



Operations Monitoring Report

Second Quarter FY19

Prepared by:

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I. Executive Summary

A review of the fiscal year 2019 (FY19) Second Quarter performance and contract obligations between Constellation New Energy (CNE) and the Metropolitan Government of Nashville and Davidson County (Metro) is presented in this report by Thermal Engineering Group, Inc. (TEG). The status of the available funds for all active capital construction and repair and improvement projects are also presented. For the fiscal year 2019 to date, CNE has satisfactorily met all of the contract obligations to Metro and has had no contract violations.

A two-year extension for the Amended and Restated Management Agreement (ARMA) between CNE and Metro was executed in October. Metro has issued an RFP for qualified entities for the management of the DES or for the sale of the system. Phase One of this process began during the quarter. This process is part of the conclusions resulting from the Options Review (DES139) project spearheaded by FVB.

For the Second Quarter FY19, the chilled water sales increased 3.6% over the previous Second Quarter (FY18). The increase in sales may be due to an increase in the number of cooling degree days during the quarter (15%) and due to the Fairlane and Bobby Hotels and the CJC operating in the Second Quarter FY19. The chilled water sendout also increased 2.4% over the previous Second Quarter. The system losses decreased approximately 17.5%. The peak chilled water demand for the current quarter was 15,025 tons, which is 0.7% higher than the previous Second Quarter.

Steam sendout for the current quarter increased by approximately 6.2% over the previous Second Quarter with a 2.6% increase in heating degree days. Likewise, steam sales also increased by approximately 9.2% over the previous Second Quarter. Total steam system losses decreased by 16.3% over the previous Second Quarter. The peak steam demand for the current quarter was 122,531 pounds per hour, which represents a decrease in the Second Quarter demand by approximately 11.5%.

The EGF performance continues to satisfactorily meet the System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels. The chilled water plant electric consumption per unit of sales continues to perform lower than the guaranteed levels for the quarter. Total chiller plant electric usage increased 6.2% from the previous Second Quarter and the unit electric consumption was 2.5% higher than in the previous Second Quarter. The steam plant electric consumption per unit of sales increased over the previous Second Quarter by 2.1%. The total water consumption for the steam and chilled water plants decreased 8.8% from the previous Second Quarter. The steam plant water usage increased by 25.1% for the quarter.

Work continued on DES Capital and Repair & Improvement Projects during the Second Quarter of FY19. Repair and Improvements to the EDS continue as scheduled. Work on DES124 was completed during the quarter. DES133.1, DES135, and DES139 is ongoing. Construction was completed early in the Second Quarter FY19 on DES144 and was also completed on DES155 and DES156 during the quarter. Due to a contractor invoicing omission, DES149 will not be closed until the Third Quarter FY19. Bidding was opened on DES151 and construction is

anticipated to begin in the Third Quarter FY19. Design completion, bidding, award and the start of construction is anticipated for DES157, DES158 and DES159 during the Third Quarter FY19. Construction is also anticipated to begin on DES164, DES165 and DES166 during the Third Quarter FY19. Design, bidding and award should also be completed on DES153 during the Third Quarter FY19.

New projects DES157, DES158, DES159, DES160, DES161, DES162, DES163, DES164, DES165 and DES166 were opened during the Second Quarter FY19.

DES124, DES133, DES143, DES155 and DES156 were closed during the Second Quarter FY19.

The current fiscal year system operating costs to date are \$11,303,824. This value represents approximately 54% of the total budgeted operating cost for FY19. The customer revenues from the sales of steam and chilled water for FY19 (to date) are \$9,530,706 which is approximately 50% of the budgeted amount. An adjustment to the customer revenues is anticipated to occur in the Third Quarter due to an error with one of the customer meters. This adjustment is not included in the fiscal year to date revenues. The difference between the operating costs and customer revenue is the Metro funding amount (MFA), which represents the shortfall in cash flow for the system. The MFA transferred to date for FY19 is \$1,230,225 (75% of budget) and includes the Third Quarter transfer amount. However, the actual MFA required cannot be accurately calculated due to outstanding invoices as of the date of this report.

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II. Energy Distribution Sales and Performance

A. Chilled Water

This section of the report discusses and presents performance information regarding the operation of the EGF for the periods described. Charts and tabular data are also presented to provide a more detailed description of the actual EGF performance.

1. Sales and Sendout

A comparison for the Second Quarter chilled water sales is shown in Figure 1. This data reflects a 3.6% increase in sales for the current quarter over the same quarter of the previous fiscal year.

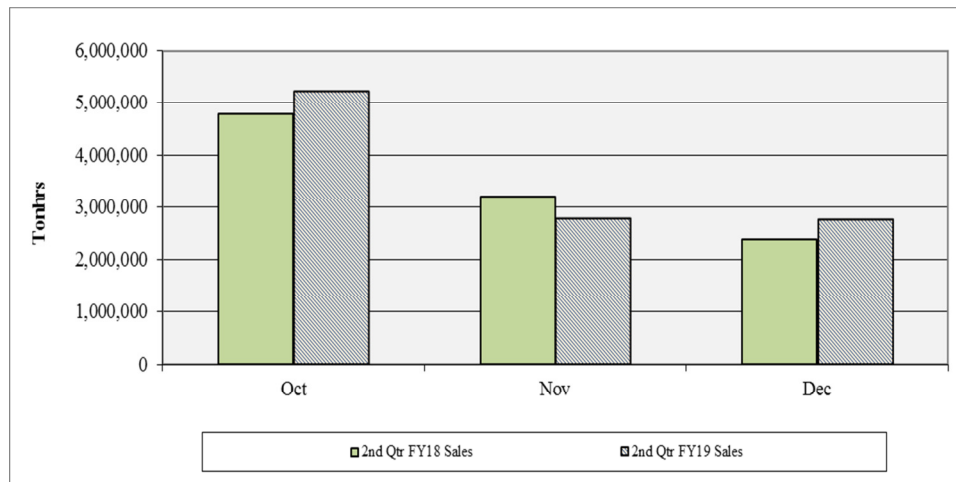


Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 15,025 tons, which represents a 0.7% increase over the previous Second Quarter.

Figure 2 shows the chilled water sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in tonhrs per month between the recorded sendout and sales values and represent the total energy loss for chilled water in the EDS. The number of cooling degree days per month are also tracked for comparison.

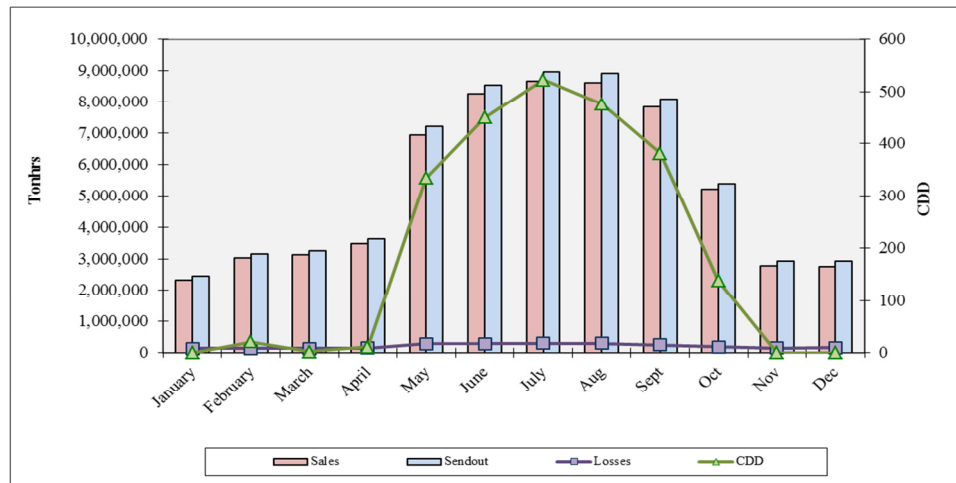


Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

2. Losses

A comparison of the total, chilled water energy losses in the EDS for the Second Quarter is shown in Figure 3. These losses are the difference in chilled water sendout and sales.

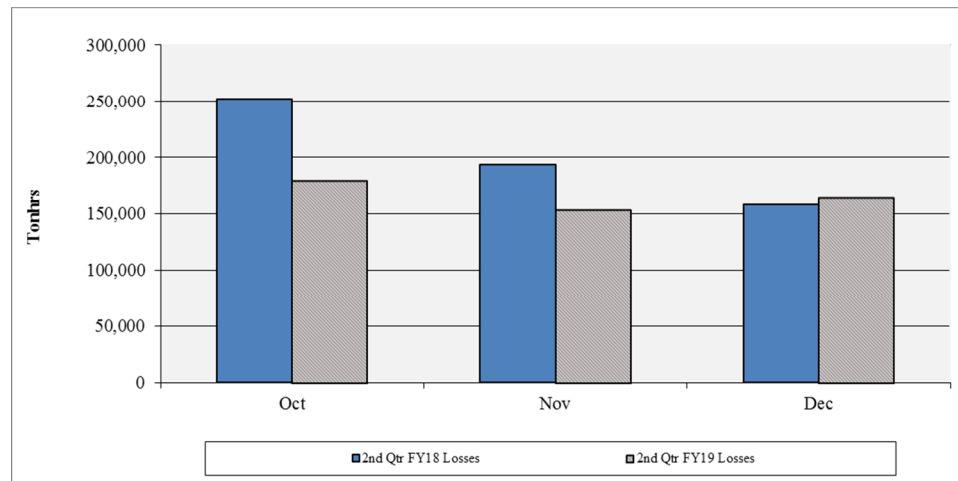


Figure 3. Chilled Water System Loss Comparison

The EDS make-up decreased by 36.3% over the previous Second Quarter. A leak was discovered at 4th Ave and Union Ave and repaired in November. The average EDS make-up flow rate was approximately 23 gpm in December. Another leak is suspected near 5th Ave and Deaderick St, but this leak may be less significant than the one at 4th Ave and Union. TEG and CNE are still investigating the sources of the leaks.

The make-up to the cooling towers decreased approximately 0.8% during the quarter. The number of cycles of concentration in the condensing water circuit experienced a 31.3% decrease during the current quarter. The overall city water make-up comparison for the chilled water system is shown in Figure 4.

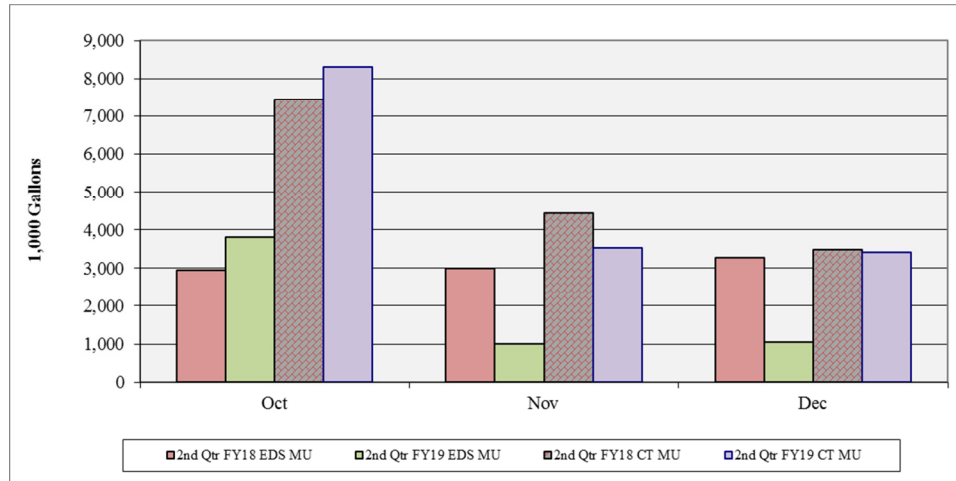


Figure 4. Chilled Water System City Water Usage Comparison

3. Performance

The performance of the chilled water aspect of the EGF is presented by the following two charts, Figures 5 and 6, for the previous twelve months. Under the management of CNE, the System Performance Guarantee levels as described in the ARMA are being achieved satisfactorily.

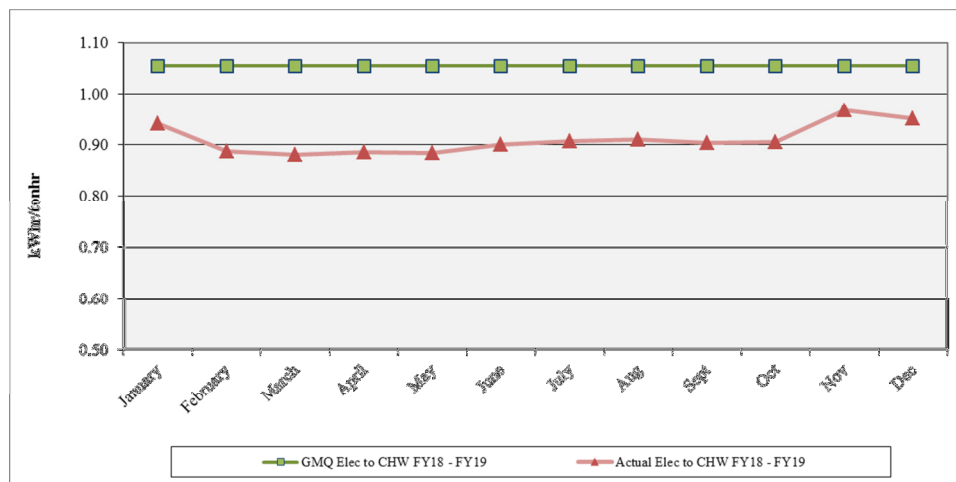


Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

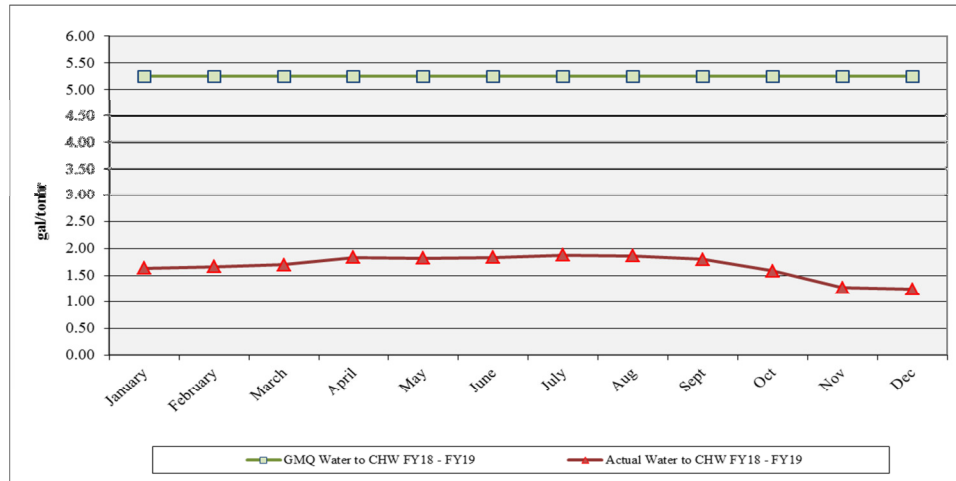


Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 1.055 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. The electric usage per unit of sales increased 2.5% over the previous Second Quarter.

The actual chiller plant water conversion factor decreased 17.1% over the previous Second Quarter. The total consumption of city water for the chiller plant for the current quarter decreased 14.1%.

B. Steam

1. Sales and Sendout

The steam sendout increased by approximately 6.2% over the previous Second Quarter (FY18), and the sales also increased by approximately 9.2%. The Quarter experienced a 2.6% increase in the number of heating degree days. The steam system losses decreased 16.3% over the previous Second Quarter. A comparison for the Second Quarter steam sales is shown in Figure 7.

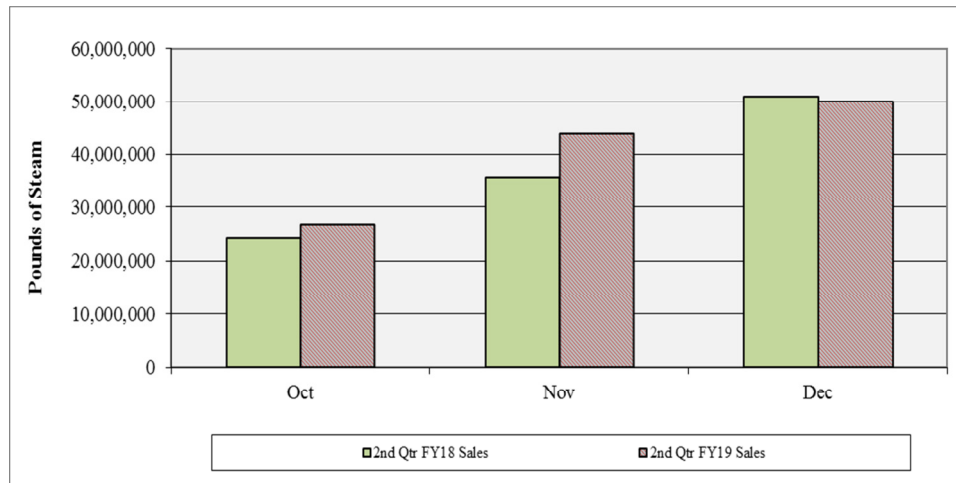


Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 15,025 pph, which reflects an approximate 0.7% increase in the peak steam production over the previous Second Quarter.

Figure 8 shows the steam sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in pounds per month between the recorded sendout and sales values and represent the total mass loss in the EDS between the EGF and the customer meters.

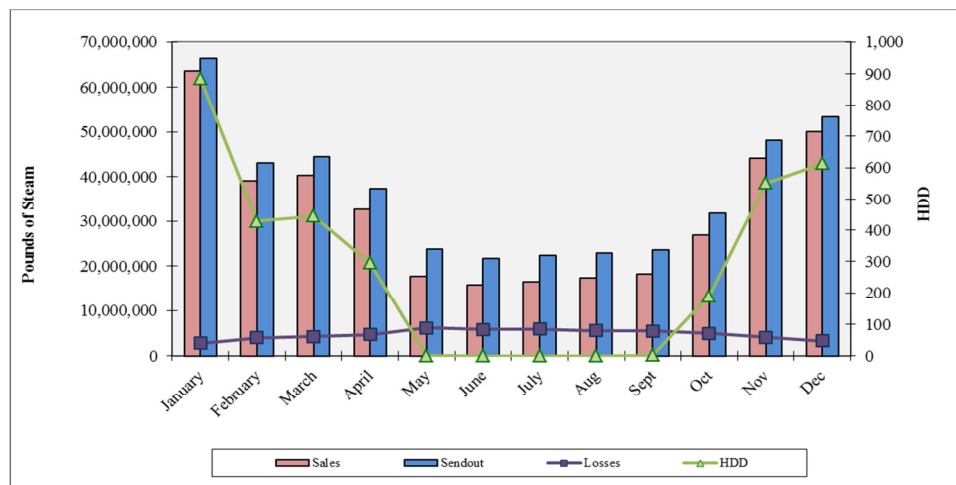


Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

2. Losses

A comparison of the total steam mass losses in the EDS for the Second Quarter is shown in Figure 9. The mass loss is caused by the heat loss in the EDS between the EGF and the customer meters, resulting in a mass loss at steam traps. Faulty

traps, steam leaks or meter error could also be a contributing cause of these losses. Whenever steam sales decrease from the previous quarter, the percent of system losses can be expected to increase since the majority of these losses are based on a near constant heat loss of the system.

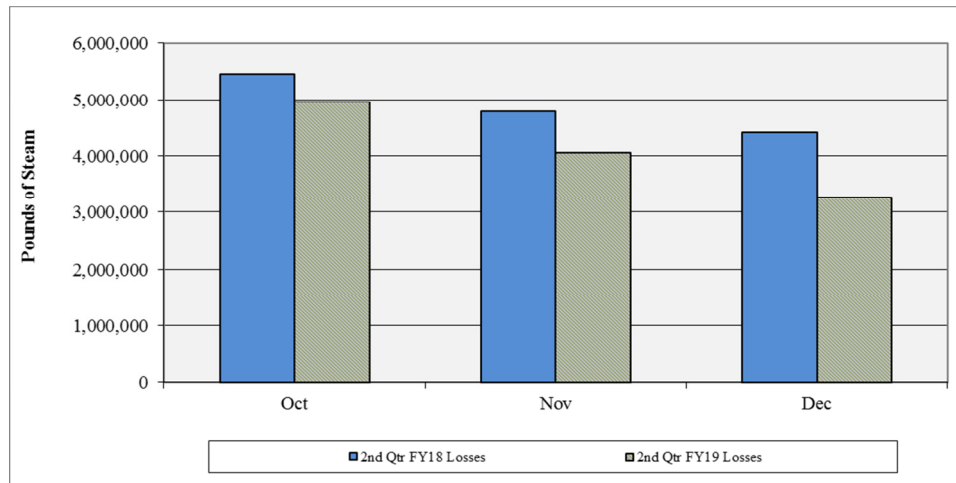


Figure 9. Steam System Losses

The amount of city water make-up (MU) to the steam system consists of the loss in mass between the EGF and the customers, in the condensate return from the customers to the EGF and losses at the EGF. This data is shown in the comparison of Second Quarter data in Figure 10.

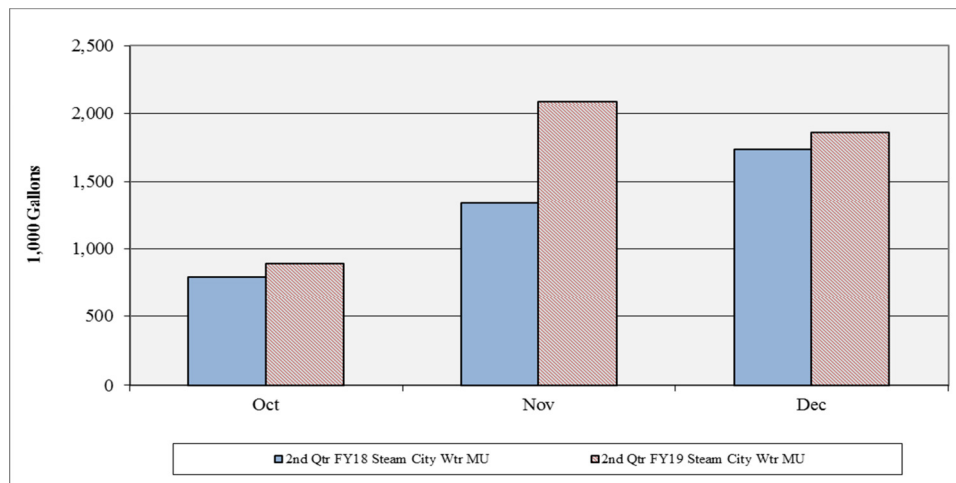


Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system of the EGF is presented by the following three charts, Figures 11, 12 and 13. Under the management of CNE, the System

Performance Guarantee levels as described in the ARMA are being achieved satisfactorily.

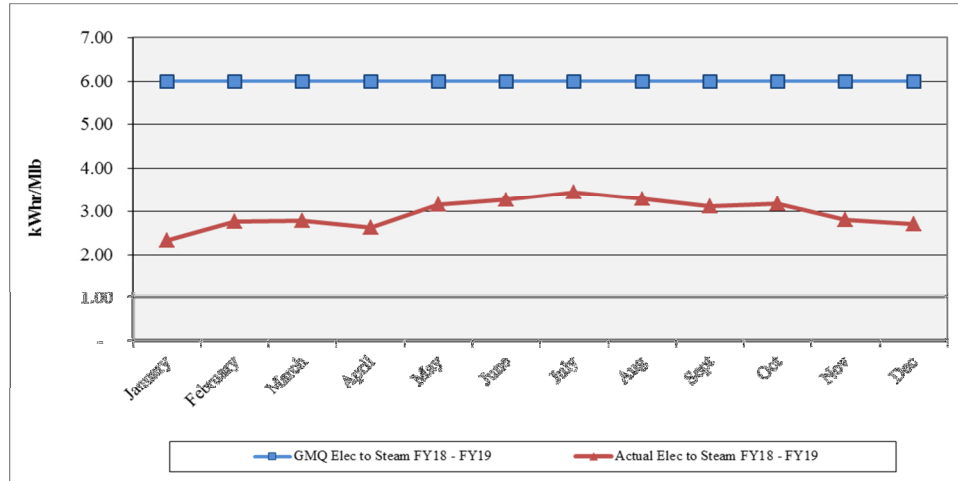


Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

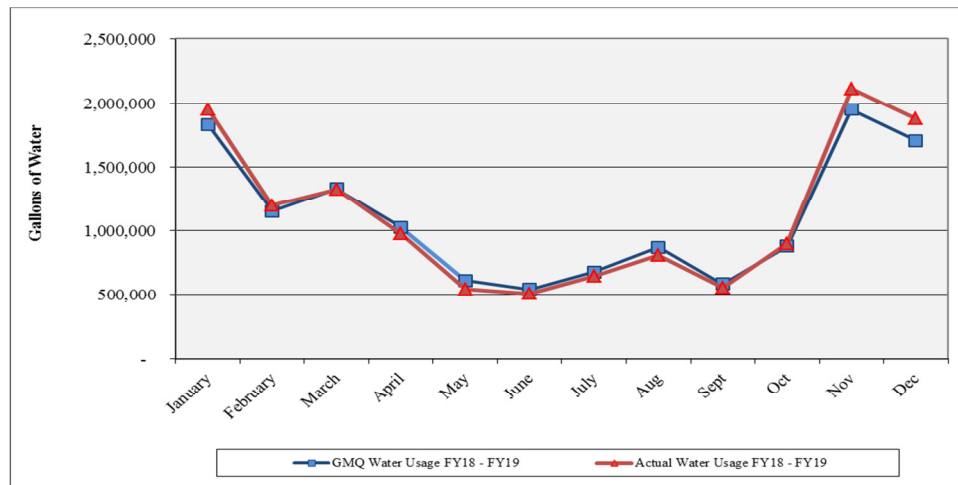


Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

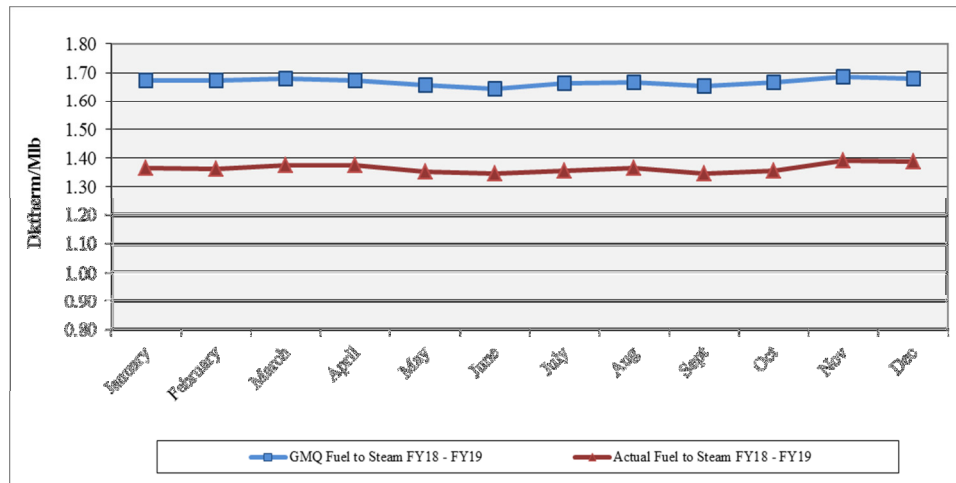


Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The current quarter experienced a 14.8% increase in the steam plant electric consumption while experiencing a 5.1% increase in the electric conversion factor. The water consumption for the steam plant increased 25.1% this quarter as compared to the previous Second Quarter. The fuel consumption per unit of steam sales was 0.3% higher than in the previous Second Quarter.

C. Contract Guarantee Performance

The production and sales performance for the EGF and EDS are summarized in Table 1 for the current quarter. Additional parameters, such as cooling tower blow-down and peak demands are listed in this table, as well. Table 2 presents the Second Quarter comparisons of the Guaranteed Maximum Quantities (GMQ) of the criteria commodities (fuel, water and electricity).

Table 1. Second Quarter FY19 Production, Sales and Consumption Summary

Item	Unit	Second Quarter FY19	Second Quarter FY18	*Percent Difference	Total Year FY19	Total Year FY18	*Percent Difference
	days	92	92	0.00%	92	92	0.00%
Total Electric Use	kWhrs	10,361,974	9,731,296	6.48%	10,361,974	9,731,296	6.48%
Chilled Water	kWhrs	10,018,497	9,431,973	6.22%	10,018,497	9,431,973	6.22%
Steam	kWhrs	343,477	299,323	14.75%	343,477	299,323	14.75%
Total Water Use	kgal	25,945	28,445	-8.79%	25,945	28,445	-8.79%
Total Chilled Water	kgal	21,105	24,576	-14.12%	21,105	24,576	-14.12%
EDS Make-up	kgal	5,864	9,208	-36.32%	5,864	9,208	-36.32%
Cooling Towers	kgal	15,241	15,368	-0.83%	15,241	15,368	-0.83%
Calc CT Evaporation	kgal	11,976	12,944	-7.48%	11,976	12,944	-7.48%
CT Blowdown	kgal	3,265	2,424	34.69%	3,265	2,424	34.69%
Calc # Cycles		3.67	5.34	-31.31%	3.67	5.34	-31.31%
Steam	kgal	4,840	3,869	25.10%	4,840	3,869	25.10%
Total Fuel Use	mmBTU	184,198	172,943	6.51%	184,198	172,943	6.51%
Natural Gas	mmBTU	184,112	172,943	6.46%	184,112	172,943	6.46%
Propane	mmBTU	86	0	0.00%	86	0	#DIV/0!
Condensate Return	kgal	12,401	11,920	4.03%	12,401	11,920	4.03%
	lbs	101,138,249	97,216,101	4.03%	101,138,249	97,216,101	4.03%
Avg Temp	°F	177.7	179.3	-0.93%	177.7	179.3	-0.93%
Sendout							
Chilled Water	tonhrs	11,237,600	10,970,300	2.44%	11,237,600	10,970,300	2.44%
Steam	lbs	133,286,000	125,508,000	6.20%	133,286,000	125,508,000	6.20%
Peak CHW Demand	tons	15,025	14,926	0.66%	15,025	14,926	0.66%
Peak Steam Demand	lb/hr	122,531	138,438	-11.49%	122,531	138,438	-11.49%
CHW LF		33.87%	33.29%	1.76%	33.87%	33.29%	1.76%
Steam LF		49.27%	41.06%	19.98%	49.27%	41.06%	19.98%
Sales							
Chilled Water	tonhrs	10,740,092	10,367,458	3.59%	10,740,092	10,367,458	3.59%
Steam	lbs	121,015,317	110,849,320	9.17%	121,015,317	110,849,320	9.17%
Losses							
Chilled Water	tonhrs	497,508	602,842	-17.47%	497,508	602,842	-17.47%
Steam	lbs	12,270,683	14,658,680	-16.29%	12,270,683	14,658,680	-16.29%
		9.21%	11.68%	-21.18%			
Degree Days							
CDD		138	120	15.00%	138	120	15.00%
HDD		1,354	1,320	2.58%	1,354	1,320	2.58%

*positive percent difference values imply an increase from FY18 to FY19

Table 2. Second Quarter FY19 Performance Guarantee Comparison for Steam and Chilled Water

GMQ Calculations	Unit	Second Quarter FY19	Second Quarter FY18	*Percent Difference	Total Year FY19	Total Year FY18	*Percent Difference
Steam							
GMQ Elec Conversion	kWhr/Mlb	6.00	6.00		6.00	6.00	
Electric Conversion	kWhr/Mlb	2.84	2.70	5.11%	2.84	2.70	5.11%
GMQ Plant Efficiency	Dth/Mlb	1.678	1.674		1.678	1.674	
Plant Efficiency	Dth/Mlb	1.382	1.378	0.29%	1.382	1.378	0.29%
Actual %CR		75.88%	77.46%	-2.04%	75.88%	77.46%	-2.04%
Avg CR Temp	°F	178	179	-0.93%	178	179	-0.93%
GMQ Water Conversion	gal	4,532,932	3,989,245		4,532,932	3,989,245	
Water Conversion	gal	4,888,400	3,907,690	25.10%	4,888,400	3,907,690	25.10%
Chilled Water							
GMQ Elec Conversion	kWhr/tonhr	1.055	1.055		1.055	1.055	
Electric Conversion	kWhr/tonhr	0.933	0.910	2.53%	0.933	0.910	2.53%
GMQ Water Conversion	gal/tonhr	5.25	5.25		5.25	5.25	
Water Conversion	gal/tonhr	1.97	2.37	-17.10%	1.97	2.37	-17.10%

*positive percent difference values imply an increase from FY18 to FY19

D. Operating Costs

The fixed operating costs for the DES include the management fee to CNE, debt service payments on the bonds and engineering and administration costs and are charged to the customers relative to their contract demand. The variable costs are dependent on the amounts of steam and chilled water produced and sold to the customers. These latter costs include the utility and chemical treatment costs. The vast majority of the costs incurred for the operation of the DES are passed onto the customers in the form of the demand charges (fixed costs) and energy charges (variable costs). A summary of the total operating costs for the fiscal year to date are shown in Table 3.

The revenues shown reflect the charges to the customers for their respective steam and chilled water service. The difference between the total costs and revenues from the customers is the shortfall that must be paid by Metro. The shortfall exists due to the remaining capacity at the EGF that was included in the original construction and remains unsold and the debt service for bonds to which the customers do not directly contribute.

The current fiscal year system operating costs to date are \$11,303,824. This value represents approximately 54% of the total budgeted operating cost for FY19. The customer revenues from the sales of steam and chilled water for FY19 (to date) are \$9,530,706 which is approximately 50% of the budgeted amount. An adjustment to the customer revenues is anticipated to occur in the Third Quarter due to an error with one of the customer meters. This adjustment is not included in the fiscal year to date revenues. The difference between the operating costs and customer revenue is the Metro funding amount (MFA), which represents the shortfall in cash flow for the system. The MFA transferred to date for FY19 is \$1,230,225 (75% of budget) and includes the Third

Quarter transfer amount. However, the actual MFA required cannot be accurately calculated due to outstanding invoices as of the date of this report.

Table 3. DES Expenses and Revenues to Date

Item	FY19 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee							
FOC: Basic	\$ 4,563,000	\$ 1,130,774	\$ 1,123,246	\$ -	\$ -	\$ 2,254,020	49.40%
9th Chiller	\$ 42,800	\$ 10,595	\$ 10,595	\$ -	\$ -	\$ 21,191	49.51%
C/O 6A	\$ 84,400	\$ 20,919	\$ 20,919	\$ -	\$ -	\$ 41,838	49.57%
C/O 6B	\$ 73,900	\$ 18,314	\$ 18,314	\$ -	\$ -	\$ 36,627	49.56%
C/O 7	\$ 27,800	\$ 6,899	\$ 6,899	\$ -	\$ -	\$ 13,798	49.63%
C/O 8	\$ 12,100	\$ 3,019	\$ 3,019	\$ -	\$ -	\$ 6,039	49.91%
Pass-thru Charges: Chemical Treatment	\$ 245,700	\$ 55,185	\$ 60,532	\$ -	\$ -	\$ 115,717	47.10%
Insurance	\$ 21,200	\$ -	\$ 5,178	\$ -	\$ -	\$ 5,178	24.42%
Marketing:							
CNE Sales Activity	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Incentive Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
FEA: Steam	\$ 66,400	\$ 17,451	\$ 37,309	\$ -	\$ -	\$ 54,760	82.47%
Chilled Water	\$ 186,400	\$ 134,260	\$ 55,261	\$ -	\$ -	\$ 189,521	101.67%
Misc: Metro Credit	\$ -	\$ (233,952)	\$ (133,181)	\$ -	\$ -	\$ (367,133)	n.a.
ARFA	\$ 64,800	\$ 16,423	\$ 16,423	\$ -	\$ -	\$ 32,845	50.69%
Deferral	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Man Fee =	\$ 5,388,500	\$ 1,413,839	\$ 1,357,696	\$ -	\$ -	\$ 2,771,535	51.43%
Reimbursed Management Fee + Chem Treatment		\$ 1,413,839	\$ 459,541	\$ -	\$ -	\$ 1,873,380	0.00%
Metro Costs							
Pass-thru Charges:							
Engineering	\$ 26,300	\$ 6,785	\$ 16,532	\$ 4,100	\$ -	\$ 27,418	104.25%
EDS R&I Transfers	\$ 281,700	\$ 70,425	\$ 70,425	\$ 23,475	\$ -	\$ 164,325	58.33%
Metro Marketing	\$ 10,900	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Project Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Metro Incremental Cost	\$ 554,900	\$ 164,631	\$ 123,203	\$ 48,245	\$ -	\$ 336,079	60.57%
Utility Costs:							
Water/Sewer	\$ 654,200	\$ 214,678	\$ 116,093	\$ -	\$ -	\$ 330,772	50.56%
EDS Water/Sewer	\$ -	\$ 40	\$ 148	\$ -	\$ -	\$ 189	n.a.
EDS Electricity	\$ 39,800	\$ 19,274	\$ 17,256	\$ -	\$ -	\$ 36,530	91.78%
Electricity	\$ 5,537,600	\$ 1,997,041	\$ 925,358	\$ -	\$ -	\$ 2,922,399	52.77%
Natural Gas Consultant	\$ 12,400	\$ 3,000	\$ 2,000	\$ -	\$ -	\$ 5,000	40.32%
Natural Gas Transport	\$ -	\$ 59,610	\$ 101,391	\$ -	\$ -	\$ 161,001	n.a.
Natural Gas Fuel	\$ 2,865,900	\$ 264,902	\$ 656,190	\$ -	\$ -	\$ 921,093	32.14%
Propane	\$ -	\$ 10,704	\$ -	\$ -	\$ -	\$ 10,704	n.a.
Subtotal - Metro Costs =	\$ 9,983,700	\$ 2,811,090	\$ 2,028,597	\$ 75,820	\$ -	\$ 4,915,507	49.24%
Subtotal - Operations =	\$ 15,372,200	\$ 4,224,929	\$ 3,386,293	\$ 75,820	\$ -	\$ 7,687,042	50.01%
Debt Service							
2012 Bonds	\$ 3,478,200	\$ 871,313	\$ 868,963	\$ 290,438	\$ -	\$ 2,030,713	58.38%
2005 Bonds -Self Funded	\$ 716,800	\$ 667,444	\$ -	\$ -	\$ -	\$ 667,444	93.11%
2007 Bonds -Self Funded	\$ 187,300	\$ 46,825	\$ 46,825	\$ 46,825	\$ -	\$ 140,475	75.00%
2008 Bonds -Self Funded	\$ 186,900	\$ 46,725	\$ 46,725	\$ 46,725	\$ -	\$ 140,175	75.00%
2010 Bonds -Self Funded	\$ 188,000	\$ 47,000	\$ 46,725	\$ 47,000	\$ -	\$ 140,725	74.85%
Fund 49107 -Self Funded	\$ 663,000	\$ 165,750	\$ 165,750	\$ 165,750	\$ -	\$ 497,250	75.00%
MIP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Oper. Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Capital =	\$ 5,420,200	\$ 1,845,057	\$ 1,174,988	\$ 596,738	\$ -	\$ 3,616,782	66.73%
Total =	\$ 20,792,400	\$ 6,069,986	\$ 4,561,280	\$ 672,558	\$ -	\$ 11,303,824	54.37%
Customer Revenues							
Taxes Collected		\$ 102,554	\$ 88,884	\$ -	\$ -	\$ 191,437	n.a.
Taxes Paid		\$ 102,554	\$ 58,604	\$ -	\$ -	\$ 161,158	n.a.
Interest & Misc Revenue	\$ 153,600	\$ 36,969	\$ 50,843	\$ -	\$ -	\$ 87,812	57.17%
Penalty Revenues/Credits		\$ 53,355	\$ 19,984	\$ -	\$ -	\$ 73,339	n.a.
Energy Revenues Collected		\$ 5,031,755	\$ 4,307,520	\$ -	\$ -	\$ 9,339,275	49.28%
Revenues =	\$ 19,152,100	\$ 5,122,079	\$ 4,408,627	\$ -	\$ -	\$ 9,530,706	49.76%
Metro Funding Amount =	\$ 1,640,300	\$ 947,908	\$ 152,653	\$ 672,558	\$ -	\$ 1,773,118	108.10%

The DES serves 28 customers and 40 buildings in downtown Nashville. These customers are divided into three categories: 1) Privately owned buildings, 2) State of TN owned buildings and 3) Metro owned buildings. A summary of the annual costs for each of these three categories is presented in Table 4. These values include late fees and penalties and any unpaid balances.

Table 4. Customer Revenue Summary to Date

Building	Chilled Water			Steam		
	Total Cost	Consumption (tonhrs/yr)	Unit Cost (\$/tonhr)	Total Cost	Consumption (Mlb/yr)	Unit Cost (\$/Mlb)
Private Customers	\$ 2,073,642	11,455,570	\$ 0.1810	\$ 756,257	46,327	\$ 16.3243
State Government	\$ 1,781,997	7,922,864	\$ 0.2249	\$ 936,826	56,628	\$ 16.5434
Metro Government	\$ 2,822,138	16,508,230	\$ 0.1710	\$ 968,451	72,577	\$ 13.3438
New Customers	\$ 1,829,395	11,041,942	\$ 0.1657	\$ 678,693	58,673	\$ 11.5673
Total	\$ 6,677,778	35,886,664	\$ 0.1861	\$ 2,661,534	175,532	\$ 15.1627

Total Revenue \$ 9,339,311
 True-up and Adjustments (Net) \$ 191,395
 Net Revenue \$ 9,530,706

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY19. Communication between TEG and CNE continues to be excellent, and CNE has reported and managed all EGF operations satisfactorily and according to the ARMA with no contract violations.

A. Reliability

The principle issues surrounding the reliable operation of the EGF relates to the ability to operate without significant interruption, exclusive of planned outages, and disruption of service to the customers. The following disruptions in service occurred during the quarter.

- On December 23 and 24, boiler #3 tripped offline due to a faulty flame scanner. The sendout steam pressure fell below 150 psig for approximately 2.5 hours between the two days

B. Efficiency

The operation of the EGF satisfied the guaranteed levels for all commodity usage during the quarter. There were no significant excursions above the guaranteed levels for the current quarter. A more detailed discussion of the contract guarantee performance was presented previously in this report.

C. Environment, Health and Safety

No environmental violations were reported during the quarter.

Monthly safety meetings were held on Blood Borne Pathogens, Heat and Cold Stress and Steam and Refrigerant Safety.

D. Personnel

The EGF currently had twenty-one full time employees, one part-time employee and two relief staff for most of the quarter. Of the current number of employees, seventeen were previously employed by Nashville Thermal Transfer Corporation.

E. Training

Staff training for this quarter consisted of the Health and Safety training discussed previously.

F. Water Treatment

The water treatment program consists of regular testing and monitoring of the water chemistry in the steam, chilled water and condensing water systems. Chemicals are added to control the water hardness, chlorine levels and biologicals. Remote testing of the condensate at the AA Birch, Tennessee Tower and the Andrew Jackson also occurs regularly to monitor the concentration and distribution of the steam system chemicals.

- Steam System
 - The condensate return averaged approximately 76% of the steam sendout during the quarter, which represents a 2% decrease over the previous Second Quarter.
 - Feedwater iron and hardness remained excellent during the quarter. The leak at the Renaissance Hotel reported in the previous Quarterly Report was repaired during the Second Quarter.
- Condensing Water System
 - The conductivity of the condensing water continues to be normal with only a few excursions resulting in high cycles of concentration and low blowdown rates.
- Chilled Water System
 - CNE continues to monitor and test for the presence of bacteria in the system. The continuous dosage of the biocide continues. At this point, the biological growth in the system, as measured at the EGF and at the customer buildings, has become essentially non-existent.
 - The project to install a side stream filter at the EGF remains on hold pending funding from Metro.

G. Maintenance and EGF Repairs

CNE continues to report on the numerous routine maintenance and preventive maintenance activities performed on the EGF primary and ancillary equipment. The principle items are discussed herein as they relate to the repair, maintenance or replacement of equipment or devices at the facility and are not considered extraordinary. The cost for these items is included as part of the FOCs.

- Repaired water column leak on #2 Boiler
- Checked and repaired plant computers & servers
- Repaired plant lighting & electrical
- Replaced #4 Boiler safety switch and checked wiring
- Trane replaced thrust bearing in 6A Chiller
- Checked flow meter on #6 chiller
- Adjusted regeneration frequency on softeners
- Sent #2 CWP motor out for repair
- Repaired #14 Cooling Tower fan shroud
- Repaired #4 chiller inlet valve
- Checked cooling tower level transmitter
- Checked and adjusted packing on all pumps
- Repaired Camera 3
- Replaced battery in MBC 4
- Replaced gauge on #3 BFWP
- Trane replaced temperature sensor on #9 Chiller
- Trane replaced purge sensor on #8 Chiller
- Replaced battery in AED
- Siemens worked on boiler communications with Insite
- Replaced Boiler #4 high pressure safety switch
- Repaired gas valve on Boiler #3
- Repaired #1 Softener limit switch
- Repaired #2 CWP motor
- Repaired #1 DA low level alarm
- Repaired #2 Boiler Walchem blowdown valve
- Repaired starter and vibration switch on #7 cooling tower
- Cleaned flow meter on #2 Softener
- Replaced toilet flush valves in men's restroom
- Repaired service air compressor
- Adjusted belts on #5, 10 & 18 cooling tower fans
- CE Power performed main switchgear auto transfer investigation
- Adjusted #4 Boiler O₂
- Installed chain operators on DA Tank isolation valves
- Repaired MBC 6
- Repaired #3 Boiler flame scanner
- Replaced #4 Boiler Walchem blowdown valve
- Repaired #14 cooling tower inlet valve
- Replaced solenoid on #9 Chiller
- Checked plant water meters
- Winterized boiler room
- Other repairs, maintenance and preventative maintenance were made during the quarter and are listed in the monthly reports issued by CNE.

H. EGF Walk-through

A quarterly Walk-through of the EGF was performed on January 2, 2019, by Kevin Jacobs, P.E. with TEG. This review involved a tour of the facility with the primary points of interest and concern noted herein. The items noted in this section need to be completed prior to the end of the operating contract for the System Operator in accordance with the ARMA paragraph 12.03.

- During the Fourth Quarter FY17 Walkthrough report, it was noted that additional rust spots were observed on towers #1, #5, #6, #11, #16 and #18. CNE has not made the repairs on the riser tubes. In addition, cooling tower fill being stored on the cooling tower deck beneath the basins has been noted by CNE as being of the new style. No old or damaged fill is currently being stored. No additional work has been performed on the riser tubes since the First Quarter Walkthrough FY18.
- CNE has made an effort to remove cobwebs within the EGF; however, this removal process is ongoing.
- In previous Walkthrough reports, it was noted that significant scale was observed on the fill (louvers) to several of the cooling towers. The scale remains on these cooling towers and most of the cells along the west-side of the plant now have significant scale or deposits on the fill (louvers). CNE does not appear to have addressed this issue since first being noted in the Fourth Quarter FY17 Walkthrough report. The scaling has increased and is apparent on most of the cooling towers. CNE needs to have their water treatment contractor to provide Metro a report explaining why the scale is forming and what actions need to be taken to remedy the issues.
- In previous Walkthrough Reports, it was noted that a drain valve on the condensing water header on the northeast corner of the cooling tower deck was frozen and had apparently been leaking. If this line or valve ruptures, a significant leak of the condensing water system will occur. CNE does not appear to have replaced this valve and the valve was observed to still have a slight leak (Second Quarter FY19 Walkthrough). It is recommended that CNE replace this valve, plug this valve or reconnect the drain line to the valve.
- In previous Walkthrough reports, it was noted that a leaking chemical feed line was observed on the south side of the southern DA. CNE has repaired the leak but has not cleaned the area affected by the spill.
- The water line in the ceiling west of boiler #4 is leaking again. This item was discussed with CNE and they are preparing to make the necessary repairs as the peak cooling season closes. During the Second Quarter FY19 Walkthrough, the leak was observed to have worsened significantly. CNE reported that they plan to repair the leak in the next few days.
- Some slight steaming was observed coming from a condensate line on the east side of the DA. A portion of insulation is missing from the condensate line exposing the bare pipe to a possible water drip from above. This item was discussed with CNE and they will investigate to determine if the steaming is due

to secondary steaming or if there is a hole in the condensate piping. CNE has repaired the piping and insulation in this area. This item will be removed from future reports.

- Four of the sycamore trees on the west side of the EGF appear to have died. One smaller tree on the north side of the building has died and CNE has removed the carcass. CNE needs to cut down and remove the dead trees and replace them. CNE has not addressed this issue due to the ongoing negotiations regarding Crockett Street and the potential equipment relocation.
- A bearing on chiller #6 is in need of replacement and will be shut down and repaired when the parts arrive in the coming days. CNE has made repairs to this chiller. This item will be removed from future reports.
- The motor for condensing water pump #2 has been removed and repaired. The motor was setting on the floor next to the pump during the Walkthrough. CNE intends to re-install the motor in next few weeks
- No homeless persons were observed on the property during this Walkthrough. However, trash was prevalent on all sides of the EGF. Graffiti is present on the west side of the EGF. CNE was notified and intends to address these issues
- Pallets were noted stacked on the mezzanine level near the water treatment area. CNE was notified and intends to address the issue
- Algae appear to be present in the low points on the roof deck. Trash has collected on some roof drains and a bag of trash was noted near CT #18. CNE was notified and intends to address these issues
- A carcass of a dead bird was found on the south end of the roof deck near the middle of the cooling towers. CNE was notified and intends to address the issue
- Other action items previously noted to be addressed by CNE have been completed.

IV. Capital Projects

The Capital Projects discussed in this section are those projects funded through the issuance of bonds by Metro. Costs for these projects will be paid from funds already appropriated. The statuses of the projects are discussed, and the project cost-to-date and bond balances are also presented.

A. Second Quarter FY19 Open Projects

The following projects remained open at the end of the First Quarter FY19.

1. DES111 – DES Combined Heat and Power

This project is currently on hold.

2. DES124 - Criminal Justice Center Redevelopment

The Work associated with the reconnection to the DES for the CJC has been completed. CNE has delivered the metering equipment to the building's contractor for their installation. The steam and chilled water service to the new building was initiated December 12. This project is now closed pending final invoicing from CNE.

TEG has prepared a reimbursement request to Metro General Services for the costs incurred by DES due to the demolition and re-construction of the CJC.

The damage to the AA Birch Tunnel that occurred as a result of the blasting at the Criminal Justice Center site has been documented. Once funds become available for the repairs, the necessary repairs to the tunnel will be completed. This additional work will be included in project DES-165.

3. DES133 – Old Convention Center Site Redevelopment

The developer (Oliver McMillan Spectrum Emery, LLC) of the new site (601 Commerce St) executed the necessary transfer of ownership documents in October and is now a DES customer. The new service connections for the site are anticipated to be completed in the Third Quarter FY19 so that chilled water may be used during construction. The service connections project is being developed under DES160. The formal date of the agreement to receive service at the full rate is January 15, 2020.

This project is now closed.

4. DES133.1 - Old Convention Center Site Redevelopment: Monitoring of Broadway Tunnel

This project involved the monitoring/reporting on the condition of the Broadway Tunnel related to the construction and blasting at the 5th + Broadway Development. As the City has now approached the contractor(s) responsible for the blasting and damage to the tunnel, including the need for the City to reinforce the tunnel and make subsequent repairs after the completion of the blasting, this project remains open. The repairs for tunnel damage will be made under project DES-164.

5. DES135 – CHW Leak at 5th and Union

After several exploratory excavations, the source of the chilled water leak at the James K Polk Building has not been located. TEG and CNE conducted a survey of the visible aspects of the chilled water system in late October. This included the opening of all of the chilled water direct buried valve manholes and valve

boxes, along with the opening of several other utilities along the chilled water piping routes. During this survey, one chilled water leak was discovered on the piping which serves Nissan Stadium. A drain valve was leaking on the east side of the Cumberland River. The isolation of this chilled water service line was scheduled with the Nissan Stadium and the valve was replaced by CNE.

The day after the leak was discovered at the Nissan Stadium, an existing leak was discovered at the intersection of 4th and Union when water containing green dye surfaced in the intersection. CNE scheduled an emergency excavation and a hole was discovered in a 6" chilled water pipe. The pipe was isolated and repaired and put back into service.

With these two repairs, the make-up to the chilled water system was reduced to about 25 to 30 gpm which was about a 100 gpm reduction. However, the repair of these two leaks did not alter the amount of water entering at the JK Polk Building. However, TEG contacted the City Water Department to inform them about the water intrusion at the JK Polk Building and ask if they were aware of a City water leak in the area. TEG was told that the Water Department had been searching for a water leak in the block immediately south of the JK Polk Building. TEG asked the City Water Department to investigate the leak at the JK Polk and they retrieved a sample of the leaking water. The analysis of this sample determined that a portion of the water was City water.

From recent conversations with the Water Department, TEG has learned that they have been unable to locate the city water leak in the block south of the JK Polk Building, and they now plan on replacing the city water main along 5th Avenue between Church Street and Union Street. TEG asked to be kept informed regarding the schedule. All of this information has been shared with JK Polk Building management.

In addition to the chilled water system survey, TEG has coordinated with CNE the partial isolation of the chilled water system to determine the impact to the make-up to the system. These isolations have revealed potential leaks in the range of 1 to 3 gpm; however, no significant changes in the make-up were recorded.

Because of the diluted nature of the green dye in the visible leak at the JK Polk, TEG believes that the majority of the water intrusion at the JK Polk is City water. Therefore, it is TEG's opinion that once the City replaces the water main, the water intrusion at the JK Polk should diminish significantly. Meanwhile, TEG will coordinate two additional partial chilled water system isolations to determine if there is an impact on the leak at the JK Polk. Otherwise, the search will continue for the origin of the chilled water system leaks with a focus on the James K Polk Building area.

6. DES139 – DES Options Review

Metro has issued an RFP to solicit proposals for the management of the DES and a possible sale of the system. Phase One of this solicitation, which entails the development of a short list of bidders, began during the quarter. Phase Two will involve the receipt of the actual proposals and is anticipated to begin in the Third Quarter.

7. DES143 – Manholes N1, N2 and S6 Insulation Repair and Replacement

The insulation of Manhole S6 is now included in DES161. The insulation of Manholes N1 and N2 will be included in a future DES project. DES143 is now closed.

8. DES144 – Manhole 6 Repair

The construction on this project was completed during the Second Quarter of FY19. Invoicing for this project is not complete, therefore it is anticipated that this project will be closed during the Third Quarter FY19.

9. DES149 – Hot Spot at 1st and Molloy

CNE was contacted by the installing contractor and told that the invoice for the insulation of the repaired steam piping had erroneously been omitted from the project invoice. TEG is now waiting on finalization of the invoice for this project, therefore it is anticipated that this project will be closed in the Third Quarter FY19.

10. DES151 – Manhole 23 Repairs

Several of the structural metal piping supports within this manhole and in the 7th Avenue Tunnel immediately below this manhole have experienced severe corrosion. In addition, the structural supports for access grating within this manhole have advanced corrosion. The manhole also has concrete repairs that are needed which include steam and condensate return piping anchor pedestals. This project addresses these needed repairs including the cleaning and painting of the structural supports, along with other miscellaneous needed repairs.

A pre-bid meeting for this project was held in December and bids are due early in January. It is anticipated that award will be made soon thereafter and construction will begin in late January/early February. It is expected that this work will be completed during the Third Quarter FY19.

11. DES152 – Manhole A and Manhole M Coating Repairs

The structural steel in these manholes were cleaned and painted as part of DES107 in 2015. Portions of the paint is now flaking and coming off of these supports. The paint manufacturer was contacted and reviewed the failing coatings. Their position is that the surface preparation and paint application is to blame. However, TEG employed a painting inspector during this work and records were maintained regarding the ambient conditions, surface preparation and application. Even with this evidence, the paint manufacturer is not willing to warrant the work. Before the existing corrosion progresses, these coating failures need to be repaired and this project addresses these needed repairs.

This work has been put on hold but is included in the FY20 capital budget request.

12. DES153 – Manhole L Repairs

The structural steel in Manhole L is corroded and needs to be cleaned and painted to prevent any additional corrosion. Additionally, the condensate piping in this manhole experiences fairly severe hammering and the piping configuration needs to be modified to try and alleviate this problem.

TEG started the design for these repairs during the First Quarter FY19. Based upon higher priority projects, it is expected that the design for this project will be completed during the Third Quarter FY19 and bidding will take place during the same quarter.

13. DES154 – Manhole K Repairs

The structural steel in Manhole K is corroded and needs to be cleaned and painted to prevent any additional corrosion.

TEG started the design for these repairs during the First Quarter FY19. It is expected that this work will be bid during the Third or Fourth Quarter FY19.

14. DES155 – 7th & Broadway Condensate Leak Repair

Work was completed during the Second Quarter FY19 and the City was invoiced during the same quarter. This project is now closed.

15. DES156 – Broadway Tunnel Kicker Repair

Work was completed during the Second Quarter FY19 and the City was invoiced during the same quarter. This project is now closed.

16. DES157 – Manhole 9 Structural Steel Repairs

The structural steel piping supports in Manhole 9 are badly corroded and need to be replaced and/or cleaned and painted to maintain the integrity of the steam and condensate piping system. It is anticipated that this project will be designed, bid and awarded during the Third Quarter FY19.

17. DES158 – Manhole 18A Structural Steel Repairs

The structural steel piping supports in Manhole 18A are badly corroded and need to be replaced and/or cleaned and painted to maintain the integrity of the steam and condensate piping system. It is anticipated that this project will be designed, bid and awarded during the Third Quarter FY19.

18. DES159 – Manhole B2 Structural Steel Repairs

The structural steel piping supports in Manhole B2 are badly corroded and need to be cleaned and painted to maintain the integrity of the steam and condensate piping system. It is anticipated that this project will be designed, bid and awarded during the Third Quarter FY19.

19. DES160 – New Service to 5th + Broadway Development

After several conversations and meetings with the building's contractors, the design of the new chilled water service connections for the 5th + Broadway development (601 Commerce St.) was completed during the quarter. The pre-bid meeting is scheduled for January 2019 and the work is anticipated to be completed by the end of February 2019. However, the installation of the metering equipment will be coordinated with the building's contractors at a later date. Chilled water service during construction is anticipated to begin during the summer of 2019. The building's substantial completion date is anticipated to be in January 2020, at which time, the normal service will begin to the conditioned spaces within the building.

20. DES161 – Manhole S6 Insulation

This project addresses the installation of insulation in Manhole S6 which is a small manhole in the State distribution system. This project was formerly included in DES143.

21. DES162 – Service to New Hotel at 3rd Ave & Molloy

Conversations for the potential service to a new hotel to be located at 3rd Avenue and Molloy began in FY18. The developer of the site contacted TEG during the Second Quarter FY19 and TEG presented the anticipated costs of service from

DES. A meeting was held between DES and the developer's team to discuss the technical aspect of DES service, as well as, the economic benefits of DES service. As of the end of the Second Quarter, TEG was anticipating follow-up meetings and additional discussions on the economic analysis of the service.

22. DES163 – New Service to MDHA Parcel K

Negotiations with this potential customer are in the early stages.

23. DES164 – Broadway Tunnel Repairs

The development of the 5th + Broadway project adjacent to a portion of the Broadway Tunnel included blasting during the excavation of rock. In order to protect the structural integrity of the Broadway Tunnel during these blasting activities, the City had to structurally reinforce portions of the Broadway Tunnel. Once the blasting was complete, TEG, TEG's structural engineer and the contractor that did the reinforcement, reviewed the tunnel and noted several repairs which were needed as a result of the blasting. This project addresses those needed repairs.

Construction is anticipated to begin during the Third Quarter FY19.

24. DES165 – AA Birch Tunnel Repairs

The Criminal Justice Center (CJC) which sits above the AA Birch Tunnel was completely demolished and a new CJC is now under construction at the same site. As a result of the removal of the old CJC, and the subsequent blasting which occurred for the new CJC construction, the AA Birch Tunnel experienced some damage which needs to be repaired. This work has been on hold until the storm sewer system for the new CJC is constructed which was tentatively scheduled to be complete at the end of January.

It is anticipated that construction will begin during the Third Quarter FY19.

25. DES166 – Miscellaneous Tunnel Repairs

During the review of the Broadway Tunnel, the 4th Avenue and 7th Avenue Tunnel were reviewed for any needed repairs. Some needed repairs were noted during this review. This project addresses those needed repairs.

Construction is anticipated to begin during the Third Quarter FY19.

B. Second Quarter FY19 Closed Projects

DES124, DES133, DES143, DES155 and DES156 were closed during the Second Quarter FY19.

C. Capital Projects Budget

The following table summarizes the costs and remaining balance of the DES capital projects based on reported expenditures to date. Open projects or completed projects that require some additional management are shown. Total costs for projects that are closed are shown with a gray highlight. Only the funds currently available are shown.

Metro has decided to make available a portion of the bond fund 49116 for new projects. The transactions for this fund are included in the following table.

Table 5. Capital Projects Expense Summary

DES Project #	Description	Total Budget	FY19 Spending to Date	Total Spent to Date	Remaining Balance
Fund-49109					
DES119	DES Delta T Issue	\$ 67,000	\$ -	\$ 65,447	\$ 1,553
DES139	Options Review	\$ 63,600	\$ 44,019	\$ 44,019	\$ 19,581
MAS	Miscellaneous Development Projects	\$ 46,900	\$ 1,843	\$ 28,842	\$ 18,058
DES124	CJC Redevelopment	\$ 2,000	\$ 1,843	\$ 1,843	\$ 157
DES133	NCC Development	\$ 10,000	\$ 4,099	\$ 4,099	\$ 5,901
DES133.3	Broadway Tunnel Reinforcement	\$ -	\$ 1,617	\$ 1,617	\$ (1,617)
DES135	Chilled Water Leak 5th and Union	\$ 50,000	\$ 20,563	\$ 20,563	\$ 29,437
DES148	89 Peabody	\$ 10,000	\$ 5,739	\$ 5,739	\$ 4,261
DES151	MH 23 Repairs	\$ -	\$ 7,209	\$ 7,209	\$ (7,209)
Total Closed Projects		\$ 2,493,661	\$ -	\$ 2,405,553	\$ 88,108
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ (137,246)	\$ -	\$ -	\$ (137,246)
Total 2010 Bond		\$ 2,605,916	\$ 86,931	\$ 2,584,930	\$ 20,986
Fund-49107					
DES124	CJC Redevelopment	\$ 300,000	\$ 1,403	\$ 359,271	\$ (59,271)
DES130	MH B3 Repair	\$ 20,000	\$ -	\$ 1,468	\$ 18,532
DES133	NCC Development	\$ 40,000	\$ 7,427	\$ 219,513	\$ (179,513)
DES133.3	Broadway Tunnel Reinforcement	\$ 450,000	\$ 212	\$ 435,735	\$ 14,265
DES135	Chilled Water Leak 5th and Union	\$ 200,000	\$ 14,872	\$ 192,629	\$ 7,371
DES138	MH-D	\$ 130,000	\$ -	\$ 121,242	\$ 8,758
DES148	89 Peabody	\$ 10,000	\$ 7,659	\$ 32,737	\$ (22,737)
Total Closed Projects		\$ 7,458,827	\$ -	\$ 6,964,044	\$ 494,783
Metro Project Admin		\$ (129,827)	\$ (0)	\$ 171,140	\$ (300,967)
Project Man, Development, etc		\$ 21,000	\$ -	\$ -	\$ 21,000
Customer Connection Fund		\$ 8,500,000	\$ 31,573	\$ 8,497,779	\$ 2,221
Fund-49116					
DES111	DES CHP	\$22,784,277	\$ -	\$ 168,706	\$22,615,571
DES152	MH A & M Repairs	\$ -	\$ -	\$ -	\$ -
DES153	MH L Repairs	\$ 110,000	\$ 261	\$ 261	\$ 109,739
DES154	MH K Repairs	\$ -	\$ 85	\$ 85	\$ (85)
DES157	MH 9 Repairs	\$ 85,000	\$ 7,430	\$ 7,430	\$ 77,570
DES158	MH 18A Repairs	\$ 75,000	\$ 8,927	\$ 8,927	\$ 66,073
DES159	MH B2 Repairs	\$ 75,000	\$ 3,598	\$ 3,598	\$ 71,402
DES160	5th + Broadway Service	\$ 60,000	\$ 5,492	\$ 5,492	\$ 54,508
DES161	MH S6 Insulation	\$ 10,000	\$ -	\$ -	\$ 10,000
DES162	3rd and Molloy Service	\$ 20,000	\$ 3,713	\$ 3,713	\$ 16,287
DES163	Parcel K Service	\$ 20,000	\$ 345	\$ 345	\$ 19,655
DES164	Broadway Tunnel Repairs	\$ 165,000	\$ 1,844	\$ 1,844	\$ 163,156
DES165	AA Birch Tunnel Repairs	\$ 75,000	\$ 853	\$ 853	\$ 74,147
DES166	Misc. Tunnel Repairs	\$ 165,000	\$ -	\$ -	\$ 165,000
Total Closed Projects		\$ 15,723	\$ -	\$ 15,723	\$ -
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ 2,290,000	\$ -	\$ -	\$ 2,290,000
CHP and EDS Repairs		\$ 26,000,000	\$ 45,467	\$ 229,896	\$ 25,770,104

V. Energy Distribution System Repairs, Improvements, PM and Emergencies

Several EDS repairs and improvements were made during the Second Quarter. The principle items for discussion are presented in the following sections.

A. Repairs and Improvements

Several repairs were made to the EDS and at customer buildings during the quarter. The remaining value of the R&I budget at the end of the current quarter (February 1, 2019) is \$36,006. Tables 6A and 6B provide a summary of the FY19 expenditures and revenues to date associated with the R&I budget.

Table 6. FY19 Repair and Improvement Expenditure and Revenue Summary

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Net Market Adjustment	Market Value	Balance
Value at end of FY18						\$ -	\$ 104,285.39	\$ 104,285.39
DES-144	7/28/2018	DES-2346	TEG	\$ 1,920.75				
DES-147	7/28/2018	DES-2346	TEG	\$ 407.03				
DES-149	7/28/2018	DES-2346	TEG	\$ 127.28				
DES-151	7/28/2018	DES-2346	TEG	\$ 4,412.21				
DES-152	7/28/2018	DES-2346	TEG	\$ 127.28				
DES-149	9/1/2018	DES-2348	CNE	\$ 88,200.26				
EMR 17-004	8/2/2018	DES-2348	CNE	\$ 5,277.44				
Interest/Transfer	07/02/18	-	-	\$ 185.59				
Interest/Transfer	07/02/18	-	-	\$ (185.59)				
CNE July R&I Invoice	09/01/18	DES-2348	CNE	\$ 2,324.97				
DES-144	08/27/18	DES-2346	TEG	\$ 2,497.71				
DES-149	08/27/18	DES-2346	TEG	\$ 42.43				
DES-150	08/27/18	DES-2346	TEG	\$ 1,718.35				
DES-151	08/27/18	DES-2346	TEG	\$ 8,132.38				
DES-153	08/27/18	DES-2346	TEG	\$ 5,606.40				
DES-154	08/27/18	DES-2346	TEG	\$ 3,648.55				
DES-147 (Reimbursement from Star Construction)	08/17/18	DES-2346	-	\$ (12,918.11)				
Interest/Transfer	08/01/18	-	-	\$ 193.12				
Interest/Transfer	08/01/18	-	-	\$ (193.12)				
CNE Aug R&I Invoice	09/19/18	DES-2351	CNE	\$ 4,017.14				
DES-144	10/01/18	DES-2351	TEG	\$ 4,343.33				
DES-150	10/01/18	DES-2351	TEG	\$ 726.93				
DES-151	10/01/18	DES-2351	TEG	\$ 3,097.58				
DES-153	10/01/18	DES-2351	TEG	\$ 6,885.45				
DES-154	10/01/18	DES-2351	TEG	\$ 721.23				
DES-155	10/01/18	DES-2351	TEG	\$ 489.57				
DES-156	10/01/18	DES-2351	TEG	\$ 678.80				
Interest/Transfer	09/04/18	-	-	\$ 230.69				
Interest/Transfer	09/04/18	-	-	\$ (230.69)				
CNE Sept R&I Invoice	11/01/18	DES-2353	CNE	\$ 8,675.15				
Sub-Total First Quarter				\$ 141,160.11	\$ 70,425.00	\$ -	\$ (70,735.11)	\$ (70,735.11)
DES-144	10/29/18	DES-2351	TEG	\$ 1,879.53				
DES-151	10/29/18	DES-2351	TEG	\$ 169.70				
DES-155	10/29/18	DES-2351	TEG	\$ 776.27				
DES-156	10/29/18	DES-2351	TEG	\$ 691.42				
Interest/Transfer	10/02/18	-	-	\$ 262.18				
Interest/Transfer	10/02/18	-	-	\$ (262.18)				
DES-144	01/02/19	-	TEG	\$ 1,926.28				
DES-156	01/02/19	-	TEG	\$ 279.00				
CNE Oct R&I Invoice	12/01/18	DES-2355	CNE	\$ 7,736.95				
DES-144	12/01/18	DES-2355	CNE	\$ 40,000.00				
Interest/Transfer	11/01/18	-	-	\$ 296.02				
Interest/Transfer	11/01/18	-	-	\$ (296.02)				
CNE Nov R&I Invoice	12/20/18	-	CNE	\$ 8,253.54				
DES-151	01/02/19	-	TEG	\$ 546.90				
DES-155	01/02/19	-	TEG	\$ 2,534.59				
DES-156	01/02/19	-	TEG	\$ 1,095.76				
DES-156	12/19/18	-	CNE	\$ 4,929.00				
DES-155	12/19/18	-	CNE	\$ 15,281.00				
DES-144	12/19/18	-	CNE	\$ 20,556.00				
CNE Dec R&I Invoice	01/16/19	-	CNE	\$ 8,263.62				
Interest/Transfer	12/03/18	-	-	\$ 245.54				
Interest/Transfer	12/03/18	-	-	\$ (245.54)				
Sub-Total Second Quarter				\$ 114,919.56	\$ 70,425.00	\$ -	\$ (44,494.56)	\$ (44,494.56)
Sub-Total Third Quarter				\$ -	\$ 46,950.00	\$ -	\$ 46,950.00	\$ 46,950.00
Sub-Total Fourth Quarter				\$ -	\$ -	\$ -	\$ -	\$ -
FY19 Year to Date				\$ 256,079.67	\$ 187,800.00	\$ -	\$ 36,005.72	\$ 36,005.72

B. Preventive Maintenance

Preventive maintenance, tunnel and manhole inspections and reviews of customers' mechanical rooms were performed during the quarter. The principle items for discussion are presented.

1. EDS Manhole Inspections
 - a. The monthly vault and tunnel inspections were held as scheduled.
 - b. Customer metering station calibration checks were completed as scheduled.
 - c. Water chemistry samples at customer buildings were taken as scheduled.
 - d. Several of the vaults continue to require pumping due to the accumulation of either groundwater or surface water.
 - e. CNE continues to fabricate and replace trap assemblies within the EDS.
2. Other EDS Inspections
 - a. Other items are included in the CNE monthly reports.

C. Emergencies

No emergencies were reported during the quarter.

D. EDS Walk-through

The Second Quarter FY 2019 walkthrough was conducted on January 9, 10 and 11, 2019. The manholes that were visited include Manholes B1, B2, B3, B4, B6, B7, B8, B9, B10, 14A, 16A, 22B, Viridian, S4A, U, C and 4. The following comments and observations are a result of these visits. The items noted in this section need to be completed prior to the end of the operating contract for the System Operator in accordance with the ARMA paragraph 12.03.

1. Manhole B1
 - a. This is sump pump manhole located in 1st Avenue South to the west of Manhole B. It was constructed a few years ago to reduce the amount of groundwater infiltration in Manhole B.
 - b. The ladder in this manhole is comprised of individual rungs embedded in the manhole concrete wall. Our experience with these ladders is that an individual rung might fail without warning. Therefore, this ladder should be replaced with a side-rail type ladder. TEG will coordinate with CNE to have this replacement scheduled.
 - c. There is not a working platform in this manhole to enable maintenance personnel to maintain the sump pump and its controls. A working platform

should be added to this manhole. TEG will coordinate with CNE to have this replacement scheduled.

2. Manhole B2

- a. This manhole has an electric sump pump, however because the sump is not very deep, the pump and float mechanism is not sufficiently below the manhole floor to enable all of the water in the floor of the manhole to be removed. Therefore, there is always a small amount of water in the floor of the manhole. TEG will investigate to determine if there is a practical solution to this situation.
- b. The discharge rate of the electric sump pump in this manhole was very low; CNE and TEG personnel disconnected the pump discharge from the discharge piping and the pump seemed to operate correctly and pumped much greater flow. TEG will obtain the pump curve and estimate what the flow should be through the discharge piping. If this estimate determines that the discharge flow appears to be restricted, then the discharge piping might be partially clogged.
- c. There is corrosion on the piping supports. These supports should be cleaned and painted to prevent additional corrosion. TEG is in the process of developing construction documents to have the steel in this manhole cleaned and painted.
- d. There are some hairline cracks in the manhole ceiling and walls. CNE should continue to monitor these cracks and inform TEG of any significant changes.
- e. Recent development at this location now has the ventilation manway located in the sidewalk. When a sidewalk was constructed around this manway, the manway cover and frame was replaced with a Fibrelite composite assembly. Initially, the manway cover set flush with the frame and sidewalk. Now, however, the manway lid is protruding from the manway frame. The installation of this lid was done by the developer of the property. The developer has been contacted and because the installation is still within a 12 month warranty, he has submitted the repair of this manway to his contractor as a warranty item. It is believed that the lid will not set flush with the sidewalk because concrete was installed in the interior of the frame and this concrete has expanded and will not allow the lid to set flush. TEG will continue communications with the developer to ensure that this manway is repaired.
- f. There is some mud and debris in the manhole; this mud and debris should be removed as soon as possible.

3. Manhole B3

- a. There was water present in this vault and it required pumping prior to entry.
- b. There is some corrosion on the piping supports. These supports should be cleaned and painted to prevent additional corrosion. This vault should be

- included in the capital project to repair and prevent structural corrosion with a “moderate” rating.
- c. There is some minor insulation repair needed in this vault; this vault should be included in the capital project to repair insulation with a “moderate” rating.
 - d. There is some minor spalling of a concrete wall where it appears that rebar chairs were placed during the vault’s original construction. These spalled places should be patched to prevent further deterioration of the concrete. TEG will coordinate with CNE to have this done.
 - e. There are several hairline cracks in the ceiling of this vault; CNE should continue to monitor these cracks and inform TEG of any significant changes.
 - f. There is some debris and mud in this manhole that should be removed as soon as possible.
4. Manhole B4
- a. There was water present in this vault and it required pumping prior to entry.
 - b. There is some corrosion of the structural components in this manhole. This vault should be included in the capital project to repair and prevent structural corrosion with a “moderate” rating.
 - c. There is some insulation repair needed in this vault; this vault should be included in the capital project to repair insulation with a “moderate-to-high” rating.
 - d. There is some mud and debris in the floor of this manhole. This should be removed by CNE as soon as possible.
 - e. There are several hairline cracks in the ceiling of this vault; these cracks should be monitored and any significant changes should be reported to TEG.
 - f. Some of the foam sealant used at the piping wall penetrations has started to “pull away” from the concrete holes. At this time, groundwater is not leaking through any of these penetrations. CNE should continue to monitor these seals and report any changes to TEG.
5. Manhole B6
- a. There was water in this manhole and it required pumping prior to entry.
 - b. Some minor deterioration of the grout behind the anchor beam baseplates has occurred. CNE should monitor this and report any significant deterioration to TEG.
 - c. The existing trap is an Armstrong model 2011 which has a history of poor performance. This trap should be replaced with a “standard” bucket trap as soon as possible.
 - d. The entry manway frame is damaged; this manway frame and lid should be replaced as soon as possible.
 - e. There is some mud in the manhole floor that should be removed as soon as possible.

- f. The trap in this manhole was cycling often. TEG will estimate what the condensate load is on this trap; it may need to be replaced with a higher capacity unit.
 - g. There is some hairline cracking of the concrete. CNE should monitor this cracking and notify TEG if there are any significant changes.
6. Manhole B7
- a. There was water in this manhole and it required pumping prior to entry.
 - b. There is mud and some debris in the manhole. CNE should remove the mud and debris as soon as possible.
 - c. The insulation on the sparge tube has fallen off; it appears that it was only held in place with caulking. This insulation should be re-positioned and an aluminum strap installed to keep it in place and then the jacketing should be re-caulked. This item was noted in the January 26, 2015 Quarterly Walkthrough Report; the April 25, 2016 Quarterly Walkthrough Report, the April 10, 2017 Quarterly Report and the January 26, 2018 Quarterly Walkthrough Report. The insulation did have some cable ties around it in what appeared to be an attempt at a repair.
 - d. Some deterioration of the grout behind the anchor beam baseplates has occurred. CNE should monitor this and report any significant deterioration to TEG.
 - e. There is some corrosion on the welds on the anchor beam support in this manhole. These welds should be wire brushed/wire wheeled/cleaned and then painted with cold galvanizing paint to prevent additional corrosion.
 - f. The existing trap is an Armstrong model 2011 which has a history of poor performance. This trap should be replaced with a “standard” bucket trap as soon as possible.
 - g. The entrance manway lid is worn and loose and needs to be replaced. CNE should arrange to have this frame and lid replaced as soon as possible. This item appeared in the January 26, 2018 Quarterly Walkthrough Report.
7. Manhole B8
- a. There was a minor amount of water in this manhole and it required pumping prior to entry.
 - b. There are some hairline cracks in the ceiling; these should be monitored by CNE and any significant changes reported to TEG.
 - c. Some deterioration of the grout behind the anchor beam baseplates has occurred. CNE should monitor this and report any significant deterioration to TEG.
 - d. There is some corrosion on the welds on the anchor beam support in this manhole. These welds should be wire brushed/wire wheeled/cleaned and then painted with cold galvanizing paint to prevent additional corrosion.

8. Manhole B9
 - a. There was some mud in this manhole; CNE should remove the mud as soon as possible.
 - b. There are some hairline cracks in the ceiling of this vault. CNE should monitor these cracks and report any significant changes to TEG.
 - c. Some deterioration of the grout behind the anchor beam baseplates has occurred. CNE should monitor this and report any significant deterioration to TEG.
 - d. There is some corrosion on the welds on the anchor beam support in this manhole. These welds should be wire brushed/wire wheeled/cleaned and then painted with cold galvanizing paint to prevent additional corrosion.

9. Manhole B10
 - a. There was water in this manhole and it required pumping prior to entry.
 - b. There was some mud in this manhole. CNE should remove this mud as soon as possible.
 - c. The entry manway frame is damaged; CNE should have this lid and frame replaced as soon as possible.
 - d. Some minor deterioration of the grout behind the anchor beam baseplates has occurred. CNE should monitor this and report any significant deterioration to TEG.
 - e. There is some corrosion on the welds on the anchor beam support in this manhole. These welds should be wire brushed/wire wheeled/cleaned and then painted with cold galvanizing paint to prevent additional corrosion.
 - f. There are some hairline cracks in the ceiling of this vault. CNE should monitor these cracks and report any significant changes to TEG.

10. Viridian Manhole
 - a. There was a lot of water in the manhole and it required pumping prior to entry.
 - b. There is some minor insulation jacketing repairs needed in this vault but they are not significant enough to warrant repair at this time.

11. Manhole 16A
 - a. There is some minor corrosion on the shear lugs attached to the chilled water piping. This corrosion should be wire brushed/wire wheeled/cleaned and then painted with cold galvanizing paint to prevent additional corrosion.
 - b. Once Item a. is addressed, because there are no valves or piping appurtances in this manhole, and due to the traffic hazard created to access this manhole, this manhole only needs to be reviewed annually.
 - c. The entry manway lid and frame on this manhole is extremely heavy and includes sunken lifting handles to remove the lid. This manhole location presents a safety hazard due to traffic and extra site time to remove the lid increases this hazard. Therefore, this lid and frame should be replaced with a lighter, more easily handled lid as soon as possible.

12. Manhole 18A

- a. The end can on the steam service piping to the Library has corroded and the end plate is partially detached from the can. At times, secondary steam from groundwater infiltration is wafting from the damaged end can. The end can should not be repaired until the breach in the service piping is repaired that is permitting the infiltration. This repair will require excavation and there is a steam anchor nearby. TEG will evaluate what repair remedies are available.
- b. Groundwater is leaking into this manhole through the steam end can in the east wall penetration. This relates to the needed repair noted in item 12.a. above.
- c. There is some insulation repair needed in this vault. This vault should be included in the capital project to repair insulation with a “moderate” rating.
- d. Some of the grating around the pipe penetrations in the floor is corroded. CNE should remove/clean this corrosion and the grating painted with cold galvanizing paint before the corrosion progresses.

13. Manhole S4A

- a. There was water present in this manhole and it required pumping prior to entry.
- b. There are several cracks in the concrete sidewalk above this manhole; these cracks are due to traffic driving on the sidewalk when making turns; TEG will again report the condition of this concrete to Metro Public Works.
- c. There are hairline cracks in the walls of this manhole. CNE should monitor these cracks and report any significant changes to TEG.
- d. There is some spalling of the concrete walls in this manhole. CNE should monitor this spalling and notify TEG of any significant changes.
- e. A blow down valve needs to be added to the strainer upstream of the trap so the strainer can be blown down.
- f. The existing trap is an Armstrong model 2011 which has a history of poor performance and it was not functioning properly during this review. This trap should be replaced with a “standard” bucket trap as soon as possible.

14. Manhole U

- a. There was water present in this manhole.
- b. One of the manway lids was dislodged and broke in half at some point in the past and vehicular traffic rode over the open manway, hitting and damaging the access ladder. The lower rung of the ladder is corroded badly also. Access to this manhole is infrequent; however, TEG will determine a course of action for safe entry/exit at this manhole.
- c. Because of groundwater infiltration into this manhole, secondary steam results and the roadway area above this manhole remains hot. This heat has caused “settlement/depression” of the asphalt above the manhole and may result in damage to one or both of the manway lids/frames. CNE should monitor this condition and report any significant changes to TEG.

- d. The clamp on the condensate piping in this manhole was not leaking during this review.
 - e. TEG will evaluate whether this manhole should be abandoned and filled. To do this, components of the steam valve in this manhole will need to be welded (bonnet flange and stem) to prevent future leaks, and the piping needs to be insulated.
15. Manhole C
- a. There was water present in this manhole and it required pumping before entry.
 - b. The link seals on the water line which passes through the vault are leaking slightly. These link seals should be tightened. Requires action within the next quarter.
 - c. There is a pinhole steam leak at the coupling in the trap piping after the second isolation valve; this needs to be repaired. Requires action as soon as possible. This appeared in the April 13, 2018 Quarterly Walkthrough Report.
 - d. There is a small accumulation of mud in the floor of this manhole; this mud needs to be removed and cleaned. Requires action within the next quarter.
 - e. The insulation on the dripleg is in dis-repair due to submersion in groundwater and subsequent boiling action. This insulation needs to be repaired. TEG will investigate whether an insulation blanket can be manufactured that can withstand boiling water.
16. Manhole 4
- a. There was water present in this manhole and it required pumping before entry.
 - b. The paint on the entry ladder and some steel supports is peeling off and there is some moderate corrosion of essential support structures. As soon as possible, CNE should clean these surfaces with a wire brush/wheel and apply a coating of cold galvanizing paint to try and prevent any additional deterioration. This statement appeared in last year's quarterly review.
 - c. The trap in this manhole discharges into a sump in the basement of the Fairlane Hotel through buried piping. The buried piping has deteriorated is now leaking. TEG has asked CNE to determine if this pipe can be removed from either the manhole or the Fairlane Hotel basement and a new replacement pipe slip-lined.
 - d. There is some missing insulation and insulation repairs that are needed within this manhole. Once the repair of the trap discharge piping is complete, TEG will coordinate with CNE to have this addressed.

Action Items

Action items from the above walk through are presented in the separate quarterly manhole review report presented to CNE.

VI. Customer Relations

This section contains descriptions of the marketing efforts made by the DES Team during the quarter. The topics of interactions, meetings and training seminars with the customers are also discussed. There are currently 28 customers, comprised of 40 different buildings, connected to the EDS. Service to each of these buildings continues to prove satisfactory, and the responsiveness to customer issues is handled by CNE in an excellent and professional manner.

A. Marketing

The transfer of ownership documents were executed during the quarter for the 5th + Broadway development (601 Commerce St). They are now a DES customer and should begin receiving service during construction by the end of FY19. The service connection project is tracked under project number DES-160.

Conversations and meetings have been held with CB Ragland and their design and development team regarding the construction of a new 253 room hotel to be constructed along Molloy Street between 2nd and 3rd Avenues South. It is believed that this hotel will require approximately 250 tons of chilled water, although, the discussions with the Owner's engineer have revolved around using 400 tons. Discussions and negotiations are ongoing. This project is tracked under project number DES-162.

B. Customer Interaction

The CNE customer service representative (CSR) continues to respond to customer issues as they arise. Much of the communication involves minor problems with the customers' heating and cooling systems that are unrelated to DES service. Other more significant issues are summarized herein.

- CNE's CSR was in contact with the personnel of several customer buildings to discuss leaks, building maintenance or building performance during the quarter.
- Chilled water service to the Renaissance Hotel and Office Complex was interrupted twice during October due to damage to drain lines caused by the 5th + Broadway developer's contractor. Repairs were made.
- Hardness was discovered in the condensate return at the Renaissance Hotel in October. The hotel made repairs to their steam heat exchanger during the month.
- CNE coordinated with customers regarding the repairs of the chilled water leaks at the Nissan Stadium and 4th Ave and Union.
- The chilled water and steam service to the John Sevier building were isolated during the quarter to permit the building's contractor to begin renovations to the building. The restoration of services is not expected until 2020.
- Other minor issues and customer interactions are noted in the monthly reports from CNE.

VII. Recommendations

Based on the review of the Second Quarter FY19 EGF and EDS operations, the following recommendations are made.

- The items noted in the report as in need of repair need to be completed prior to the end of the operating contract for the System Operator in accordance with the ARMA paragraph 12.03.
- Corroded structural steel within the vaults and tunnels should be cleaned and painted or replaced;
- Insulation which is absent, or in disrepair, in the vaults should be addressed through additional capital and R&I projects, and through regular maintenance provided by CNE.
- Steam traps which need repair or replacement should be addressed as soon as possible.
- Expansion joint leaks should be repaired by either tightening the packing bolts or injection of packing once the leak(s) is substantial enough to warrant repair.
- Concrete repairs need to be made in some manholes.
- Mud and debris needs to be cleaned and removed from some manholes.