Metro Nashville
DISTRICT ENERGY SYSTEM

Operations Monitoring Report

Second Quarter FY22

Prepared by:

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I. Executive Summary

A review of the fiscal year 2022 (FY22) Second Quarter performance and contract obligations between Constellation NewEnergy (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 is also presented. For the fiscal year 2022 to date, CNE has failed to meet the performance guarantees for each month during the fiscal year and for the twelve consecutive months of FY21 as required by Paragraph 8.d of the Amendment 2 of the Amended and Restated DES Management Agreement (ARMA) between Metro and CNE and Section 18 of the ARMA. TEG continues to monitor CNE's operations.

Metro asked CNE during the First Quarter for a plan to bring the operation of the EGF (Energy Generating Facility) into compliance with the new performance guarantees. CNE provided a draft report from their engineer during the Second Quarter; however, a final version of this report remains pending.

For the Second Quarter FY22, the chilled water sales increased 37.6% over the previous Second Quarter (FY21). The chilled water sendout also increased 41.2% over the previous Second Quarter. The system losses increased approximately 88.8%. The number of cooling degree days decreased 4.4%. The peak chilled water demand for the current quarter was 14,384 tons, which is 45.4% higher than the previous Second Quarter. The increase in chilled water sales is attributed to the commercial recovery from the nCOVID-19 pandemic and a warmer than normal December.

Steam sendout for the current quarter decreased by approximately 3.4% over the previous Second Quarter and steam sales, likewise, decreased by approximately 2.8%. This decrease came with a 12.0% decrease in heating degree days which is attributed to a warmer than normal December. Total steam system losses decreased 6.9% from the previous Second Quarter. The peak steam demand for the current quarter was 104,288 pounds per hour, which represents a decrease in the Second Quarter demand by approximately 15.0%.

With the implementation of the new System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels beginning in July 2020, CNE has failed to consistently meet all of the performance guarantees. CNE has consistently met the chilled water plant electric consumption per unit of sales metric but failed to meet it in December 2021. CNE continues to make changes to their operation at the EGF to address the issues preventing them from meeting the new performance criteria. These changes have resulted in some improvements, but CNE continues to fail at meeting the chilled water-water guarantees.

The steam-water conversion exceeded the performance guarantee for five out of the six months of the fiscal year. CNE believes that some of these excursions are related to a faulty water meter that was replaced in September. The steam fuel guarantee was exceeded four out of the six months of the fiscal year. The steam electric conversion guarantee was exceeded only in July with no subsequent excursions noted. 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 Fourth Quarter. Repair and Improvements to the EDS continue as scheduled. DES133.1, DES139, DES152, DES154, DES 143/161, DES163, DES177, DES178, DES179, DES180, DES184, DES185, DES187, DES188, DES 189, DES 190, DES192, DES193 and DES194 are ongoing. As noted in prior quarterly monitoring reports, the postponement or deferral of these items will result in an increase in maintenance costs to the DES and could impact the delivery of steam and chilled water. Projects DES192, DES193 and DES194 have been added. Projects DES172, DES174, DES182 and DES186 are closed/in close-out.

The current fiscal year system operating costs to date are $9,545,100. This value represents approximately 48.5% of the total budgeted operating cost for FY22. The customer revenues from the sales of steam and chilled water for FY22 are $9,303,114 (48.9% of budgeted amount) which includes the annual true-up amount for FY21. 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 FY22 is $315,350 (50% of budget). The actual MFA can only be estimated 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.

With the reopening of the businesses within Metro and increased events and commercial activities, chilled water sales are continuing to rebound. These changes are noted by the significant increases shown in the following graphs.

1. Sales and Sendout

A comparison for the Second Quarter chilled water sales is shown in Figure 1. This data reflects a 37.6% increase in sales for the current quarter over the same quarter of the previous fiscal year.

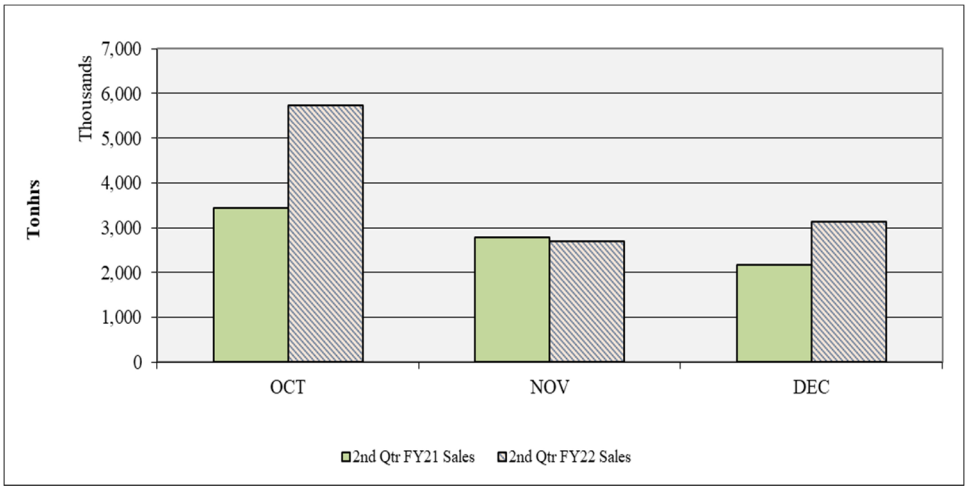

Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 14,384 tons, which represents a 45.4% increase over the previous Second Quarter. This increase in chilled water demand is due to an increase in commercial activities and a warmer than normal December. However, the number of cooling degree days were 4.4% lower in FY22 than in FY21.

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.

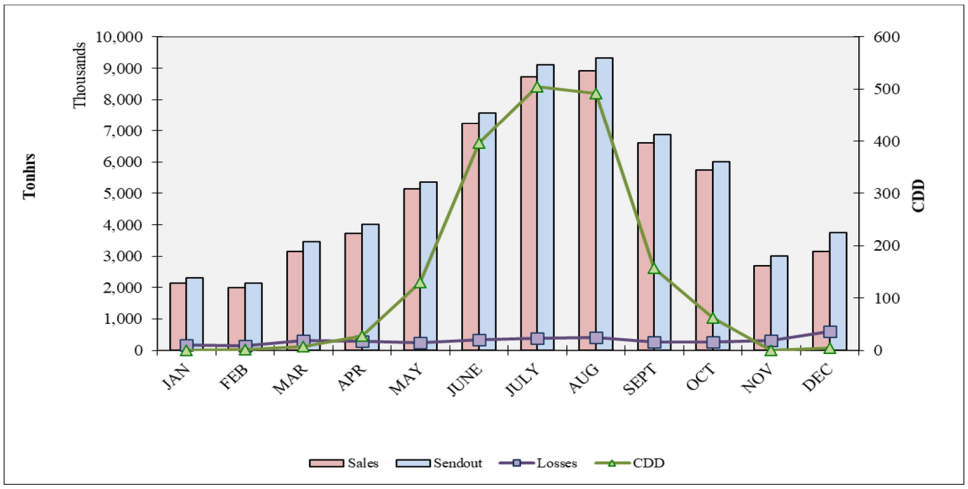

Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

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.

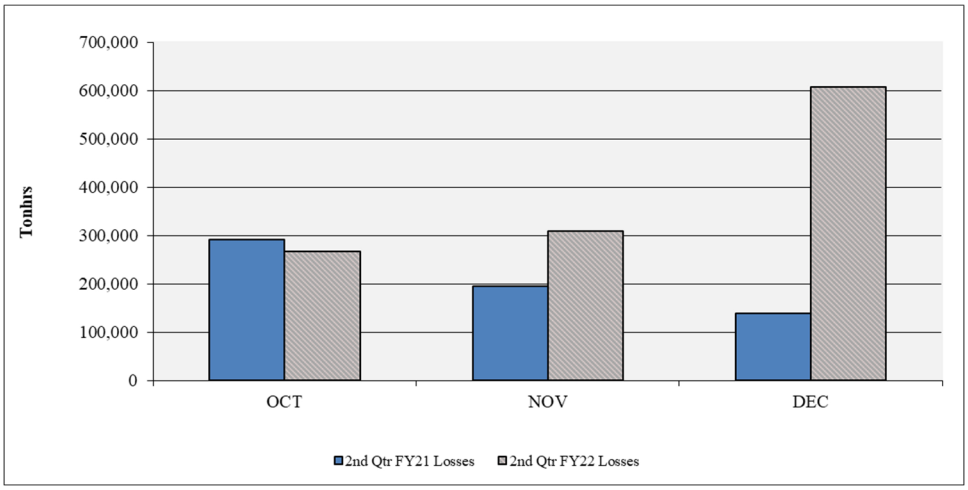

Figure 3. Chilled Water System Loss Comparison

The EDS make-up increased by 182.1% over the previous Second Quarter. An additional leak is suspected on 3rd Ave North where a repair had previously been made. CNE and TEG will investigate this location in the Third Quarter. Another leak is still suspected on 5th Ave N, but previous efforts to locate the actual source of the leak have been unsuccessful. CNE and TEG are continuing to monitor the EDS make-up and investigate any potential leaks. If the specific location of an additional leak is discovered, DES will address the issue promptly.

The make-up to the cooling towers increased 49.0% over the previous Second Quarter. The water usage in the cooling towers is typically proportional 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 31.7%; this decrease in cycles of concentration equates to an increase in cooling tower blowdown that requires additional make-up water to the cooling towers. The total chiller plant water use increased 68.2% over the Second Quarter FY21. The overall city water make-up comparison for the chilled water system Second Quarter is shown in Figure 4.

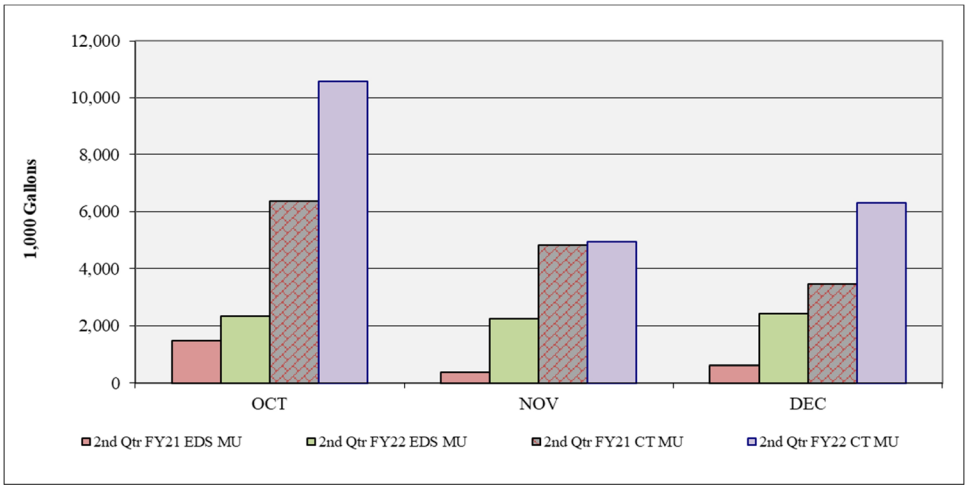

Figure 4. Chilled Water System City Water Usage Comparison

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 were not consistently achieved for the chilled water-water conversion for FY22. CNE has met the chilled water-electric guarantee for all but one month of the fiscal year.

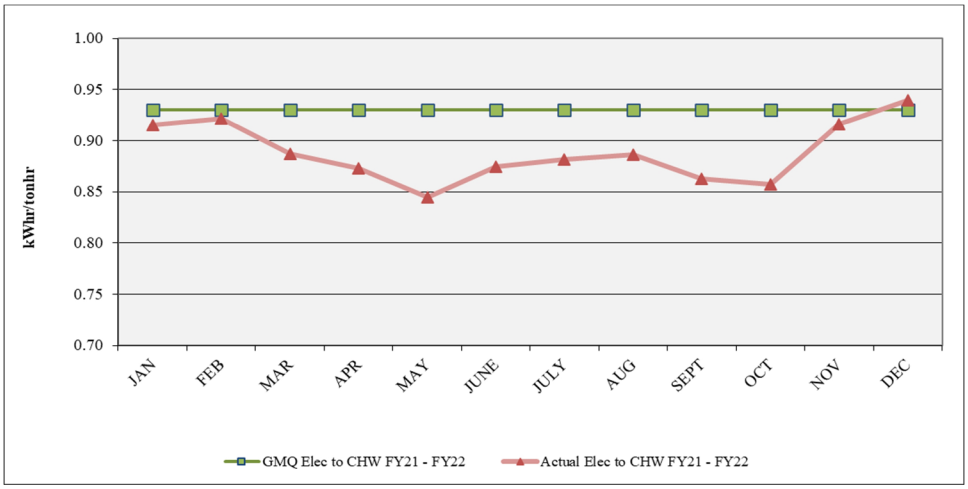

Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

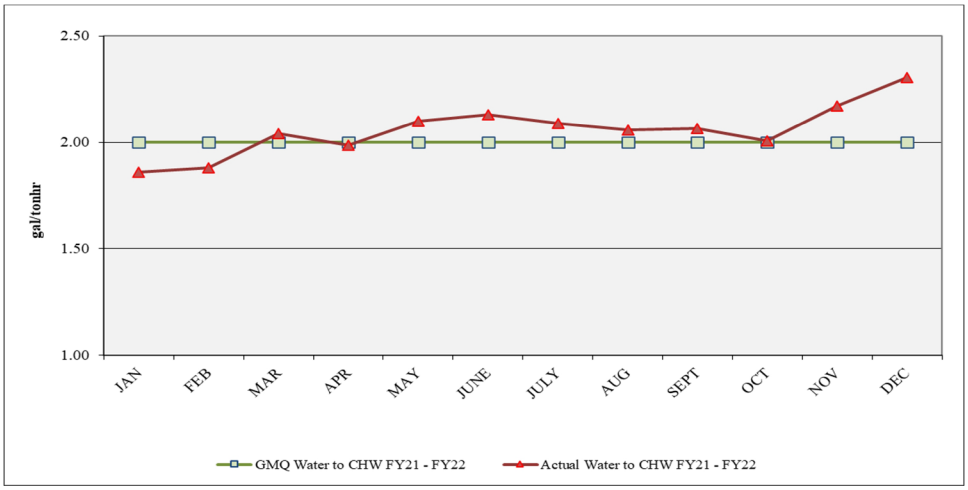

Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 0.93 kWhr per tonhr for the current quarter on average with only one excursion reported for the current fiscal year. However, the electric usage per unit of sales increased 3.2% over the previous Second Quarter.

CNE has worked to address some operational issues within the plant in an additional effort to improve efficiency. 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 increased by approximately 68.2% due largely to the increase in chilled water sales. The water conversion factor for the chiller plant increased by approximately 10.7%

(on average) over the Second Quarter FY21. The cooling tower blowdown increased 104.5% over the previous Second Quarter. These metrics indicate a decrease in the EGF performance.

B. Steam

1. Sales and Sendout

The steam sendout decreased by approximately 3.4% over the previous Second Quarter (FY21), and the sales also decreased by approximately 2.8%. The Quarter experienced a 12.0% decrease in the number of heating degree days with a warmer than normal December. The steam system losses decreased 6.9%, and the relative amount of condensate return increased 57.6%. A comparison for the Second Quarter steam sales is shown in Figure 7.

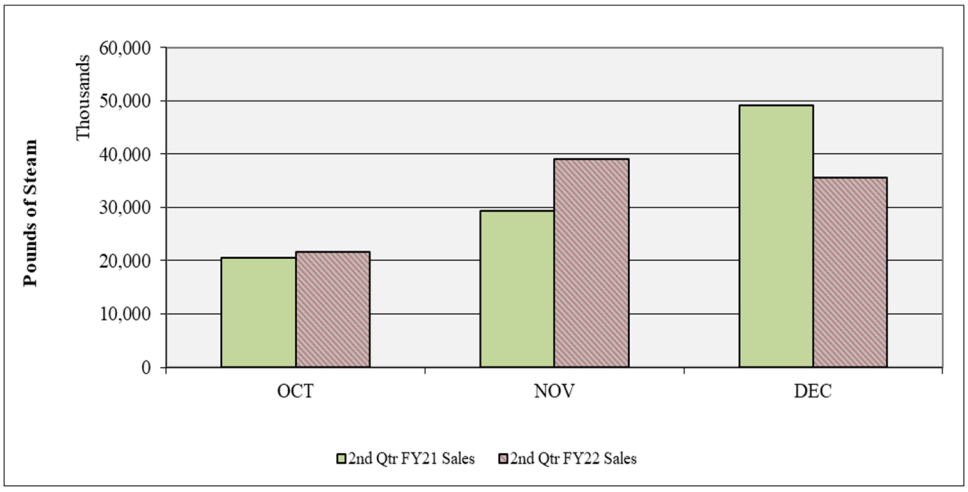

Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 104,288 pph, which reflects an approximate 15.0% decrease 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.

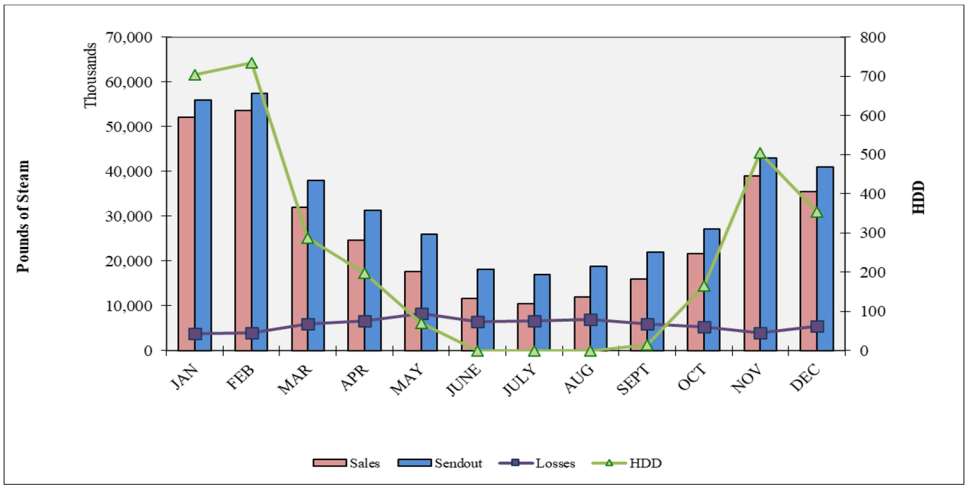

Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

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 most of these losses are based on a near constant heat loss of the system.

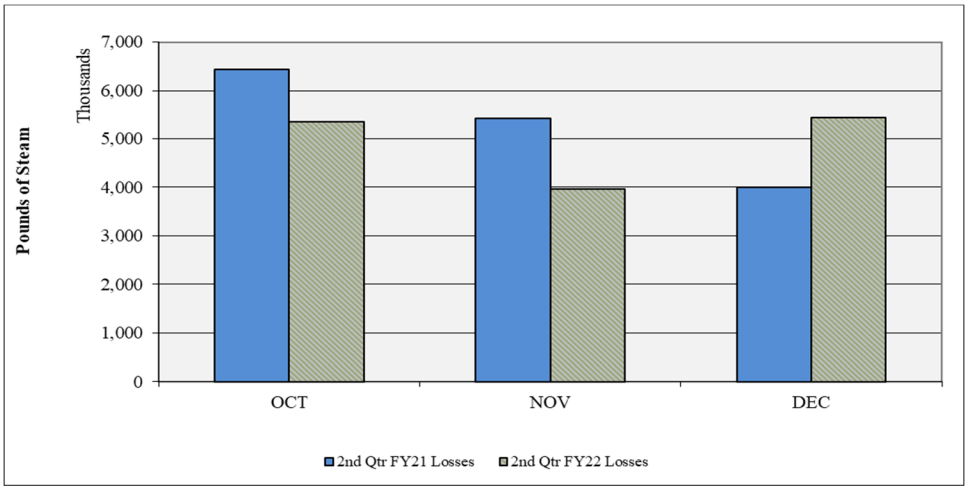

Figure 9. Steam System Losses

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

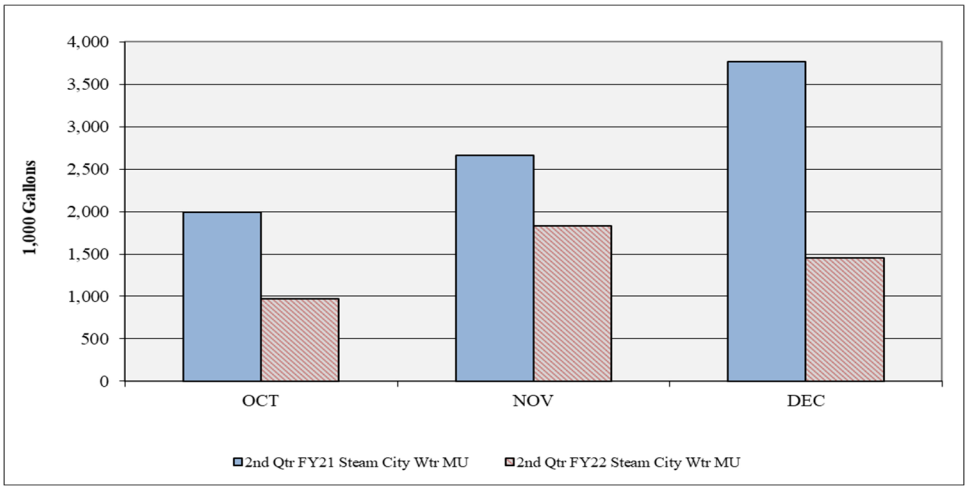

Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system of the EGF is presented by the following three charts, Figures 11, 12 and 13. The steam fuel conversion factor exceeded the guaranteed values for the months of September, October, November, and December. The steam electric conversion factor was exceeded in July but was not exceeded in subsequent months. TEG monitors CNE performance regularly and will continue to report any non-compliance in the EGF's operation. The steam water conversion factor exceeded the guaranteed values in August, September, October, November, and December. The faulty meter at the EGF was replaced in September.

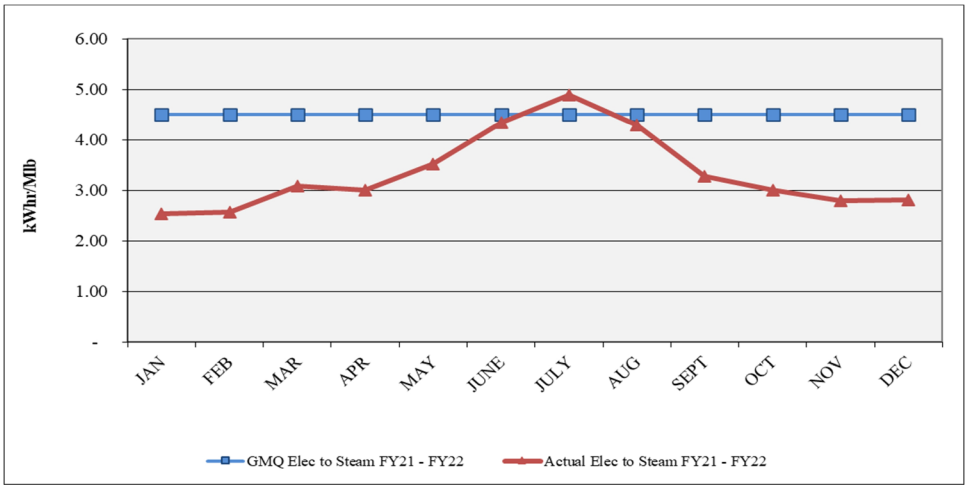

Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

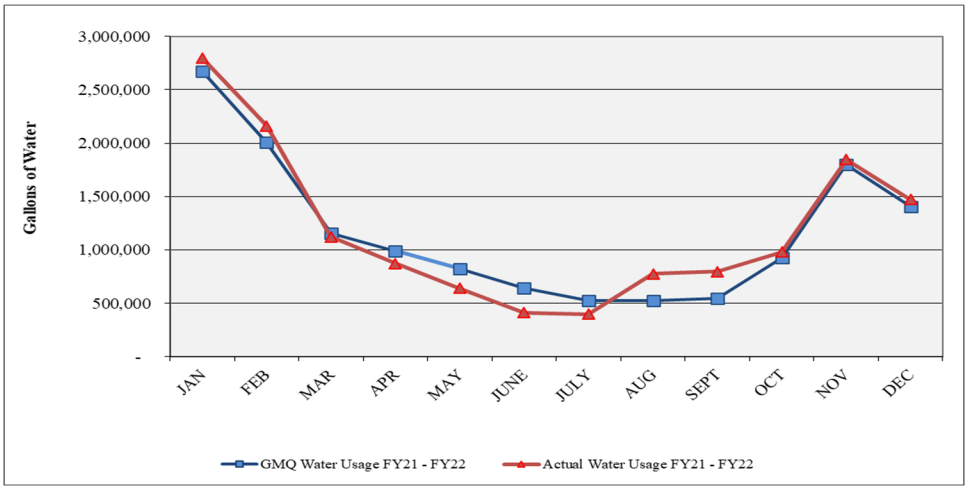

Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

The steam plant electric consumption for the current quarter was 9.8% lower in FY22 than in FY21. The steam-to-electric conversion factor decreased 8.7% over the same period. The monthly steam-to-electric conversion factors, along with the guaranteed values, are shown in Figure 11.

The water consumption for the steam plant decreased 49.5% this quarter as compared to the previous Second Quarter due to a significant amount of condensate returned during the quarter. Figure 12 shows the comparison between the actual and guaranteed steam-to-water usages for each month. The excursions above the guaranteed values in August and September are believed to be caused by a faulty meter that was replaced in September.

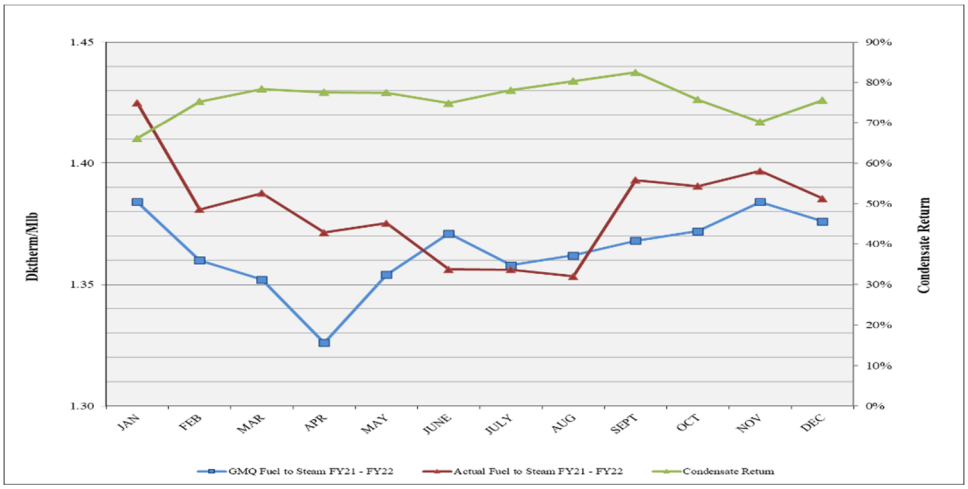

Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The fuel consumption per unit of steam sales decreased 3.2% over the previous Second Quarter. As shown in Figure 13, the performance guarantee was met in July and August but was not met for the remaining months of FY22. The relative amount of condensate return is shown on this graph to reflect the influence that the condensate return has on the plant efficiency.

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) or System Performance Guarantees of the criteria commodities (fuel, water, and electricity).

CNE failed to meet all of the performance guarantees required under Amendment 2 of the ARMA for the quarter but some improvement in the operation of the EGF is noted.

Table 1. Second Quarter FY22 Production, Sales and Consumption Summary

Item	Unit	Second Quarter FY22	Second Quarter FY21	*Percent Difference
	days	92	92	0.00%
Total Electric Use	kWhrs	10,606,046	7,671,702	38.25%
Chilled Water	kWhrs	10,332,015	7,368,077	40.23%
Steam	kWhrs	274,031	303,625	-9.75%
Total Water Use	kgal	33,073	25,554	29.42%
Total Chilled Water	kgal	28,817	17,130	68.23%
EDS Make-up	kgal	6,987	2,477	182.08%
Cooling Towers	kgal	21,830	14,653	48.98%
Calc CT Evaporation	kgal	17,489	12,530	39.58%
CT Blowdown	kgal	4,341	2,123	104.47%
Calc # Cycles		4.03	5.90	-31.74%
Steam	kgal	4,256	8,424	-49.48%
Total Fuel Use	mmBTU	154,323	164,928	-6.43%
Natural Gas	mmBTU	154,307	164,797	-6.37%
Propane	mmBTU	16	131	-87.79%
Condensate Return	kgal	10,010	6,574	52.26%
	lbs	81,640,255	53,619,004	52.26%
Avg Temp	°F	170.0	178.3	-4.67%
Sendout				
Chilled Water	tonhrs	12,752,200	9,034,400	41.15%
Steam	lbs	110,941,000	114,822,000	-3.38%
Peak CHW Demand	tons	14,384	9,896	45.35%
Peak Steam Demand	lb/hr	104,288	122,719	-15.02%
CHW LF		40.15%	41.35%	-2.89%
Steam LF		48.18%	42.38%	13.70%
Sales				
Chilled Water	tonhrs	11,568,443	8,407,281	37.60%
Steam	lbs	96,182,072	98,966,175	-2.81%
Losses				
Chilled Water	tonhrs	1,183,757	627,119	88.76%
Steam	lbs	14,758,928	15,855,825	-6.92%
		13.30%	13.81%	-3.66%
Degree Days				
CDD		66	69	-4.35%
HDD		1,023	1,163	-12.04%

*positive percent difference values imply an increase from FY21 to FY22

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

GMQ Calculations	Unit	Second Quarter FY22	Second Quarter FY21	*Percent Difference
Steam				
GMQ Elec Conversion	kWhr/Mlb	4.50	4.50	
Electric Conversion	kWhr/Mlb	2.87	3.14	-8.69%
GMQ Plant Efficiency	Dth/Mlb	1.377	1.412	
Plant Efficiency	Dth/Mlb	1.391	1.436	-3.17%
Actual %CR		73.59%	46.70%	57.59%
Avg CR Temp	°F	170	178	-4.67%
GMQ Water Conversion	gal	4,131,495	8,629,811	
Water Conversion	gal	4,298,560	8,508,240	-49.48%
Chilled Water				
GMQ Elec Conversion	kWhr/tonhr	0.930	0.930	
Electric Conversion	kWhr/tonhr	0.904	0.876	3.18%
GMQ Water Conversion	gal/tonhr	2.00	2.00	
Water Conversion	gal/tonhr	2.16	1.95	10.65%

*positive percent difference values imply an increase from FY21 to FY22

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.

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 and are passed onto the customers directly without mark-up. 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.

For FY22, the current fiscal year system operating costs to date are $9,545,100. This value represents approximately 48.5% of the total budgeted operating cost for FY22. The customer revenues from the sales of steam and chilled water for FY22 are $9,303,114

(48.9% of budgeted amount), including the FY21 customer true-up. 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 FY22 is $315,350 (50% of budget). However, the actual MFA required can only be estimated due to outstanding invoices as of the date of this report.

Table 3. DES Expenses and Revenues to Date

Item		FY22 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee								
FOC:	Basic	$ 3,890,100	$ 972,529	$ 972,529	$ -	$ -	$ 1,945,058	50.00%
	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	$ 232,200	$ 64,895	$ 55,523	$ -	$ -	$ 120,418	51.86%
	Insurance	$ 16,500	$ -	$ 19,636	$ -	$ -	$ 19,636	119.00%
Marketing:	CNE Sales Activity	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Incentive Payments	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
FEA:	Steam	$ 70,900	$ (4,267)	$ (1,921)	$ -	$ -	$ (6,188)	-8.73%
	Chilled Water	$ 133,800	$ 19,059	$ 5,368	$ -	$ -	$ 24,427	18.26%
Misc:	Metro Credit	$ -	$ (387,092)	$ (258,250)	$ -	$ -	$ (645,341)	n.a.
	ARFA	$ 61,200	$ 15,296	$ 15,296	$ -	$ -	$ 30,591	49.99%
	Deferral	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Subtotal - Man Fee =	**$ 4,404,700**	**$ 1,067,510**	**$ 1,066,431**	**$ -**	**$ -**	**$ 2,133,941**	**48.45%**
Reimbursed Management Fee + Chem Treatment			$ 708,449	$ -	$ -	$ -	$ 708,449	0.00%
Metro Costs								
Pass-thru Charges:	Engineering	$ 53,800	$ 8,693	$ 9,103	$ -	$ -	$ 17,796	33.08%
	EDS R&I Transfers	$ 294,800	$ 73,700	$ 73,700	$ 24,567	$ -	$ 171,967	58.33%
	Metro Marketing	$ 10,900	$ -	$ -	$ -	$ -	$ -	0.00%
	Project Administration	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Metro Incremental Cost	$ 378,400	$ 83,084	$ 76,047	$ -	$ -	$ 159,131	42.05%
Utility Costs:	Water/Sewer	$ 737,500	$ 370,328	$ 242,161	$ -	$ -	$ 612,489	83.05%
	EDS Water/Sewer	$ -	$ 45	$ 154	$ -	$ -	$ 199	n.a.
	EDS Electricity	$ 62,100	$ 16,764	$ 16,088	$ -	$ -	$ 32,852	52.90%
	Electricity	$ 6,122,000	$ 1,750,697	$ 933,362	$ -	$ -	$ 2,684,059	43.84%
	Natural Gas Consultant	$ 12,400	$ 1,000	$ 5,000	$ -	$ -	$ 6,000	48.39%
	Natural Gas Transport	$ -	$ 46,378	$ 70,590	$ -	$ -	$ 116,968	n.a.
	Natural Gas Fuel	$ 2,401,200	$ 314,641	$ 844,001	$ -	$ -	$ 1,158,642	48.25%
	Propane	$ 111,900	$ -	$ 95,983	$ -	$ -	$ 95,983	85.78%
	Subtotal - Metro Costs =	**$ 10,185,000**	**$ 2,665,331**	**$ 2,366,189**	**$ 24,567**	**$ -**	**$ 5,056,087**	**49.64%**
	Subtotal - Operations =	**$ 14,589,700**	**$ 3,732,841**	**$ 3,432,620**	**$ 24,567**	**$ -**	**$ 7,190,028**	**49.28%**
Debt Service	2012 Bonds	$ 3,478,700	$ 869,303	$ 880,082	$ 289,713	$ -	$ 2,039,098	58.62%
	2005 Bonds -Self Funded	$ 340,600	$ -	$ -	$ -	$ -	$ -	0.00%
	2007 Bonds -Self Funded	$ 170,300	$ 42,575	$ -	$ -	$ -	$ 42,575	25.00%
	2008 Bonds -Self Funded	$ 170,400	$ 42,600	$ -	$ -	$ -	$ 42,600	25.00%
	2010 Bonds -Self Funded	$ 173,500	$ 43,375	$ -	$ -	$ -	$ 43,375	25.00%
	Fund 49107 -Self Funded	$ 612,000	$ 153,000	$ -	$ -	$ -	$ 153,000	25.00%
	Fund 49116 -Self Funded	$ 137,700	$ 34,425	$ -	$ -	$ -	$ 34,425	25.00%
	MIP	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Oper. Reserve Fund	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Subtotal - Capital =	**$ 5,083,200**	**$ 1,185,278**	**$ 880,082**	**$ 289,713**	**$ -**	**$ 2,355,073**	**46.33%**
	Total =	**$ 19,672,900**	**$ 4,918,119**	**$ 4,312,702**	**$ 314,279**	**$ -**	**$ 9,545,100**	**48.52%**
Customer Revenues								
	Taxes Collected		$ 109,591	$ 97,050	$ -	$ -	$ 206,641	n.a.
	Taxes Paid		$ 115,728	$ 67,776	$ -	$ -	$ 183,504	n.a.
	Interest & Misc Revenue	$ 128,100	$ -	$ 127	$ -	$ -	$ 127	0.10%
	Penalty Revenues/Credits		$ (9,022)	$ 4,328	$ -	$ -	$ (4,694)	n.a.
	Energy Revenues Collected		$ 4,847,654	$ 4,436,890	$ -	$ -	$ 9,284,544	49.40%
	Revenues =	**$ 19,042,200**	**$ 4,832,495**	**$ 4,470,619**	**$ -**	**$ -**	**$ 9,303,114**	**48.86%**
	Metro Funding Amount =	**$ 630,700**	**$ 85,624**	**$ (157,917)**	**$ 314,279**	**$ -**	**$ 241,986**	**38.37%**

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. The New Customers listed in Table 4 are non-Initial System private customers. 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	$ 2,244,304	12,934,933	$ 0.1735		$ 760,934	36,073	$ 21.0942
State Government	$ 1,769,893	7,940,360	$ 0.2229		$ 965,469	41,682	$ 23.1627
Metro Government	$ 2,553,188	15,223,650	$ 0.1677		$ 990,756	56,832	$ 17.4331
New Customers	$ 1,630,979	9,214,877	$ 0.1770		$ 693,367	42,051	$ 16.4885
Total	**$ 6,567,385**	**36,098,943**	**$ 0.1819**		**$ 2,717,158**	**134,587**	**$ 20.1889**

Total Revenue	**$**	**9,284,544**
True-up and Adjustments (Net)	**$**	**18,571**
Net Revenue	**$**	**9,303,114**

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY22. 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; however, they have failed to meet all of the new performance guarantees in Amendment 2 for eighteen consecutive months.

A. Reliability

The principal 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 4 tripped three times in October. On the 4th, CNE could not determine the cause of the trip, but the steam pressure dropped to 126 psi and was below 150 psi for approximately 45 minutes. The boiler tripped on the 9th while starting another boiler; this trip caused the pressure to be below 150 psi for 75 minutes. On the 16th, the boiler tripped due to low feedwater pressure. The pressure was below 150 psi for 60 minutes.
- On November 11, a safety relief valve lifted on boiler 3. The steam pressure dropped below 150 psi for 30 minutes. The relief valve was tested and reset on November 22. The steam pressure was also less than 150 psi on the 22nd due to the safety relief valve testing on all the boilers, the de-aerators and the PRV station.
- An electric power disruption caused the steam pressure to drop below 150 psi for 30 minutes on November 18. On the same day, the steam pressure was lowered to perform a tune-up on boiler 3. The pressure was below 150 psi for approximately 75 minutes.

- The tune-up on boiler 3 was completed on November 19th. The tuning on boiler 2 was also performed that day. The tuning caused the steam pressure to be below 150 psi for 150 minutes.
- There were no other reported issues during the quarter.

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 as required by Exelon, CNE has implemented and is requiring regular attendance for online safety courses for their employees. Masks are to be worn within the EGF and when social distancing cannot be implemented.

D. Personnel

CNE is currently staffed with eighteen full time employees, one remote part-time employee and two shared employees. One employee retired during the quarter, and CNE is actively interviewing replacements for the electrician position. 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 73.6% of the steam sendout during the quarter, which represents a 57.6% increase over the previous Second Quarter.
  - Feedwater iron, pH, and hardness 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.
  - The cooling tower blowdown increased 104.5% over the previous Second Quarter. This increase resulted in an average decrease in the cycles of concentration in the cooling towers by 31.7%. The factors contribute to an increase in the chilled water system make-up water usage that may be contributing to the inability to meet the chilled water-water performance guarantee.
- 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. Chem-Aqua's proprietary biological treatment system continues to function properly.
  - Metro and CNE are evaluating options for the installation of a side stream filter at the EGF.

G. Maintenance and EGF Repairs

CNE continues to report on the routine and preventative maintenance activities performed on the EGF primary and ancillary equipment. The principal 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, updated, backed-up and repaired plant computers and servers;
- Checked and adjusted packing on all pumps;
- Repaired plant lighting and electrical;
- Assisted Chem-Aqua with the replacement of chemical storage and feed equipment;
- Repaired and replaced boiler blow down piping;
- Repaired the damper linkage on boiler 1;
- Repaired the softener controls;

- Assisted IB&M repair a tube leak in boiler 1 and make refractory repairs in boiler 2;
- Performed chiller PMs;
- Cleared the cooling tower blowdown strainer;
- Replaced the fan belt on cooling tower 12;
- CWP 5 motor was repaired and set and aligned;
- Repaired air compressor;
- Installed new motor on boiler 1 damper linkage;
- Repaired the bonnet leak on de-aerator steam isolation valve;
- Tuned boilers 1, 2 and 3;
- Adjusted the firing rate on boiler 1;
- Repaired the gas valve on boiler 1;
- Replaced the continuous blowdown valve actuator on boiler 3;
- Painted the condensing water pumps;
- 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 EGF Walkthrough was conducted on January 4, 2022, by Kevin L. Jacobs, P.E. Ben Casteel with Metro Water Services joined Mr. Jacobs during the Walkthrough. Based on the review of the EGF, the following comments and observations are presented.

- 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 Fourth Quarter FY19 Walkthrough and have continued to worsen. CNE applied a new coating on the riser tubes to four of the cooling towers prior to the First Quarter FY22 Walkthrough but has not applied the coating to additional towers. **CNE reported that some additional work on the towers is anticipated in the Third Quarter FY22.**
- The louvers and portions of the fill at cooling towers 1, 6 and 15 appear to have been damaged. As noted in the First Quarter FY22 Walkthrough, no additional work appears to have been completed since this item was noted in the Third Quarter FY20 Walkthrough. The damaged portions need to be repaired or replaced. In addition, the sections of the louvers on towers 5 and 6 appear to have separated in several places. **CNE reported that they have requested a quote from their contractor to make these repairs.**
- The presence of algae on the cooling towers and cooling tower deck has grown from the previous Walkthrough. Algae was also noted beneath the water level in

nearly every basin. **CNE reported that they are working with their water treatment vendor to adjust the water treatment to address the algae.**

- As noted in the previous Walkthrough report, the insulation on the feedwater piping at the boiler 4 economizer appears to have been damaged. During the Third Quarter Walkthrough FY21, insulation on the condensate piping near the unit heaters for the boiler plant make-up air was missing. **CNE has not made the insulation repairs to date.**
- The water levels in the basins for CT 18 and 19 were noticeably higher than in the other operating cooling towers in the First Quarter FY22 Walkthrough. Water was also overflowing, through the internal overflow piping, in each of these cells. **This issue has been resolved by CNE. This item will be removed from future reports unless it is noted again.**
- As noted in the previous Walkthrough report, the weather stripping on the doors to the two MCC's located on the cooling tower deck has deteriorated or is missing. Trash, including a coke can, wiring and other debris from electrical work was located within the MCC's. The door hardware was also damaged or broken on several of the MCC doors. **CNE has replaced and repaired the door hardware, replaced all the damaged weather stripping, and removed all of the trash from within the MCC's. This item will be removed from future reports.**
- A contractor had the FD fan for boiler 1 disassembled and was working on the FD fan for boiler 2 during the Walkthrough. Therefore, the minimum capacity requirement from the ARMA could not be met. **The FD fans have been repaired and all four boilers were operational during this Walkthrough. This item will be removed from future reports.**
- 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 stated in the First Quarter FY21 that they intended to address the overall cleanliness of the EGF. **CNE has made some improvement from the level noted in the Third Quarter FY21 Walkthrough Report. CNE reported that they hired an extermination contractor that also helped remove cobwebs. CNE is continuing in their efforts to clean the EGF.**
- The concrete facade of the EGF has noticeable water stains and has blackened in some places. **This item was discussed with CNE during the Fourth Quarter Walkthrough, and they plan on pressure washing and cleaning the concrete portion of the building's façade when the weather warms.**
- Chemical feed lines were noted as leaking with visible salt build-up on some of the lines between the tanks labeled 12900 and 10600 and tanks 12001 and 34170. **CNE should clean these areas and repair the leaking joints.**
- The isolation valve on the steam line to the southern de-aerator was leaking. Steam valves on boilers 1 and 4 were also noted as leaking. A secondary steam line (possibly a pressure transmitter line that did not have a transmitter installed) was leaking at boiler 4. **CNE reported that they made the repairs to the leaking valve on the de-aerator on January 11. The remaining leaks need to be repaired.**

- Water was observed dripping from the flue gas recirculation (FGR) line for boiler 4 near the FD fan. The leak appeared to be coming from a weld in the duct. A water leak in the FGR line is unusual. CNE was informed of this leak during the Walkthrough. CNE indicated that they would address the leak on the FGR line but the presence of water in the FGR line may indicate a tube leak within the boiler. **CNE reported that they have hired a contractor to investigate, locate and repair these leaks.**
- Other action items previously noted to be addressed by CNE have been completed. (See also the "Quarterly EGF Walkthrough Report," dated January 14, 2022, 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. Second Quarter FY22 Open Projects

The following projects remained open at the end of the Second Quarter FY22.

1. 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. Metro 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 which has since been closed.

2. DES139 – DES Options Review

TEG, the Metro Liaison and Metro Water Services (MWS) discussed the Business and Marketing Plans proposed by TEG in FY21. The draft of these documents remain 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. No additional work was requested by Metro during the quarter.

3. 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 are failing, resulting in spots of corrosion on these

supports. The paint manufacturer reviewed the failing coatings. Their position was 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 was not willing to warrant the paint. To prevent progression of this corrosion, these areas 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.

CNE has contracted with Enecon, and this work is underway. It is anticipated that this work will be completed during the Third Quarter FY22.

4. DES154 – Manhole K Repairs

The structural steel in Manhole K is corroded and needs to be cleaned and painted to prevent additional corrosion. The base of the manhole walls also need to be sealed to reduce/prevent mud infiltration into the manhole.

TEG started the design for these repairs during the First Quarter FY19; however, due to higher priority projects, this work was postponed. Additionally, this manhole needs to be sealed to substantially reduce or prevent mud infiltration into this manhole and TEG wanted to gauge the results of sealing Manhole N2 before the work in Manhole K was undertaken. Manhole N2 was sealed and thus far the results are positive. Based on this, TEG requested that CNE get pricing from Enecon for sealing Manhole K. Enecon should also provide pricing for cleaning and coating this manhole's structural steel and entry ladder.

Pricing was received from Enecon, and it was reviewed and approved by TEG. A contract has been executed and it is anticipated that this work will be completed during the Third Quarter FY22.

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

This project addresses the installation of insulation in three (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.

Manhole S6 (DES-161) was completed during the Third Quarter FY22. Once TEG reviews this work, cost substantiation documentation will be presented.

It is anticipated that the work in Manholes N1 and N2 (DES-143) will be completed prior to the end of FY22.

6. DES163 – New Service to MDHA Parcel K (Peabody Union)

TEG, Metro, and the Peabody Union personnel continued to have conversations and negotiations for their twenty-seven story, mixed-use development. Part of the negotiations involve chilled water service to the site and modifications to the DES property at the north and south corners of the property to accommodate a new through road east of the DES property line. Progress of the negotiations were delayed over the holidays, but additional conversations are anticipated in the Third Quarter.

The Peabody Union development includes the construction of Guthrie St that will require the modification to the east retaining wall along the EGF property. The installation of this new road may affect the entrance and exit to the EGF site and result in the loss of DES property. Negotiations are ongoing.

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

This project was completed during the Second Quarter FY22, and cost substantiation documentation has been reviewed by TEG. This project is now in close-out.

8. DES174 – 7th Avenue Tunnel Pipe Support Repairs

This project was completed during the Second Quarter FY22, and cost substantiation documentation has been reviewed by TEG. This project is now in close-out.

9. 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 was bid and verbally awarded during the Fourth Quarter FY21. There is a dispute between CNE and DES regarding scope items that CNE is requesting additional compensation to perform this work, therefore this project is on hold until the matter is resolved.

10. 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 and the replacement of damaged/missing piping insulation.

The insulation was removed from the structural steel components during the Second Quarter FY22 so that TEG could better evaluate the extent of the corrosion. TEG is finalizing the scope and drawings for this work, and it is anticipated that this project will be executed during FY22.

11. DES179 – Manhole 11 Repairs

Manhole 11 has structural steel piping anchors and supports which are corroded and need to be cleaned and coated. This project addresses this need along with the repair of piping wall penetration end cans.

This project will be bid and awarded early in the Second Quarter FY22 and due to delivery delays, will not begin construction until February 2022. It is anticipated that the construction will be completed during the Third Quarter FY22.

12. 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. The primary cause of this corrosion is water infiltration into the tunnel, and it would be prudent for the State to make repairs to the tunnel structure to address the water infiltration before the steel piping supports are cleaned and coated. TEG has spoken with the State and transmitted photos outlining the existing conditions and damage. TEG is waiting to hear back from the State on this matter.

TEG has initiated a scope outline. The project's initiation and completion will be dictated by the State's schedule to address the tunnel's structural deficiencies.

13. DES184 - 7th Avenue North Steam Leak Repair

This project was completed during the Fourth Quarter FY21 and is still awaiting cost documentation on the final paving. It is anticipated that this project will be closed out during the Third Quarter FY22.

14. DES185 – 5th Avenue North Exploratory Excavation

This project is complete and CNE is awaiting final cost substantiation documentation. It is anticipated that this project will be closed out during the Third Quarter FY22.

15. DES187 – Exploratory Excavation at Manhole 22B

Water has been leaking for several months into Manhole 22B (located on 7th Avenue North beside the Metro Public Library) through the steam piping casing that serves the Metro Public Library. Therefore, there is a breach in the steam casing outside the manhole.

CNE began an exploratory excavation east of Manhole 22B during the Fourth Quarter FY21 to locate the damage to the casing and make repairs. Extensive damage to the steam piping casing was discovered and some damage to the condensate return pipe casing. Sections of new pre-insulated piping were ordered and installed during the Second Quarter FY22. Some additional insulation repairs will be conducted during the Third Quarter FY22. It is anticipated that this work will be completed during the Third Quarter FY22.

16. DES188 - 4th and Church Building Access Tunnel Repair

Chilled water, steam and condensate return service piping to the 4th and Church Building and the 5/3 Financial Center originates in the 4th Ave Tunnel, comes up a vertical shaft and then turns horizontal through an access tunnel into the underground parking garage of the 4th & Church Building. This access tunnel was constructed out of individual galvanized metal liner plates bolted together. Steel piping supports were then added inside this tunnel and these supports were welded to the steel liner plates. The pipe supports and liner plates are corroded and need to be repaired or replaced. This project addresses these needs.

This project was bid and awarded early in the Second Quarter FY22. It is anticipated that the work will be completed during the Third Quarter FY22.

17. DES189 – Manhole 4 Structural Steel and Insulation Repair

The structural steel piping supports in Manhole 4 are corroded and need to be cleaned and coated to mitigate further degradation. Some of the existing pipe insulation also needs repair or replacement. CNE replaced the steam and condensate return piping insulation during the First Quarter FY22 under Amendment 2 of its contract with Metro and is in the process of obtaining quotes for the insulation blanket replacements. TEG will direct CNE to get a quotation from Enecon to have the structural steel cleaned and coated.

It is anticipated that this work will take place during the Second or Third Quarter FY22.

18. DES191 – Manhole 20 Repairs

Manhole 20 houses steam, condensate return and chilled water service piping for Hume Fogg High School, and it sits on top of a vertical shaft that connects to the 7th Ave Tunnel. The pipe supports within the manhole are badly corroded, the existing entry ladder consists of individual embedded rungs which are prone to failure with little warning, a caisson that prevents groundwater from flowing down the vertical shaft is badly corroded, and the condensate return piping is leaking. This project addresses these issues. TEG has provided CNE with bid drawings for this work, however, because the work is civil intensive, TEG has directed CNE to wait until they have 3 civil contractors as approved vendors before bidding this work. CNE is awaiting the approval of the third vendor by Constellation's home office.

19. DES192 - Peabody Street Development

With new potential customer developments along Peabody Street, including the conversations for potential service to 133 KVB, a survey of the area from the west side of the EGF and along Peabody to 4th Avenue South was commissioned during the quarter. This survey will provide the necessary detail for developing a preliminary routing of new services along Peabody to potentially serve the new developments in that area

20. DES193 – Manhole 13 Repairs

There is a badly corroded condensate pipe support in Manhole 13 that needs replacement. In addition, there is a flanged condensate pipe connection in this manhole which leaks. The leaking flange connection has been addressed by CNE in the past but re-occurs after the replacement of the gasket and re-tightening, therefore the piping is not properly aligned and needs to be addressed.

TEG has completed construction documents for this work and conveyed them to CNE. Because the flange work will require a partial isolation of the condensate return system, this work will not proceed until the spring or summer of 2022.

21. DES194 – Manhole B4 Repairs

The structural steel pipe supports within Manhole B4 are corroded and require cleaning and coating. In addition, most of the insulation within Manhole B4 needs replacement and the entry ladder needs to be extended. This project addresses these needs.

TEG is in the process of developing construction documents for this work. It is anticipated that these drawings will be completed during the Third Quarter FY22 and that contracts for the wok will be executed late in the Third Quarter or early Fourth Quarter FY22.

B. Second Quarter FY22 Closed Projects

DES172, DES174, DES182 and DES186 were closed during the Second Quarter FY22.

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 efforts 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	FY22 Spending to Date	Total Spent to Date	Remaining Balance
Fund-49116						
	DES133.1	NCC Blasting Issue	$ 200,000	$ 9,411	$ 148,586	$ 51,414
	DES139	Options Review	$ 450,000	$ 2,639	$ 318,440	$ 131,560
	DES143	MH N1, N2 and S6 Insulation	$ 30,000	$ 2,783	$ 6,195	$ 23,805
	DES152	MH A & M Repairs	$ 28,000	$ 938	$ 9,753	$ 18,247
	DES153	MH L Repairs	$ 169,475	$ 129,614	$ 165,709	$ 3,766
	DES154	MH K Repairs	$ 75,085	$ 1,214	$ 1,888	$ 73,197
	DES161	MH S6 Insulation	$ 6,500	$ 1,865	$ 1,865	$ 4,635
	DES162	3rd and Molloy Service	$ 150,000	$ -	$ 143,602	$ 6,398
	DES163	Parcel K Service	$ 1,018,802	$ 9,868	$ 21,342	$ 997,460
	DES171	Broadway Tunnel Support Repair	$ 268,907	$ 7,436	$ 119,367	$ 149,540
	DES172	Viridian Pipe Support Repair	$ 256,250	$ 68,125	$ 250,641	$ 5,609
	DES173	MH-B3 Structural Repair	$ 50,000	$ -	$ 45,751	$ 4,249
	DES174	7th Ave Pipe Support Repairs	$ 180,000	$ 118,832	$ 178,565	$ 1,435
	DES175	MH4 Condensate Repair	$ 118,090	$ -	$ 19,661	$ 98,429
	DES176	Condensate Leak at MH9	$ 175,000	$ -	$ 126,039	$ 48,961
	DES177	MHB1 Ladder & Platform	$ 45,500	$ 1,181	$ 6,833	$ 38,667
	DES178	MH-5 Repairs	$ 97,500	$ 749	$ 4,551	$ 92,949
	DES179	MH-11 Repairs	$ 58,500	$ 3,971	$ 8,336	$ 50,164
	DES180	State Tunnel Support Repairs	$ 140,000	$ 1,412	$ 3,284	$ 136,716
	DES181	3rd Ave Leak Repair	$ 140,000	$ -	$ 3,079	$ 136,921
	DES182	MH-B10 Exp Joint Replacement	$ 145,000	$ 31,770	$ 132,821	$ 12,179
	DES183	Hermitage Hotel Service Relocation	$ 60,000	$ -	$ 1,032	$ 58,968
	DES184	7th Ave STM Leak	$ 125,000	$ 1	$ 122,550	$ 2,450
	DES185	MH10 Water Leak	$ 285,000	$ 258,954	$ 282,755	$ 2,245
	DES186	Printers Alley Exploratory Excavation	$ 110,000	$ 90,552	$ 95,901	$ 14,099
	DES187	Exploratory Excavation/Steam Repair MH22B	$ 153,750	$ 14,971	$ 16,594	$ 137,156
	DES188	4th and Church Access Tunnel Repairs	$ 125,000	$ 12,227	$ 19,136	$ 105,864
	DES189	MH4 Structural Steel and Insulation Repairs	$ 56,750	$ 335	$ 1,462	$ 55,288
	DES190	MH Sparge Tube Repairs	$ 20,000	$ 12,661	$ 14,661	$ 5,339
	DES191	MH 20 Repairs	$ 94,875	$ 22,731	$ 22,731	$ 72,144
	DES192	Peabody Developments	$ 40,000	$ 4,202	$ 4,202	$ 35,798
	DES193	MH-13 Repairs	$ 30,000	$ 3,929	$ 3,929	$ 26,071
	DES194	MH-B4 Repairs	$ 80,000	$ 6,192	$ 6,192	$ 73,808
		Total Closed Projects	$ 1,335,927	$ -	$1,335,927	$ -
		Metro Project Admin	$ -	$ -	$ -	$ -
		Project Man, Development, etc	$19,681,090	$ -	$ -	$19,681,090
		Fund Total	**$26,000,000**	**$ 818,561**	**$3,643,381**	**$22,356,619**

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

Several EDS repairs and improvements were made during the Second Quarter. The principal 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 account to date is $189,716. Table 6 provides a summary of the FY22 expenditures and revenues to date associated with the R&I budget.

Table 6. FY22 Repair and Improvement Expenditure and Revenue Summary

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Net Market Adjustment	Market Value	Balance
Value at end of FY21				**$ 383,359.85**		**$ 20.97**	**$ 47,950.15**	**$ 47,950.15**
CNE July 2021 R&I	12/3/2021		CNE	$ 1,792.37				
CNE Aug 2021 R&I	10/21/2021		CNE	$ 15,254.82				
CNE Sept 2021 R&I	10/20/2021		CNE	$ 6,618.84				
Sub-Total First Quarter				**$ 23,666.03**	**$ 73,700.01**	**$ -**	**$ 50,033.98**	**$ 97,984.13**
CNE Oct 2021 R&I	11/17/21		CNE	$ 2,770.38				
CNE Nov 2021 R&I	12/15/21		CNE	$ 2,212.34				
CNE Dec 2021 R&I	01/19/22		CNE	$ 1,552.50				
Sub-Total Second Quarter				**$ 6,535.22**	**$ 73,700.01**	**$ -**	**$ 67,164.79**	**$ 165,148.92**
Sub-Total Third Quarter				**$ -**	**$ 24,566.67**	**$ -**	**$ 24,566.67**	**$ 189,715.59**
Sub-Total Fourth Quarter				**$ -**	**$ -**	**$ -**	**$ -**	**$ 189,715.59**
FY22 Year to Date				**$ 30,201.25**	**$ 171,966.69**	**$ -**	**$ 189,715.59**	**$ 189,715.59**

B. Preventive Maintenance

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

1. EDS Manhole/Tunnel Inspections
   a. The monthly vault/tunnel reviews were conducted as scheduled.
   b. Several of the vaults continue to require pumping due to the accumulation of either groundwater or surface run-off.
   c. CNE continues to replace trap assemblies within the EDS as needed.
   d. CNE should continue to clean areas of minor corrosion and then paint those areas with a cold galvanizing paint. If maintained, this should help reduce/slow down the progression of some areas of corrosion.
2. Customer metering station calibration checks were completed as scheduled.
3. Water chemistry samples at customer buildings were taken as scheduled.
4. Other EDS items are included in the CNE monthly reports.

C. Emergencies

There were no emergencies reported during the quarter.

D. EDS Walkthrough

This quarter's walkthrough was conducted on December 3 and 6, 2021. The manholes that were visited include Manholes B1, B2, B3, B4, B6, B7, B8, B9, B10, 14A, 16A, 22B, Viridian, S4A, and U. The following comments and observations are a result of these visits:

1. Manhole B1
   a. This is a sump pump manhole located in 1st Avenue South to the west of Manhole B. It was constructed to reduce/control 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 siderail type ladder. The replacement of this ladder is addressed in DES-177.
   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. The addition of a platform is addressed in DES-177.

2. Manhole B2
   a. There was water in this manhole, and it required pumping before entry.
   b. This manhole has an electric sump pump. However, the sump is not deep enough to enable the removal of all water before the level control stops the pump. As a result, there is always a small amount of water in the floor of this manhole. TEG investigated deepening this sump to eliminate this problem, but a well point needs to be installed to prevent the groundwater from flooding the manhole while the work takes place. The addition of a well point would add substantially to the construction cost, so this idea was abandoned.
   c. An extension needs to be added to the access ladder to raise the position of the first rung relative to grade. TEG is in the process of compiling a work scope for the nearby Manhole B4. The extension of this ladder will be included in that scope.
   d. The piping support steel in this manhole was cleaned and coated with Enecon products to help prevent corrosion. The coating has some minor flaking on the ends of some bolts. Since the ladder extension mentioned in item b. above will require the application of a coating, TEG will notify the coating representative of this need and have it addressed during the ladder work.
   e. CNE should continue to monitor the structural steel coatings and report any degradation to TEG.
   f. CNE should continue to monitor the concrete surfaces and the concrete patching and report any degradation to TEG.
   g. The western steam penetration pre-insulated piping end can was badly corroded and allowing groundwater to enter the manhole. This penetration was repaired using Enecon products to rebuild the end can and then form a "donut" around the penetration with an Enecon hydraulic cement material. There is some minor distress to this cement material. TEG will have the Enecon representative address this when the coating of the ladder extension is executed. CNE should continue to monitor this penetration and report any degradation to TEG.

h. The insulation was removed from the steam isolation valve next to the western steam wall penetration which was repaired. CNE should have this insulation and jacketing re-installed within the next quarter.
i. The insulation jacketing on the northern lower CHW 90 ell needs to be repaired. CNE should have this insulation jacketing repaired within the next quarter.
j. The trap piping was recently re-routed to avoid being in the path of maintenance personnel. The new and disturbed piping has not yet been re-insulated which includes portions of the sparge tube. CNE should re-insulate this piping within the next quarter.
k. The sump pump discharge piping appears to be clogged, or, possibly when the new 222 Molloy St. building was constructed, this piping was crushed or dis-connected. The discharge piping includes fittings/valves to enable the insertion of a cleaning auger/snake, cleaning pig or camera. CNE should hire a contractor to try and determine the cause of the blockage and, if it is a blockage, try and clear it. If it is determined that the piping is damaged/crushed, CNE should try to determine the location of this damage relative to Manhole B2 in order to enable a more expedient/cost-effective repair.
l. There are electrical enclosures in the manhole for the sump pump; these enclosures are experiencing some corrosion. CNE should monitor these enclosures and plan on replacing them with non-corrosive enclosures (such as stainless steel) within the next two years.
m. Unistrut supports are used for the electrical conduit and sump pump discharge piping; these supports are experiencing corrosion. CNE should plan on replacing these supports with non-corrosive supports (such as stainless steel) within the next two years.
n. CNE should monitor the electrical conduits and repair/replace them as needed.

3. Manhole B3
   a. There was some water present in the manhole, and it required pumping prior to entry.
   b. The structural steel has recently been cleaned and coated through DES-173; CNE should monitor the structural steel coatings and report any degradation to TEG.
   c. Some of the concrete surfaces was patched and repaired in DES-173; CNE should monitor the concrete surfaces and the concrete patching and report any degradation to TEG.
   d. The trap piping was recently re-routed to avoid being in the path of maintenance personnel. The new and disturbed piping has not yet been re-insulated which includes portions of the steam dripleg. CNE should re-insulate this piping within the next quarter.
   e. The CHW piping drain valves are sweating and causing ponding water in the manhole floor. These drain valves should be insulated within the next quarter.

f. There is debris in the manhole floor which CNE should clean during the next review.

4. Manhole B4
   a. There was water present in this manhole, and it required pumping prior to entry.
   b. There is some corrosion of the structural components in this manhole. CNE personnel has cleaned and applied cold galvanizing paint to some components in this manhole, however, to prevent the further degradation of these structural components, they need to be professionally cleaned and coated. DES-194 addresses this need.
   c. Most of the insulation in this manhole needs to be repaired/replaced; DES-194 addresses these needed repairs/replacements.
   d. There are several hairline cracks in the ceiling of this vault; DES-194 addresses the patching of these cracks.
   e. Some of the foam sealant used at the piping wall penetrations has shrunk and "pulled away" from the penetration holes. Currently, no groundwater is leaking through any of these penetrations. TEG will investigate the repair of these seals and include instructions in DES-194 construction documents.
   f. There is debris in the manhole floor which CNE should remove during their next review.

5. Manhole B6
   a. There was water present in this manhole, and it required pumping prior to entry.
   b. The entry ladder is badly corroded at the base; this ladder requires replacement. CNE is required to replace 2 ladders per fiscal year under Amendment 2 of their contract with Metro; CNE should advise TEG if this is one of the two ladders that they would like to include in their FY22 obligations.
   c. There are some insulation repairs/replacements needed in this manhole. This includes:
      (1) The trap piping should be insulated up to the trap (excluding the trap); some of this insulation is absent due to recent piping repairs/replacements and needs to be added within the next 6 months;
      (2) A main steam valve is un-insulated due to the recent trap piping repairs/replacement; this valve needs to be re-insulated within the next 6 months;
      (3) Both the condensate return slip-type expansion joint and the steam slip-type expansion joint insulation blankets need to be replaced. TEG obtained the specific blanket ID numbers and will contact the blanket manufacturer to see if new blankets can be ordered that CNE can then install.

d. The grout behind the anchor beam baseplates has cracked and needs to be repaired. When making this repair, if the system is active, only half of the grout behind each end plate should be removed/replaced at a time. The new grout should be allowed to cure before the remaining half of the grout is removed/replaced. CNE should have these repairs done within the next 6 months.
e. There is some corrosion on the steel components within this manhole; these areas should be cleaned and painted with cold galvanizing paint during CNE's next manhole:
   (1) The slip joint attachments to the anchor beam;
   (2) The end can retaining plates at the north wall;
f. There is some hairline cracking of the concrete. CNE should monitor this cracking and notify TEG of any significant changes.

6. Manhole B7
   a. Portions of the grout behind the anchor beam wall plates has cracked and fallen out; this grout needs to be replaced. When making this repair, if the system is active, only half of the grout behind each end plate should be removed/replaced at a time. The new grout should be allowed to cure before the remaining half of the grout is removed/replaced. CNE should have these repairs done within the next 6 months.
   b. There was some corrosion on the anchor beam support in this manhole. The areas at the slip joint connections were cleaned and painted by CNE personnel during this review. The end plate areas and the stiffeners underneath the beam need to be cleaned and painted during the next review. CNE should continue to clean/paint the structural steel as needed.

7. Manhole B8
   a. There are some hairline cracks in the ceiling; these should be monitored by CNE, and any significant changes reported to TEG.
   b. Some deterioration of the grout behind the anchor beam baseplates has occurred and some portions of the grout is missing. All of this grout needs to be repaired/replaced. When making this repair, if the system is active, only half of the grout behind each end plate should be removed/replaced at a time. The new grout should be allowed to cure before the remaining half of the grout is removed/replaced. CNE should have these repairs done within the next 6 months.
   c. There is some corrosion on the steel components within this manhole; these areas should be cleaned and painted with cold galvanizing paint during CNE's next manhole review:
      (1) The slip joint attachments to the anchor beam – cleaned and painted by CNE personnel during the review;
      (2) The end can retaining plates at the east wall;
   d. The eastern condensate end can vent valve has corroded and the vent piping has failed. This vent piping and valve needs to be replaced. This will require

the removal of the remaining piece of vent piping attached to the end can and the subsequent installation of a new vent pipe and valve. This should be replaced as soon as possible to prevent the possible infiltration of water into the pre-insulated piping casing due to accumulation of surface and groundwater within the manhole.

e. Both the condensate return slip-type expansion joint and the steam slip-type expansion joint insulation blankets need to be replaced. TEG obtained the specific blanket ID numbers and will contact the blanket manufacturer to see if new blankets can be ordered that CNE can then install.
f. Some of the insulation jacketing caulking needs to be replaced. CNE should do this during their next manhole review.

8. Manhole B9
   a. There was a little water in this manhole, but it did not require pumping prior to entry.
   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. There is some corrosion on portions of the anchor beam support in this manhole. These areas were cleaned and painted by CNE personnel during this review.
   d. There was some corrosion at the base of the entry ladder. CNE cleaned and painted these areas during this review.
   e. Some of the insulation jacketing needs to be re-caulked. CNE should do this during their next review of this manhole.

9. Manhole B10
   a. There was water in this manhole, and it required pumping prior to entry.
   b. CNE has cleaned and painted areas of corrosion on the structural steel. CNE should continue to monitor the steel and clean/paint it as needed.
   c. 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 a fair amount of mud in this manhole. CNE should schedule a vac truck (coincident with other manholes) to clean this manhole out within the next 6 months.
    c. The northern blind flange needs to be re-insulated along with the two vent valves. CNE should have this done within the next 6 months.

11. Manhole 14A
    a. There was water present in this manhole, and it required pumping before entry.

b. This manhole is no longer in service. It is located on Charlotte Ave between 3rd and 4th Avenue. It is reviewed annually to make sure that the structure is sound. The main manhole houses abandoned steam and condensate return piping. There are two smaller manholes west of the main manhole which house abandoned chilled water supply and return piping isolation valves.
c. There is a large amount of mud in the floor of the main manhole. CNE should schedule a vac truck (coincident with other manholes) to clean this manhole out within the next 6 months.
d. The ceiling is beginning to flake where rebar chair feet are close to the surface. CNE should monitor these areas and report any significant changes to TEG.

12. Manhole 16A
    a. There was some dirt/debris left from DES-172; CNE personnel cleaned the manhole floor during the review.
    b. No deficiencies to report.

13. Manhole 22B
    a. The steam and condensate return service lines to the Public Library which originate in this manhole were recently replaced because of breaches in the piping outer casings.
    b. Water is infiltrating into the manhole around the chilled water wall penetrations (primarily) and around the newly installed steam and condensate return wall penetrations. TEG has contacted the Water Dept to question if there is a city water leak in this area; the Water Dept. is going to send a leak detection crew to investigate. CNE should direct the DES-187 contractor to tighten the newly installed linkseals to remedy this problem. CNE should also tighten the CHW linkseals to prevent water infiltration. Report the results of this to TEG.
    c. There is a lot of debris/trash left from the DES-187 work. CNE needs to ensure that the contractor cleans this manhole.
    d. The chilled water piping insulation needs to be replaced; this will be done as part of DES-187.
    e. CNE should monitor/clean/paint the newly installed CHW piping support steel as needed.

14. Manhole S4A
    a. There was a little water present in this manhole, but it did not require pumping before entry.
    b. There are hairline cracks in the walls of this manhole. CNE should monitor these cracks and report any significant changes to TEG.
    c. There is some minor spalling of the concrete walls in this manhole. CNE should monitor this spalling and notify TEG of any significant changes.

15. Manhole U
    a. There was water present in this manhole, and it required pumping prior to entry.
    b. CNE recently installed a new ladder in this manhole in accordance with Amendment 2 of their contract with Metro. CNE should monitor this ladder and clean/paint it as needed to mitigate corrosion.
    c. Because of groundwater infiltration into this manhole, secondary steam results and the roadway area above this manhole remains hot. In the past, this heat has caused settlement and some depression of the asphalt above the manhole and could 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 condensate return piping that passes through this manhole began leaking several years ago and a repair clamp was installed. This repair clamp was not leaking during this review. CNE should continue to monitor this clamp and report any leaks/changes to TEG.
    e. A steel plate was installed against the exterior lower southern wall of this manhole several years ago to prevent dirt/fill from flowing into the manhole. This plate has begun to delaminate. CNE should monitor this and report any significant changes to TEG.

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 expeditious and professional manner.

A. Marketing

Although the original design and development team for the two proposed hotels at 1st Ave S and KVB have been replaced by a new development team, TEG continued discussions with the design and ownership team for potential steam and chilled water service from DES to the 133 KVB site. Conversations are anticipated through the Third Quarter.

TEG has continued its negotiations with the development team for Lot K (Peabody Union). Additional conversations and negotiations are anticipated in the Third Quarter FY22 as service to the site appears favorable. This project is tracked under DES163.

Metro Water Services (MWS) participates on the East Bank Technical Advisory Committee, which consists of more than two dozen representatives of interested utilities, regulatory bodies, planning agencies, property owners, and design professionals. DES is represented by the Metro Liaison who also represents the interests of MWS infrastructure. The Metro Liaison has been actively promoting the use of district energy in the East Bank planning process by identifying synergies with other utility, transportation, and public recreation agencies.

MWS and DES have made initial inquiries into the developing plans for the Oracle campus, but those plans have not been widely publicized. DES continues to explore options for serving the Oracle campus in a sustainable way.

TEG remained in contact with the potential customer at 333 Union St. The development of this small boutique hotel is currently on hold.

TEG has made efforts to contact the parties involved with a new development south of Peabody St in the Rolling Mill Hill area. This potential development could be served from new service lines along Peabody St (DES192).

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, there has been no additional communications in some time. This potential customer may be removed from this list in future reports if further discussions do not occur.

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.
- CNE isolated steam to the TSU building and replaced a steam trap assembly. CNE notified building personnel that they had a leak in their condensate system.
- CNE CSR scheduled some local service interruptions for distribution maintenance work could be performed.
- CNE assisted the Hyatt Place Hotel with a steam leak.

- CNE met with personnel from the Hermitage Hotel regarding a condensate leak at the building.
- An electrical outage at the Andrew Jackson disrupted the control valve at the State steam loop. CNE responded to the issue once electricity was restored and restored the steam service.
- The Renaissance Hotel building engineer contacted CNE's CSR to ask why the steam pressure at the building was low. The cause of the low pressure was due to the boiler safety relief valve testing on November 22.
- CNE's CSR discussed the low Delta with the Fifth Third's building engineer.
- Other minor issues and customer interactions are noted in the monthly reports from CNE.

VII. Recommendations

CNE is obligated to meet the standard of good utility practice and performance guarantees as outlined by the ARMA. Based upon the operating data, CNE continues to fail to meet several of the performance guarantees. CNE is developing a plan to improve the system performance which should be implemented in the coming quarters. In TEG's opinion, CNE needs to continue to improve the operations of the EGF to comply with the ARMA. CNE has improved its EDS maintenance over the last several quarters and there are fewer items which have been repeated in TEG's quarterly reviews. CNE needs to expeditiously address any long-outstanding items.

Based on the review of the Second Quarter FY22 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.
- CNE needs to increase their preventative maintenance program to decrease the number of equipment malfunctions and trips within the EGF or otherwise improve the operation of the system to prevent such frequent occurrences in the future.
- 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 (B)(4) of the ARMA. CNE has operated the EGF for eighteen consecutive months with at least one performance guarantee excursion each month.
- CNE needs to continue their efforts to improve the overall cleanliness and orderliness of the EGF.
- Corroded structural steel within the vaults and tunnels should be cleaned and coated and/or repaired/replaced.
- CNE should continue to clean and paint the minor instances of corrosion in the vaults and tunnels to mitigate the progression of corrosion.
- Insulation that is absent or in disrepair in the vaults and tunnels should be repaired/replaced through Amendment 2 of CNE's contract or through capital and R&I projects.

- Steam traps which need repair or replacement should be addressed immediately.
- Expansion joint leaks should be repaired by either re-packing the joint or injection of a sealant once the leak(s) is sufficient for the repair to be effective.
- CNE should continue to remove debris and mud from manholes.