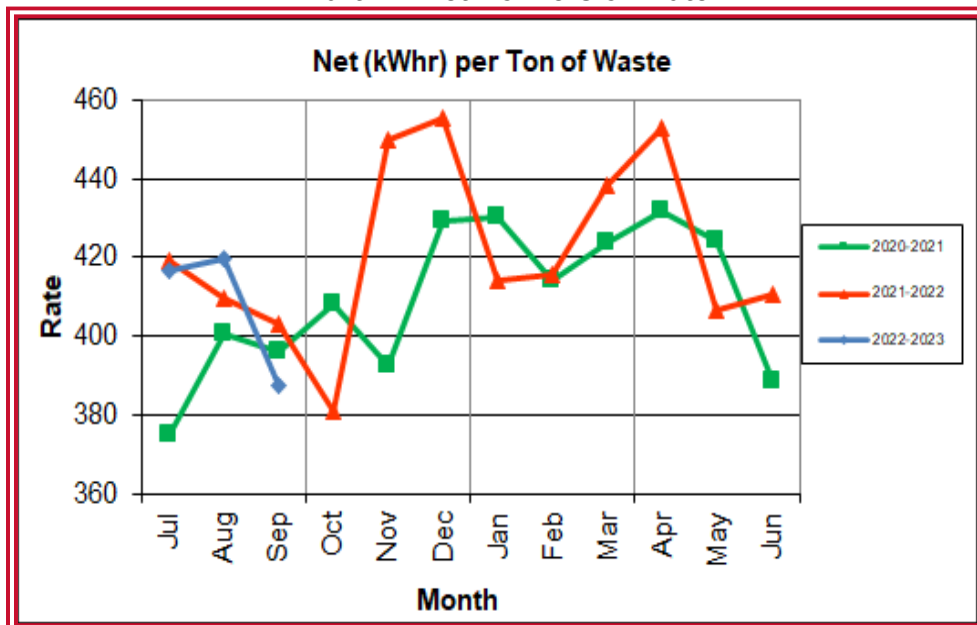


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q1FY23 was 408 kWhr, which is 0.7% lower than the corresponding quarter.

Chart 13: Gross Turbine Generator Conversion Rate

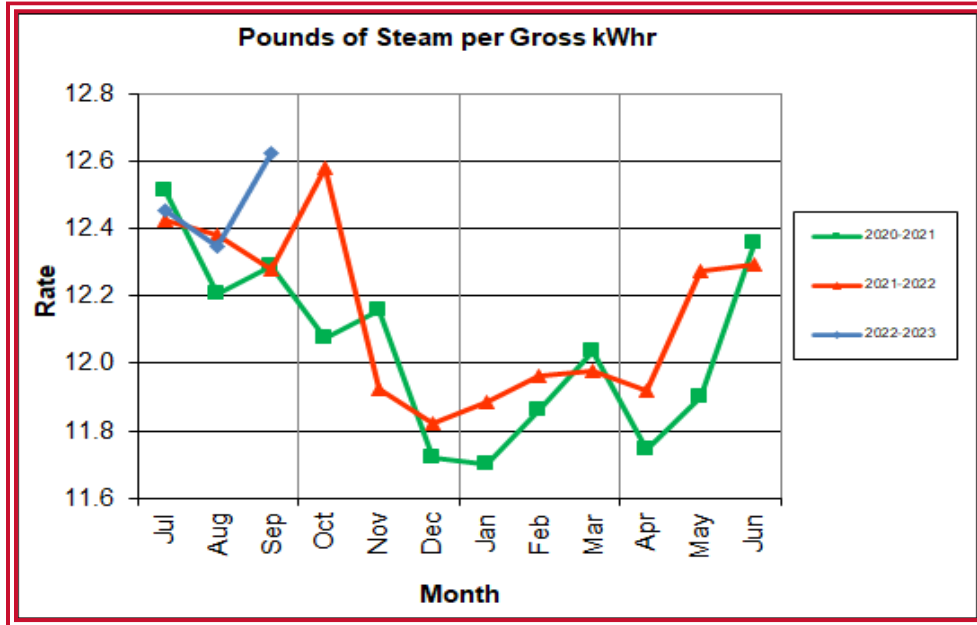


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q1FY23 the average pounds of steam consumed per gross kWhr generated was 12.5, which is 0.8% higher (less efficient) than the corresponding quarter Q1FY22. The 3-year high in September 2022 is attributable to downtime associated with the Turbine Generator No. 2 Overhaul which commenced on September 24th and continued through the end of the quarter. The average main steam temperature during the quarter was 678.4 °F, which is 0.4°F lower than the average main steam temperature of the corresponding quarter last fiscal year and 21.6°F lower than 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	Q1FY23 Total	Q1FY22 Total	Q1FY23 "Per Processed Ton" Consumption	Q1FY22 "Per Processed Ton" Consumption
Purchased Power	MWhr	5,395	5,496	0.0592	0.0586
Fuel Oil	Gal.	20,220	12,380	0.22	0.08
Boiler Make-up	Gal.	1,710,000	1,458,000	18.76	13.96
Cooling Tower Make-up	Gal.	45,868,499	46,860,999	503.32	472.36
Pebble Lime	Lbs.	1,690,000	1,666,000	18.54	18.10
Ammonia	Lbs.	165,000	205,000	1.81	1.96
Carbon	Lbs.	78,000	78,000	0.86	0.83

Fuel oil usage during the quarter represents approximately 0.34% of the total heat input to the boilers, which compares favorably with industry averages, and is slightly higher than the 0.21% of total heat input in Q1FY22. 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 2.6% of steam flow, which is slightly higher than the boiler makeup in Q1FY22 which was 2.2% of steam flow. Higher boiler makeup quantities are indicative of increased steam leakage, and the improvement in this metric indicates that the substantial leaks have been corrected. Pebble lime usage, at 1,690,000 lbs. is higher (1.4%) than the corresponding quarter last year.

In comparing Q1FY23 to Q1FY22 on a per processed ton consumption basis:

- the purchased power consumption rate was 1.8% lower
- the total fuel oil consumption rate was 63.3% higher
- the boiler make-up water consumption rate was 17.3% higher
- the cooling tower make-up water consumption rate was 2.1% lower
- the total pebble lime consumption rate was 1.4% higher
- the ammonia consumption rate was 19.5% lower
- the carbon consumption rate was the same

The significant increase in fuel oil consumption was attributable to the 11 instances of downtime that occurred during the quarter. The significant decrease in ammonia consumption rate was reported by CAAI to be attributed to the newly implemented low NOx system.

4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents and two (2) First Aid Accidents during Q1FY23. CAAI reports that the first incident occurred in July when an employee was burned from their arm touching a steam pipe. The second instance was in August when an employee got debris in their eye. CAAI has operated 169 days without an OSHA recordable accident as of September 30, 2022. Safety and Environmental training were conducted with themes as follows:

July 2022

- Safety:
 - Fall protection and Hazcom
- Environmental:
 - Opacity and Plumes
 - Ash Pit

August 2022

- Safety:
 - Respiratory Protection
- Environmental:
 - Environmental Compliance Operational Manual Annual review
 - Minimizing nuisance conditions
 - Waste inspections

September 2022

- Safety:
 - Fire extinguisher use
- Environmental:
 - Environmental Compliance Operational Manual Annual review
 - Regulatory inspections
 - Air pollution 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 July 12, 2022, Boiler No. 1 experienced 66.8 hours of downtime for a scheduled boiler cleaning outage. Beginning September 6, 2022, Boiler No. 3 experienced 76.0 hours of downtime for a scheduled boiler cleaning outage. Beginning September 24, 2022, Boiler No. 2 experienced 100.0 hours of downtime for a scheduled boiler cleaning outage. In addition to the scheduled outages, CAAI reports that 1,371 preventative maintenance actions were completed during the quarter.

Beginning on September 24, Turbine Generator No. 2 experienced 148.0 hours of downtime for scheduled maintenance. Significant maintenance items completed during the outage will be reported in the forthcoming Q2FY23 report.

5.1 Availability

Facility availabilities for Q1FY23 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q1FY23 were 94.6%, 94.2%, and 95.4%, respectively. The three-boiler average availability during the quarter was 94.7%, which is excellent. Note that the boilers experienced no standby time during the quarter.

According to CAAI reports, the average unit availabilities for Turbine Generator Nos. 1 and 2 for Q1FY23 were 100.0% and 93.1%, respectively. The average turbine generator availability of 96.6% was negatively impacted by the scheduled maintenance performed on Turbine Generator No. 2 during September 2022. Note that no standby time was experienced by the turbine generators during the quarter.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY23 Average
Boiler No. 1	94.6%
Boiler No. 2	94.2%
Boiler No. 3	95.4%
Avg.	94.7%
Turbine No. 1	100.0%
Turbine No. 2	93.1%
Avg.	96.6%

Table 6: Boiler Downtime – Q1FY23

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	7/12/22	7/15/22	66.8	Scheduled	Scheduled Cleaning Outage
3	8/3/22	8/4/22	14.2	Unscheduled	Atomizer repairs and motor starter replacement
2	8/4/22	8/5/22	10.3	Unscheduled	Superheater safety repairs
2	8/28/22	8/29/22	15.0	Unscheduled	Auxiliary burner system issues
3	9/6/22	9/10/22	76.0	Scheduled	Scheduled Cleaning Outage
3	9/11/22	9/11/22	8.7	Unscheduled	Waterwall failure
1	9/19/22	9/20	28.3	Unscheduled	Waterwall tube failure unprotected
1	9/23/22	9/23/22	24.0	Unscheduled	UFA fan motor replacement
2	9/24/22	9/28/22	100.0	Scheduled	Scheduled Maintenance Outage
2	9/30/22	9/30/22	0.5	Unscheduled	Ash discharger pluggage
1	9/30/22	9/30/22	0.5	Unscheduled	Ash discharger pluggage
Total Unscheduled Downtime				101.5 Hours	
Total Scheduled Downtime				242.8 Hours	
Total Standby Downtime				0.0 Hours	
Total Downtime				344.3 Hours	

Table 7: Turbine Generator Downtime – Q1FY23

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	9/24/22	9/30/22	148.0	Scheduled	Scheduled Turbine Outage
Total Unscheduled Downtime				0.0 Hours	
Total Scheduled Downtime				148.0 Hours	
Total Standby Downtime				0.0 Hours	
Total Downtime				148.0 Hours	

5.2 Facility Housekeeping

CAAI is performing Facility housekeeping and maintaining plant cleanliness in accordance with acceptable industry practices. A site walkdown was conducted in November 2022. At the time of the walkdown, new deficiencies were recorded, and

prior deficiencies were given a status update. Photos of interest from the walkdown are depicted in Appendix B. The Facility housekeeping ratings from the November 2022 walkdown are presented in Table 8.

Table 8: Facility Housekeeping Ratings – November 2022

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 Q1FY23 are summarized in Appendix A. The Facility experienced one (1) permit deviation during Q1FY23 on August 28, 2022, when Boiler No. 2 4-hour Carbon Monoxide limit reached 182 ppm (100 ppm limit). CAAI attributed the permit deviation to a malfunction of the auxiliary burner and water jacket failure. As of September 30, 2022, the Facility operated 31 days without an environmental excursion.

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. LN™

Technology has been installed on Boiler Nos. 1 and 2, with Boiler No. 1 operating under the lower NO_x limits of 110 ppm (24 hr) and 90 ppm (annual rolling average) since June 2021, and Boiler No. 2 since June 2020. In December 2021 CAAI provided VADEQ a notification letter that the Boiler No. 3 LNTM Technology retrofit was underway. Boiler No. 3 completed its period of calibration and optimization on June 29, 2022 and CAAI submitted a letter to VADEQ on June 30, 2022, that the system optimization was complete and that it is now operating under the lower NO_x limits of 110 ppm (24 hr. average) and 90 ppm (annual rolling average).

6.2 Nitrogen Oxide Emissions

During Q1FY23, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 87.8 ppm, 88.0 ppm, and 86.7 ppm for Boiler Nos. 1, 2, and 3, respectively. As previously mentioned, the LNTM Technology has been fully implemented on all boilers and the Facility is now operating under the lower NO_x limits of 110 ppm (24 hr) and 90 ppm (annual rolling average) as of July 1, 2022. In comparing Q1FY23 to the corresponding quarter last year, ammonia usage decreased 19.5%.

6.3 Sulfur Dioxide Emissions

During Q1FY23 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 1.0 ppm, 1.0 ppm, and 0.7 ppm for Boiler Nos. 1, 2, and 3, respectively. All these stack SO₂ concentrations are significantly below the permit limit of 29 ppm @ 7% O₂.

6.4 Carbon Monoxide Emissions

During Q1FY23, the monthly average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 26.0 ppm, 26.0 ppm, and 22.0 ppm, respectively, and all are well within permit limits (100 ppmdv, 4-hour average).

6.5 Opacity

During Q1FY23, the average opacity on Boiler Nos. 1, 2, and 3 were 0.2%, 0.6%, and 1.4%, respectively, which are all significantly below the 10% (6-minute) average permit limit.

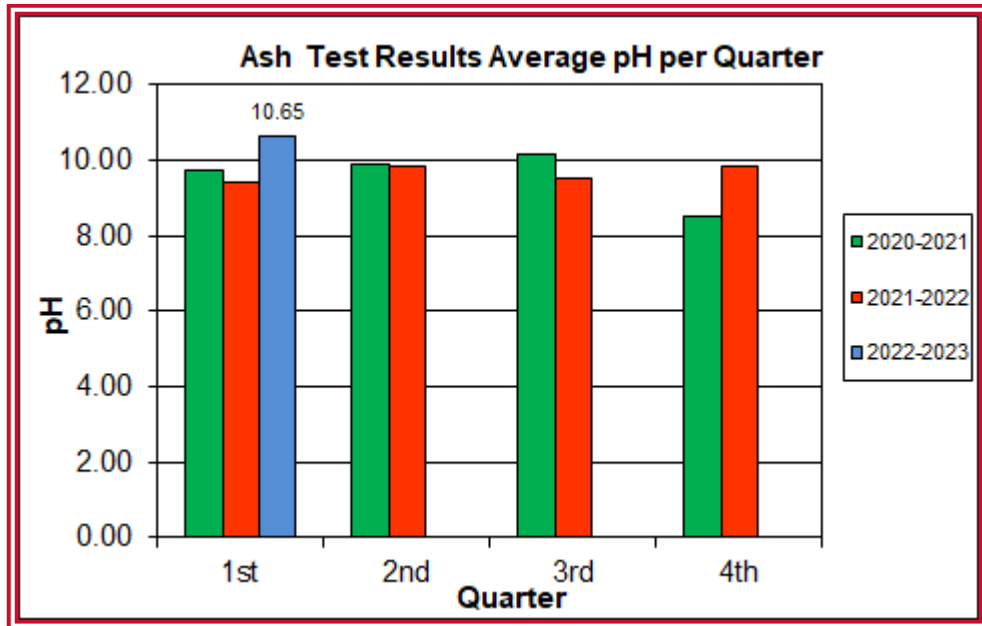
6.6 Daily Emissions Data

Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q1FY23. Excursions 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

The desired ash pH level ranges from 8.0 to 11.0. Toxicity Characteristic Leaching Procedure (TCLP) tests were not performed during the quarter. However, in addition to semi-annual TCLP testing, CAAI also samples ash monthly in-house, and documents pH reading and adjusts lime feed rate as needed. 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 Q1FY23, the average ash pH for in-house tests was 10.7.

Chart 14: Quarterly Ash Test Results



APPENDIX A FACILITY CEMS DATA

Table 9: Boiler No. 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	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 - 22	AVG	87.6	33.0	1.0	29.0	88.0	0.0	300.0	12.3	4.1
	Max	90.6	81.0	4.0	51.0	91.0	0.3	301.0	13.2	4.6
	Min	83.8	12.0	0.0	18.0	87.0	0.0	299.0	12.3	3.6
Aug - 22	AVG	89.7	21.0	1.0	23.0	88.0	0.0	300.0	12.3	4.0
	Max	91.2	32.0	2.0	29.0	90.0	0.2	303.0	12.7	4.5
	Min	86.4	8.0	0.0	16.0	86.0	0.0	300.0	12.0	3.5
Sep - 22	AVG	85.0	26.0	1.0	26.0	87.0	0.5	300.0	12.2	3.9
	Max	91.5	120.0	13.0	52.0	96.0	0.9	300.0	12.2	5.6
	Min	74.7	8.0	0.0	17.0	85.0	0.0	296.0	12.2	3.0
Quarter Average		87.4	26.7	1.0	26.0	87.7	0.2	300.0	12.3	4.0
Quarter Max Value		91.5	120.0	13.0	52.0	96.0	0.9	303.0	13.2	5.6
Quarter Min Value		74.7	8.0	0.0	16.0	85.0	0.0	296.0	12.0	3.0
Limits:		99	NA	29	100	110	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: Boiler No. 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	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 - 22	AVG	87.5	40.0	1.0	24.0	88.0	0.5	299.0	12.3	4.1
	Max	91.2	51.0	3.0	32.0	90.0	0.8	300.0	13.1	4.7
	Min	84.6	25.0	0.0	16.0	87.0	0.4	298.0	12.3	3.4
Aug - 22	AVG	88.8	39.0	1.0	27.0	89.0	0.6	298.0	12.3	4.0
	Max	90.8	49.0	4.0	45.0	94.0	0.8	299.0	12.3	4.5
	Min	82.7	26.0	0.0	16.0	87.0	0.4	297.0	12.2	3.2
Sep - 22	AVG	88.7	39.0	1.0	27.0	87.0	0.7	297.0	12.3	3.8
	Max	91.6	74.0	7.0	41.0	90.0	1.0	298.0	12.4	4.6
	Min	74.4	20.0	0.0	17.0	86.0	0.3	295.0	12.3	3.0
Quarter Average		88.3	39.3	1.0	26.0	88.0	0.6	298.0	12.3	4.0
Quarter Max Value		91.6	74.0	7.0	45.0	94.0	1.0	300.0	13.1	4.7
Quarter Min Value		74.4	20.0	0.0	16.0	86.0	0.3	295.0	12.2	3.0
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: Boiler No. 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	
Jul – 22	AVG	87.8	37.0	0.0	22.0	87.0	1.6	298.0	12.3	4.2
	Max	91.5	52.0	2.0	32.0	88.0	1.8	298.0	13.1	4.7
	Min	82.2	26.0	0.0	17.0	85.0	1.2	297.0	12.1	3.6
Aug – 22	AVG	85.2	30.0	1.0	22.0	88.0	1.8	298.0	12.2	3.8
	Max	89.4	47.0	10.0	32.0	89.0	2.0	304.0	12.5	4.5
	Min	75.3	20.0	0.0	15.0	83.0	1.5	293.0	12.1	1.6
Sep – 22	AVG	86.5	42.0	1.0	22.0	85.0	0.8	298.0	12.2	3.9
	Max	92.4	73.0	5.0	29.0	94.0	2.1	298.0	12.3	4.7
	Min	71.5	26.0	0.0	10.0	77.0	0.4	296.0	12.2	3.3
Quarter Average		86.5	36.3	0.7	22.0	86.7	1.4	298.0	12.2	4.0
Quarter Max Value		92.4	73.0	10.0	32.0	94.0	2.1	304.0	13.1	4.7
Quarter Min Value		71.5	20.0	0.0	10.0	77.0	0.4	293.0	12.1	1.6
Limits:		98	NA	29	100	110	10	329	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



Figure 1: Martin stoker system



Figure 2: Ash material vibrating conveyor



Figure 3: Refuse pit



Figure 4: Boiler feedwater pumps



Figure 5: Lime slurry pumps



Figure 6: Lime slaker

Figure 7: Martin stoker system



Figure 8: TG-2 disassembled for bearing damage – Turbine casing open and rotor removed

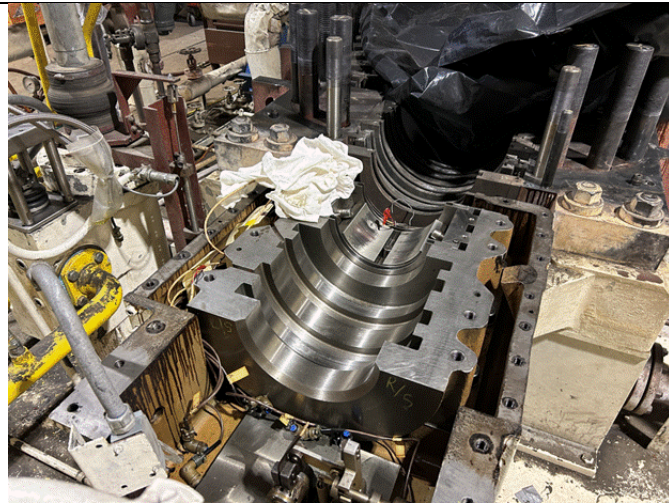


Figure 9: TG-2 disassembled for bearing damage – bearing housing

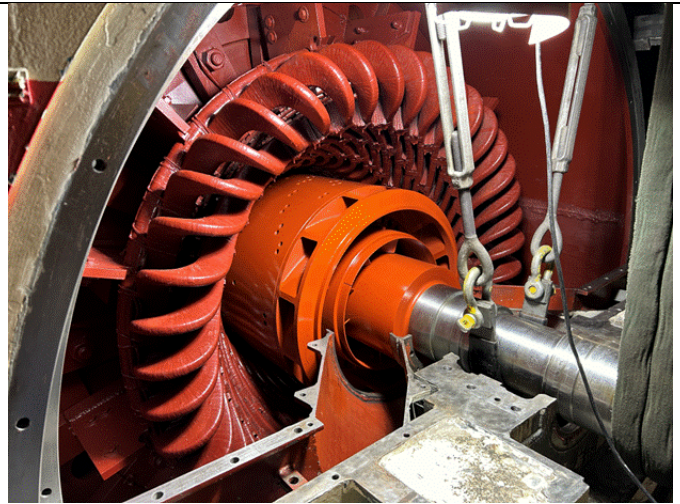


Figure 10: TG-2 disassembled for bearing damage – Generator re installed



Figure 11: Pavement refurbished on the North side of the Facility.



Figure 12: Cooling Tower packing material on-site for replacement.



Figure 13: Leak on process pipe under platform grating.



Figure 14: Bollard damaged on West side of Facility access roadway.



Figure 15: Temporary pump set up to transport wastewater from the trench drains to the Cooling Tower basin



Figure 16: Temporary hoses set up to transport wastewater from the trench drains to the Cooling Tower basin



Figure 17: Boiler building exhaust fan above Boiler No. 3 not operational.

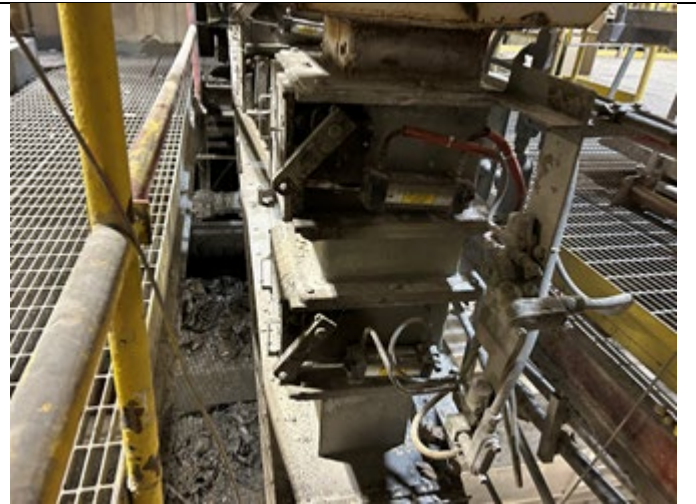


Figure 18: Ash hopper double dump valves not operational (Boiler No. 2 gen. bank hopper)