



Alexandria Arlington Resource Recovery Facility

**Fiscal Year 2023
Annual Operations Report**

August 2023

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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 Annual 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 fourth quarter of the 2023 Fiscal Year and summarizes Facility operations between April 1, 2023 and June 30, 2023, as well as the entire fiscal year. This report identifies the fiscal year beginning on July 1, 2022 as FY23 and the quarter beginning on April 1, 2023 as Q4FY23.

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 Q4FY23. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. The Facility experienced no reportable environmental excursions during the quarter.

During Q4FY23, the boilers experienced two (2) instances of scheduled downtime totaling 108.8 hours and five (5) instances of unscheduled downtime totaling 67.5 hours. The turbine generators experienced one (1) instance of scheduled downtime totaling 14.8 hours, and two (2) instances of unscheduled downtime totaling 0.8 hours during the quarter. A detailed listing of downtime is provided in Section 5.1 of this report.

Average waste processed during the quarter was 996.5 tons per day, or 102.2% of nominal facility capacity. Waste deliveries averaged 1,018.9 tons per day, which is higher (2.2%) than the burn rate.

During FY23, average waste processed was 959.3 tons per day, or 98.4% of nominal facility capacity of 975 tons per day. Annual waste deliveries averaged 961.8 tons per day, which is 0.3% more than the annual burn rate. The annual capacity utilization of 98.4% compares very favorably to industry averages.

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.

Compared to the corresponding quarter in FY22, during Q4FY23 MSW processed was slightly lower (0.1%), steam production increased (2.8%), and electricity generated (gross) slightly increased (0.7%). The increase in steam generation is attributable to the increase in waste heating value (2.7%) offset by more boiler downtime. The increase in electricity generated (gross) in Q1FY23 is attributable to the higher (2.8%) steam production paired with less Turbine Generator (TG) downtime.

During FY23, MSW processed was nearly identical (decreasing less than 0.1%), steam production increased 2.1%, and electricity generated (gross) decreased 2.7% compared to FY22. The increase in steam generation is attributable to the increase in the waste heating value and boiler steam production rate (which was 1.5% higher in FY23). The decrease in electrical generation is attributable to the Turbine-Generator No. 2 overhaul causing more turbine-generator downtime hours compared to FY22.

3.0 Facility Inspection and Records Review

In August 2023, 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	Insulation and lagging damaged/deteriorated around Boiler No. 3 Steam Drum	February 2021	C	Replace insulation and lagging	Status Unchanged	Open
8	Baghouse No. 3 hopper heaters set to manual; heater off but signaling low temperature	February 2021	B	Repair hopper heaters	Status Unchanged	Open
9	Feed Chute Cooling Jacket Water Level Boxes empty on Boilers No. 1 and No. 2	May 2021	B	Repair feed chute cooling jacket water level boxes	Boiler No. 3 has been addressed. Boiler no. 1 has been added.	Open
10	Uneven water flow from Cooling Tower nozzle/distribution on southeast side of tower	August 2021	C	Repair nozzle	Status Unchanged	Open
11	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
12	overhead lights (typical of 5 or more), on Tipping Floor, are out.	February 2022	C	Replace light bulb.	Status Unchanged	Open
13	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	Consider a permanent pump installation in lieu of temporary.	Status Unchanged	Open
14	A roadway bollard is damaged, near the stack on the west side of the Facility's access road.	November 2022	C	Replace bollard.	During HDR's August site visit, this item has been addressed.	Closed
15	Roof ventilation fan above Boiler No. 1 is not operational.	May 2023	C	Repair fan.	During HDR's August site visit, this item has been addressed.	Closed
16	There is a small section of building siding missing on the east side (near the Tipping Floor entrance).	May 2023	C	Repair/Replace siding.	Status Unchanged	Open
17	Grounding on Southwest corner of Cooling Tower not secured.	May 2023	B	Repair grounding wire.	Status Unchanged	Open

Item No.	Inspection Report Deficiencies	Issue Reported	Priority*	HDR Recommendation	Status	Open / Closed
18	There is a hole in stairs near Boiler No. 1 grate system. The area has been caution taped off.	May 2023	C	Repair stairs.	During HDR's August site visit, this item has been addressed.	Closed
19	There is caution taped wrapped around a section of stairs on the Cooling Tower staircase.	August 2023	C	Address the issue on the stairs.	During HDR's August site visit, this item was observed.	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 90,682 tons of MSW were processed during Q4FY23, and a total of 92,717 tons of MSW including 1,972 tons of Special Handling Waste (2.1% by weight) were received. Total ash production during the quarter was 18,113 tons, which represents 20.0% of the waste processed by weight. The average uncorrected steam production rate for Q4FY23 was 3.13 tons_{steam}/ton_{waste}, which is higher (2.9%) than the corresponding quarter in FY22 and attributable to increase (2.7%) in the calculated average waste heating value.

On an annual basis, 350,146 tons of MSW were processed during FY23, and a total of 351,045 tons of MSW including 7,403 tons of Special Handling Waste (2.1% by weight) were received. Total ash production during FY23 was 70,384 tons, which represents 20.1% of the waste processed. The average uncorrected steam production rate for FY23 was 3.11 tons_{steam}/ton_{waste}, and higher (2.1%) than the prior fiscal year. The increase in this metric is attributable to the slight increase (0.7%) in the calculated average waste heating value.

Chart 1: Tons of Waste Processed

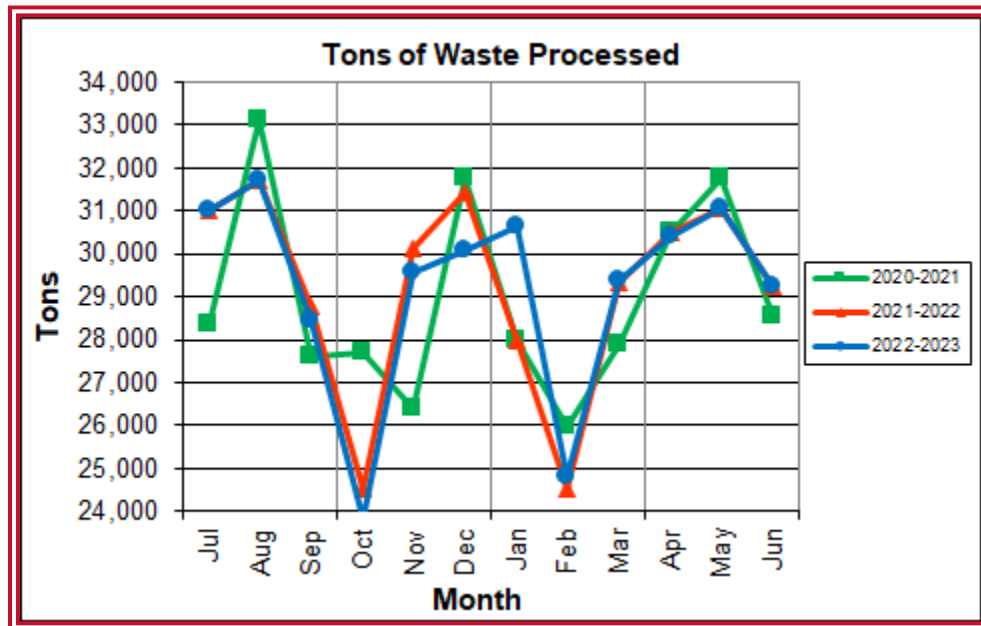


Chart 1 illustrates that Q4FY23 waste processed was slightly lower (0.1%) than the corresponding quarter, Q4FY22. CAAI reported that 552 tipping floor/MSW

internal inspections were performed during the quarter and no notices of violation (NOV) were issued to haulers.

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

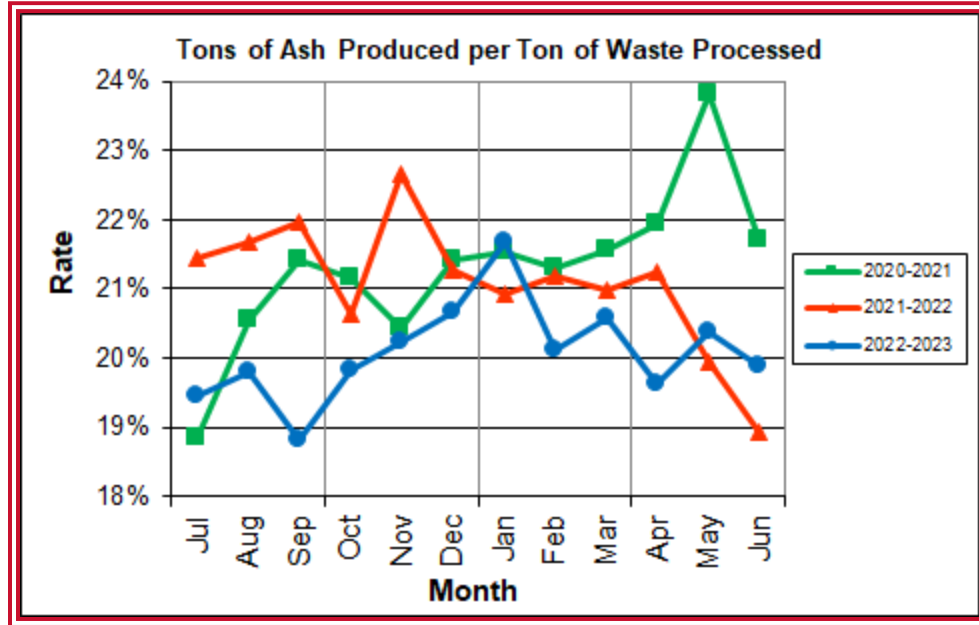


Chart 2 illustrates that the average ash production rate in Q4FY23 was slightly lower (0.1 percentage points) at 20.0% of processed waste, compared to the corresponding quarter in FY22 when the rate was 20.1%.

The annual ash production rate for FY23 was lower (1.0 percentage points) at 20.1% of processed waste, compared to FY22 when the rate was 21.1%.

Chart 3: Ferrous Recovery Rate

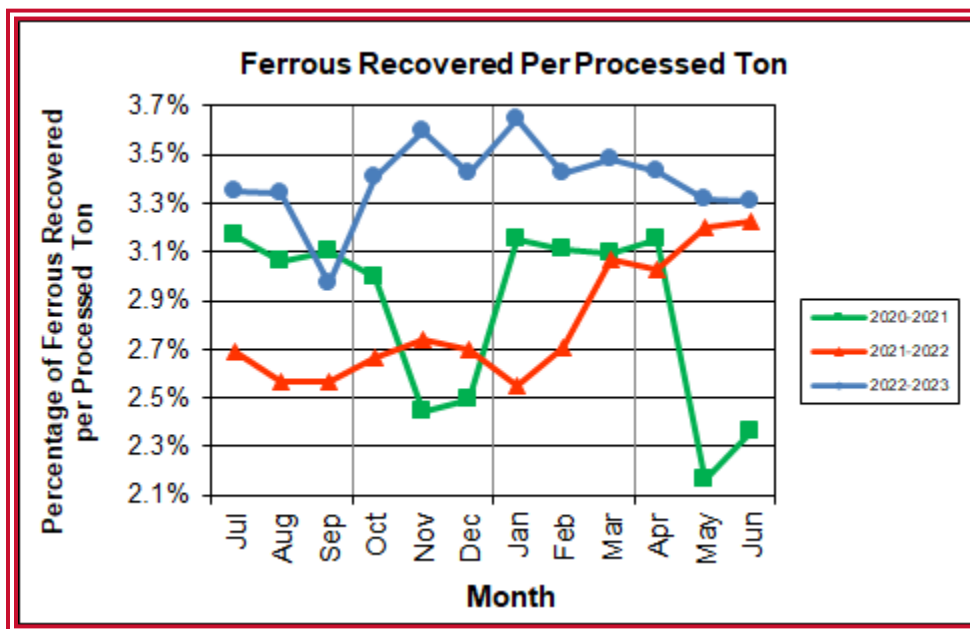
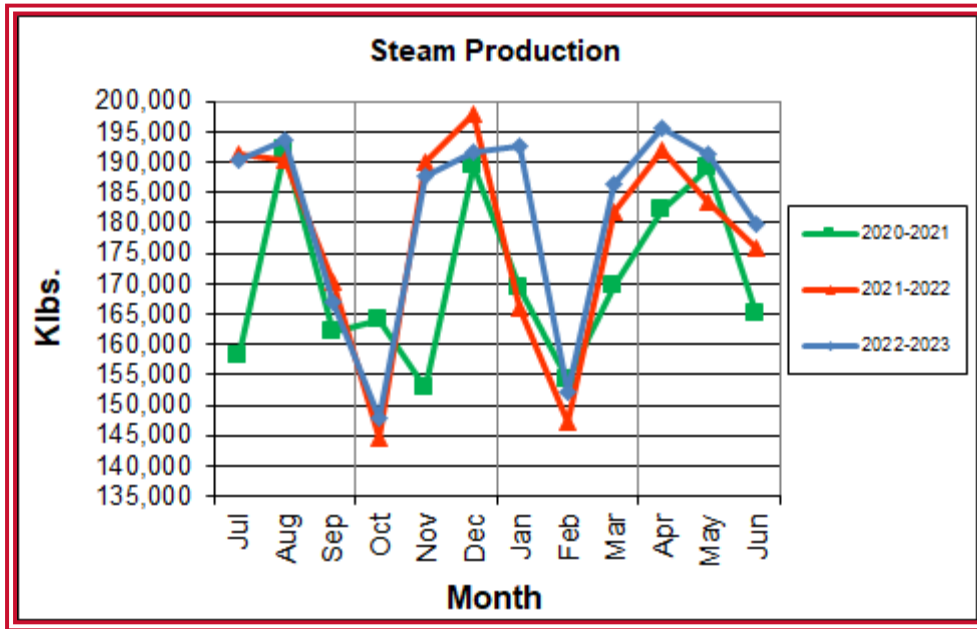


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q4FY23, 3,040 tons of ferrous metals were recovered, which is 6.2% higher than the corresponding quarter in FY22. Chart 3 illustrates that the ferrous recovery rate in Q4FY23 was 0.2 percentage points higher, at 3.4% of processed waste, compared to the corresponding quarter in FY22 when the rate was 3.2%.

In FY23, 11,874 tons of ferrous metals were recovered, which is 20.5% more than FY22 and equivalent to 3.4% of processed waste compared to 2.8% of process waste experienced in FY22. The significant increase in ferrous metals recovery is attributable to a full year of operations with the recently replaced (February 2022) ferrous drum magnet.

Chart 4: Steam Production



In Chart 4, the total steam production for Q4FY23 was 566,813 klbs, higher (2.8%) than the corresponding quarter in FY22. The increase in steam generation is attributable to the increase in waste heating value (2.7%) offset by more boiler downtime (51.1 hours).

Annual steam production for FY23 was 2,176,211 klbs. which is 2.1% higher than FY22 when 2,130,932 klbs. were produced. The increase in annual steam generation is attributable to the increase in the waste heating value and boiler steam production rate (which was 1.5% higher in FY23).

Chart 5: 12-Month Rolling Steam Production

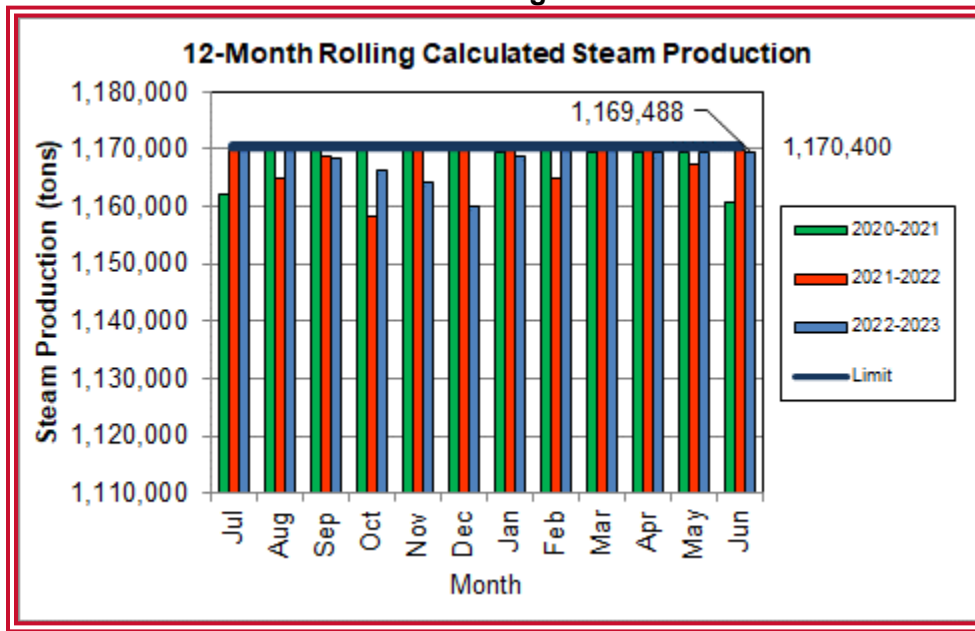
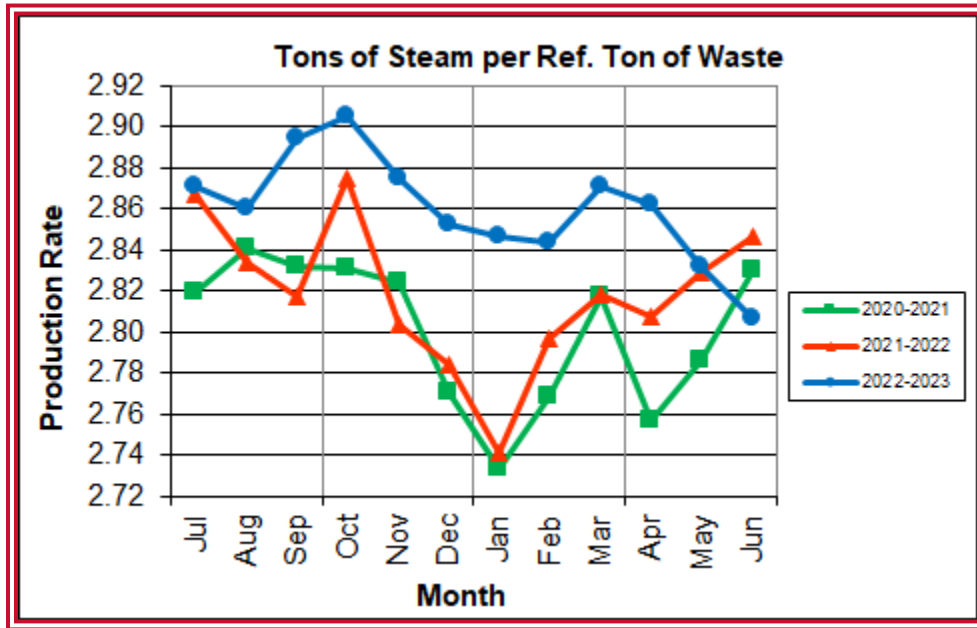


Chart 5 depicts the 12-month rolling steam production total for FY23, and for the previous two (2) fiscal years. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons based on an average value of 3.34 lbs. of steam per lb. of MSW processed, calculated monthly as the sum of each consecutive 12-month period. The Facility complied with the 12-month rolling steam production total every month in Q4FY23. The 12-month rolling total for steam production ending in June 2023 was 1,169,488 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 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 Q4FY23, this metric tracked slightly higher (0.3%) at 2.83 tons_{steam/ton_{ref}} compared to the corresponding quarter in FY22, which is indicative of slightly improved boiler performance.

The annual steam production rate for FY23 was 2.86 tons_{steam/ton_{ref}} which is higher (1.5%) than FY22. This metric tracked higher for most of FY23 and is indicative of an improvement in boiler performance when comparing FY23 to FY22.

Chart 7: Calculated Waste Heating Value

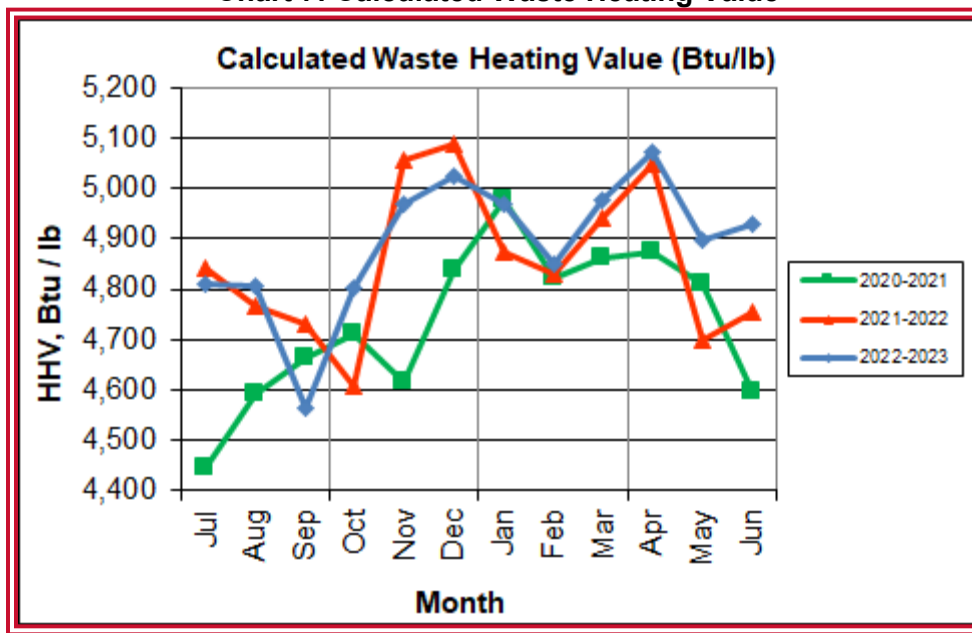


Chart 7 illustrates that Q4FY23 calculated average waste heating value was higher (2.7%) at 4,965 Btu/lb than the corresponding quarter in FY22, which averaged 4,835 Btu/lb. Note that 6.6¹ inches of precipitation were recorded at Ronald Reagan National Airport, which is 6.5 inches less than the corresponding quarter in FY22 which resulted in less moisture content in the waste and positively impacted the average quarterly waste heating value.

In FY23, the annual average waste heating value was higher (0.7%) at 4,889 Btu/lb, than FY22, which averaged 4,854 Btu/lb. Note that 33.68 inches of precipitation were recorded at Ronald Reagan National Airport in FY23 compared to 43.88 inches of precipitation in FY22 which is 10.2 inches less. The decrease in precipitation in the Washington, D.C. Area positively impacted the annual average waste heating value.

The FY23 annual average heating value of 4,889 Btu/lb is 8.6% higher than the facility design value of 4,500 Btu/lb. This disparity in average heating value of the as-fired fuel compared to the original design value established in the 1980's is one of the reasons that the annual capacity utilization is close to 100% and considerably higher than similar facilities that generally operate in the 90% range (see Section 2.0).

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)
Q4FY21	Quarterly Totals	90,784	0	20,447	1,813	2,324	536,469	37,722
	April-21	30,501	0	6,693	653	961	182,199	13,170
	May-21	31,740	0	7,560	519	688	189,168	13,459
	June-21	28,543	0	6,194	641	675	165,102	11,093
Q4FY22	Quarterly Totals	90,764	0	18,207	2,176	2,862	551,482	38,420
	April-22	30,476	0	6,478	685	924	192,018	13,800
	May-22	31,061	0	6,195	756	995	183,605	12,623
	June-22	29,227	0	5,534	735	943	175,859	11,997
Q4FY23	Quarterly Totals	90,682	0	18,113	1,972	3,040	566,813	38,547
	April-23	30,388	0	5,967	567	1,043	195,698	13,209
	May-23	31,060	0	6,331	682	1,031	191,415	13,221
	June-23	29,234	0	5,815	723	966	179,700	12,117
FY23 Totals		350,146	0	70,384	7,403	11,874	2,176,211	143,457
FY22 Totals		350,204	0	73,839	7,091	9,855	2,130,932	147,884
FY21 Totals		347,556	0	74,135	10,116	9,908	2,048,011	142,476

Table 2 presents the production data provided to HDR by CAAI for Q4FY23 on both a monthly and quarterly basis. For purposes of comparison, data for Q4FY21 and Q4FY22 are shown, as well as FY21, FY22 and FY23 year to date (YTD) totals.

In comparing quarterly totals, the data shows:

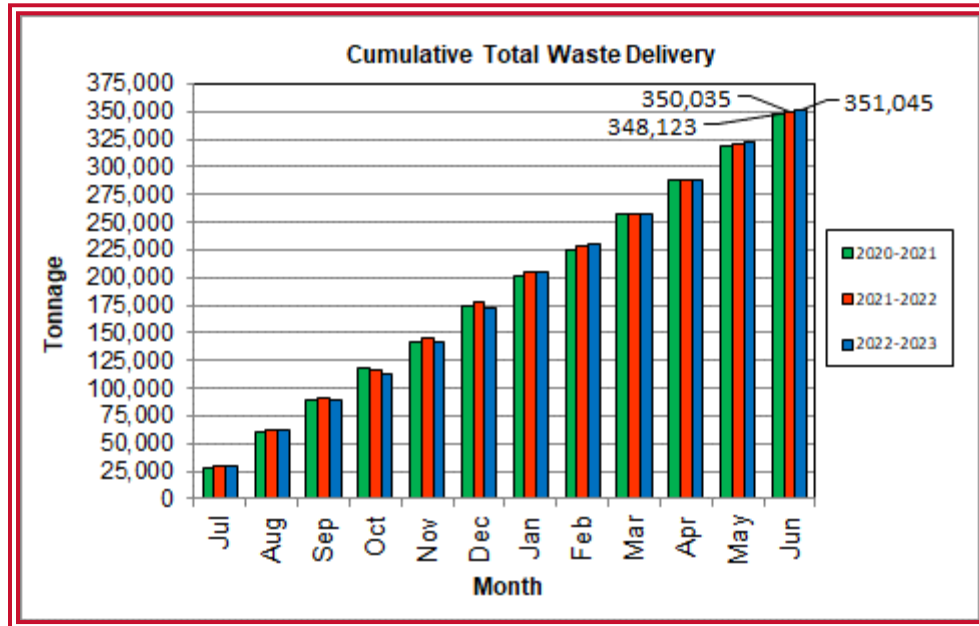
- Slightly less waste was processed in Q4FY23 than Q4FY22 and Q4FY21
- More steam was generated in Q4FY23 than Q4FY22 and Q4FY21
- More electricity (net) was generated in Q4FY23 than Q4FY22 and Q4FY21
- More supplemental waste was received in Q4FY23 than Q4FY21, but less than Q4FY22

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

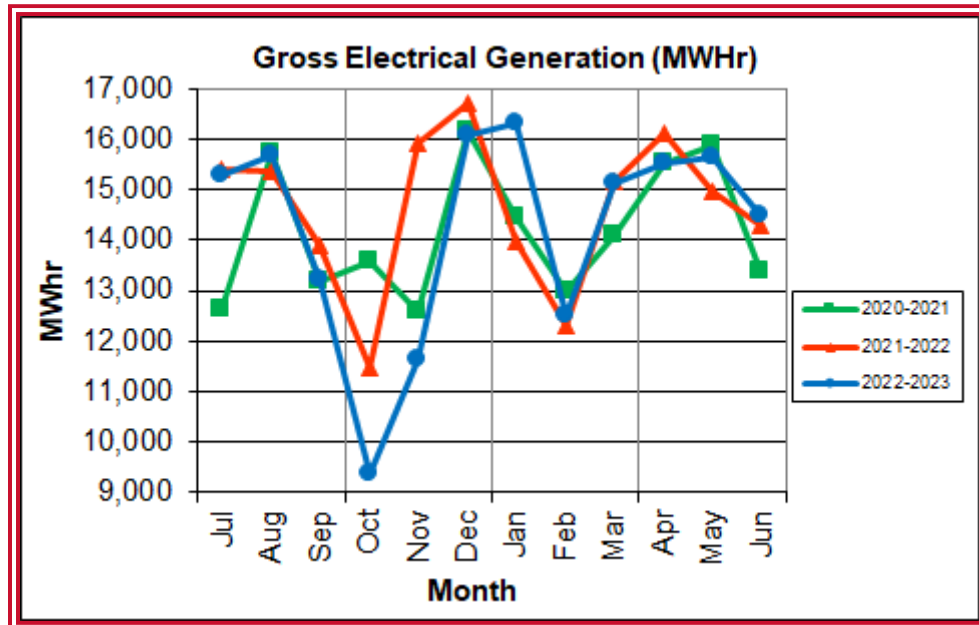
		<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Totals</u>	<u>% of Total</u>
FY19	City Waste	1,848	1,836	1,823	1,996	1,892	1,732	1,823	1,458	1,614	2,063	2,442	1,882	22,409	6.43%
	County Waste	2,560	2,798	2,554	2,656	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	29,337	8.38%
	Municipal Solid Waste	24,682	26,646	25,378	19,376	23,834	27,424	24,212	19,114	23,465	25,745	27,057	23,637	290,569	83.01%
	Supplemental Waste	688	778	479	514	534	499	448	349	626	685	756	735	7,090	2.03%
	MSW Totals	29,740	31,907	30,356	23,929	28,832	32,326	28,520	23,225	28,510	30,719	32,681	29,291	350,035	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	1,827	2,046	1,872	1,880	1,566	1,829	1,887	2,035	1,913	22,590	6.43%
	County Waste	2,339	2,471	2,454	2,188	2,448	2,333	2,453	2,092	2,444	2,104	2,656	2,571	28,552	8.13%
	Municipal Solid Waste	24,434	26,977	23,660	17,994	24,827	25,487	26,656	21,209	23,673	24,530	29,037	24,013	292,500	83.32%
	Supplemental Waste	656	797	682	444	582	537	559	592	582	567	682	723	7,403	2.11%
	MSW Totals	29,270	32,265	28,670	22,454	29,905	30,229	31,548	25,460	28,527	29,087	34,410	29,220	351,045	100.00%

Chart 8: Cumulative Total Waste Delivery



As depicted in Table 3 and Chart 8, FY23 total waste delivery was 0.3% higher compared to FY22.

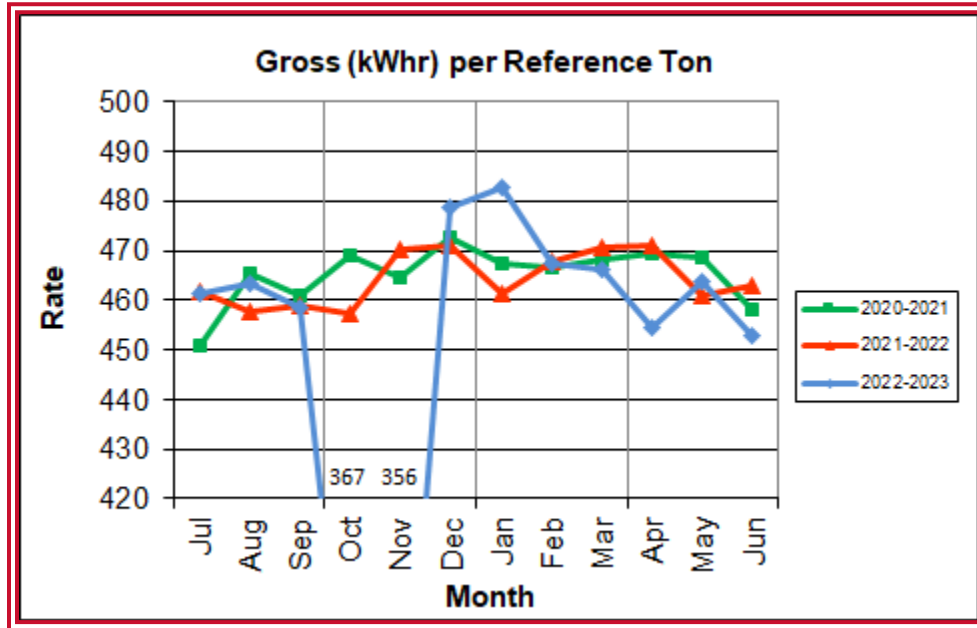
Chart 9: Gross Electrical Generation



During Q4FY23, the Facility generated 45,696 MWhrs (gross) of electricity compared to Q4FY22 generation of 45,370 MWhrs (gross), a 0.7% increase. This increase is attributable to the increase in steam production (2.1%) offset by the decrease in TG availability (9.8%)

During FY23, the Facility generated 170,899 MWhrs (gross) of electricity compared to the FY22 generation of 175,641, a 2.7% decrease. Annual electrical generation decreased in FY23 compared to FY22 due to significantly more downtime (1,472.5 additional hours) primarily attributable to the Turbine Generator No 2 overhaul which lasted 556.0 hours across September and October 2022.

Chart 10: Gross Conversion Rate



As shown in Chart 10, the average gross electrical generation per reference ton of refuse processed during Q4FY23 was 457 kWhr, which is 1.8% less than the corresponding quarter in FY22. In April, the cooling tower water failure may have contributed to the reduced gross conversion rate. In June, there was 15.5 hours of TG total downtime for troubleshooting the hotwell level control and maintenance errors which affected the gross conversion rate.

During FY23, the average gross electrical generation per reference ton of refuse processed was 448 kWhr, which is lower (3.6%) than FY22 due to the previously mentioned turbine overhaul outage.

Chart 11: Net Conversion Rate

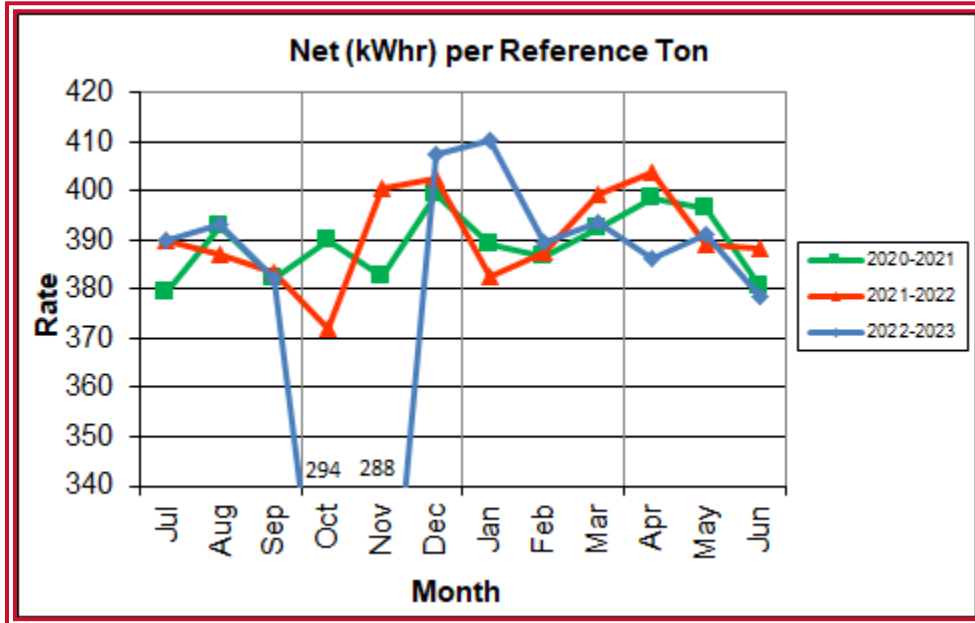


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q4FY23, the average net electrical generation per reference ton was 385 kWhr, which is 2.1% lower than the corresponding quarter in FY22.

In FY23, the average net electrical generation per reference ton was 375 kWhr, which is lower (3.9%) than FY22 primarily due to the Turbine Generator No.2 overhaul that occurred in FY23.

Chart 12: Net Conversion Rate

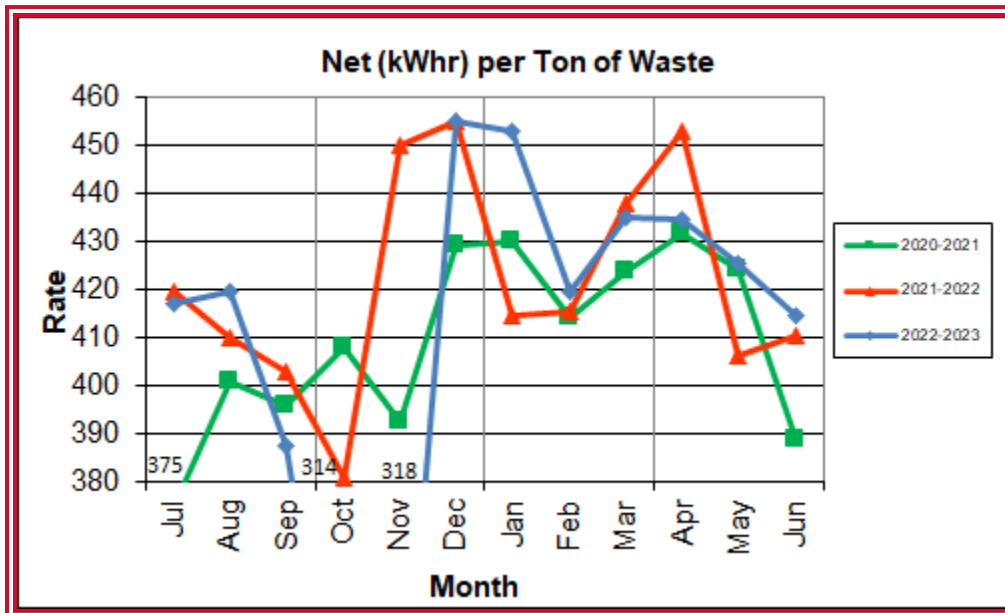


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q4FY23 was 425 kWhr, which is 0.4% higher than the corresponding quarter.

In FY23, the net electrical generation per processed ton was 408 kWhr which is 3.2% lower than FY22.

Chart 13: Gross Turbine Generator Conversion Rate

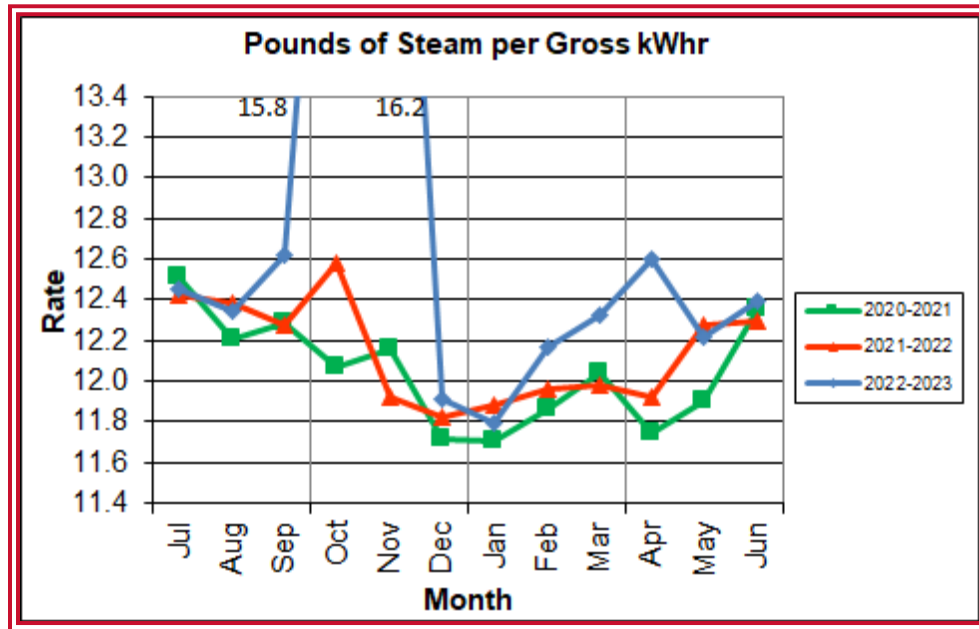


Chart 13 illustrates the quantities of steam required to generate one (1) kWhr of electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q4FY23 the average pounds of steam consumed per gross kWhr generated was 12.4, which is 2.1% higher (less efficient) than the corresponding quarter Q4FY22. The average main steam temperature during the quarter was 680.4 °F, which is 2.1°F higher than the average main steam temperature of the corresponding quarter last fiscal year and 19.6°F lower than design temperature of 700°F. Lower main steam temperature decreases power generation, all other factors being equal.

In FY23, the average pounds of steam consumed per gross kWhr was 12.7, which is 5.0% higher (less efficient) than the rate in FY22, noting that for this metric, higher steam consumption represents declined performance. There was extended

downtime for the Turbine Generator No. 2 overhaul that effected the annual performance for electric generation. The overhaul (and extended outage) accounted for 556.0 hours of the total 1,614.0 hours of scheduled and unscheduled downtime for the Turbine Generators in FY23. The average steam temperature for FY23 was 675.1°F, which is 2.9°F lower than the average main steam temperature last fiscal year and 24.9°F lower than design temperature of 700°F.

4.1 Utility and Reagent Consumptions

Table 4: Facility Utility and Reagent Consumptions

Utility	Units	Q4FY23 Total	Q4FY22 Total	Q4FY23 “Per Processed Ton” Consumption	Q4FY22 “Per Processed Ton” Consumption
Purchased Power	MW hr	-	5,363	0.00	0.06
Fuel Oil	Gal.	8,200	7,340	0.09	0.08
Boiler Make-up	Gal.	1,387,000	1,277,000	15.30	14.07
Cooling Tower Make-up	Gal.	47,315,321	43,213,595	521.77	476.11
Pebble Lime	Lbs.	1,622,000	1,656,000	17.89	18.25
Ammonia	Lbs.	169,000	179,000	1.86	1.97
Carbon	Lbs.	72,000	76,000	0.79	0.84

Fuel oil usage during the quarter represents approximately 0.14% of the total heat input to the boilers, which compares favorably with industry averages, and is slightly higher than the 0.12% of total heat input in Q4FY22. 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 2.0% of steam flow, which is slightly higher than the boiler makeup in Q4FY22 which was 1.9% 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.

In comparing Q4FY23 to Q4FY22 on a per processed ton consumption basis:

- there was no purchased power during the quarter; this was a change in the Facility’s metering calculation, made in February 2023.
- the total fuel oil consumption rate was 11.8% higher
- the boiler make-up water consumption rate was 8.7% higher
- the cooling tower make-up water consumption rate was 9.6% higher

- the total pebble lime consumption rate was 2.0% lower
- the ammonia consumption rate was 5.5% lower
- the carbon consumption rate was 5.2% lower

The increase in the cooling tower make-up water is attributable to the cooling tower fan failure and the coupling failure that occurred in April.

4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents and no First Aid Accidents during Q4FY23. CAAI has operated 206 days without an OSHA recordable accident as of June 30, 2023. Safety training and Environmental activities that were conducted with themes as follows:

April 2023

- Safety:
 - Hand and Power Tools
- Environmental:

May 2023

- Safety:
 - Lock Out Tag Out
 - Completed role out of life critical safety rules #6 for safe operation of mobile equipment
- Environmental:
 - Control of Hazardous Energy

June 2023

- Safety:
 - Hearing conservation
- Environmental:
 - Unauthorized Waste, Universal Waste and Internally Generated waste

5.0 Facility Maintenance

Throughout the quarter, regular 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 May 16, Boiler No. 3 experienced 61.0 hours of scheduled maintenance. Beginning June 20, Boiler No. 2 experienced 43.8 hours of scheduled downtime for a cleaning outage. In addition to the scheduled outages, CAAI reports that 1,073 preventative maintenance actions were completed during the quarter.

5.1 Availability

Facility availabilities for Q4FY23 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q4FY23 were 98.7%, 97.8%, and 96.1%, respectively. The three-boiler average availability during the quarter was 97.5%, which is excellent.

According to CAAI reports, the average unit availabilities for Turbine Generator 1 and 2 for Q4FY23 were 100% and 99.3%, respectively. Note that no standby time was experienced by the turbine generators during the quarter.

Overall boiler availability for FY23 was 93.9%, and overall turbine generator availability was 90.8%. Overall availabilities for the boilers are commensurate with industry averages for operations of mature boilers, noting that these reported availability metrics exclude standby time experienced during the fiscal year which amounted to 121.7 hours for the boilers and 3.5 hours for the turbine generators. Turbine generator availability was negatively impacted by the Turbine Generator No. 2 Overhaul which occurred in September/October 2022 and lasted 556.0 hours.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY23 Average	Q2FY23 Average	Q3FY23 Average	Q4FY23 Average	Annual Average
Boiler No. 1	94.6%	87.0%	93.5%	98.7%	93.4%
Boiler No. 2	94.2%	94.9%	91.7%	97.8%	94.7%
Boiler No. 3	95.4%	91.7%	91.3%	96.1%	93.6%
Avg.	94.7%	91.2%	92.2%	97.5%	93.9%

Turbine No. 1	100.0%	94.7%	100.0%	100.0%	98.7%
Turbine No. 2	93.1%	39.5%	100.0%	99.3%	83.0%
Avg.	96.6%	67.1%	100.0%	99.7%	90.8%

Table 6: Boiler Downtime – Q4FY23

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	4/28/23	4/29/23	27.5	Unscheduled	Grate Bar Failure
2	5/9/23	5/10/23	14.0	Unscheduled	Environmental Analyzer Failure
3	5/16/23	5/19/23	61.0	Scheduled	Scheduled Maintenance
1	6/2/23	6/2/23	1.0	Unscheduled	Inadvertently operating a circuit breaker
2	6/2/23	6/2/23	0.5	Unscheduled	Maintenance Error – circuit breaker
3	6/1/23	6/2/23	24.5	Unscheduled	Waterwall Tube Leak & circuit breaker
2	6/21/23	6/22/23	43.8	Scheduled	Cleaning
Total Unscheduled Downtime			67.5 Hours		
Total Scheduled Downtime			108.8 Hours		
Total Standby Downtime			0.0 Hours		
Total Downtime			176.3 Hours		

Table 7: Turbine Generator Downtime – Q4FY23

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
1	6/2/23	6/2/23	0.3	Unscheduled	Maintenance Error – circuit breaker
2	6/2/23	6/2/23	0.5	Unscheduled	Maintenance Error – circuit breaker
2	6/21/23	6/21/23	14.8	Scheduled	Scheduled Repair of Hotwell Level Controls
Total Unscheduled Downtime			0.8 Hours		
Total Scheduled Downtime			14.8 Hours		
Total Standby Downtime			0.0 Hours		
Total Downtime			15.6 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 May 2023. 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 May 2023 walkdown are presented in Table 8.

Table 8: Facility Housekeeping Ratings – May 2023

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 Q4FY23 are summarized in Appendix A. The Facility experienced no permit deviations during Q4FY23. As of June 31, 2023, the Facility operated 304 days without an environmental excursion.

6.1 Nitrogen Oxide Emissions

During Q4FY23, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 88.0 ppm, 88.0 ppm, and 87.7 ppm for Boiler Nos. 1, 2, and 3, respectively. In comparing Q4FY23 to the corresponding quarter last year, ammonia usage decreased by 5.5%.

6.2 Sulfur Dioxide Emissions

During Q4FY23 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 0.3 ppm, 1.3 ppm, and 4.3 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.

6.3 Carbon Monoxide Emissions

During Q4FY23, the monthly average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 23.3 ppm, 24.7 ppm, and 26.3 ppm, respectively, and all are well within permit limits (100 ppmdv, 4-hour average).

6.4 Opacity

During Q4FY23, the average opacity on Boiler Nos. 1, 2, and 3 were 1.0%, 0.4%, and 0.9%, respectively, which are all significantly below the 10% (6-minute) average permit limit. New Opacity Monitors are being installed on all three units.

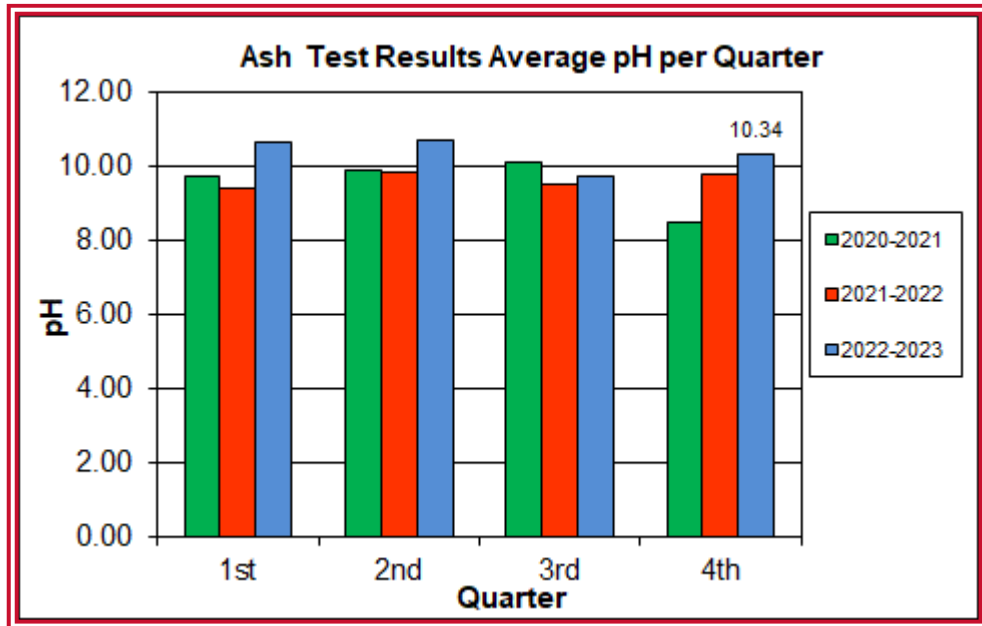
6.5 Daily Emissions Data

Appendix A, Tables 9, 10, and 11 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q4FY23. 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.

6.6 Ash System Compliance

The desired ash pH level ranges from 8.0 to 11.0. Toxicity Characteristic Leaching Procedure (TCLP) testing was not performed during Q4FY23. However, CAAL continued to sample ash monthly in-house, and document pH readings and adjust lime feed rate as needed. The results for the ash pH tests are depicted below in Chart 14 where each quarter is represented by the average of the respective monthly readings. In Q4FY23, the average ash pH for in-house tests was 10.3.

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	
Apr – 23	AVG	91.0	41.0	1.0	20.0	88.0	0.8	298.0	12.4	3.8
	Max	92.5	50.0	4.0	31.0	90.0	1.2	299.0	13.5	4.1
	Min	85.3	28.0	0.0	8.0	84.0	0.3	294.0	12.2	3.6
May – 23	AVG	88.9	31.0	0.0	24.0	88.0	1.1	298.0	11.3	3.8
	Max	92.1	41.0	2.0	28.0	90.0	1.6	302.0	11.8	4.0
	Min	82.6	18.0	0.0	17.0	86.0	0.7	298.0	11.2	3.6
Jun - 23	AVG	86.2	27.0	0.0	26.0	88.0	1.1	298.0	11.3	3.6
	Max	91.4	45.0	2.0	33.0	90.0	1.5	299.0	12.3	4.1
	Min	79.9	17.0	0.0	17.0	86.0	0.8	298.0	11.2	3.2
Quarter Average		88.7	33.0	0.3	23.3	88.0	1.0	298.0	11.7	3.7
Quarter Max Value		92.5	50.0	4.0	33.0	90.0	1.6	302.0	13.5	4.1
Quarter Min Value		79.9	17.0	0.0	8.0	84.0	0.3	294.0	11.2	3.2
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.	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	
Apr – 23	AVG	91.2	50.0	1.0	23.0	88.0	0.2	293.0	12.3	3.8
	Max	92.9	63.0	4.0	29.0	90.0	0.5	294.0	13.6	4.0
	Min	88.5	38.0	0.0	11.0	86.0	0.0	292.0	12.1	3.6
May – 23	AVG	88.6	42.0	0.0	25.0	88.0	0.2	293.0	11.2	3.8
	Max	92.1	60.0	1.0	31.0	90.0	0.7	295.0	11.8	4.0
	Min	83.1	30.0	0.0	18.0	86.0	0.0	292.0	11.1	3.6
Jun - 23	AVG	85.8	41.0	3.0	26.0	88.0	0.7	295.0	11.3	3.7
	Max	91.6	71.0	5.0	35.0	91.0	0.9	295.0	12.2	4.1
	Min	77.0	26.0	0.0	15.0	86.0	0.4	291.0	11.1	3.2
Quarter Average		88.5	44.3	1.3	24.7	88.0	0.4	293.7	11.6	3.8
Quarter Max Value		92.9	71.0	5.0	35.0	91.0	0.9	295.0	13.6	4.1
Quarter Min Value		77.0	26.0	0.0	11.0	86.0	0.0	291.0	11.1	3.2
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	
Apr – 23	AVG	92.0	39.0	4.0	23.0	88.0	0.9	299.0	12.3	3.9
	Max	92.7	62.0	11.0	35.0	89.0	1.2	300.0	13.7	4.2
	Min	89.8	27.0	0.0	14.0	87.0	0.5	297.0	12.2	3.5
May – 23	AVG	87.8	41.0	8.0	35.0	88.0	0.9	299.0	11.2	4.0
	Max	92.3	62.0	18.0	53.0	89.0	1.2	300.0	11.9	4.7
	Min	76.5	22.0	1.0	20.0	86.0	0.6	297.0	11.2	3.3
Jun - 23	AVG	85.7	42.0	1.0	21.0	87.0	1.0	299.0	11.3	3.7
	Max	92.0	63.0	3.0	28.0	88.0	1.2	299.0	12.2	4.2
	Min	78.9	30.0	0.0	14.0	86.0	0.6	295.0	11.2	3.3
Quarter Average		88.5	40.7	4.3	26.3	87.7	0.9	299.0	11.6	3.9
Quarter Max Value		92.7	63.0	18.0	53.0	89.0	1.2	300.0	13.7	4.7
Quarter Min Value		76.5	22.0	0.0	14.0	86.0	0.5	295.0	11.2	3.3
Limits:		98	NA	29	100	110	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
To be added in Final Report

Figure 1:	Figure 2:
Figure 3:	Figure 4:
Figure 5:	Figure 6:
Figure 7:	Figure 8:
Figure 9:	Figure 10:
Figure 11:	Figure 12:
Figure 13:	Figure 14:
Figure 15:	Figure 16:
Figure 17:	Figure 18:
Figure 19:	Figure 20:
Figure 21:	Figure 22:
Figure 23:	Figure 24:
Figure 25:	Figure 26:
Figure 27:	Figure 28:
Figure 29:	Figure 30:
Figure 31:	Figure 32:
Figure 33:	Figure 34: