



Alexandria Arlington Resource Recovery Facility

Fiscal Year 2020

First Quarter Operations Report



November 2019

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Definition of Abbreviations & Acronyms

<u>Abbreviation/Acronym</u>	<u>Definition</u>
APC	Air Pollution Control
Apr	April
Aug	August
Avg	Average
Btu	British thermal unit
CAAI	Covanta Alexandria Arlington, Inc.
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
Dec	December
ECOM	Emergency Communications
Feb	February
FMG	Facility Monitoring Group
FY	Fiscal Year
gal	Gallon
GAT	Guaranteed Annual Tonnage
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 2020

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 2020 Fiscal Year. This report is prepared for the first quarter of the 2020 fiscal year and summarizes Facility operations between July 1, 2019 and September 30, 2019. This report identifies the fiscal year beginning on July 1, 2019 as FY20 and the quarter beginning on July 1, 2019 as Q1FY20.

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 Q1FY20. The operation of the Facility, maintenance, safety, and overall cleanliness continue to be above average. Environmental performance was excellent with no reportable environmental excursions throughout the quarter.

During Q1FY20, the boilers experienced eight (8) instances of unscheduled downtime totaling 144.0 hours, and the turbine generators experienced no unscheduled downtime. Boiler No. 2 experienced one (1) instance of downtime totaling 26.5 hours, and Boiler No. 3 experienced one (1) instance of downtime totaling 55.5 hours, both for scheduled cleaning outages. No scheduled maintenance was conducted on Boiler No. 1 during the quarter as its cleaning outage was conducted last quarter. No scheduled or unscheduled downtime was experienced by the turbine generators. The boilers experienced no standby

downtime and Turbine Generator No. 2 experienced one (1) instance of standby downtime totaling 11.2 hours during the quarter. A detailed listing of downtime is provided in Section 5.2 of this report.

Average waste processed during the quarter was 967.9 tons per day, or 99.3% of nominal facility capacity. Waste deliveries averaged 968.0 tons per day, which is slightly higher (less than 0.1%) 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 (0.1%) compared to the corresponding quarter in FY19; steam production increased (4.6%), and electricity generated (gross) increased (6.6%) from the corresponding quarter in FY19. The increase in steam generation is attributable to the increase (5.9%) in waste heating value, paired with less boiler downtime (123.4 fewer hours). The increase in electricity generated (gross) in Q1FY20, is attributable to higher steam production, paired with less downtime (69.1 fewer hours) experienced by the turbine generators.

3.0 Facility Inspection and Records Review

In August 2019, HDR met with the Facility management and other plant personnel to discuss Facility operations and maintenance, acquire data and reports, perform an independent visual inspection of the operating Facility, photograph areas of interest, and perform a review of recent Facility activity. This visit was coordinated with the scheduled FMG meeting. At the time of the inspection, HDR reviewed CAAI records and discussed performance issues with CAAI staff. HDR maintains a running tabulation of the status of corrective actions and plant performance trends. CAAI provides the following documents for each month:

- Facility Monthly Operating Reports

- Monthly Continuous Emissions Monitoring System (CEMS) Reports

Table 1 summarizes maintenance, repair, and plant condition issues reported during this and prior reporting periods. An “A” indicates an issue of the highest priority and worthy of immediate attention. Such items are usually safety or operability issues. A “B” indicates that the issue needs to be dealt with as quickly as possible, but is not urgent. These items will usually result in a process improvement or will help avoid future “urgent” issues. A “C” indicates that the issue should be dealt with in due course, but is not a priority issue. This category might include issues related to aesthetics, non-urgent maintenance, or housekeeping improvements which are not safety related.

Note that HDR inspections are generally performed while equipment is operating, and are not intended to address the internal condition, performance or life expectancy of mechanical, electrical and electronic equipment and structures. HDR inspections are only performed quarterly, generally representing findings on the day of the inspection. CAAI is responsible, without limitation, for operations, maintenance, environmental performance and safety and should not rely on HDR observations or inspection reports which are overviews of Facility external conditions only.

Table 1: Summary of Inspection Report Deficiencies

*A is highest priority & demands immediate attention; B needs attention, but is not urgent; C can be addressed at earliest opportunity & is not urgent.

Item No.	Inspection Report Deficiencies	Issue Reported	Priority*	HDR Recommendation	Status	Open / Closed
1	Pot hole, southeast corner of Ash Trailer Canopy	August 2015	C	Repair road surface	Status Unchanged	Open
2	Pavement spider-cracking at Tipping Floor Entrance	November 2016	C	Resurface section of pavement at Tipping Floor Entrance	Status Unchanged	Open
3	SDA Penthouse No. 3 Door deteriorated at base	November 2017	C	Patch and Paint Door – Replace if necessary	Status Unchanged	Open
4	Pipe corroded on west side of SDA No. 1	March 2018	C	Conduct proper painting preservation measures	Complete	Closed
5	Roof Ventilation Fan Not Working above Deaerator	May 2019	C	Repair roof ventilation fan	Status Unchanged	Open
6	Diamond Plate Deck Corroded at Boiler No. 3 Opacity Monitor	May 2019	C	Sand, Prime, Paint, and Preserve	Status Unchanged	Open
7	Multiple stair treads missing and not adhered to Cooling Tower Access Stairs	May 2019	A	Replace missing stair tread and apply adhesive to loose stair tread	Status Unchanged	Open
8	Hand railing cracked on south end of Cooling Tower Deck	May 2019	A	Replace hand railing	Complete	Closed
9	Hand Railing Posts (Typical of Most) on the Cooling Tower Deck Split with bolt exposed	May 2019	A	Replace or install caps on all posts. Consider annual application of protective coatings to increase longevity.	During the August 2019 site visit, HDR observed that some copper caps had been installed without adhesive or mechanical fasteners on some of the posts.	Open
10	Ferrous Metal Roll-off Containers (typical of 2) Deteriorated – New Deficiency – See Figure 1 (Appendix B)	August 2019	C	Patch and conduct painting preservation or replace roll-off containers.	Status Unchanged	Open
11	Deterioration behind lime slurry piping in SDA Penthouse No. 2 – New Deficiency – See Figure 2 (Appendix B)	August 2019	C	Replace kick-plate and conduct painting preservation measures	Status Unchanged	Open
12	Siding deteriorated beneath Baghouse No. 3 Hoppers – New Deficiency – See Figure 3 (Appendix B)	August 2019	C	Replace siding	Status Unchanged	Open

4.0 Facility Performance

Monthly operating data provided by CAAI indicates that 89,046 tons of MSW were processed during Q1FY20, and a total of 89,053 tons of MSW including 3,826 tons of Special Handling Waste were received. Total ash production during the quarter was 17,636 tons, which represents 19.8% of the waste processed by weight. The average uncorrected steam production rate for Q1FY20 was 3.03 tons_{steam}/ton_{waste}, which is higher (4.6%) than the corresponding quarter in FY19. The increase in this metric is attributable to the 5.9% increase in the quarterly average waste heating value (HHV) calculated by CAAI.

Chart 1: Tons of Waste Processed

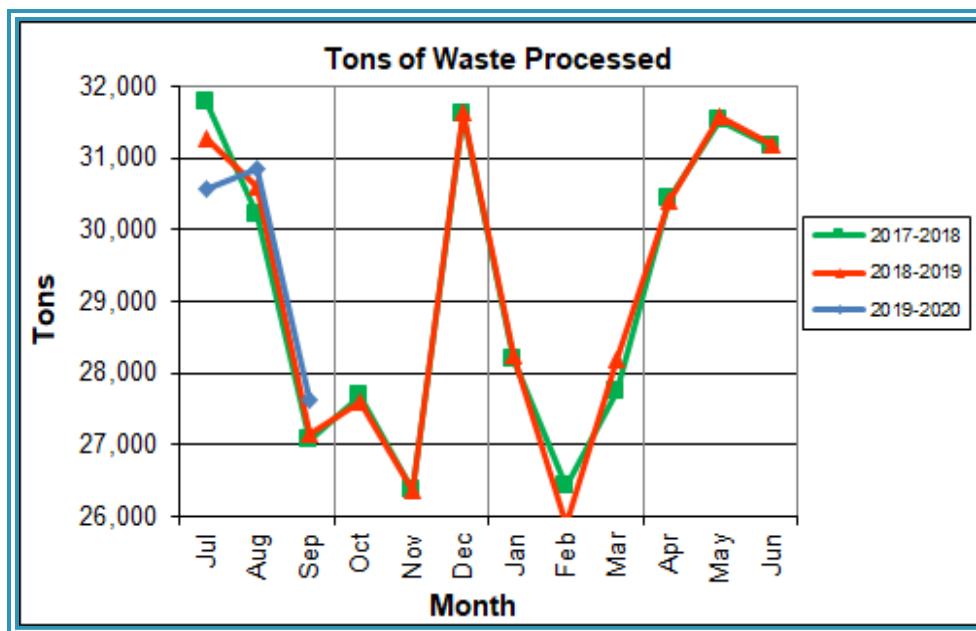


Chart 1 illustrates that Q1FY20 waste processed was slightly higher (0.1%) than the corresponding quarter, Q1FY19.

CAAI reported that 415 tipping floor/MSW internal inspections were conducted during the quarter and no notices of violation (NOVs) were issued to haulers.

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

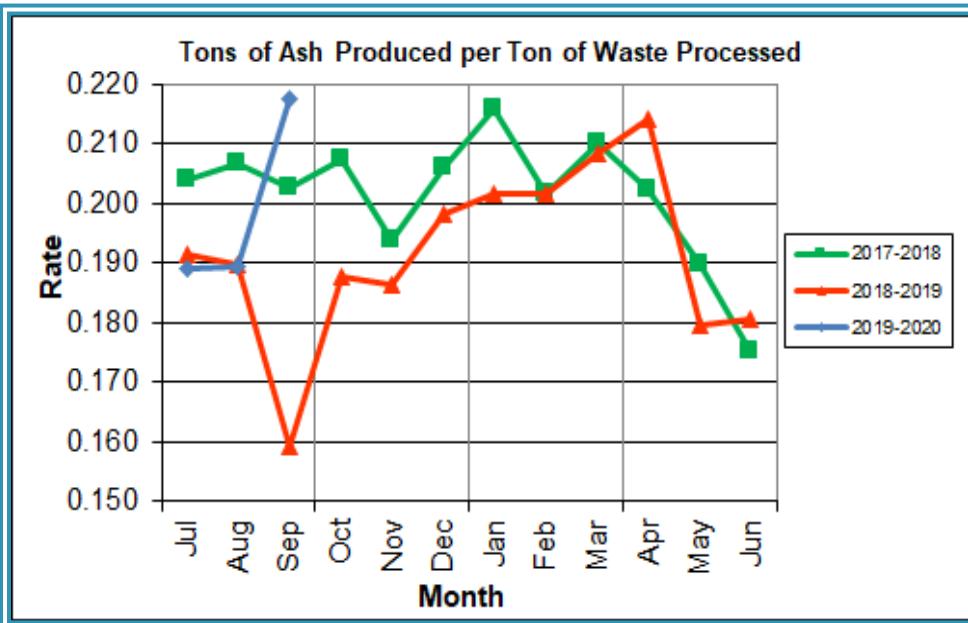


Chart 2 illustrates that the average ash production rate in Q1FY20 was higher (1.7%) at 19.8% of processed waste, compared to the corresponding quarter in FY19 when the rate was 18.1%. The increase in this metric is partially attributable to the decrease (1.6%) in ferrous metal recovery in Q1FY20 when compared to the corresponding quarter in FY19.

Chart 3: Ferrous Recovery Rate

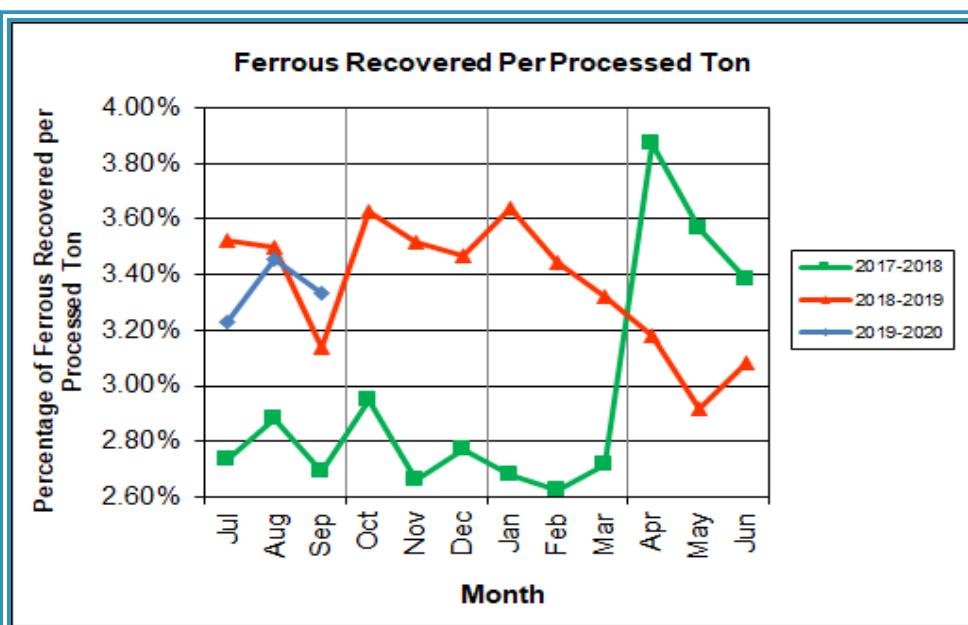
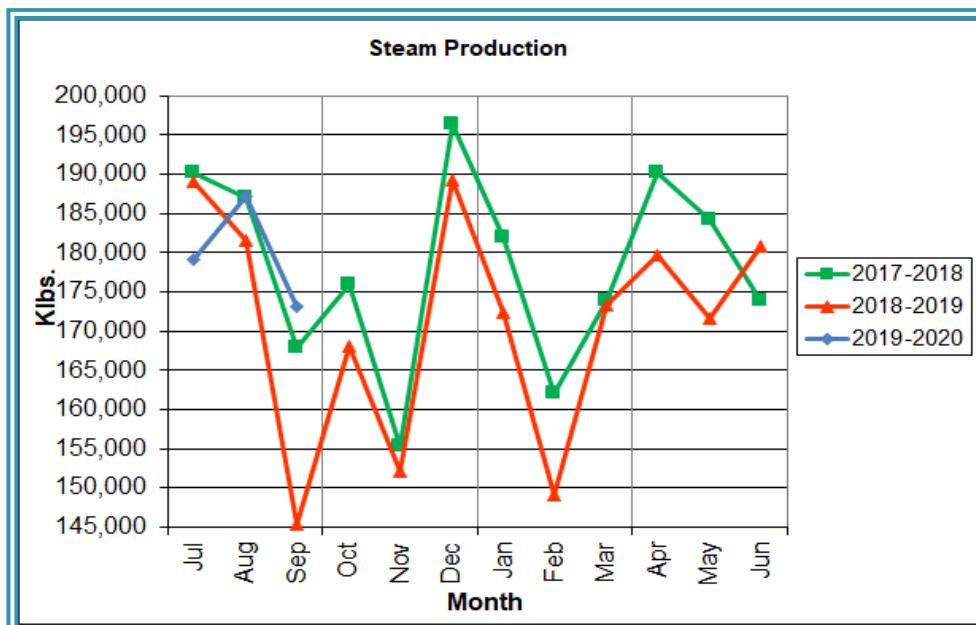


Chart 3 depicts the monthly ferrous metal recovery rate as a percentage of processed MSW tonnage. In Q1FY20, 2,976 tons of ferrous metals were recovered, which is 1.6% lower than the corresponding quarter in FY19 and equivalent to 3.3% of processed waste. CAAI reported that during Q1FY20, it continued experimental processing of the recovered metals through a trommel screen to remove some of the residual ash, which resulted in a decrease in the ferrous recovery tonnage, when compared to the corresponding quarter in FY19.

Chart 4: Steam Production



In Chart 4, the total steam production for Q1FY20 was 539,648 klbs, and higher (4.6%) than the corresponding quarter in FY19. The increase in steam generation is attributable to the increase (5.9%) in waste heating value, paired with less boiler downtime (123.4 fewer hours).

Chart 5: 12-Month Rolling Steam Production

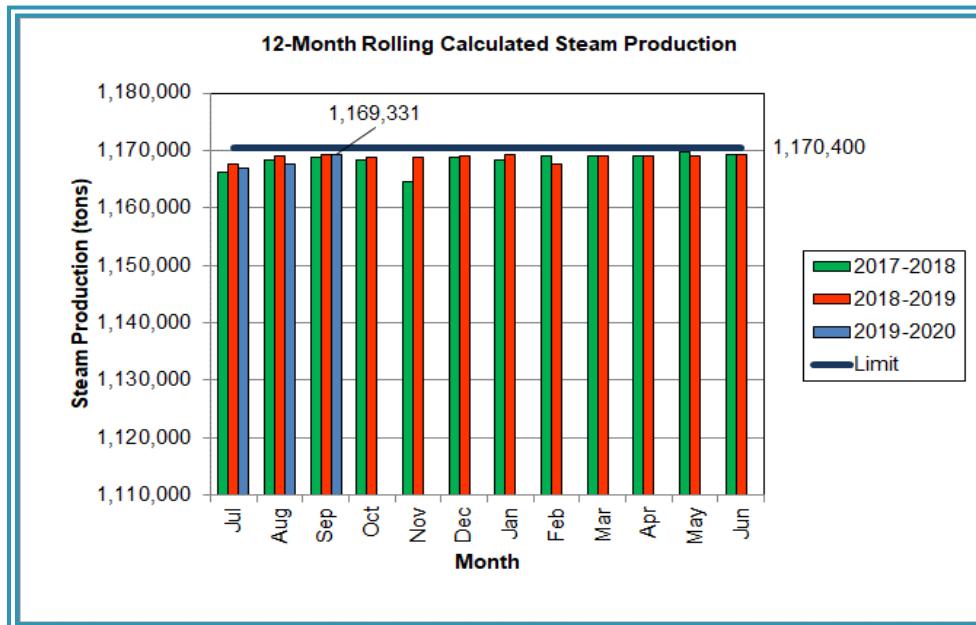
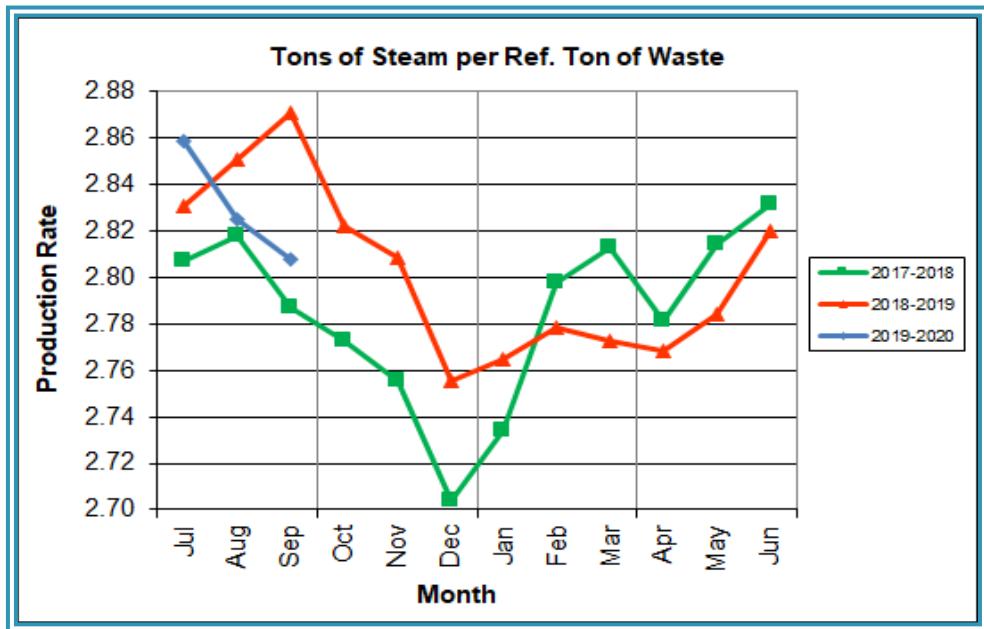


Chart 5 depicts the 12-month rolling steam production total for the quarter ending in September 2019, and for the prior two (2) fiscal years. According to the Title V permit, the annual steam production for the Facility shall not exceed 1,170,400 tons on the basis of an average value of 3.34 lbs of steam 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 Q1FY20. The 12-month rolling total for steam production ending in September 2019 was 1,169,331 tons which is 99.9% of the limit. Chart 5 shows that Facility throughput, and in turn, steam and electricity production are being throttled to stay ever so slightly below the steam production limit nearly every month.

Chart 6: Steam Production Rate



In Chart 6, the conversion of raw waste tonnages into “reference tons” is another way of analyzing steam production and helps to determine whether changes are related to boiler performance or to fuel issues. “Reference tons” are adjusted to account for the calculated average fuel heating value, so that lower Btu fuel raw tonnages are adjusted upwards and vice versa. In Q1FY20, this metric tracked slightly lower (0.6%) at 2.83 tons_{steam}/ton_{ref} compared to the corresponding quarter in FY19.

Chart 7: Calculated Waste Heating Value

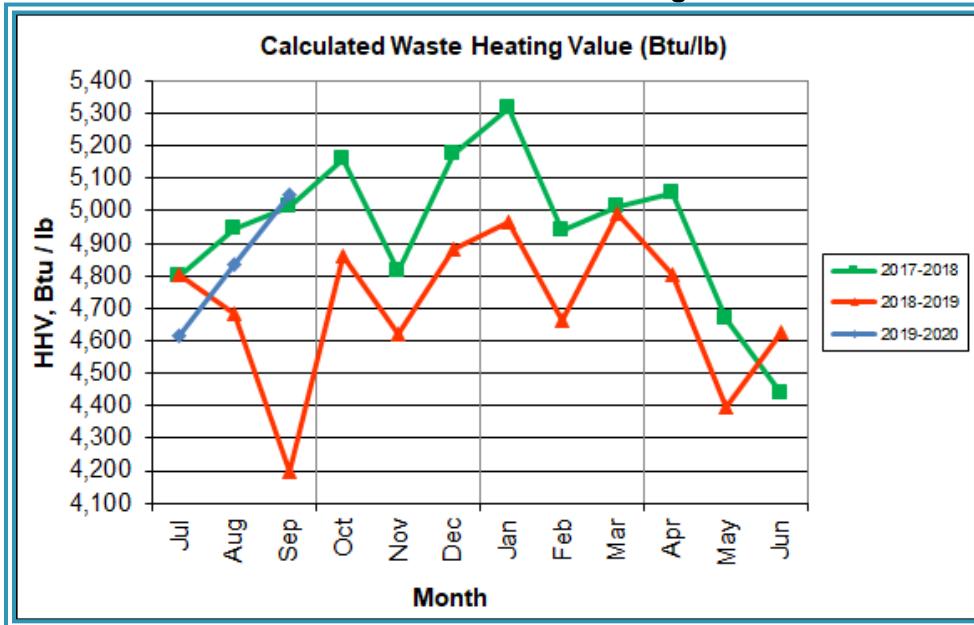


Chart 7 illustrates that Q1FY20 calculated average waste heating value was higher (5.9%) at 4,833 Btu/lb than the corresponding quarter Q1FY19, which averaged 4,562 Btu/lb. Note that the waste heating value in September 2018 of 4,198 Btu/lb was a historical low and 24.7 inches of rainfall was recorded at the Ronald Reagan National Airport¹ during the Q1FY19, compared to 8.6 inches of rainfall in Q1FY20, which is 65.2% lower.

This disparity in average heating value of the 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). In other words, there was sufficient conservatism in the original design of the boiler(s) and their capacity to absorb more heat, and routinely process more MSW, than they were originally rated for.

¹ <https://www.wunderground.com/history/monthly>

Table 2: Quarterly Performance Summaries

Month		Waste Processed (tons)	Waste Diverted (tons)	Ash Shipped (tons)	Special Handling (Supplemental) (tons)	Ferrous Recovered (tons)	Steam Produced (klbs)	Net Electrical Generation (MWhr)
Q1FY18	Quarterly Totals	89,023	0	18,197	5,448	2,468	545,082	38,038
	July -18	31,763	0	6,476	1,807	869	190,170	13,182
	August -18	30,200	0	6,237	1,836	871	186,971	12,970
	September - 18	27,060	0	5,484	1,805	728	167,941	11,886
Q1FY19	Quarterly Totals	89,004	0	16,120	3,191	3,024	515,910	34,925
	July -19	31,273	0	5,989	1,013	1,102	188,996	13,042
	August -19	30,590	0	5,808	1,040	1,071	181,530	12,393
	September – 19	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 -20	30,563	0	5,777	1,269	987	179,207	12,162
	August -20	30,849	0	5,845	1,321	1,067	187,278	13,088
	September - 20	27,634	0	6,014	1,236	922	173,163	11,989
FY20 YTD Totals		89,046	0	17,636	3,826	2,976	539,648	37,239
FY19 Totals		350,057	0	67,068	11,778	11,756	2,052,153	142,430
FY18 Totals		350,087	0	70,368	16,431	10,418	2,139,023	150,506

Table 2 presents the production data provided to HDR by CAAI for Q1FY20 on both a monthly and quarterly basis. For purposes of comparison, data for Q1FY18 and Q1FY19 are also shown, as well as FY18, FY19 and FY20 year to date totals. In comparing quarterly totals, the data shows:

- Slightly more waste was processed in Q1FY20 than Q1FY19 and Q1FY18
- More steam was generated in Q1FY20 than Q1FY19 and less than Q1FY18
- More electricity (net) was generated in Q1FY20 than Q1FY19 and less than Q1FY18
- More supplemental waste was received in Q1FY20 than Q1FY19 and less than Q1FY18.

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

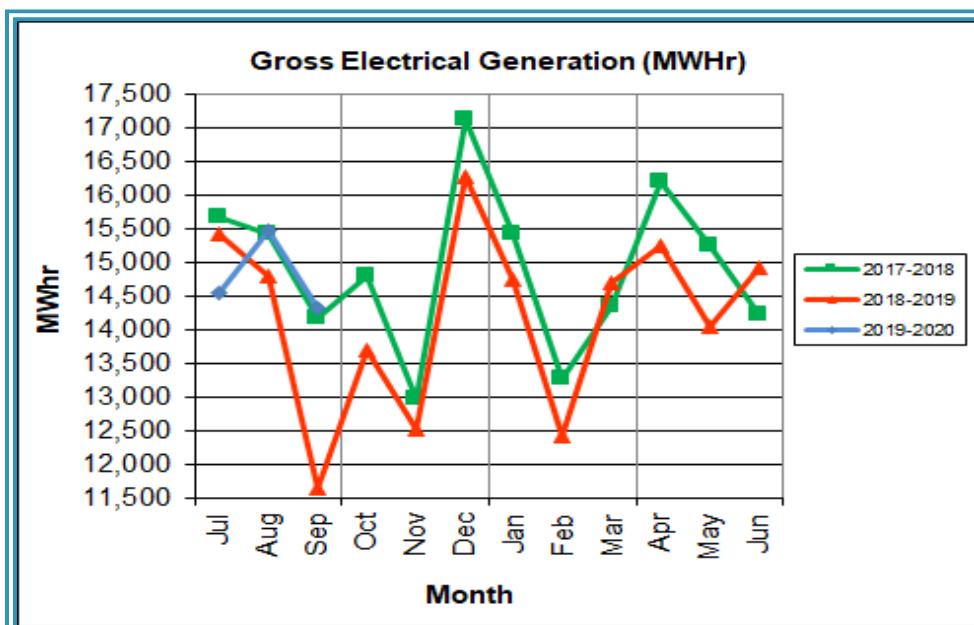
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
FY16	City Waste	1,960	1,563	1,723	1,645	1,685	1,872	1,147	1,619	1,811	2,024	1,950	2,220	21,219	6.03%
	County Waste	3,627	2,880	2,832	2,869	2,682	2,891	2,025	2,389	2,694	2,406	2,508	2,661	32,465	9.22%
	Municipal Solid Waste	27,933	22,999	22,552	22,850	20,679	26,138	22,632	22,781	22,935	24,388	26,561	27,355	289,801	82.32%
	Supplemental Waste	676	427	771	684	676	787	642	850	792	996	605	661	8,565	2.43%
	MSW Totals	34,196	27,869	27,878	28,047	25,722	31,687	26,446	27,639	28,232	29,814	31,623	32,896	352,049	100.00%
FY17		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
	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%
FY18	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
	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%
FY19	Supplemental Waste	1,807	1,835	1,805	1,638	1,553	1,339	1,301	884	829	886	1,391	1,161	16,430	4.67%
	MSW Totals	30,914	31,668	27,478	26,772	25,146	29,869	30,726	25,185	27,770	32,040	34,086	30,039	351,691	100.00%
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Totals	% of Total
	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%
FY20	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
	City Waste	2,070	1,771	1,726										5,566	6.25%
FY20	County Waste	3,069	2,600	2,544										8,213	9.22%
	Municipal Solid Waste	26,033	23,287	22,129										71,448	80.23%
	Supplemental Waste	1,269	1,321	1,236										3,826	4.30%
	MSW Totals	32,440	28,979	27,634										89,053	100.00%

Chart 8: Cumulative Total Waste Delivery



As depicted in Table 3 and Chart 8, for the quarter ending in September 2019 cumulative total waste delivery was 0.9% lower compared to the same period in FY19.

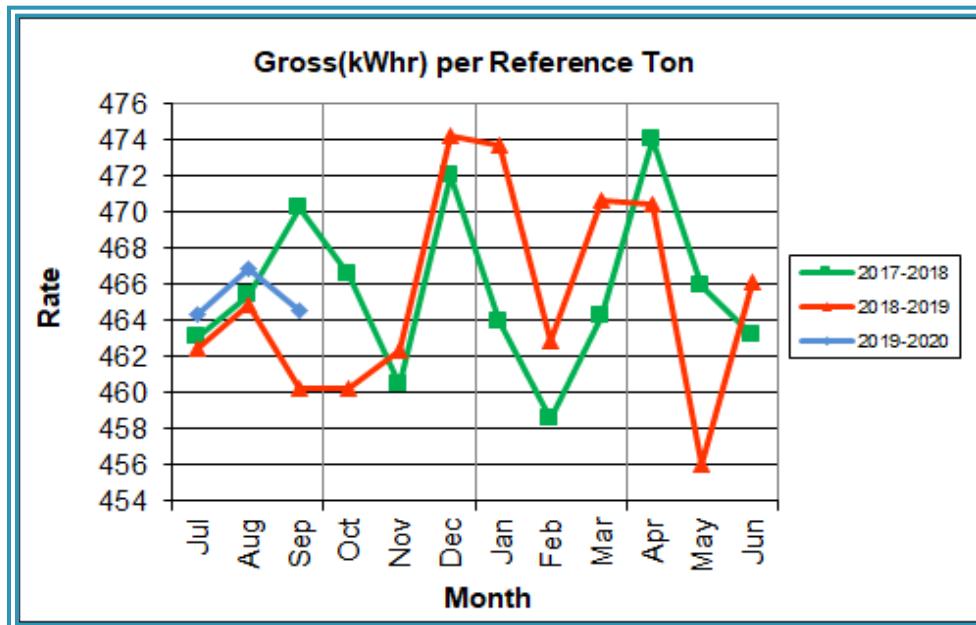
Chart 9: Gross Electrical Generation



During Q1FY20, the Facility generated 44,352 MWhrs (gross) of electricity compared to Q1FY19 generation of 41,894 MWhrs (gross), a 5.9% increase. The increase in electricity generated (gross) in Q1FY20, is attributable to higher steam

production, paired with less downtime (69.1 fewer hours) experienced by the turbine generators.

Chart 10: Gross Conversion Rate



As shown in Chart 10, the average gross electrical generation per reference ton of refuse processed during Q1FY20 was 465 kWhr, which is slightly lower (0.6%) than the corresponding quarter in FY19. 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

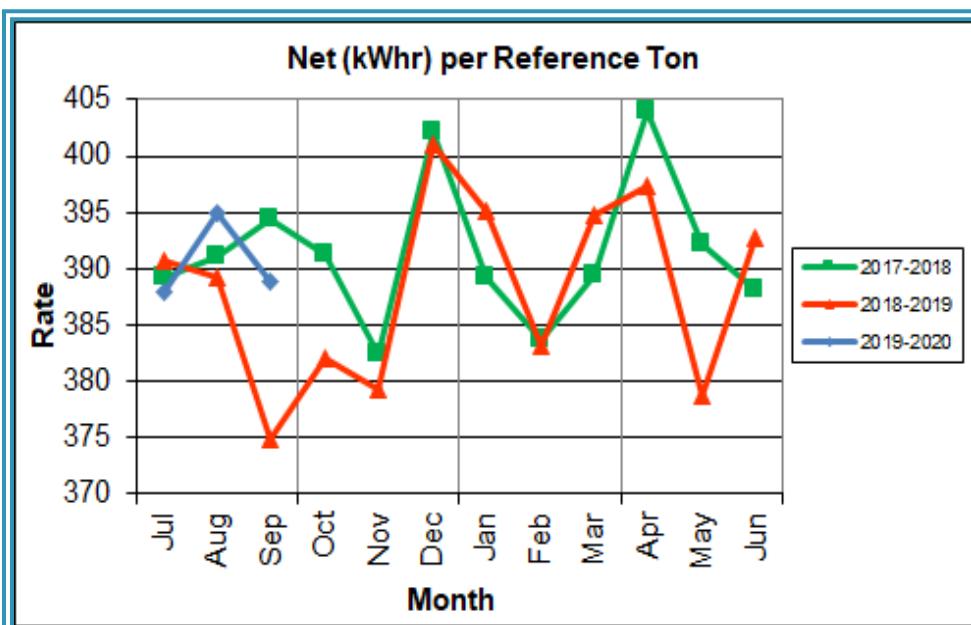


Chart 11 depicts the normalized net power (gross minus in-house usage) generation history. In Q1FY20, the average net electrical generation per reference ton was 391 kWhr, which is 1.5% lower than the corresponding quarter in FY19.

Chart 12: Net Conversion Rate

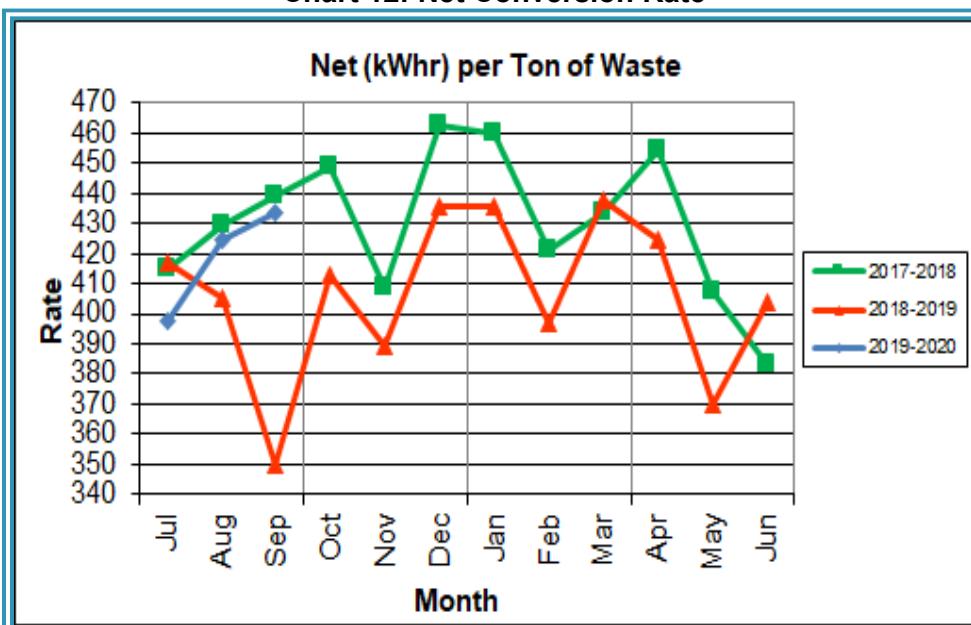


Chart 12 depicts the net power generation per processed ton. The net electrical generation per processed ton in Q1FY20 was 419 kWhr, which is 7.2% higher than

the corresponding quarter in FY19 and is attributable to the increase (5.9%) in waste heating value.

Chart 13: Gross Turbine Generator Conversion Rate

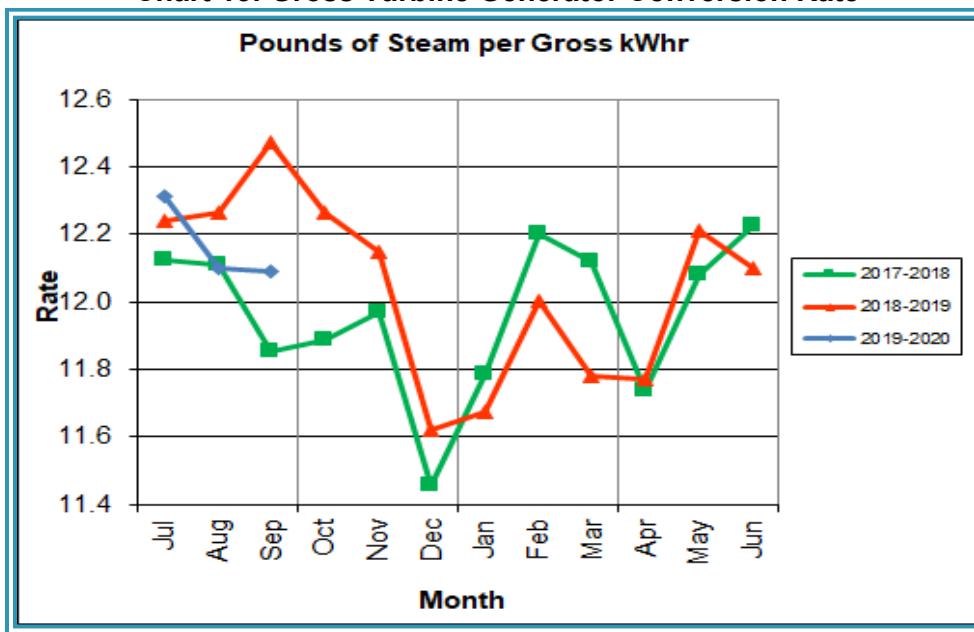


Chart 13 illustrates the quantities of steam required to generate one (1) kWh of electricity. This measure is a turbine generator performance indicator, where lower steam rates indicate superior performance. For simplification, this calculated rate is based on the average for the two turbine generators. In Q1FY20 the average lbs of steam consumed per gross kWh generated was 12.2, which is 1.2% lower (more efficient) than the corresponding quarter Q1FY19. A factor that negatively impacts this metric is Turbine Generator No. 2 continues to operate with its Stage 9 blades removed from the rotor. CAAI reported that during the Turbine Generator No. 2 overhaul in November 2013, some cracking was observed on the Stage 9 blades of the rotor, and the blading in that row was removed as a precautionary measure. CAAI originally indicated that a new set of blades would be manufactured and installed during a Turbine Generator No. 2 Outage in 2016, but advised in May 2015, that the implementation of the replacement blades installation would be delayed and did not provide a date for repair. The average main steam temperature during the quarter was 679.1°F, which is 1.3°F higher than the average main steam temperature of the corresponding quarter last fiscal year and 20.9°F lower than design temperature of 700°F.

4.1 Utility and Reagent Consumptions

Table 4: Facility Utility and Reagent Consumptions

Utility	Units	Q1FY20 Total	Q1FY19 Total	Q1FY20 "Per Processed Ton" Consumption	Q1FY19 "Per Processed Ton" Consumption
Purchased Power	MWhr	5,562	5,503	0.0625	0.0618
Fuel Oil	Gal.	14,820	14,650	0.17	0.16
Boiler Make-up	Gal.	1,465,000	1,469,000	16.45	16.50
Cooling Tower Make-up	Gal.	45,662,716	40,348,706	512.80	453.34
Pebble Lime	Lbs.	1,434,000	1,222,000	16.10	13.73
Ammonia	Lbs.	178,000	166,000	2.00	1.87
Carbon	Lbs.	72,000	78,000	0.81	0.88
Dolomitic Lime	Lbs.	0	222,000	0.00	2.49

Fuel oil usage during the quarter represents approximately 0.26% of the total heat input to the boilers, which compares favorably with industry averages, and is slightly higher than the percentage of heat input in Q1FY19 which was 0.25%. 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 2.3% of steam flow, which is slightly lower than the boiler makeup in Q1FY19 which was 2.4% of steam flow, and is acceptable. Pebble lime usage, at 1,434,000 lbs. is significantly higher (17.3%) than the corresponding quarter last year. During Q2FY19, CAAI reported that it was discontinuing dolomitic lime feed, while increasing lime slurry feed in an effort to stabilize the ash pH to levels that will minimize dolomitic lime to condition the ash going forward. Ash pH levels in the range of 8 to 11 are desirable to minimize leaching potential of heavy metals. This operational change explains the significant increase in pebble lime usage during the quarter.

In comparing Q1FY20 to Q1FY19 on a per processed ton consumption basis:

- the purchased power consumption rate was 1.0% higher
- the total fuel oil consumption rate was 1.1% higher
- the boiler make-up water consumption rate was 0.3% lower
- the cooling tower make-up water consumption rate was 13.1% higher
- the total pebble lime consumption rate was 17.3% higher
- the ammonia consumption rate was 7.2% higher
- the carbon consumption rate was 7.7% lower

- the total dolomitic lime consumption rate was 100.0% lower, as no dolomitic lime was fed during the quarter

The decrease in carbon consumption during the quarter was primarily attributable to the Facility demonstrating compliance with mercury and dioxin/furan emissions limits during 2019 Stack Testing (March 2019) at a minimum feed rate of 12.0 lbs. per hour, rather than a minimum of 13.0 lbs. per hour which was demonstrated in 2018.

4.2 Safety & Environmental Training

The Facility experienced no OSHA recordable accidents or First Aid accidents during the quarter. CAAI has operated 553 days without an OSHA recordable accident as of September 30, 2019. Safety and Environmental training was conducted with themes as follows:

July 2019

- Safety:
 - Heat Stress
 - Confined Spaces
 - Confined Space Rescue
- Environmental:
 - Carbon Monoxide
 - Environmental Permits
 - How to respond to an Air Permit Violation

August 2019

- Safety:
 - Walking/Working Surfaces
 - Fall Protection
 - Mobile Equipment and Tipping Floor Safety
 - Crane Boarding
- Environmental:
 - Regulatory Inspections

September 2019

- Safety:

- Hazardous Materials and Globally Harmonized System (GHS)
- Medical Surveillance and Access to Medical Records
- Complacency and Safety Health and Environment (SHE) Communication Forms
- Open Door Policy and the Network – “The Hotline”
- Environmental:
 - Self-paced review of Storm Water Pollution, Prevention Plan (SWPPP) for all employees
 - Review of Profiled Waste Stand Operating Procedure (SOP) and Animal and Plant Health Inspection Service (APHIS) Waste Compliance Agreement by Operations Personnel

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 8, 2019 Boiler No. 2 experienced 26.5 hours of downtime, and beginning on August 12, Boiler No. 3 experienced 55.5 hours of downtime, both for a scheduled cleaning outage.

In addition to the scheduled outages, CAAI reports that 871 preventative maintenance actions were completed during the quarter.

5.1 Availability

Facility availabilities for Q1FY20 are shown in Table 5. According to CAAI reports, the average unit availabilities for Boiler Nos. 1, 2, and 3 for Q1FY20 were 95.9%, 96.3%, and 97.4%, respectively. The three-boiler average availability during the quarter was 96.6%, 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 Q1FY20 was 100.0% and is excellent. Note that the reported availability metrics exclude standby time experienced which amounted to 11.2 hours for Turbine Generator No. 2.

Table 5: Quarterly Facility Unit Availabilities

Availability	Q1FY20 Average
Boiler No. 1	95.9%
Boiler No. 2	96.3%
Boiler No. 3	97.4%
Avg.	96.6%
Turbine No. 1	100.0%
Turbine No. 2	100.0%
Avg.	100.0%

Table 6: Boiler Downtime – Q1FY20

Boiler Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	7/8/19	7/9/19	26.5	Scheduled	Scheduled cleaning outage
1	7/20/19	7/21/19	21.1	Unscheduled	Repair of broken grate bars
3	8/12/19	8/14/19	55.5	Scheduled	Scheduled cleaning outage
1	9/10/19	9/10/19	1.0	Unscheduled	Failure of #2 480V Transformer
2	9/10/19	9/12/19	45.5	Unscheduled	Failure and Repair of #2 480V Transformer
3	9/10/19	9/10/19	1.3	Unscheduled	Failure of #2 480V Transformer
1	9/12/19	9/13/19	25.4	Unscheduled	Repair of #2 480V Transformer
2	9/13/19	9/13/19	8.6	Unscheduled	Replacement of Induced Draft Fan Bearing
1	9/22/19	9/23/19	22.7	Unscheduled	Repair of broken grate bars
1	9/24/19	9/24/19	18.4	Unscheduled	Repair of waterwall tube leak
Total Unscheduled Downtime				144.0 Hours	
Total Scheduled Downtime				82.0 Hours	
Total Standby Downtime				0.0 Hours	
Total Downtime				226.0 Hours	

Table 7: Turbine Generator Downtime – Q1FY20

Turbine Generator Number	Outage Begin Date	Outage End Date	Hours Unavailable	Downtime Classification	Reason Unavailable
2	9/13/19	9/13/19	11.2	Standby	No steam due to boiler downtime for transformer work
Total Unscheduled Downtime				0.0 Hours	
Total Scheduled Downtime				0.0 Hours	
Total Standby Downtime				11.2 Hours	
Total Downtime				11.2 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 2019. At the time of the inspection, new deficiencies were recorded and prior deficiencies were given a status update. Photos of interest from the inspection are depicted in Appendix B. The Facility housekeeping ratings from the August 2019 inspection are presented in Table 8.

Table 8: Facility Housekeeping Ratings – August 2019

Facility Area	Acceptable	Needs Improvement	Unacceptable
Tipping Floor	✓		
Citizen's Drop-off Area	✓		
Tipping Floor Truck Exit	✓		
Front Parking Lot	✓		
Rear Parking Lot	✓		
Boiler House Pump Room	✓		
Lime Slurry Pump Room	✓		
Switchgear Area	✓		
Ash Load-out Area	✓		
Vibrating Conveyor Area	✓		
Ash Discharger Area	✓		
Cooling Tower Area	✓		
Truck Scale Area	✓		
SDA/FF Conveyor Area	✓		
SDA Penthouses	✓		
Lime Preparation Area	✓		
Boiler Drum Levels	✓		
Turbine Room	✓		
Electrical Room	✓		

6.0 Environmental

The air pollution control equipment maintained emission concentrations well within the established regulations. Average Continuous Emission Monitoring System (CEMS) data collected for each monthly period during Q1FY20 are summarized in Appendix A. No permit deviations were reported by the Facility during Q1FY20. Note that as of September 30, 2019, the CAAI Facility has operated 713 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. CAAI has notified the Jurisdictions that the installation of LN™ Technology is planned on the first of the three (3) boilers in the second quarter of Fiscal Year 2020, with subsequent unit installations in the second quarters of Fiscal Years 2021 and 2022.

6.2 Nitrogen Oxide Emissions

During Q1FY20, the monthly emission concentrations of nitrogen oxides (NO_x) averaged 160.0 ppmdv, 160.7 ppmdv, and 159.0 ppmdv for Boiler Nos. 1, 2, and 3, respectively. CAAI continues to operate the units at the lower (160 ppmdv) set-points, except immediately following a scheduled outage and associated boiler cleaning.

6.3 Sulfur Dioxide Emissions

During Q1FY20 the monthly emission concentration of stack sulfur dioxide (SO₂) averaged 0.7 ppmdv, 1.3 ppmdv, and 1.7 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 Q1FY20, the monthly average CO emission concentrations on Boiler Nos. 1, 2, and 3 were 31.3 ppmdv, 31.0 ppmdv, and 25.0 ppmdv, respectively, and all are well within permit limits (100 ppmdv, hourly average).

6.5 Opacity

During Q1FY20, the average opacity on Boiler Nos. 1, 2, and 3 were 0.2%, 0.9%, and 0.6%, respectively, which are all significantly below the 10% (6-minute) average permit limit.

6.6 Daily Emissions Data

Appendix A, Tables 10, 11, and 12 tabulate the monthly average, maximum, and minimum emissions data for each unit during Q1FY20. Excursions, if any, would appear in bold print. It should be noted that these tabulations of monthly averages, reported here for informational purposes, are based on tabulations of daily averages. These averages do not correlate with official reports to the regulatory agencies because of differences in averaging times and other technical differences required by agency report formats.

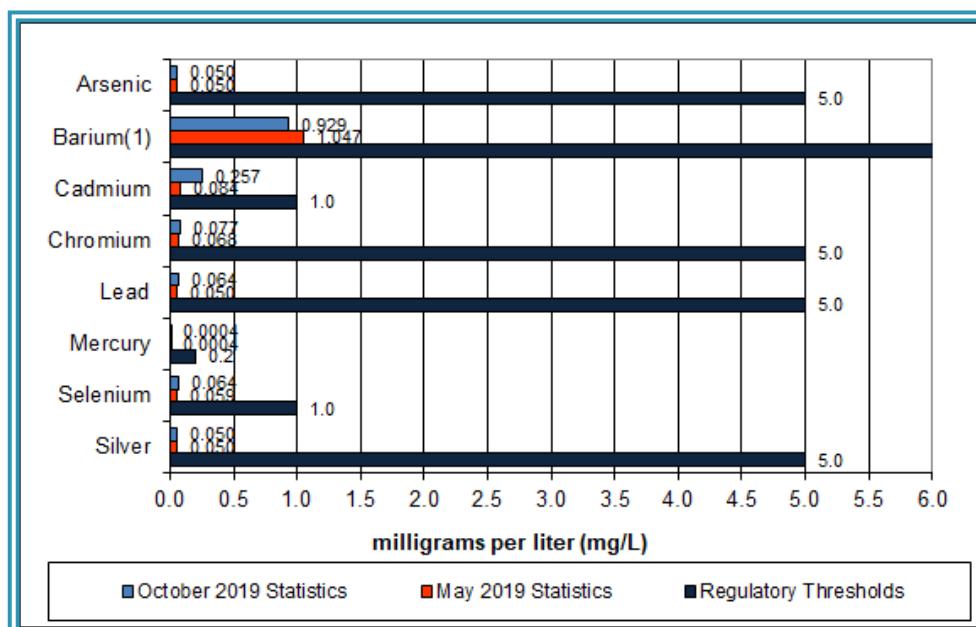
6.7 Ash System Compliance

During Q2FY19, CAAI reported that it was discontinuing dolomitic lime feed, while increasing lime slurry feed in an effort to stabilize the ash pH to levels that will allow eliminating dolomitic lime to condition the ash going forward. The desired ash pH level ranges from 8.0 to 11.0. During Q1FY20, CAAI reported that no dolomitic lime was fed, while pebble lime consumption rate was 16.1 lbs per ton, which is 17.3% higher than Q1FY19. Ash Toxicity (TCLP) tests were performed for field samples collected during September and October 2019, and results indicated that the average pH during testing was 9.0. Results from the TCLP testing conducted in October 2019 and May 2019 are depicted in Table 9 and Chart 14 below.

Table 9: Comparison of Statistical Results and Regulatory Thresholds for Metal Analytes

Metals	90% Upper Confidence (October 2019)	90% Upper Confidence (May 2019)	Regulatory Threshold (mg/L)	% of Threshold (October 2019)	% of Threshold (May 2019)
Arsenic	0.050	0.050	5.0	1.00%	1.00%
Barium	0.929	1.047	100.0	0.93%	1.05%
Cadmium	0.257	0.084	1.0	25.70%	8.40%
Chromium	0.077	0.068	5.0	1.54%	1.36%
Lead	0.064	0.050	5.0	1.28%	1.00%
Mercury	0.0004	0.0004	0.2	0.20%	0.20%
Selenium	0.064	0.059	1.0	6.40%	5.90%
Silver	0.050	0.050	5.0	1.00%	1.00%

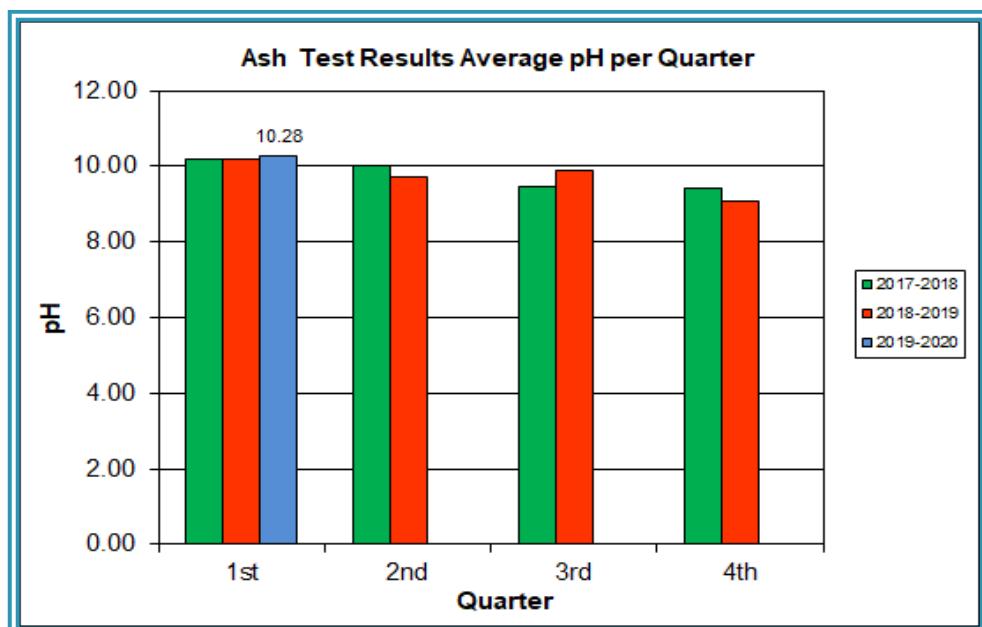
Chart 14: Ash Toxicity Characteristic Leaching Procedure (TCLP) Results



Note: The regulatory threshold for Barium is 100 mg/L

CAAI also samples ash monthly in-house, and documents pH reading to adjust dolomitic lime feed rate. The results for the ash pH tests are found below in Chart 15 where each quarter is represented by the average of the respective monthly readings. During Q1FY20, the average ash pH for in-house tests was 10.3.

Chart 15: Quarterly Ash Test Results



APPENDIX A FACILITY CEMS DATA

Table 10: 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 - 19	AVG	82.1	37.0	1.0	31.0	160.0	0.2	300.0	12.4	3.5
	Max	89.0	66.0	9.0	43.0	167.0	0.4	301.0	14.4	3.8
	Min	74.5	20.0	0.0	22.0	151.0	0.1	295.0	12.2	3.1
Aug - 19	AVG	86.2	26.0	0.0	30.0	160.0	0.2	300.0	12.4	3.7
	Max	89.1	37.0	1.0	45.0	166.0	0.4	303.0	12.6	3.8
	Min	83.4	17.0	0.0	22.0	156.0	0.0	300.0	12.2	3.3
Sep - 19	AVG	83.6	28.0	1.0	33.0	160.0	0.2	300.0	12.3	3.5
	Max	88.8	80.0	4.0	45.0	169.0	0.5	305.0	13.1	3.8
	Min	66.3	10.0	0.0	15.0	147.0	0.0	289.0	12.2	2.9
Quarter Average		84.0	30.3	0.7	31.3	160.0	0.2	300.0	12.4	3.6
Quarter Max Value		89.1	80.0	9.0	45.0	169.0	0.5	305.0	14.4	3.8
Quarter Min Value		66.3	10.0	0.0	15.0	147.0	0.0	289.0	12.2	2.9
Limits:		98	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 11: 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 - 19	AVG	81.7	47.0	1.0	26.0	161.0	1.0	299.0	12.3	3.6
	Max	88.5	85.0	7.0	36.0	167.0	1.2	300.0	12.4	4.0
	Min	73.4	7.0	0.0	11.0	158.0	0.4	288.0	12.2	3.1
Aug - 19	AVG	86.3	40.0	1.0	31.0	160.0	1.0	299.0	12.2	3.7
	Max	89.3	54.0	5.0	39.0	162.0	1.4	300.0	12.7	4.0
	Min	82.9	30.0	0.0	21.0	156.0	0.3	297.0	12.1	3.5
Sep - 19	AVG	85.8	32.0	2.0	36.0	161.0	0.8	2999.0	12.3	3.8
	Max	88.5	51.0	8.0	45.0	163.0	1.3	300.0	13.0	3.9
	Min	78.9	11.0	0.0	26.0	159.0	0.4	293.0	12.1	3.2
Quarter Average		84.6	39.7	1.3	31.0	160.7	0.9	1199.0	12.3	3.7
Quarter Max Value		89.3	85.0	8.0	45.0	167.0	1.4	300.0	13.0	4.0
Quarter Min Value		73.4	7.0	0.0	11.0	156.0	0.3	288.0	12.1	3.1
Limits:		98	NA	29	100	205	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 12: 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 - 19	AVG	81.3	23.0	2.0	25.0	159.0	1.2	298.0	12.3	3.5
	Max	88.7	36.0	10.0	42.0	160.0	1.4	298.0	12.4	3.9
	Min	73.0	10.0	0.0	17.0	156.0	0.8	295.0	12.1	3.0
Aug - 19	AVG	84.3	41.0	2.0	25.0	159.0	0.6	298.0	12.3	3.6
	Max	90.7	63.0	7.0	44.0	160.0	1.6	298.0	12.8	3.9
	Min	78.6	26.0	0.0	15.0	155.0	0.0	297.0	12.3	3.3
Sep - 19	AVG	84.7	34.0	1.0	25.0	159.0	0.0	298.0	12.3	3.6
	Max	88.3	53.0	2.0	37.0	161.0	0.0	298.0	13.3	3.9
	Min	74.8	20.0	0.0	14.0	157.0	0.0	294.0	12.2	3.2
Quarter Average		83.4	32.7	1.7	25.0	159.0	0.6	298.0	12.3	3.6
Quarter Max Value		90.7	63.0	10.0	44.0	161.0	1.6	298.0	13.3	3.9
Quarter Min Value		73.0	10.0	0.0	14.0	155.0	0.0	294.0	12.1	3.0
Limits:		98	NA	29	100	205	10	332	12a)	

(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 2019



Figure 1: Ferrous Metal Roll-off Containers (typical of 2)
Deteriorated – New Deficiency



Figure 2: Deterioration behind lime slurry piping in SDA
Penthouse No. 2 – New Deficiency



Figure 3: Siding deteriorated beneath Baghouse No. 3
Hoppers – New Deficiency



Figure 4: Ferrous Magnet Access Area



Figure 5: Boiler No. 3 Grates – Boiler No. 3 Cleaning
Outage in progress



Figure 6: Boiler No. 3 from Firing Aisle – Boiler No. 3
Cleaning Outage in progress



Figure 7: Metal Roll-off



Figure 8: Citizen's Drop-off Roll-off, northeast corner of Facility



Figure 9: General Facility Photo from Tipping Floor Access



Figure 10: Facility Entrance/Exit Roadway



Figure 11: Concrete Speed Bump at Tipping Floor Exit



Figure 12: General Facility Photo from southwest corner, up Eisenhower



Figure 13: Ash/Ferrous Metal Loading Area



Figure 14: Cooling Towers



Figure 15: Ammonia Storage Tank and Containment Area



Figure 16: Ash Trailer Canopy from Cooling Tower Deck



Figure 17: General Facility Photo - North side of Facility facing east from Cooling Tower Deck



Figure 18: Caps installed on hand railing posts on Cooling Tower Deck – Existing Deficiency Repair in Progress

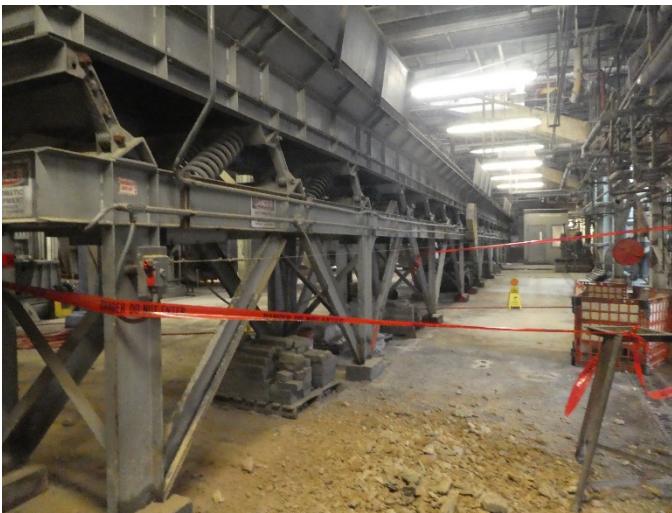


Figure 19: Main Vibrating Conveyor – Boiler No. 3 Cleaning Outage in progress



Figure 20: Cooling Towers from Boiler No. 3 SDA Penthouse



Figure 21: Baghouse Compartment Aisle – No issues observed on any unit



Figure 22: Baghouse Hopper Aisle

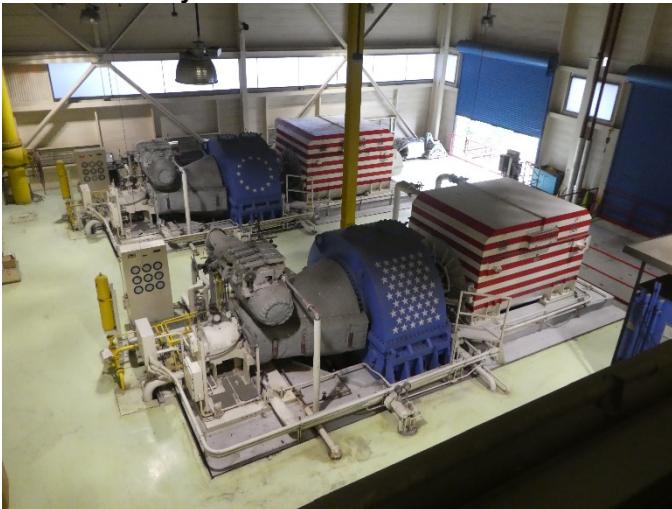


Figure 23: Turbine Generators



Figure 24: Feed Chute No. 3 Taped Off on Charging Floor – Boiler No. 3 Cleaning Outage in progress



Figure 25: Tipping Floor Operations – Facing North



Figure 26: Control Room Screens



Figure 27: Refuse Pit – Photo from north end of Charging Floor facing south



Figure 28: Supplemental Waste Elevator at Charging Floor Elevation



Figure 29: SDA Penthouse No. 2 – Recently Painted Deck



Figure 30: General Facility Photo from northeast corner of Property