



Operations Monitoring Report

First Quarter FY21

Prepared by:

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I. Executive Summary

A review of the fiscal year 2021 (FY21) First 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 2021 to date, CNE has met their contract obligations to Metro and has had no contract violations; however, they have exceeded several of their performance guarantees for multiple months.

Beginning with July 1, 2020, Amendment 2 to CNE's operating contract (Amended and Restated Management Agreement or ARMA) became effective. This amendment extends CNE's operating contract through June 30, 2025, increases their maintenance responsibilities, decreases their annual fee, and narrows the performance guarantees to create more stringent criteria to be met. For the First Quarter, CNE has failed to meet all of the new performance guarantees.

Although the local economy in the Metro area began to recover from the effects of the nCOVID-19 pandemic in recent months, steam and chilled water sales continue to be lower than normal. The rebounding of the building occupancies, which will drive increases in the needs for DES services, are anticipated in the coming months. However, this decrease in sales has reduced the total energy demand on the system which would result in a reduction in the greenhouse gas emissions due to a reduced HVAC.

For the First Quarter FY21, the chilled water sales decreased 19.9% over the previous First Quarter (FY20). The chilled water sendout also decreased 19.7% over the previous First Quarter. The system losses decreased approximately 16.2%. The number of cooling degree days was 13.2% lower than in FY20. The peak chilled water demand for the current quarter was 15,511 tons, which is 12.4% lower than the previous First Quarter. Although the First Quarter was cooler than the previous year, the decline in chilled water sales is attributed to customer occupancies being lower than normal due to the nCOVID-19 pandemic.

Steam sendout for the current quarter decreased by approximately 13.0% over the previous First Quarter and steam sales, likewise, decreased by approximately 18.8%. This decrease came with an increase in heating degree days thus the quarter was much cooler than in FY20. Total steam system losses were approximately the same as in the previous First Quarter. The peak steam demand for the current quarter was 50,469 pounds per hour, which represents a decrease in the First Quarter demand by approximately 12.0%. Although the steam consumptions for some buildings remained similar to the previous First Quarter, the steam sales have also been impacted by the pandemic.

With the implementation of the new System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels beginning in this quarter, CNE has failed to consistently meet the chilled water-water conversion, the steam fuel conversion, and the steam electric conversion during the quarter. The chilled water plant electric consumption per unit of sales continues to perform better than the guaranteed levels for the quarter but higher than many of the historic

values. CNE continues to make changes to their operation and are performing additional maintenance at the EGF to address the decline in the chiller plant efficiency and to meet the new performance criteria.

These changes have resulted in the quarterly average chiller plant efficiency being approximately 2.2% better than in the First Quarter FY20. The steam water conversion has also improved slightly during the quarter, but they have failed to improve on all other metrics. TEG is continuing to monitor CNE's efforts in improving the system's performance.

Work continued with the DES Capital and Repair & Improvement Projects during the First Quarter. Repair and Improvements to the EDS continue as scheduled. DES133.1, DES153, DES159, DES163, DES168, DES171, DES172, DES173, DES174, DES175, DES176 and DES177 are ongoing. Projects DES177, DES178, DES179, and DES180 have been added. DES162, DES169 and DES176 are in close-out. CNE has continued to address recurring maintenance items. As noted in prior quarterly monitoring reports, the postponement or deference of these items will result in an increase in maintenance costs to the DES and could impact the delivery of steam and chilled water.

The current fiscal year system operating costs to date are \$5,084,004. This value represents approximately 26.7% of the total budgeted operating cost for FY21. The customer revenues from the sales of steam and chilled water for FY21 are \$4,322,167 (23.5% of budgeted amount). The DES response to the nCOVID-19 pandemic included the potential deferral of customer invoices and waiving late fees. The option to take the deferral and the late fee waiver period expired at the end of the First Quarter. Two customers took advantage of the deferral option and was able to reduce a portion of the invoices. The repayments of the deferred amounts began in the First Quarter FY21 and the revenues shown include those amounts. 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 FY21 is \$157,675 (25% of budget). 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.

The decline in business operations, office building occupancies and group events due to the COVID-19 pandemic has impacted the DES by creating a significant decrease in the steam and chilled water energy usage and demand during the quarter. The venue-driven customers have had no events since early March 2020, restaurants, bars, and hotels have had few patrons and many of the office buildings have experienced a decline in tenant occupancies due to more employees working from home. These factors have contributed to a decline in the energy use normally experienced. However, the decline in usage does not impact the MFA since the energy costs incurred by the system are passed through to the customers.

1. Sales and Sendout

A comparison for the First Quarter chilled water sales is shown in Figure 1. This data reflects a 19.9% decrease in sales for the current quarter over the same quarter of the previous fiscal year.

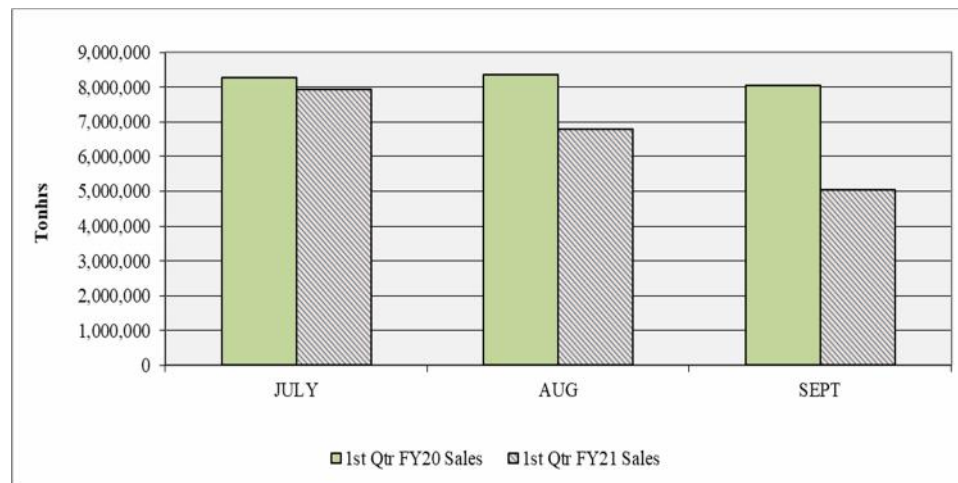


Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 15,511 tons, which represents a 12.4% decrease over the previous First Quarter. Although the chilled water demand is affected by building occupancies, which have decreased, the quarter experienced a 13.2% decrease in the number of cooling degree days which also play a significant role in chilled water demand and usage.

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.

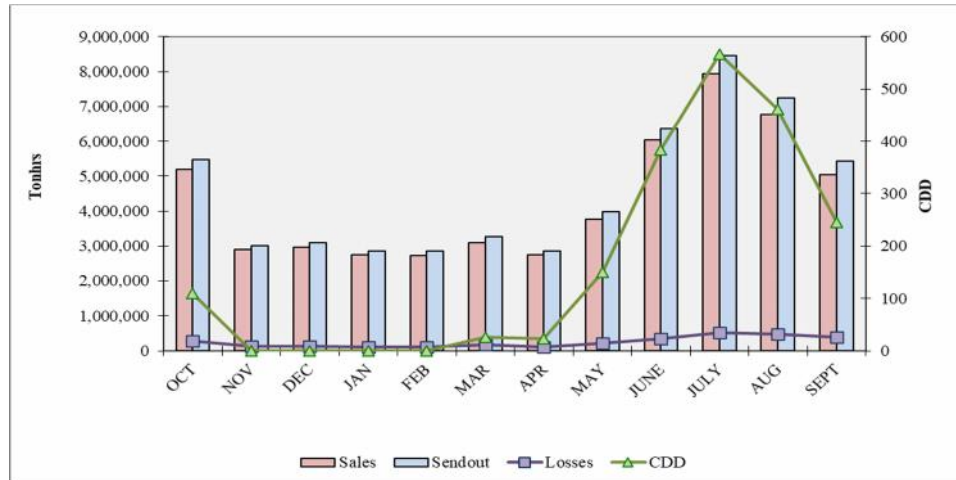


Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

2. Losses

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

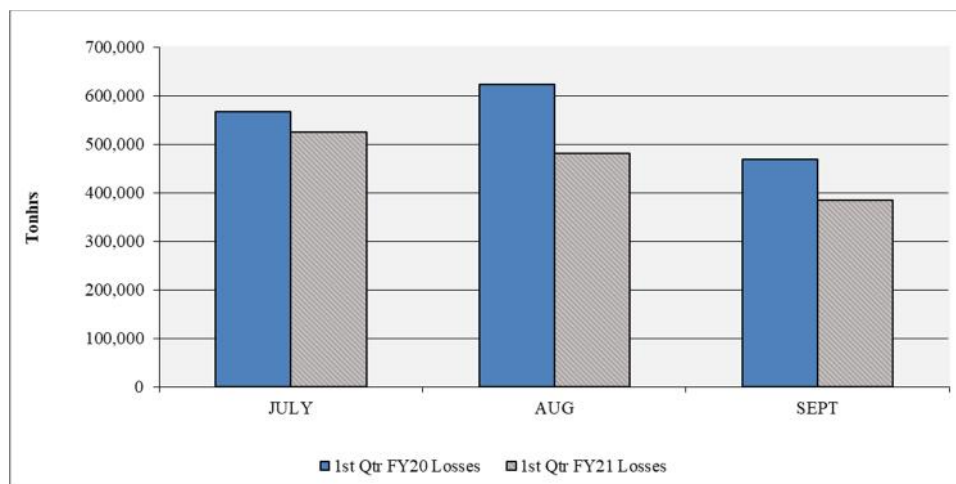


Figure 3. Chilled Water System Loss Comparison

The EDS make-up increased by 75.7% over the previous First Quarter. All the known distribution leaks have been found and repaired. The locations where

leaks remain suspected are on 3rd Ave N and 5th Ave N, but previous efforts to locate the actual source of the leaks have been unsuccessful. Additional chilled water was discovered leaking on 3rd Ave N during the quarter. TEG has developed a plan for the exploratory excavation of the area to locate and repair the leaks in this area. The excavations are anticipated to begin early in the Second Quarter FY21.

The make-up to the cooling towers decreased 11.5% over the previous First Quarter. The water usage in the cooling towers is largely due to the consumption of chilled water and should vary with chilled water sales. The number of cycles of concentration in the condensing water circuit decreased 44.6%. The total chiller plant water use decreased 14.5% over the First Quarter FY20. The overall city water make-up comparison for the chilled water system First Quarter is shown in Figure 4.

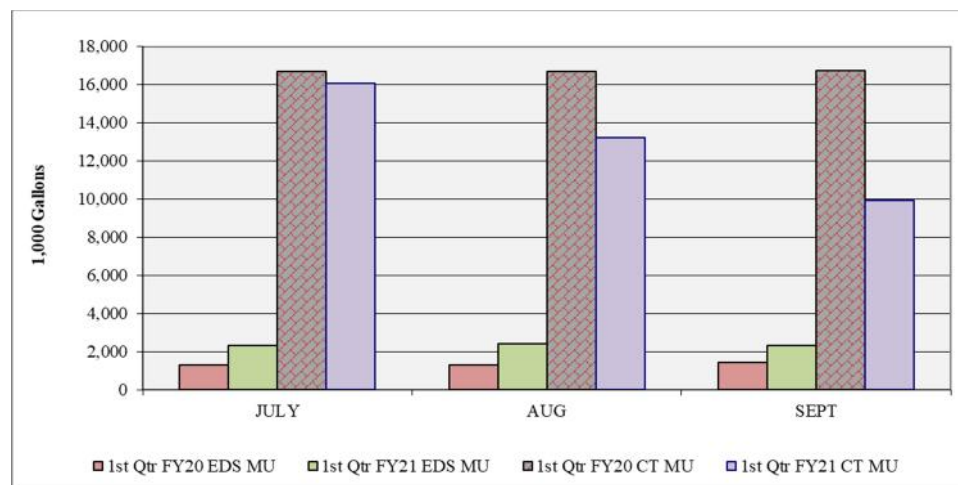


Figure 4. Chilled Water System City Water Usage Comparison

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. The System Performance Guarantee levels as described in Amendment 2 of the ARMA are not being achieved for the chilled water-water conversion for the quarter.

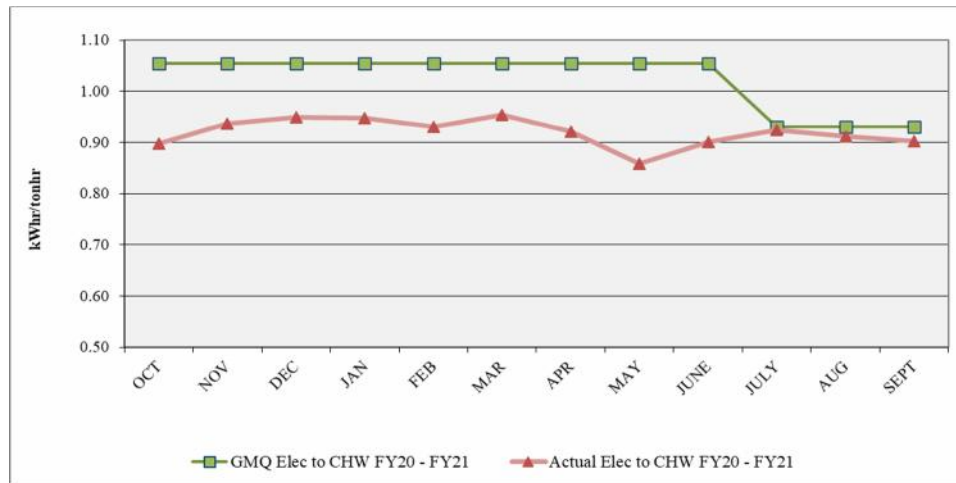


Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

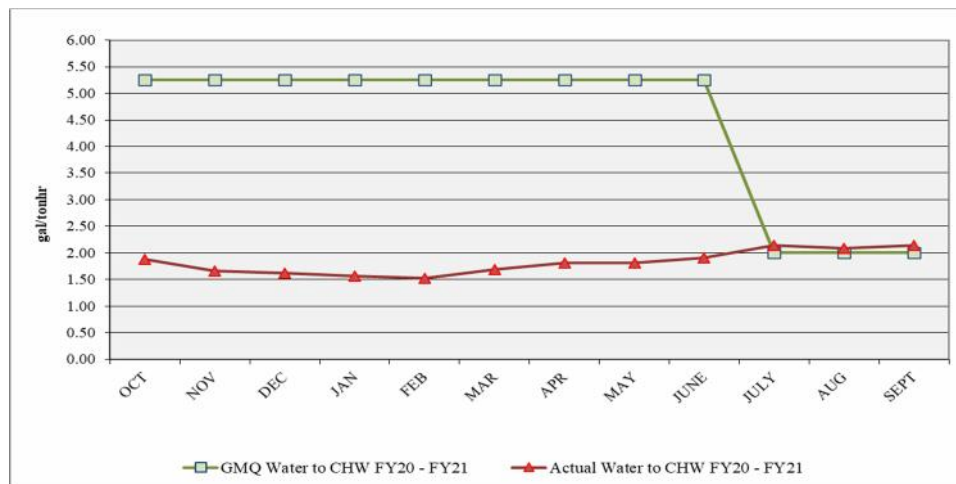


Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 0.93 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. The electric usage per unit of sales decreased 2.2% over the previous First Quarter.

CNE has worked to address some operational issues within the plant in an additional effort to improve efficiency. They have also performed some additional maintenance. CNE and TEG are continuing to monitor the improvements created by these changes.

The total consumption of city water for the chiller plant for the current quarter has decreased by approximately 14.5% due largely to the decrease in chilled water

sales. The water conversion factor for the chiller plant increased by approximately 6.8%. This increase in the factor means that more water than typical was required to produce the same amount of chilled water. Since chilled water sales are down, the water conversion factor should have remained approximately the same as in the previous quarter. However, the EDS make-up has increased which could be a contributing factor to the increase in the total water usage. However, the new chilled water-water conversion factor limits the EDS make-up to 30,000 gallons per day, thus increases in the chilled water system leaks should have no impact on the performance guarantee.

B. Steam

1. Sales and Sendout

The steam sendout decreased by approximately 13.0% over the previous First Quarter (FY20), and the sales also decreased by approximately 18.8%. The Quarter experienced an increase in the number of heating degree days. The steam system losses remained approximately the same as in the previous First Quarter and experienced a decrease in the relative amount of condensate return of 32.8%. A comparison for the First Quarter steam sales is shown in Figure 7.

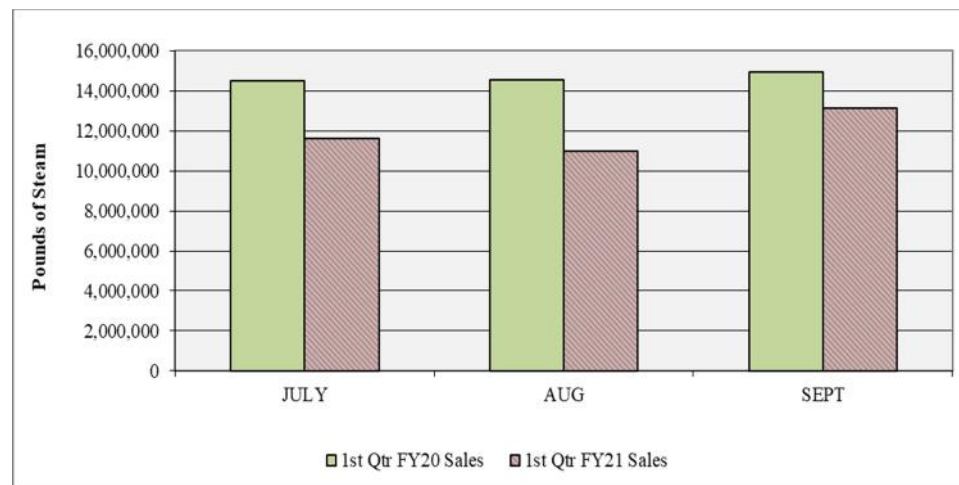


Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 50,469 pph, which reflects an approximate 12.0% decrease in the peak steam production over the previous First 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.

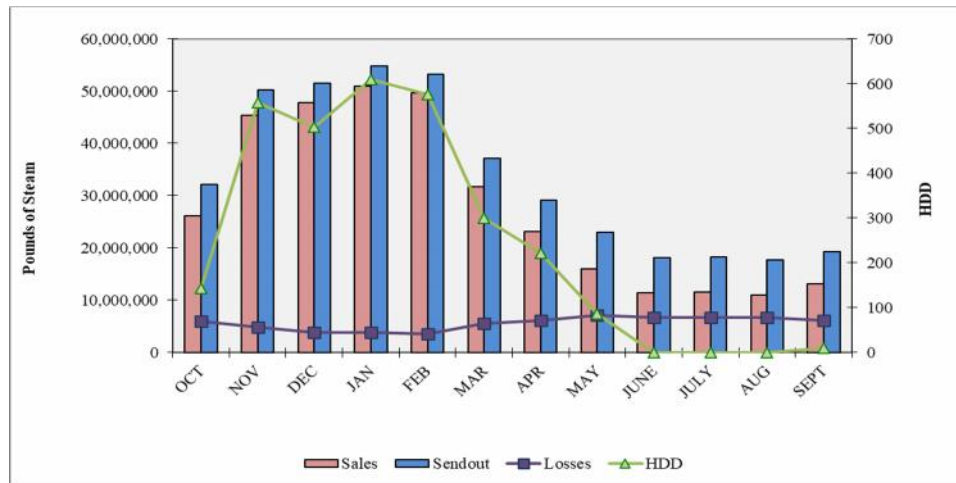


Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

2. Losses

A comparison of the total steam mass losses in the EDS for the First 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 most of these losses are based on a near constant heat loss of the system.

The increase in the losses and make-up shown in Figures 9 and 10 was largely due to a leak in the condensate system near MH-9. This leak was discovered in late FY20 and repaired in July 2020. As a result of the leak, it is believed that gravel may have entered the condensate pipe that remained and caused the condensate return hardness level to be higher than tolerable for the system. Therefore, CNE placed the condensate to drain in the 4th Ave tunnel and continued to monitor the hardness levels daily. The hardness continued to decline during the quarter, and condensate return from this area of the system is expected to be re-established in the Second Quarter. The cost for the repairs to this leak are being tracked as DES176.

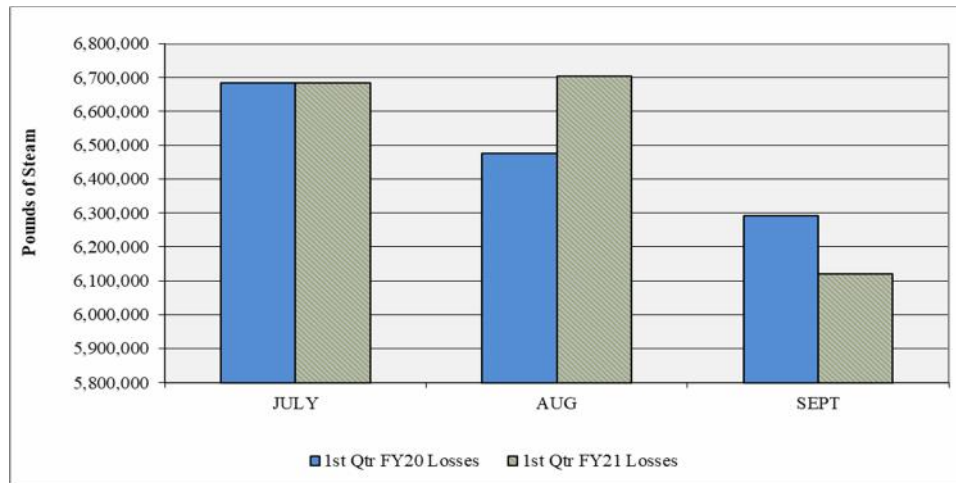


Figure 9. Steam System Losses

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. The corresponding data for steam system make-up is shown in the comparison of First Quarter data in Figure 10.

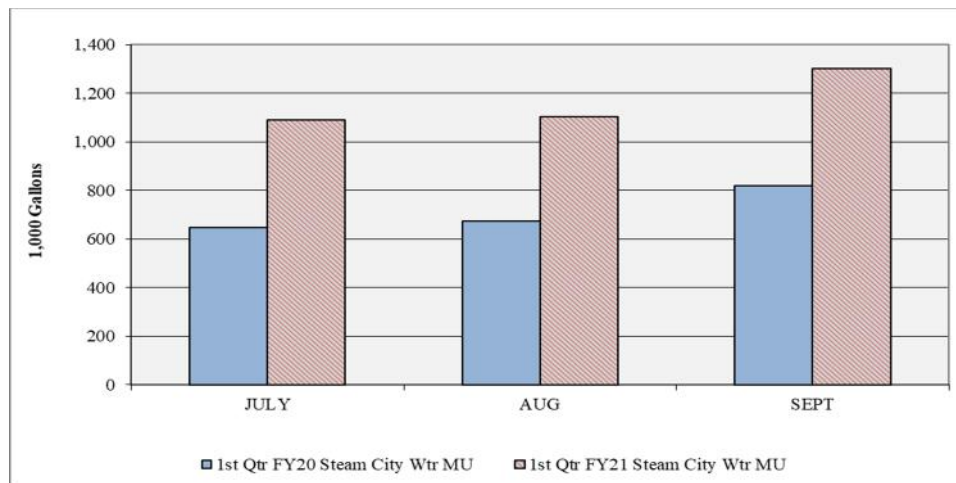


Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system of the EGF is presented by the following three charts, Figures 11, 12 and 13. The System Performance Guarantee levels as described in Amendment 2 of the ARMA are not consistently being achieved for the steam fuel and steam electric conversions for the quarter.

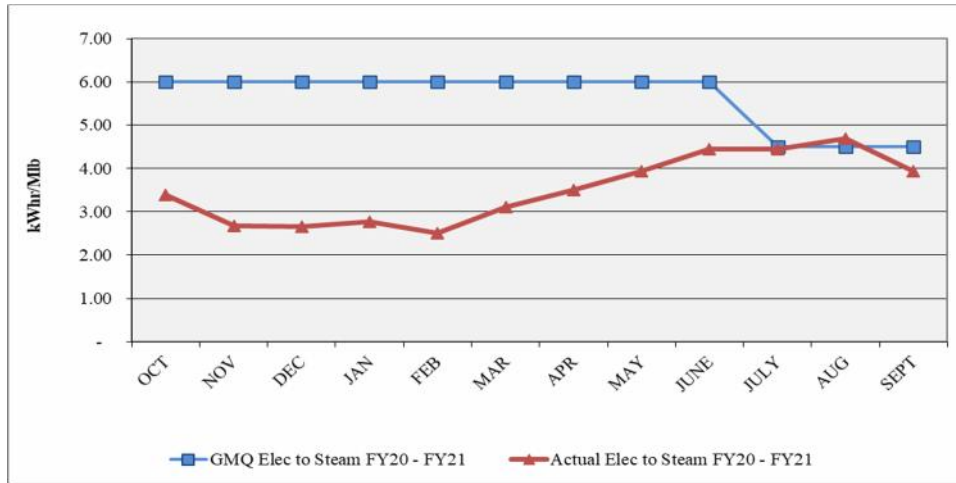


Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

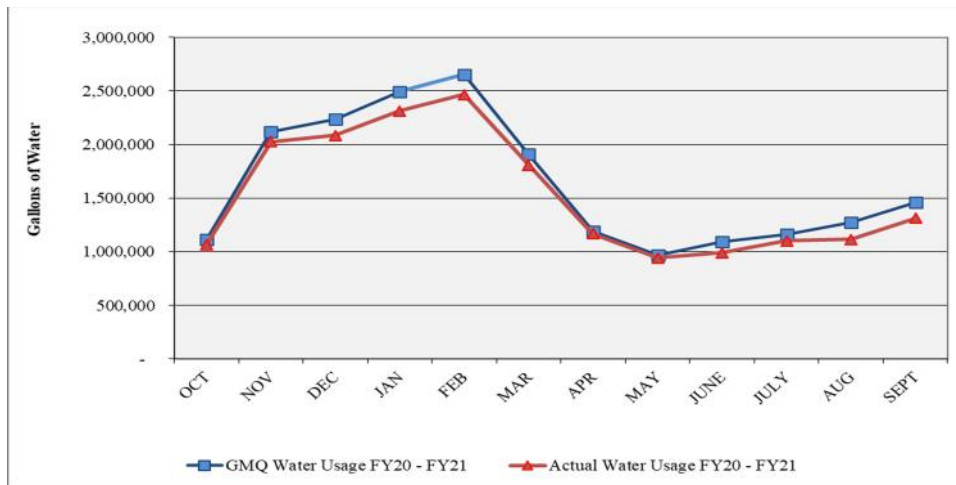


Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

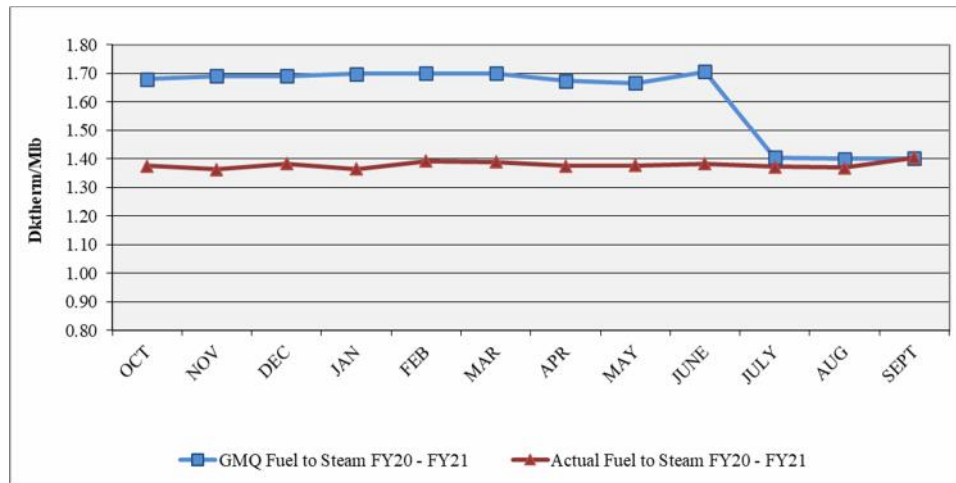


Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The current quarter experienced a 6.0% increase in the steam plant electric consumption while experiencing a 16.5% increase in the electric conversion factor. The water consumption for the steam plant increased 63.2% this quarter as compared to the previous First Quarter due largely to the condensate leak and the dumping of condensate due to hardness levels. The fuel consumption per unit of steam sales was 3.1% higher than in the previous First Quarter. The increase in the fuel consumption per unit of sales represents a decrease in boiler plant efficiency. This change may be due to the significantly lower steam sales and sendout. TEG will continue to monitor this issue.

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 First Quarter comparisons of the Guaranteed Maximum Quantities (GMQ) or System Performance Guarantees of the criteria commodities (fuel, water, and electricity).

Table 1. First Quarter FY21 Production, Sales and Consumption Summary

Item	Unit	First Quarter FY21	First Quarter FY20	*Percent Difference
	days	92	92	0.00%
Total Electric Use	kWhrs	18,236,099	23,211,838	-21.44%
Chilled Water	kWhrs	18,081,279	23,047,157	-21.55%
Steam	kWhrs	154,820	164,681	-5.99%
Total Water Use	kgal	49,783	56,277	-11.54%
Total Chilled Water	kgal	46,288	54,136	-14.50%
EDS Make-up	kgal	7,060	4,018	75.71%
Cooling Towers	kgal	39,228	50,118	-21.73%
Calc CT Evaporation	kgal	33,588	45,855	-26.75%
CT Blowdown	kgal	5,640	4,263	32.30%
Calc # Cycles		5.96	10.76	-44.64%
Steam	kgal	3,495	2,141	63.24%
Total Fuel Use	mmBTU	76,338	85,012	-10.20%
Natural Gas	mmBTU	76,306	84,954	-10.18%
Propane	mmBTU	32	58	-44.83%
Condensate Return	kgal	3,387	5,789	-41.50%
	lbs	27,620,601	47,211,769	-41.50%
Avg Temp	°F	185.0	196.7	-5.93%
Sendout				
Chilled Water	tonhrs	21,158,300	26,350,300	-19.70%
Steam	lbs	55,233,000	63,453,000	-12.95%
Peak CHW Demand	tons	15,511	17,711	-12.42%
Peak Steam Demand	lb/hr	50,469	57,344	-11.99%
CHW LF		61.78%	67.38%	-8.31%
Steam LF		49.56%	50.11%	-1.10%
Sales				
Chilled Water	tonhrs	19,768,598	24,691,070	-19.94%
Steam	lbs	35,723,358	44,003,358	-18.82%
Losses				
Chilled Water	tonhrs	1,389,702	1,659,230	-16.24%
Steam	lbs	19,509,642	19,449,642	0.31%
		35.32%	30.65%	15.24%
Degree Days				
CDD		1,273	1,466	-13.17%
HDD		10	0	NA

*positive percent difference values imply an increase from FY20 to FY21

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

GMQ Calculations	Unit	First Quarter FY21	First Quarter FY20	*Percent Difference
Steam				
GMQ Elec Conversion	kWhr/Mlb	4.50	4.50	
Electric Conversion	kWhr/Mlb	4.36	3.74	16.45%
GMQ Plant Efficiency	Dth/Mlb	1.402	1.658	
Plant Efficiency	Dth/Mlb	1.382	1.340	3.12%
Actual %CR		50.01%	74.40%	-32.79%
Avg CR Temp	°F	185	197	-5.93%
GMQ Water Conversion	gal	3,893,433	2,290,064	
Water Conversion	gal	3,529,950	2,162,410	63.24%
Chilled Water				
GMQ Elec Conversion	kWhr/tonhr	0.930	1.055	
Electric Conversion	kWhr/tonhr	0.913	0.933	-2.18%
GMQ Water Conversion	gal/tonhr	2.00	2.00	
Water Conversion	gal/tonhr	2.34	2.19	6.79%

*positive percent difference values imply an increase from FY20 to FY21

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 Initial System Customers (ISCs) relative to their contract demand. For all non-ISCs, their fixed costs are principally based on a value established by their contracts and are not tied directly to the actual costs of the debt service or CNE's management fee.

Amendment 2 of the ARMA, effective July 1, 2020, reduced the total management fee paid to CNE. The ISCs, whose fixed costs are tied directly to the value of the System Operator's management fees, experienced the greatest reduction in costs for FY21. However, all customers benefited from the negotiated contract extension due to more stringent performance guarantees and a reduction in the Fuel Efficiency Adjustment.

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. Most 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). Therefore, the reduction in monthly energy usage decreases the revenue for the DES but

has negligible impact on the required Metro Funding Amount. A summary of the total operating costs for the fiscal year to date are shown in Table 3.

The revenues shown in Tables 3 and 4 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 covered by Metro. The shortfall exists due to the remaining unsold capacity at the EGF and the debt service for bonds to which the customers do not directly contribute.

The DES response to the nCOVID-19 pandemic included the potential deferral of customer invoices and waiving late fees. Customers had the option, beginning in late March, to defer 75% of their invoices for a two-month period if they could substantiate financial hardship due to the pandemic. DES also waived late fees and disconnects for non-payments. This deferral was extended during the Fourth Quarter FY20 and into the First Quarter FY21. The option for customers to take the deferral and for late fees to be waived expired on September 30. Only two customers took advantage of the deferrals. These two customers are being invoiced one-twelfth of the total deferred amounts.

For FY21, the current fiscal year system operating costs to date are \$5,084,004. This value represents approximately 26.7% of the total budgeted operating cost for FY21 and includes some costs occurring in the Second Quarter. The customer revenues from the sales of steam and chilled water for FY21 are \$4,322,167 (23.5% of budgeted amount). 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 FY21 is \$157,675 (25% of budget). However, the actual MFA required cannot be accurately calculated due to outstanding invoices as of the date of this report. The total revenue list includes the costs associated with the FY20 customer true-up and repayment of the nCOVID-19 deferrals for the two customers who elected for this option.

Table 3. DES Expenses and Revenues to Date

Item	FY21 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee							
FOC: Basic	\$ 3,776,800	\$ 944,203	\$ -	\$ -	\$ -	\$ 944,203	25.00%
9th Chiller	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 6A	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 6B	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Pass-thru Charges: Chemical Treatment	\$ 260,700	\$ 68,435	\$ -	\$ -	\$ -	\$ 68,435	26.25%
Insurance	\$ 14,800	\$ 16,013	\$ -	\$ -	\$ -	\$ 16,013	108.19%
Marketing: CNE Sales Activity	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Incentive Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
FEA: Steam	\$ 125,000	\$ 890	\$ -	\$ -	\$ -	\$ 890	0.71%
Chilled Water	\$ 73,800	\$ (2,741)	\$ -	\$ -	\$ -	\$ (2,741)	-3.71%
Misc: Metro Credit	\$ -	\$ (347,378)	\$ -	\$ -	\$ -	\$ (347,378)	n.a.
ARFA	\$ 59,400	\$ 14,850	\$ -	\$ -	\$ -	\$ 14,850	25.00%
Deferral	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Man Fee =	\$ 4,310,500	\$ 1,041,650	\$ -	\$ -	\$ -	\$ 1,041,650	24.17%
Reimbursed Management Fee + Chem Treatment		\$ 344,794	\$ -	\$ -	\$ -	\$ 344,794	0.00%
Metro Costs							
Pass-thru Charges: Engineering	\$ 37,300	\$ 6,136	\$ -	\$ -	\$ -	\$ 6,136	16.45%
EDS R&I Transfers	\$ 291,900	\$ 72,258	\$ 25,042	\$ -	\$ -	\$ 97,300	33.33%
Metro Marketing	\$ 10,900	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Project Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Metro Incremental Cost	\$ 330,900	\$ 70,051	\$ -	\$ -	\$ -	\$ 70,051	21.17%
Utility Costs: Water/Sewer	\$ 633,400	\$ 326,528	\$ -	\$ -	\$ -	\$ 326,528	51.55%
EDS Water/Sewer	\$ -	\$ 44	\$ -	\$ -	\$ -	\$ 44	n.a.
EDS Electricity	\$ 59,400	\$ 20,851	\$ -	\$ -	\$ -	\$ 20,851	35.10%
Electricity	\$ 5,919,500	\$ 1,461,598	\$ -	\$ -	\$ -	\$ 1,461,598	24.69%
Natural Gas Consultant	\$ 12,400	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Natural Gas Transport	\$ -	\$ 36,211	\$ -	\$ -	\$ -	\$ 36,211	n.a.
Natural Gas Fuel	\$ 2,305,000	\$ 150,093	\$ -	\$ -	\$ -	\$ 150,093	6.51%
Propane	\$ -	\$ 77,271	\$ -	\$ -	\$ -	\$ 77,271	n.a.
Subtotal - Metro Costs =	\$ 9,600,700	\$ 2,221,039	\$ 25,042	\$ -	\$ -	\$ 2,246,081	23.39%
Subtotal - Operations =	\$ 13,911,200	\$ 3,262,689	\$ 25,042	\$ -	\$ -	\$ 3,287,731	23.63%
Debt Service							
2012 Bonds	\$ 3,486,100	\$ 879,026	\$ 289,800	\$ -	\$ -	\$ 1,168,826	33.53%
2005 Bonds -Self Funded	\$ 377,700	\$ 337,647	\$ -	\$ -	\$ -	\$ 337,647	89.40%
2007 Bonds -Self Funded	\$ 176,000	\$ 44,000	\$ -	\$ -	\$ -	\$ 44,000	25.00%
2008 Bonds -Self Funded	\$ 175,900	\$ 43,975	\$ -	\$ -	\$ -	\$ 43,975	25.00%
2010 Bonds -Self Funded	\$ 178,300	\$ 44,575	\$ -	\$ -	\$ -	\$ 44,575	25.00%
Fund 49107 -Self Funded	\$ 629,000	\$ 157,250	\$ -	\$ -	\$ -	\$ 157,250	25.00%
Fund 49116 -Self Funded	\$ 75,000	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
MIP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Oper. Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Capital =	\$ 5,098,000	\$ 1,506,473	\$ 289,800	\$ -	\$ -	\$ 1,796,273	35.23%
Total =	\$ 19,009,200	\$ 4,769,163	\$ 314,842	\$ -	\$ -	\$ 5,084,004	26.74%
Customer Revenues							
Taxes Collected		\$ 92,533	\$ -	\$ -	\$ -	\$ 92,533	n.a.
Taxes Paid		\$ 62,667	\$ -	\$ -	\$ -	\$ 62,667	n.a.
Interest & Misc Revenue	\$ 230,900	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Penalty Revenues/Credits		\$ 30,813	\$ -	\$ -	\$ -	\$ 30,813	n.a.
Energy Revenues Collected		\$ 4,261,488	\$ -	\$ -	\$ -	\$ 4,261,488	22.68%
Revenues =	\$ 18,378,500	\$ 4,322,167	\$ -	\$ -	\$ -	\$ 4,322,167	23.52%
Metro Funding Amount =	\$ 630,700	\$ 446,995	\$ 314,842	\$ -	\$ -	\$ 761,837	120.79%

The DES serves 29 customers and 42 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	\$ 1,123,047	6,825,869	\$ 0.1645	\$ 243,571	7,352	\$ 33.1299
State Government	\$ 955,212	4,920,617	\$ 0.1941	\$ 344,249	11,054	\$ 31.1414
Metro Government	\$ 1,278,115	8,022,112	\$ 0.1593	\$ 317,293	17,317	\$ 18.3227
New Customers	\$ 789,339	4,458,613	\$ 0.1770	\$ 220,035	13,285	\$ 16.5630
Total	\$ 3,356,374	19,768,598	\$ 0.1698	\$ 905,113	35,723	\$ 25.3367

Total Revenue \$ 4,261,488
 True-up and Adjustments (Net) \$ 60,680
 Net Revenue \$ 4,322,167

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY21. TEG and CNE continue to meet monthly and regularly communicate about important issues and on-going projects. CNE has reported and managed EGF operations satisfactorily but have failed to consistently meet all of the new performance guarantees in Amendment 2.

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.

-) Boiler 3 tripped offline on August 7 due to low compressed air pressure. The steam pressure reached a low of 110 psig and was below 150 psig for sixty minutes.
-) There were no other reported issues.

B. Efficiency

The operation of the EGF did not satisfy all of the guaranteed levels for all commodity usage during the quarter. There were 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.

In order to maintain the COVID-19 social distancing guidelines, CNE has implemented and is requiring regular attendance for online safety courses for their employees.

D. Personnel

CNE is currently staffed with nineteen full time employees, one part-time employee and one relief staff. Of the current number of employees, fourteen 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 50.0% of the steam sendout during the quarter, which represents a 32.8% decrease over the previous First Quarter. The decline in condensate return was due to the increase in the measured levels of harness in the condensate. Although the hardness levels continue to decline, the condensate for a portion of the system was dumped in the 4th Ave tunnel for the quarter.
- Feedwater iron, pH, and hardness (otherwise) remained within their acceptable ranges during the 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. 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 and authorization 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.

-) Cleared debris around exterior of EGF;
-) Checked and repaired plant computers and servers;
-) Checked and adjusted packing on all pumps;
-) Repaired plant lighting;
-) Completed the replacement of chilled water pump 6 VFD;
-) Repaired the exhaust fan on switchgear #1;
-) Painted the condensing water pump volutes;
-) Repaired several chemical feed pumps;
-) Replaced the temperature sensors on chillers 6, 7 and 8;
-) Cleaned and repaired the temperature sensor on chiller 4;
-) Refrigerant was added to chiller 8;
-) Several purge units were repaired;
-) Replaced the wire harnesses for chiller 1 and 3;
-) A BAS failure on chillers 4, 5, and 6 were repaired;
-) Inspections on boilers 2 and 4 were completed, refilled with water, and checked for leaks;
-) A cooling tower make-up line leak was repaired;
-) Other repairs, maintenance and preventative maintenance were made during the quarter and are listed in the monthly reports issued by CNE.

H. EGF Walkthrough

The First Quarter EGF Walkthrough was conducted on September 29, 2020, by Kevin L. Jacobs, P.E. Adrienne Fancher with MWS accompanied Mr. Jacobs on the Walkthrough. Based on the review of the EGF, the following comments and observations are presented. 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.

-) CNE has reported in the previous quarters that the riser tubes in all of the cooling towers had been painted and that the cooling tower fill had all been replaced. Rust spots on the riser tubes remained present in the First Quarter FY21 Walkthrough and have continued to worsen. CNE applied a test coat of a new material on the riser tube for cooling tower 1 during the Fourth Quarter FY20. No additional work has been performed on the riser tubes since the First Quarter Walkthrough FY18.

- J In previous Walkthrough reports, it was noted that significant scale was observed on the fill (louvers) to several of the cooling towers. CNE began cleaning some of the towers and their louvers during the Second Quarter FY20. Where the cleaning has occurred, the scale has been largely removed. Although the vast majority of the scale has been removed by CNE's efforts, towers 11, 12, 13 and 15 need additional cleaning. No additional work appears to have been performed during the First Quarter FY21. TEG has investigated the change in the chiller plant efficiency and determined that the chiller plant efficiency has declined in the past calendar two years relative to the past 3 and 5-year averages.
- J In previous Walkthrough reports, it was noted that a leaking chemical feed line was observed on the south side of the southern DA. CNE previously cleaned and repaired the leaking valve, and it was noted in the previous Walkthrough report that this item would be removed from subsequent reports. However, the leak and the salt buildup at the valve has returned. Additional repairs and cleanup may be necessary.
- J CNE has removed all of the dead trees and their detritus. CNE and Metro have discussed the plan to potentially replace the trees. CNE will meet with the city's Urban Forester to determine the appropriate tree density required by the city for the EGF site and the proper species to replant. CNE has postponed this meeting due to CNE's safety protocols associated with the pandemic.
- J During the Fourth Quarter FY20 Walkthrough, a rainwater leak was noted from the roof drain on the mezzanine level over the chemical feed tank BWT6130. A second leak was also noted from around a natural gas vent near the de-aerator on the mezzanine level. CNE reported that the leaking areas had been repaired. The roof drains were not leaking during the First Quarter FY21 Walkthrough. This item will be removed from future reports.
- J Mineral deposits on the condensing water pumps have been noted in previous Walkthrough reports and CNE has since cleaned the pumps and painted the volutes. During this Walkthrough, the mineral deposits were noted as having returned on the condensing water pumps. CNE has cleaned and repainted the pumps. This item will be removed from future reports.
- J Salts from the chemicals used at the chemical Tank 8 were noted scattered around the chemical feed pump and the floor. CNE needs to clean this area.
- J Salt build-ups and leaks were noted on the valves and gauges to the chemical feed lines at Tank 3 and BWT6130. CNE needs to repair these leaks and clean the area.
- J The louvers and portions of the fill at cooling towers 1, 6 and 15 appear to have been damaged. The damaged portions need to be repaired or replaced.
- J Although cooling tower 14 was not running during the Walkthrough, water was dripping/running along the east and west faces of the louvers and tower structure. These leaks may be originating from the hot water deck. CNE needs to address the source of the leaks and make the necessary repairs.
- J The fluid level line/overflow adjacent to cooling tower 6 was oozing foam and slime during the Walkthrough. Foam and algae build-up was also noted in many

of the cooling towers (CT 14 may have had the greatest presence of algae). CNE needs to clean this area and address the condensing water treatment.

-) The insulation on the feedwater piping at the boiler 4 economizer appears to have been damaged. CNE needs to repair this insulation.
-) CNE, Metro and TEG have discussed the need for CNE to perform additional cleaning of the EGF and to maintain an increased level of cleanliness through the plant. CNE intends to address these issues in the coming weeks. The Second and Third Quarter FY21 Walkthrough reports will note the progress of this effort.
-) In the Fourth Quarter FY20 report, it was reported that several of the lamps on the operating floor were not working. During this Walkthrough, all the lamps were operational. This item will be removed from future reports.
-) Other action items previously noted to be addressed by CNE have been completed. (See also the “Quarterly EGF Walkthrough Report,” dated September 29, 2020, by TEG for additional information.)

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 status of the projects is discussed, and the project cost-to-date and bond balances are also presented.

A. First Quarter FY21 Open Projects

The following projects remained open at the end of the First Quarter FY21.

1. DES111 – DES Combined Heat and Power

This project is currently on hold.

2. 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. The City is pursuing reimbursement from the contractor(s) responsible for the blasting and subsequent damage to the tunnel through legal means, this project remains open. The repairs for tunnel damage were completed under project DES164.

3. DES139 – DES Options Review

With the passage of the FY21 budget in June, the execution of CNE’s contract extension, referred to as Amendment 2 to the Amended and Restated Management Agreement (ARMA) has been executed and became effective July

1, 2020. Metro Water Services (MWS) has officially assumed the responsibilities of the Metro Liaison role.

TEG met with the new Metro Liaison (Adrienne Fancher) and other members of Metro Water Services in August to discuss the Business and Marketing Plans proposed by TEG at the request of MWS. The draft of this document remains under review by MWS but TEG is working under this project number to address the questions and comments raised by MWS during this meeting and is preparing other documentation that presents recommendations for the DES moving into the future while remaining under Metro ownership.

4. DES152 – Manhole A and Manhole M Coating Repairs

The structural steel in these manholes was cleaned and painted as part of DES107 in 2015. Portions of the paint has been flaking resulting in corrosion spots on these supports. The paint manufacturer reviewed the failing coatings. Their position is that the surface preparation and paint application was at fault. However, TEG employed a painting inspector during this work and records were maintained regarding the ambient conditions, surface preparation and coating application process. 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. This project addresses these needed repairs. Due to similar issues resulting from DES107 work, Manhole B has been added to this scope.

TEG has prepared construction documents to have this work completed however, Metro has temporarily put a hold on funding for this project.

5. 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 some hammering, and the piping configuration needs to be modified to alleviate this problem. Also, the condensate piping's current routing interrupts the access ladder creating a safety concern.

This project was bid late in the First Quarter FY21 and is expected to be awarded and executed during the Second Quarter FY21.

6. 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, however, due to higher priority projects this work has been postponed. It is anticipated that this work will take place during calendar year 2021.

7. DES157 – Manhole 9 Structural Steel Repairs

This project was substantially complete during the Fourth Quarter FY20, all punch list items have been addressed. This project is in close-out.

8. DES159 – Manhole B2 Structural Steel Repairs

This project was substantially complete during the Fourth Quarter FY20, however additional needed repairs at a steam pipe wall penetration were discovered. This additional repair work was delayed because the installing contractor was purchased by another company and documentation from the new owner needed to be reviewed by Constellation NewEnergy.

It is anticipated that the remaining work will be completed during the Second Quarter FY21.

9. DES143/161 – Manhole N1, N2 and S6 Insulation

This project addresses the installation of insulation in (3) manholes, Manhole N1, Manhole N2 and Manhole S6. Manhole N1 and N2 house chilled water piping which is partially uninsulated. Manhole S6 is a small manhole that is a part of the State distribution system which houses steam and condensate return piping which is uninsulated. These projects address the insulation of this uninsulated piping.

This project is temporarily on hold pending Metro approval.

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

The instrumentation and metering system was installed during the quarter and chilled water service became available to the contractor and owner in September 21. Service is available at a potentially reduced rate until April 1, 2021, which is the official Service Commencement Date according to the Customer Service Agreement. This project was completed during the quarter.

11. DES163 – New Service to MDHA Parcel K

Negotiations with this potential customer are in the early stages.

12. DES168 – DES Service to 1st and KVB Hotels

TEG continued to be in contact with the engineer for two new hotels proposed to be developed at 1st Ave S and KVB during the quarter. The building's preliminary design is reported to include service from the DES but is currently on hold pending direction from the building's developer/owner.

13. DES169 - Manhole 20 Repairs

This work was completed during the First Quarter FY21 and is now in close-out.

14. DES171 – Broadway Tunnel Pipe Support & Safety Items Repairs

Some of the steel pipe supports, guides and anchors in the Broadway Tunnel are corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 18 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting was held during the First Quarter FY21 and a verbal award has been made. Work should begin on this project during the Second Quarter FY21.

15. DES172 – Viridian and 4th Avenue Tunnel Pipe Support Repairs

Some of the steel pipe supports, guides and anchors in the 4th Avenue Tunnel and the supports for the Viridian service are corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 17 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting was held during the First Quarter FY21 and a verbal award has been made. Work should begin on this project during the Second Quarter FY21.

16. DES173 – Manhole B3 Structural Repairs

The steel pipe supports in Manhole B3 need to be cleaned and coated to prevent further corrosion. In addition, some minor concrete repairs are needed. This manhole is located in front of the new Hyatt-Centric Hotel being constructed and scheduled to open early in 2021 (a new DES customer). Therefore, TEG has arranged with the developer/owner to have this work completed during the fall of 2020.

A pre-bid meeting was held during the First Quarter FY21. This project will be awarded and completed during the Second Quarter FY21.

17. DES174 – 7th Avenue Tunnel Pipe Support Repairs

Some of the steel pipe supports, guides and anchors in the 7th Avenue Tunnel are corroded and either need to be repaired or replaced. Additionally, the access

ladder in Manhole 22 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting was held during the First Quarter FY21 and a verbal award has been made. Work should begin on this project during the Second Quarter FY21.

18. DES175 – Manhole 4 Condensate Return Repairs

The condensate return piping between Manholes 3 and 4 on Union Street failed several years ago. Because of the limited number of customers connected to this part of the condensate return system, the costs to replace this piping segment results in a very long payback. In lieu of replacing this piping segment, in order to safely discharge the condensate from Manhole 4's trap, a short piping run was installed between Manhole 4 and the basement of 401 Union Street (Fairlane Hotel) in order to discharge the trap's condensate to drain. After several years of service, this trap discharge piping between Manhole 4 and 401 Union Street has now failed. TEG has developed an immediate solution for the failed trap discharge piping which includes modification of the piping within Manhole 4 which will be executed during the Second Quarter FY21. TEG has also developed a solution to recover the condensate from 401 Union St. which will be re-visited as a separate project in the future.

19. DES176 – Manhole 9 Condensate Return Leak Repair

This work was substantially completed during the First Quarter FY21 and is now in close-out pending review of the cost substantiation information.

20. DES177 – Manhole B1 Ladder and Platform

Manhole B1 is located in 1st Ave South and houses a groundwater sump pump to alleviate the amount of groundwater that infiltrates into Manhole B. Manhole B1 is a 4 ft diameter, precast manhole with individual embedded rung access ladder. Currently, personnel stand on partially submerged concrete blocks when maintenance is required within this manhole. This project addresses the installation of a platform and ladder for maintenance.

This project is temporarily on hold pending Metro approval.

21. DES178 – Manhole 5 Repairs

Manhole 5 has several structural steel piping supports which are corroded and need to be cleaned and coated. This project addresses the cleaning and coating of these components.

This project is temporarily on hold pending Metro approval.

22. DES179 – Manhole 11 Repairs

Manhole 11 has structural steel piping anchors/supports which are corroded and need to be cleaned and coated. This project addresses the cleaning and coating of these components.

This project is temporarily on hold pending Metro approval.

23. DES180 – State Tunnel Pipe Support Repairs

The State Tunnel has several steel piping supports which are corroded and need to be cleaned and coated. This project addresses the cleaning and coating of these components.

This project is temporarily on hold pending Metro approval.

B. First Quarter FY21 Closed Projects

DES162, DES169 and DES176 were closed during the First Quarter FY21.

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.

Table 5. Capital Projects Expense Summary

DES Project #	Description	Total Budget	FY21 Spending to Date	Total Spent to Date	Remaining Balance
Fund-49109					
	Total Closed Projects	\$ 2,600,602	\$ -	\$2,600,602	\$ -
	Metro Project Admin	\$ -	\$ -	\$ -	\$ -
	Project Man, Development, etc	\$ 5,314	\$ -	\$ -	\$ 5,314
	Total 2010 Bond	\$ 2,605,916	\$ -	\$2,605,916	\$ (0)
Fund-49107					
	Total Closed Projects	\$ 8,499,961	\$ -	\$8,499,961	\$ -
	Metro Project Admin	\$ -	\$ -	\$ -	\$ -
	Project Man, Development, etc	\$ 39	\$ -	\$ -	\$ 39
	Customer Connection Fund	\$ 8,500,000	\$ -	\$8,499,961	\$ 39
Fund-49116					
DES111	DES CHP	\$ 168,706	\$ -	\$ 168,706	\$ -
DES133.1	NCC Blasting Issue	\$ 72,151	\$ 4,160	\$ 41,311	\$ 30,840
DES139	Options Review	\$ 211,250	\$ 90,181	\$ 226,432	\$ (15,181)
DES143	MH N1, N2 and S6 Insulation	\$ 1,700	\$ 679	\$ 2,114	\$ (414)
DES151	MH 23 Repairs	\$ 219,388	\$ -	\$ 219,388	\$ -
DES152	MH A & M Repairs	\$ 28,000	\$ 4,082	\$ 6,571	\$ 21,429
DES153	MH L Repairs	\$ 129,893	\$ 3,439	\$ 12,357	\$ 117,536
DES154	MH K Repairs	\$ 75,085	\$ -	\$ 85	\$ 75,000
DES157	MH 9 Repairs	\$ 127,509	\$ 13,945	\$ 118,455	\$ 9,055
DES159	MH B2 Repairs	\$ 92,281	\$ -	\$ 57,281	\$ 35,000
DES161	MH S6 Insulation	\$ 38,000	\$ -	\$ -	\$ 38,000
DES162	3rd and Molloy Service	\$ 120,885	\$ 22,670	\$ 138,555	\$ (17,670)
DES163	Parcel K Service	\$ 1,018,802	\$ -	\$ 1,302	\$ 1,017,500
DES168	1st and KVB Hotels	\$ 5,365,777	\$ -	\$ 5,777	\$ 5,360,000
DES169	MH-20 Repairs	\$ 17,500	\$ 15,620	\$ 30,808	\$ (13,308)
DES171	Broadway Tunnel Support Repair	\$ 268,907	\$ 5,579	\$ 35,736	\$ 233,171
DES172	Viridian Pipe Support Repair	\$ 190,128	\$ 3,129	\$ 22,006	\$ 168,121
DES173	MH-B3 Structural Repair	\$ 31,823	\$ 1,339	\$ 3,162	\$ 28,661
DES174	7th Ave Pipe Support Repairs	\$ 160,534	\$ 3,008	\$ 23,543	\$ 136,992
DES175	MH4 Condensate Repair	\$ 118,090	\$ 6,950	\$ 13,290	\$ 104,800
DES176	Condensate Leak at MH9	\$ 75,000	\$ 14,022	\$ 14,637	\$ 60,363
DES177	MHB1 Ladder & Platform	\$ 45,500	\$ 1,695	\$ 1,695	\$ 43,805
	Total Closed Projects	\$ 615,678	\$ 97	\$ 615,775	\$ (97)
	Metro Project Admin	\$ -	\$ -	\$ -	\$ -
	Project Man, Development, etc	\$16,807,413	\$ -	\$ -	\$16,807,413
	CHP and EDS Repairs	\$26,000,000	\$ 190,596	\$1,758,985	\$24,241,015

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

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

D. EDS Walkthrough

The First Quarter FY21 walkthrough was conducted on September 28 and 30, 2020, and October 1 and 2, 2020. The manholes that were visited included Manholes 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 15, 18A, 20, C, D, D1 and S6. The following comments and observations are a result of these visits:

1. Manhole 2

- a. There was water in this manhole, and it required pumping before entry.
- b. CNE had recently removed the mud from this manhole.
- c. A concrete patching material was applied to several small areas on the walls and ceiling in September 2013. Some of these patches are beginning to experience some flaking. CNE personnel should monitor these patched areas and notify TEG as the deterioration progresses.
- d. The steam dripleg insulation is nonexistent due to groundwater in contact with the steam piping and boiling. To avoid this from reoccurring, an insulation blanket should be purchased and installed in lieu of field installed insulation. TEG will coordinate this with CNE.
- e. The steam end can at the western wall penetration is corroded and deteriorating. CNE should monitor this end can and report any groundwater infiltration or other problems to TEG. TEG will research a solution/repair.
- f. There are (2) piping stanchion supports (Grinnell Fig. 192) on the trap piping. Both are corroded and should be monitored for replacement.
- g. The steam and condensate return piping originally passed through this vault. A few years ago, the piping east of this vault (and Manhole 1) was abandoned and both the steam and condensate return piping through the east wall was capped. The capped steam line penetration (wall sleeve and link seals) through the east wall has deteriorated and it is likely that groundwater will start seeping into the manhole at some point. CNE should monitor these penetrations and report any changes to TEG.

2. Manhole 3

- a. There was water in this manhole, and it required pumping before entry.
- b. There are some hairline cracks in the concrete walls; one is above the condensate penetration on the east wall; the other is above the steam penetration on the west wall. Pictures from prior reviews indicate that these cracks have not progressed. CNE should continue to monitor these cracks and report any significant changes to TEG.
- c. CNE had recently removed the mud from this manhole.
- d. There is some minor insulation/jacketing damage that should be repaired during the next project that involves this manhole. This should include the replacement of some of the insulation blankets.
- e. CNE had recently cleaned and painted the piping support; CNE should monitor these supports and clean/paint as needed.

- f. The access ladder coating was flaking/peeling. CNE cleaned the ladder and applied cold galvanizing paint during the review. CNE should monitor these supports and clean/paint as needed.
3. Manhole 4
 - a. There was water in this manhole, and it required pumping before entry.
 - b. The entry ladder and the steel piping supports are corroded to different degrees. CNE should clean these surfaces with a wire brush/wheel and apply a coating of cold galvanizing paint to try and prevent additional deterioration. Because of the limited time window to access this manhole due to its location, this work might have to be completed over several site visits.
 - c. The trap in this manhole was discharging into a sump in the basement of the Fairlane Hotel through buried piping, however this piping has failed. CNE investigated to determine if the existing failed piping can be removed and replaced by slip lining a new pipe in the existing casing and found that this cannot be done. The trap discharge was isolated because a portion of the piping was removed during the investigation by CNE. Because of this, the trap cannot be re-energized until some piping modifications are made to make it safe for maintenance personnel. TEG is researching remedies to this situation and will notify CNE when a solution is determined.
 - 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.
 - e. There is mud and debris in the floor of the manhole that needs to be removed once the trap piping situation is remedied.
 4. Manhole 5
 - a. There was water in this manhole, and it required pumping before entry.
 - b. CNE recently cleaned the mud from this manhole.
 - c. There are some insulation repairs that are needed in this manhole including the replacement of insulation blanket(s). The dripleg insulation is absent due to recent repairs to a pin hole leak on the trap piping connection. This insulation needs to be replaced. TEG will coordinate this effort with CNE.
 - d. There is a significant amount of structural steel pipe supports/anchors within this manhole that is corroded and needs to be cleaned and coated. TEG will coordinate this effort with CNE.
 - e. The steam piping kicker to the south wall had some corrosion on it; CNE cleaned/removed the corrosion and painted it with cold galvanizing paint. CNE should monitor this structure and clean/paint as needed.
 5. Manhole 6
 - a. There was water in this manhole, and it required pumping before entry.
 - b. There is some a minor amount of mud in the floor of the manhole which was removed by CNE personnel during the review.

- c. Holes and cracks in the concrete surfaces in this manhole were repaired during a recent project. CNE should monitor these repairs and report any deterioration to TEG.
 - d. The structural pipe supports were recently cleaned and painted. Some of the structures are presenting “creep” (the migration of rust stains from concealed surfaces that could not be exposed, cleaned, and painted). CNE should monitor these structures and report any deterioration to TEG.
6. Manhole 9
- a. There was water in this manhole, and it had to be pumped prior to entry. The existing sump pump was not functioning properly. CNE should investigate the reason that the sump pump was not functioning properly and make any needed repairs. Since the operation of this sump pump is not monitored remotely, CNE should check on the operation of this sump pump on a weekly basis.
 - b. The structural pipe supports/anchors were recently either cleaned and coated to eliminate corrosion or replaced. CNE should monitor these structures and report any degradation to TEG.
 - c. The insulation in this manhole was recently replaced. CNE should monitor the insulation and report any degradation to TEG.
 - d. Some cracking has occurred in the underside of the concrete opening which was cut into the northern wall of the “old” manhole. This crack was sealed by a contractor in early 2018. CNE should monitor these sealed cracks and report any degradation to TEG.
7. Manhole 10
- a. There was some water present in this manhole which was pumped out with the existing sump pump.
 - b. CNE recently cleaned and painted the condensate anchor. CNE should continue to clean/paint this anchor as needed.
 - c. The spalling of the grout surrounding the southern steam piping penetration has not worsened since the last review. TEG will coordinate with CNE to have repairs made to this grout. CNE should continue to monitor this and inform TEG if it becomes worse.
 - d. There is a small area of concrete spalling on the southern wall. CNE should monitor this and notify TEG if it worsens.
 - e. Some hammering occurred during the review. Although difficult to determine, it sounded as though the hammering was originating in the condensate return piping; this piping comes from the Andrew Jackson Building. CNE should investigate the traps inside the Andrew Jackson Building to try and determine if any of them are malfunctioning. CNE should also investigate the Rachel Jackson Building and the southern end of the east leg of the State Tunnel for any malfunctioning traps.

8. Manhole 11
 - a. There was water in this manhole, and it required pumping before entry.
 - b. There is corrosion on the structural members in this manhole. CNE should continue to monitor this corrosion. TEG will prioritize the corrosion in this manhole with the other system manholes and coordinate with CNE to have this corrosion removed and the steel cleaned and coated.
 - c. Spalling of the manhole roof was repaired in 2018. CNE should continue to monitor the ceiling and report any degradation of these repairs to TEG.
 - d. The eastern steam penetration includes an end can which projects into the manhole several feet. There is a gap between the end can and the steam pipe and hot air is coming into the manhole from this gap. In addition, the barrel of the end can is corroded resulting in some holes. At some point in the future, this may require the excavation of the steam line entering the manhole to make repairs. Until this future potential repair is undertaken, to reduce the infiltration of hot air into the manhole, TEG instructed CNE personnel to “stuff” this gap with loose insulation; this was accomplished during the manhole review. CNE should monitor this insulation and replace it as needed.
 - e. The steam slip joint insulation blanket is in poor condition and will probably “fall apart” the next time the blanket is removed. TEG will coordinate with CNE to order/purchase and install a new insulation blanket.

9. Manhole 12
 - a. No water was present in this manhole.
 - b. CNE should monitor the structural steel coatings and report any degradation to TEG.
 - c. CNE should monitor the hairline cracks in the ceiling and report any significant changes to TEG.
 - d. The grout under the northern base plate on the east end of the manhole has some small cracks. CNE should monitor this and report any significant changes to TEG.

10. Manhole 12A
 - a. This consists of (2) chilled water valve box manholes just south of Manhole 12.
 - b. No deficiencies to report.

11. Manhole 13
 - a. There was no water present in this manhole.
 - b. There is corrosion on a condensate pipe support on the 6” condensate piping extending west out of the manhole. This support should be replaced within the next 12 months. TEG will coordinate this work with CNE.
 - c. The existing trap train does not include a strainer; a strainer should be added ahead of the trap. TEG will coordinate this work with CNE.

12. Manhole 15

- a. The breach in the insulation on the eastern chilled water pipe coming up from the 4th Ave Tunnel was repaired by CNE personnel during this review.
- b. CNE cleaned and painted the slight corrosion on the support beams in the sidewalk “entry area” prior to this review. CNE should monitor this steel and clean/paint as needed.
- c. The floor grating over the vertical shaft to the 4th Ave Tunnel has some corrosion; TEG will coordinate the cleaning/coating and/or replacement of this grating with CNE.

13. Manhole 18A

- a. The structural steel was recently cleaned and coated. CNE should monitor the structural steel coatings and report any degradation to TEG.
- b. The slip joint insulation blankets are starting to deteriorate and will probably require replacement in the next 12 to 24 months. CNE should monitor these blankets and report any significant degradation to TEG.

14. Manhole 20

- a. This manhole is located at the top of a vertical shaft which connects to the 7th Ave. Tunnel. It houses chilled water, steam and condensate return piping which serves the Hume Fogg High School. There is not any serviceable equipment (valves, traps, etc.) in this manhole. The manhole consists of a lower rectangular concrete vault with (2) manway openings in the concrete ceiling. Setting over these (2) manway openings are (2) separate precast round manholes with conical upper sections. Each of these precast round manhole sections include individual embedded ladder rungs (which are prone to failure without warning) which do not extend into the lower rectangular vault section making access a challenge. TEG will evaluate the inclusion of a new access ladder for this manhole.
- b. There is a metal caisson at the top of the vertical shaft which protrudes above the concrete floor of the lower rectangular vault. This protruding caisson creates a “wall” which helps prevent groundwater in the lower vault from falling down the vertical shaft onto piping and pipe supports at the bottom of the shaft. Portions of this caisson has corroded and broken away permitting groundwater to fall down the vertical shaft promoting corrosion on the pipe supports below. TEG will investigate a solution for this problem.
- c. There is a beam in the southern end of the rectangular lower vault that structural tees welded to the (4) pipes rest on. This beam is corroded. It would be very difficult to access this beam to clean and coat it. Therefore, TEG will investigate an alternate pipe support system to alleviate the need for this support beam.

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 and allowing groundwater to seep into the manhole. CNE has attempted to tighten the link seals without success. TEG will research/investigate alternate methods of trying to seal these penetrations.
- c. The dripleg is not insulated; the insulation was removed to repair a steam leak on the trap piping and the insulation was not re-installed. TEG received a preliminary quotation from Fit Tight for an insulation blanket to re-insulate this dripleg. TEG will forward the information from this quotation to CNE to get an updated quotation.
- d. The steam piping wall penetrations end cans and pipe insulation are beginning to deteriorate. CNE should monitor these wall penetrations and report any significant changes to TEG.

16. Manhole D

- a. There was water present in this manhole, and it required pumping before entry.
- b. There is a large amount of water infiltration in this manhole and CNE has determined that the water is DES chilled water through testing. This verifies that there is a chilled water leak in this area. TEG has directed CNE to schedule an exploratory excavation to locate and repair this leak as soon as possible.
- c. The trap in this manhole is firing continuously. This is a result of chilled water from the leak in this area surrounding portions of the buried steam piping resulting in an extraordinary amount of condensation in the steam line. On the date of this review, the trap was barely keeping up with the load. This further reinforces the need to locate and repair the chilled water leak as soon as possible.
- d. The sump pumps in Manhole D1 (immediately south of Manhole D) are running continuously due to the amount of leaking chilled water in this area. There are (2) sump pumps in Manhole D1 which alternate based on the successful “pumping down” of the manhole and cycling of the pumps. With this high inflow, the pumps are not allowed to alternate which will eventually result in the failure of the pump in use. In addition, this water infiltration has resulted in damage to pipe support steel coating which was recently applied. Once the chilled water leak is repaired, the piping support steel in this manhole will need to be cleaned and re-coated. TEG will coordinate this with CNE once the chilled water leak has been located and repaired.
- e. The southern steam penetration includes a gap between the corroded end can and the carrier pipe. Hot air enters the manhole from this gap and elevates the ambient temperature of the manhole. TEG directed CNE to insert

insulation in this gap during this review to reduce the hot air infiltration into the manhole.

17. Manhole D1

- a. As mentioned under Manhole D above, the water infiltration into this manhole is abundant due to the chilled water leak in the area. This has resulted in the continuous operation of the sump pump(s) which could result in premature failure. TEG has directed CNE to schedule an exploratory excavation to locate and repair this leak as soon as possible.
- b. The access ladder has surface corrosion. CNE needs to clean/remove the corrosion from this ladder and paint it with cold galvanizing paint as soon as possible.

18. Manhole S6

- a. There was no water in the manhole.
- b. The structural steel in this manhole is corroded as well as the steam and condensate piping - insulation is non-existent. The life of the piping can be extended with the installation of insulation in this manhole. This project was postponed in the FY19 and FY20 budgets and is currently postponed in the FY21 budget. TEG has provided specifications and a scope to CNE to have this manhole insulated. TEG will direct CNE to insulate this piping once approval has been granted.
- c. TEG directed CNE recently to replace the extremely heavy and awkward manway lid on this manhole.

Action Items

Action items from the above walkthrough 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 and prominent existing customer interactions. The topics of interactions, meetings and training seminars with the customers are also discussed. There are currently 29 customers, comprised of 42 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 design of the two proposed hotels at 1st Ave S and KVB have been placed on hold. TEG will continue to remain in contact with the engineering team. This project is tracked under DES168.

The architect for Lot K reported that they remain interested in DES service but are continuing to work through a revised building plan. Additional discussions for receiving DES service are anticipated in the coming months.

TEG remained in contact with the potential customer at 333 Union St. This small boutique hotel is currently in the design phase but demolition and renovation work on the property began during the quarter.

TEG has also been in contact with the engineering team for an apartment complex to be constructed north of Gay St near 2nd Ave North. This building will have relatively small load and may be located too far away to be economically served by DES.

Another potential customer is a proposed hotel to be located near Peabody and 8th Ave S. Although initial discussions with this potential customer were favorable, it is believed that progress on this development has slowed due to the pandemic.

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.

-) Several customers made repairs within their buildings during the Quarter and requested assistance from CNE, which was provided. Some of these repairs involved isolating the steam or chilled water services to the building for the customers.
-) The condensate return system experienced high hardness levels during the quarter. Condensate return samples were taken at several of the DES customers in order to determine the source of the hardness. CNE concluded that the hardness may have been due to the presence of gravel in the condensate return piping that was repaired near MH-9.
-) CNE was unable to contact anyone at the Wildhorse Saloon for several months. This building has been shut down since the pandemic began. However, there are no reported service issues at this building and the building owner continues to make timely payments on their invoices. In September, CNE was finally able to contact the building maintenance staff to schedule the annual meter calibrations and checks.
-) CNE has been in contact with building personnel at the Rachel Jackson office building during the quarter regarding a steam trap that failed in late summer. The trap belongs to the State, and CNE believes the trap has been repaired.
-) Remote communications with the DES metering panel at the 5th + Broadway site were made during the quarter.
-) The State Library and Archives building manager contacted CNE regarding a steam and pressure issue at the building. CNE determined that the building's

PRV needed repair. The building personnel stated that they would address the problem.

-) CNE met with personnel at the Ryman Auditorium to discuss a recent failure of one of their chilled water pumps. The Ryman believes the failure may be due to the chilled water chemistry. CNE and TEG continue to investigate the cause of the issue and Metro was notified.
-) CNE assisted the State Library and Archives personnel in determining the cause of their steam flow issues. CNE determined that their PRV had failed and needed repair.
-) Other minor issues and customer interactions are noted in the monthly reports from CNE.

VII. Recommendations

The ARMA requires the system to be maintained consistent with good utility practice. In TEG's opinion, CNE is not meeting that standard. Based on the review of the First Quarter FY21 EGF and EDS operations, the following recommendations are made.

-) CNE needs to address the maintenance and repair items included in the EGF and EDS Walkthrough sections of this report as soon as possible.
-) TEG is continuing to monitor the chilled water system losses, the water usage at the EGF and the decrease in chiller plant electric efficiency. Although CNE had performed some of the previously noted work on the cooling towers, they need to complete the remaining items and work towards restoring the chiller plant efficiency to its historic values.
-) CNE needs to address their inability to meet the new performance guarantees for the EGF. Failure to meet the performance guarantees for twelve consecutive months may be considered an Event of Default according to section 18.02 (4) of the ARMA.
-) CNE needs to improve the overall cleanliness and orderliness of the EGF.
-) Corroded structural steel within the vaults and tunnels should be cleaned and coated or replaced.
-) Insulation that is absent or in disrepair in the vaults and tunnels should be addressed through Amendment 2 with CNE and additional capital and R&I projects.
-) 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 sufficient for the repair to be effective.
-) There is some debris and mud which needs to be cleaned and removed from some manholes.