



## **Operations Monitoring Report**

**Third Quarter FY22**

**Prepared by:**

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**April 29, 2022**

## **I. Executive Summary**

A review of the fiscal year 2022 (FY22) Third Quarter performance and contract obligations between Constellation Energy Solutions, LLC. (CES) 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, CES 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 CES and Section 18 of the ARMA. TEG continues to monitor CES's operations.

Metro asked CES during the First Quarter FY22 for a plan to bring the operation of the EGF (Energy Generating Facility) into compliance with the new performance guarantees. CES provided a draft report from their engineer during the Second Quarter. A virtual meeting was held between Metro, CES and their engineer during the quarter to discuss the report. The recommendations made by CES are currently being evaluated by their engineer and will be presented to Metro once the evaluation is completed. The completion date is expected in the Fourth Quarter FY22.

Constellation NewEnergy (CNE) changed their name during the quarter to Constellation Energy Solutions, LLC. (CES) and separated from their parent company Exelon.

For the Third Quarter FY22, the chilled water sales increased 14.7% over the previous Third Quarter (FY21). The chilled water sendout also increased 10.5% over the previous Third Quarter. The system losses decreased approximately 38%. The number of cooling degree days increased 225%. The peak chilled water demand for the current quarter was 9,802 tons, which is 2.3% higher than the previous Third Quarter.

Steam sendout for the current quarter increased by only 0.9% over the previous Third Quarter with steam sales increasing 2.4%. This increase came with a 4.1% increase in heating degree days. Total steam system losses decreased 14.3% from the previous Third Quarter. The peak steam demand for the current quarter was 149,750 pounds per hour, which represents an increase in the Third Quarter demand by approximately 8.4%.

With the implementation of the new System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels beginning in July 2020, CES has failed to consistently meet all of the performance guarantees. CES failed to meet the chilled water plant electric consumption per unit of sales in December 2021 but have otherwise met this metric. CES 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. CES has met the chilled water-water guarantees for each month during the Third Quarter and after a chilled water leak was repaired in the EDS in January.

The steam-water conversion exceeded the performance guarantee for eight out of the nine months of the fiscal year. The issues related to a faulty meter that was repaired in September do not account for the subsequent excursions. The steam fuel guarantee was exceeded eight out of the nine months of the fiscal year but the difference between the actual and guaranteed values were close for those eight months. The steam electric conversion guarantee was exceeded only in July with no subsequent excursions noted. TEG is continuing to monitor CES's efforts in improving the system's performance.

Work continued with the DES Capital and Repair & Improvement Projects during the Third Quarter. Repair and Improvements to the EDS continue as scheduled. DES133.1, DES139, DES143, DES154, DES163, DES177, DES178, DES179, DES180, DES184, DES187, DES188, DES 189, DES191, 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 DES195, DES196, DES197, DES198, DES199 and DES200 have been added. Projects DES152, DES161 and DES185 are closed/in close-out.

The current fiscal year system operating costs to date are \$14,565,336. This value represents approximately 74.0% of the total budgeted operating cost for FY22. The customer revenues from the sales of steam and chilled water for FY22 are \$13,618,705 (71.5% 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 \$473,025 (75% 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

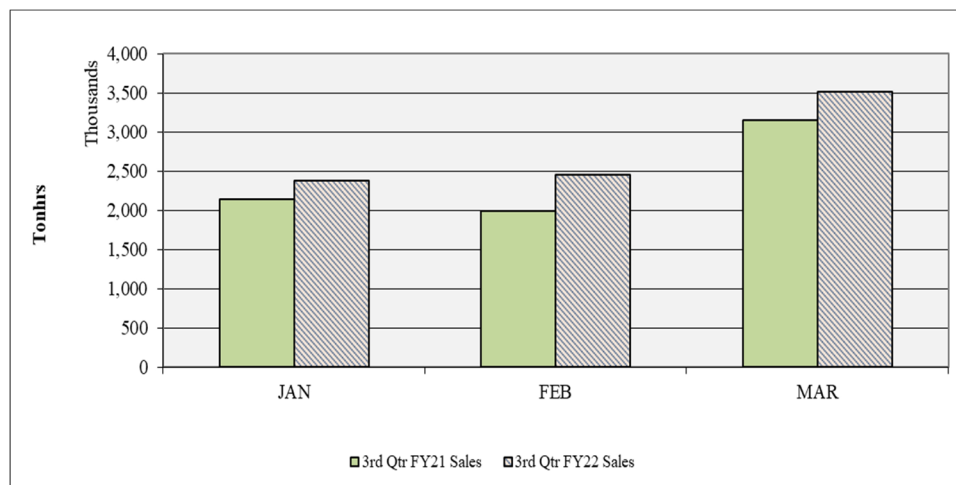
### A. Chilled Water

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

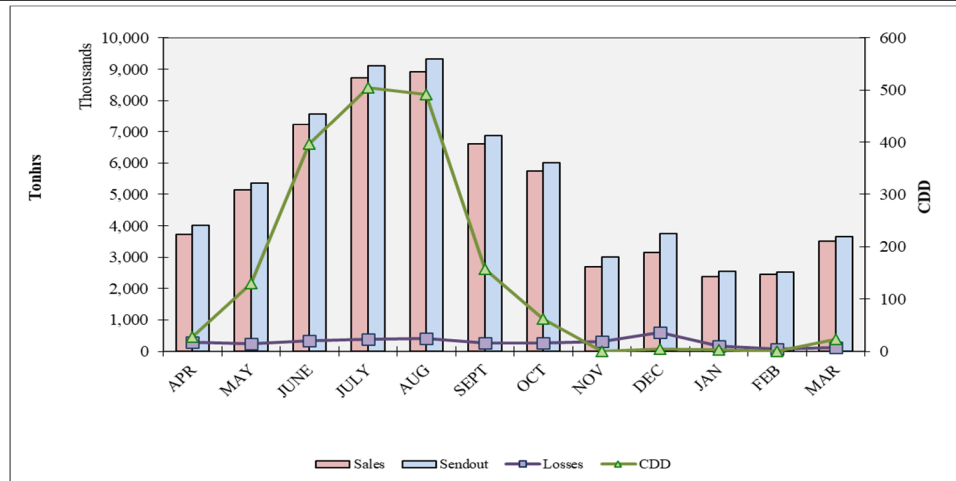
A comparison for the Third Quarter chilled water sales is shown in Figure 1. This data reflects a 14.7% increase in sales for the current quarter over the same quarter of the previous fiscal year.



**Figure 1. Chilled Water Sales Comparison**

The peak chilled water demand for the current quarter was 9,802 tons, which represents a 2.3% increase over the previous Third Quarter. The number of cooling degree days were 225% higher in FY22 than in FY21.

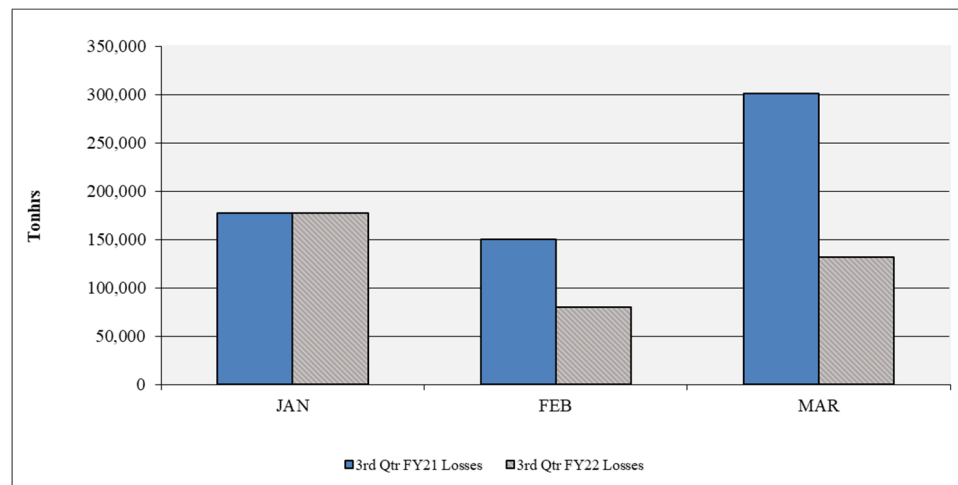
Figure 2 shows the chilled water sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in tonhrs per month between the recorded sendout and sales values and represent the total energy loss for chilled water in the EDS. The number of cooling 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 Third Quarter is shown in Figure 3. These losses are the difference in chilled water sendout and sales.

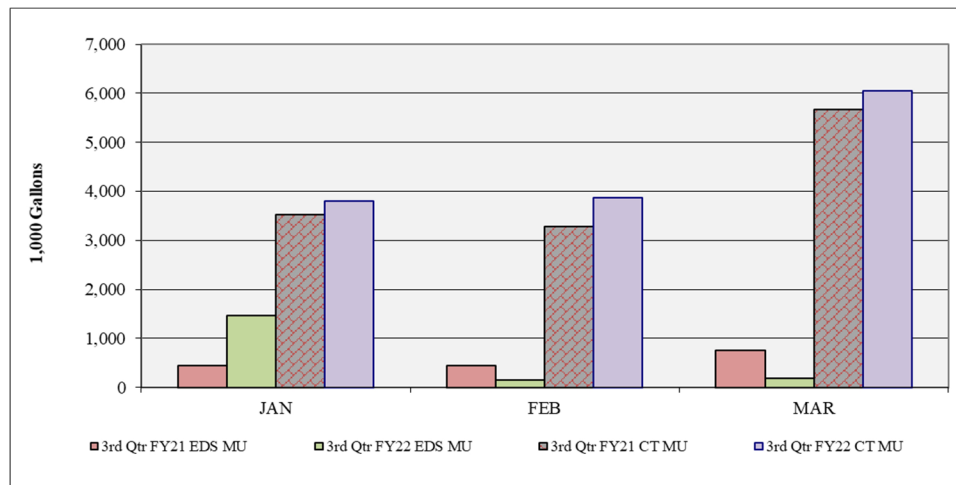


**Figure 3. Chilled Water System Loss Comparison**

The EDS make-up increased by 10.2% over the previous Third Quarter. However, a leak was found and repaired in January on 3<sup>rd</sup> Ave North near where a repair had previously been made. The make-up dropped dramatically after the repairs were made and have remained relatively constant since that time, although there were occasional increases in make-up due to repairs made by customers at their buildings. The average daily make-up for February and March were 5,714 and 5,871 gallons per day, respectively. These values compare to 15,929 and 24,452 gallons per day, respectively, for February and March 2021.

Another leak is still suspected on 5<sup>th</sup> Ave N, but previous efforts to locate the actual source of the leak have been unsuccessful. CES 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.

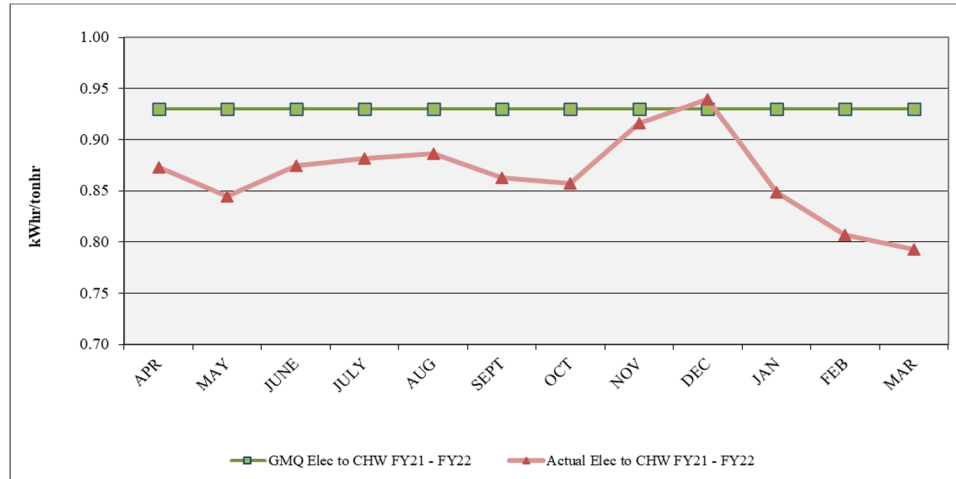
The make-up to the cooling towers increased 9.8% over the previous Third Quarter. The water usage in the cooling towers is typically proportional to the consumption of chilled water and should vary with chilled water sales. The number of cycles of concentration in the condensing water circuit decreased 7.2%; 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 8.6% over the Third Quarter FY21. The overall city water make-up comparison for the chilled water system Third Quarter is shown in Figure 4.



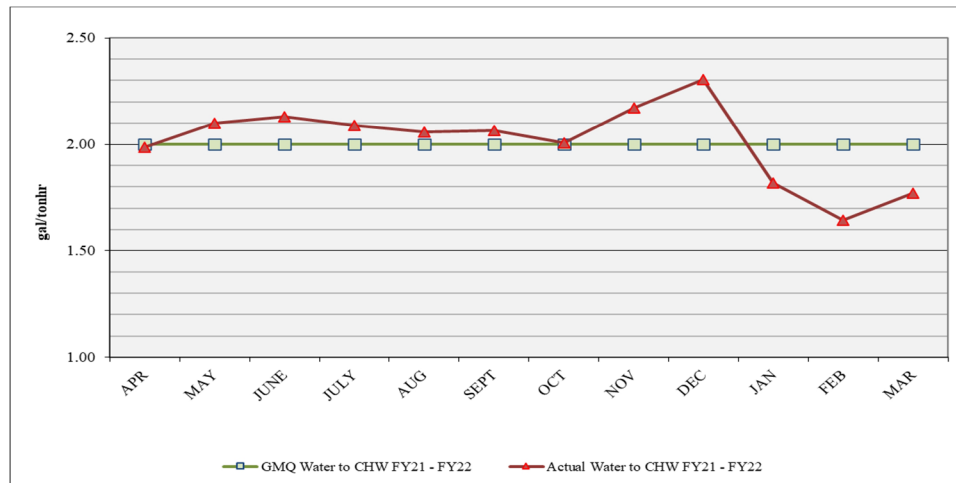
**Figure 4. Chilled Water System City Water Usage Comparison**

### 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 until after the leak was repaired in the EDS in January 2021. CES 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. The electric usage per unit of sales decreased 9.8% over the previous Third Quarter – a marked improvement over 2021.

CES has worked to address some operational issues within the plant in an additional effort to improve efficiency. CES 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 8.6% due largely to the increase in chilled water sales. The water conversion factor for the chiller plant decreased by approximately 9.5%

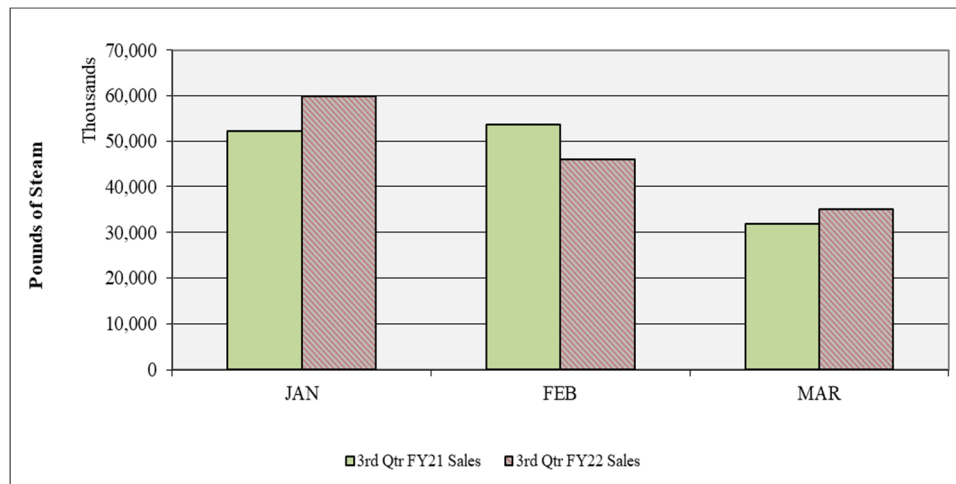


(on average) over the Third Quarter FY21. The cooling tower blowdown increased 16.6% over the previous Third Quarter.

**B. Steam**

**1. Sales and Sendout**

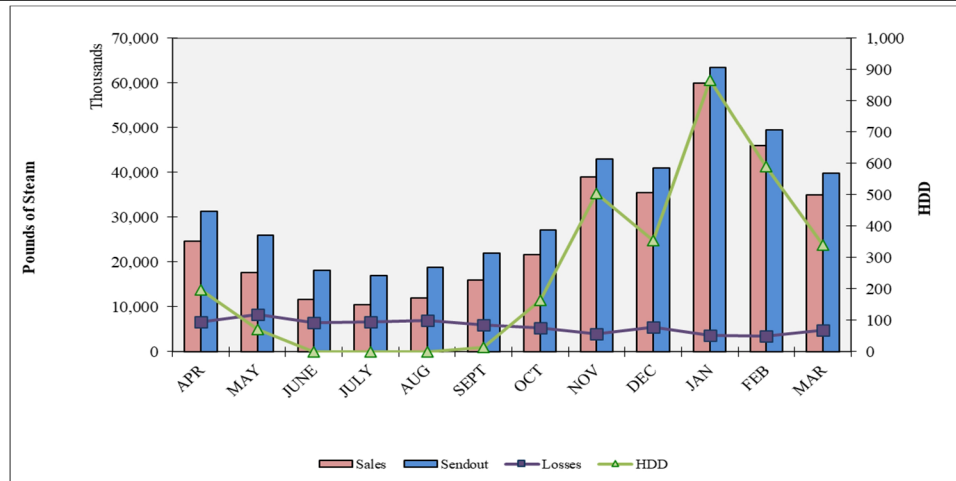
The steam sendout increased by approximately 0.9% over the previous Third Quarter (FY21), and the sales increased by approximately 2.4%. The Quarter experienced a 4.1% increase in the number of heating degree days. The steam system losses decreased 14.3%, and the relative amount of condensate return decreased 1.9%. A comparison for the Third Quarter steam sales is shown in Figure 7.



**Figure 7. Steam Sales Comparison**

The peak steam demand for the current quarter was 149,750 pph, which reflects an approximate 8.4% increase in the peak steam production over the previous Third Quarter.

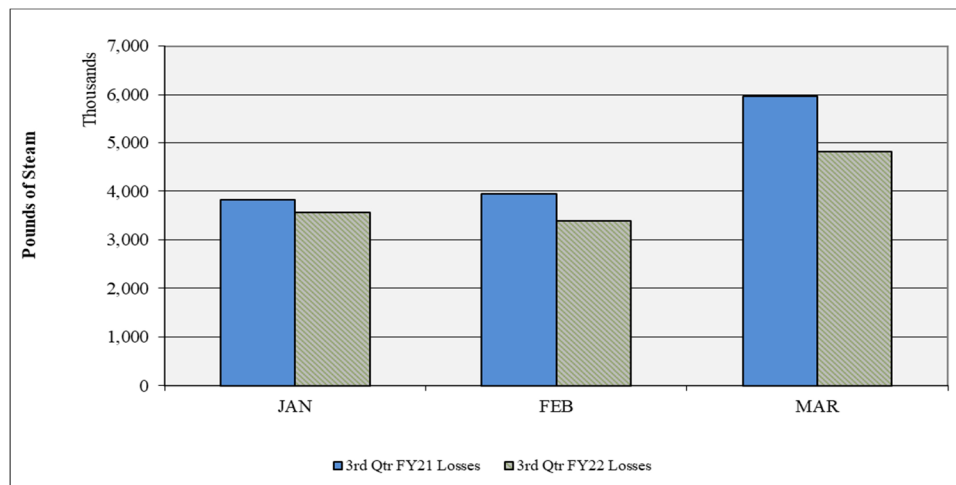
Figure 8 shows the steam sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in pounds per month between the recorded sendout and sales values and represent the total mass loss in the EDS between the EGF and the customer meters.



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

2. Losses

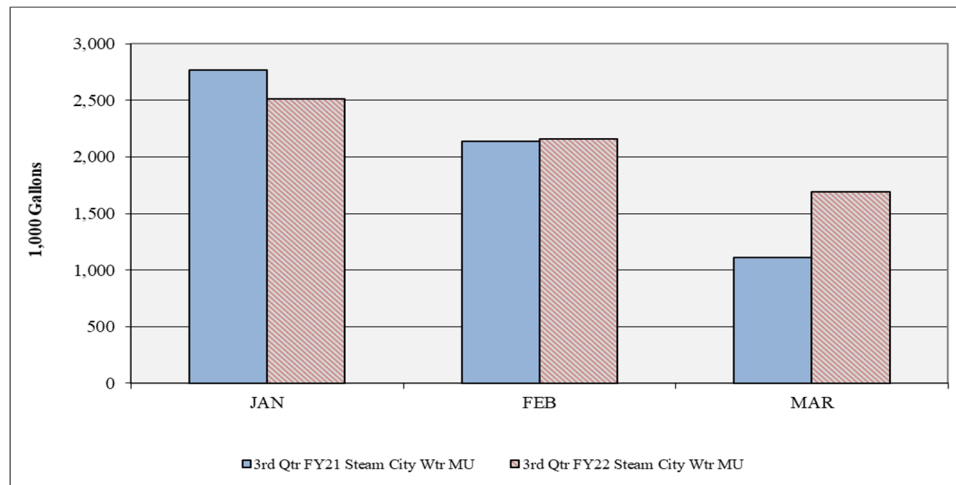
A comparison of the total steam mass losses in the EDS for the Third Quarter is shown in Figure 9. The mass loss is caused by the heat loss in the EDS between the EGF and the customer meters, resulting in a mass loss at steam traps. Faulty traps, steam leaks or meter error could also be a contributing 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

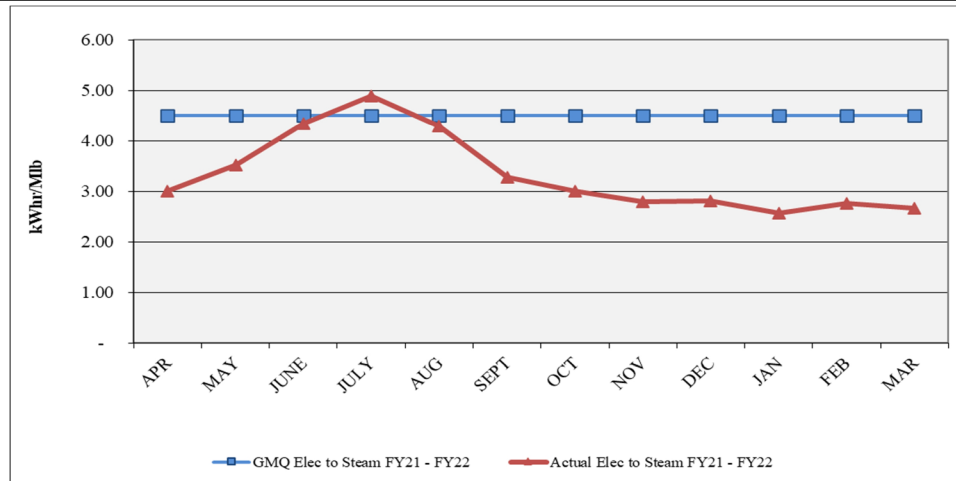
customers to the EGF and losses at the EGF. The corresponding data for steam system make-up is shown in the comparison of Third Quarter data in Figure 10.



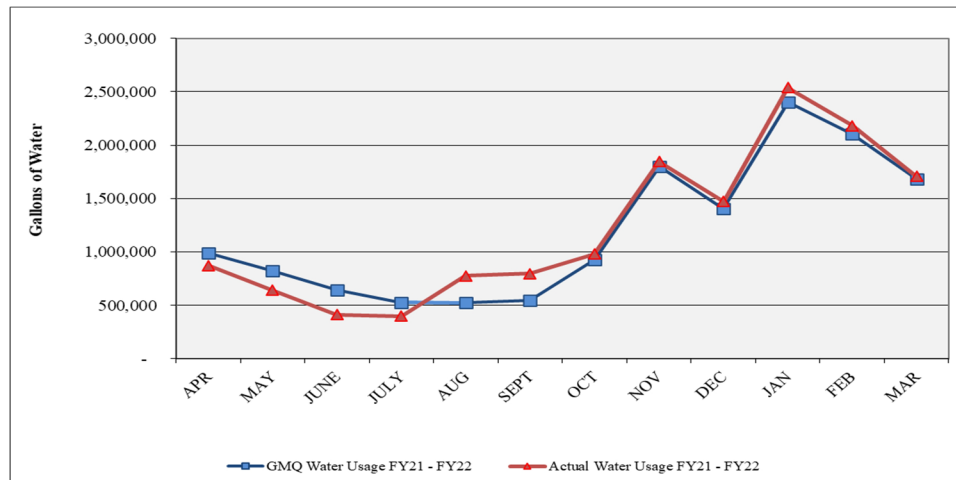
**Figure 10. Steam System City Water Make-up Comparison**

### 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, January, February, and March; however, the differences between the actual and guaranteed values were small. The steam electric conversion factor was exceeded in July but was not exceeded in subsequent months. TEG monitors CES's 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 every month of FY22 except July. The faulty meter at the EGF was replaced in September.



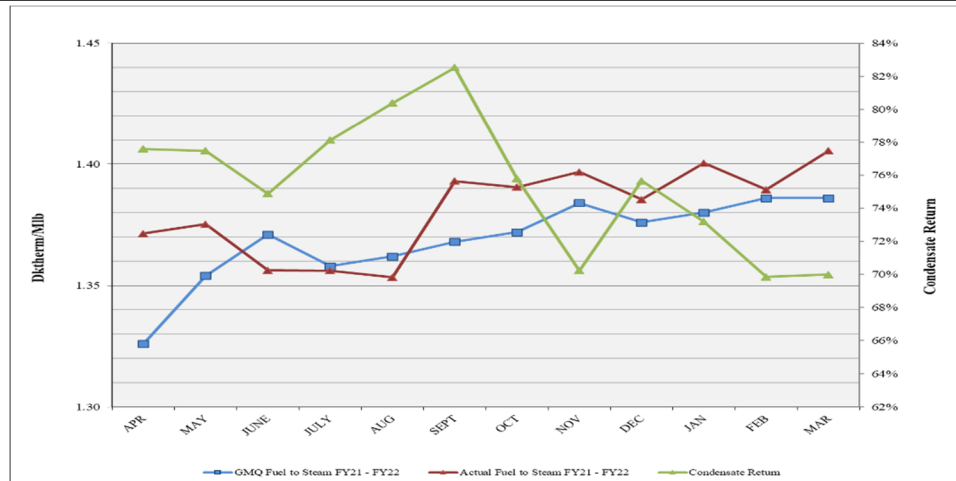
**Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months**



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

The steam plant electric consumption for the current quarter was 1.8% higher in FY22 than in FY21. The steam-to-electric conversion factor decreased 2.2% 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 increased 5.8% this quarter as compared to the previous Third Quarter due to a decrease in the 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 sendout remained approximately the same as in the previous Third 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 Third Quarter comparisons of the Guaranteed Maximum Quantities (GMQ) or System Performance Guarantees of the criteria commodities (fuel, water, and electricity).

CES 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. Third Quarter FY22 Production, Sales and Consumption Summary**

Item	Unit	Third Quarter FY22	Third Quarter FY21	*Percent Difference
	days	90	90	0.00%
<b>Total Electric Use</b>	kWhrs	7,154,909	6,952,484	2.91%
Chilled Water	kWhrs	6,780,189	6,584,314	2.97%
Steam	kWhrs	374,720	368,170	1.78%
<b>Total Water Use</b>	kgal	21,890	20,157	8.60%
Total Chilled Water	kgal	15,525	14,140	9.79%
EDS Make-up	kgal	1,816	1,648	10.19%
Cooling Towers	kgal	13,709	12,492	9.74%
Calc CT Evaporation	kgal	11,129	10,280	8.26%
CT Blowdown	kgal	2,580	2,212	16.64%
Calc # Cycles		4.31	4.65	-7.18%
Steam	kgal	6,365	6,017	5.78%
<b>Total Fuel Use</b>	mmBTU	213,557	211,814	0.82%
Natural Gas	mmBTU	213,548	211,627	0.91%
Propane	mmBTU	8	189	-95.65%
<b>Condensate Return</b>	kgal	13,348	13,495	-1.09%
	lbs	108,864,123	110,064,927	-1.09%
Avg Temp	°F	167.7	184.0	-8.88%
<b>Sendout</b>				
Chilled Water	tonhrs	8,732,200	7,904,700	10.47%
Steam	lbs	152,736,000	151,422,000	0.87%
Peak CHW Demand	tons	9,802	9,582	2.30%
Peak Steam Demand	lb/hr	149,750	138,100	8.44%
CHW LF		41.24%	38.19%	7.99%
Steam LF		47.22%	50.76%	-6.98%
<b>Sales</b>				
Chilled Water	tonhrs	8,342,705	7,276,059	14.66%
Steam	lbs	140,961,767	137,691,566	2.38%
<b>Losses</b>				
Chilled Water	tonhrs	389,495	628,641	-38.04%
Steam	lbs	11,774,233	13,730,434	-14.25%
		7.71%	9.07%	-14.98%
<b>Degree Days</b>				
CDD		26	8	225.00%
HDD		1,799	1,729	4.05%

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

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

GMQ Calculations	Unit	Third Quarter FY22	Third Quarter FY21	*Percent Difference
<b>Steam</b>				
GMQ Elec Conversion	kWhr/Mlb	4.50	4.50	
Electric Conversion	kWhr/Mlb	2.67	2.73	-2.19%
GMQ Plant Efficiency	Dth/Mlb	1.384	1.365	
Plant Efficiency	Dth/Mlb	1.398	1.399	-0.03%
Actual %CR		71.28%	72.69%	-1.94%
Avg CR Temp	°F	168	184	-8.88%
GMQ Water Conversion	gal	6,186,070	5,831,475	
Water Conversion	gal	6,428,650	6,077,170	5.78%
<b>Chilled Water</b>				
GMQ Elec Conversion	kWhr/tonhr	0.930	0.930	
Electric Conversion	kWhr/tonhr	0.816	0.905	-9.83%
GMQ Water Conversion	gal/tonhr	2.00	2.00	
Water Conversion	gal/tonhr	1.74	1.93	-9.48%

\*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 CES, 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 CES'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 \$14,565,336. This value represents approximately 74.0% of the total budgeted operating cost for FY22. The customer revenues from the sales of steam and chilled water for FY22 are \$13,618,705

(71.5% 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 \$473,025 (75% 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
<b>Operating Management Fee</b>							
<b>FOC: Basic</b>	\$ 3,890,100	\$ 972,529	\$ 972,529	\$ 972,529	\$ -	\$ 2,917,586	75.00%
9th Chiller	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 6A	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 6B	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
C/O 8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
<b>Pass-thru Charges:</b>							
Chemical Treatment	\$ 232,200	\$ 64,895	\$ 58,523	\$ 53,803	\$ -	\$ 177,221	76.32%
Insurance	\$ 16,500	\$ -	\$ 19,636	\$ -	\$ -	\$ 19,636	119.00%
<b>Marketing:</b>							
CNE Sales Activity	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Incentive Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
<b>FEA:</b>							
Steam	\$ 70,900	\$ (4,267)	\$ (1,921)	\$ (5,132)	\$ -	\$ (11,321)	-15.97%
Chilled Water	\$ 133,800	\$ 19,059	\$ 3,510	\$ 25,437	\$ -	\$ 48,006	35.88%
<b>Misc:</b>							
Metro Credit	\$ -	\$ (387,092)	\$ (258,250)	\$ (174,620)	\$ -	\$ (819,962)	n.a.
ARFA	\$ 61,200	\$ 15,296	\$ 15,296	\$ 15,296	\$ -	\$ 45,887	74.98%
Deferral	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
<b>Subtotal - Man Fee =</b>	<b>\$ 4,404,700</b>	<b>\$ 1,067,510</b>	<b>\$ 1,067,573</b>	<b>\$ 1,061,932</b>	<b>\$ -</b>	<b>\$ 3,197,015</b>	<b>72.58%</b>
<b>Reimbursed Management Fee + Chem Treatment</b>		\$ 1,067,510	\$ 1,069,125	\$ 348,830	\$ -	\$ 2,485,465	0.00%
<b>Metro Costs</b>							
<b>Pass-thru Charges:</b>							
Engineering	\$ 53,800	\$ 8,693	\$ 9,103	\$ 21,028	\$ -	\$ 38,824	72.16%
EDS R&I Transfers	\$ 294,800	\$ 73,700	\$ 73,700	\$ 73,700	\$ 24,567	\$ 245,667	83.33%
Metro Marketing	\$ 10,900	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Project Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Metro Incremental Cost	\$ 378,400	\$ 83,084	\$ 76,047	\$ 78,685	\$ 5,550	\$ 243,366	64.31%
<b>Utility Costs:</b>							
Water/Sewer	\$ 737,500	\$ 370,328	\$ 242,161	\$ 160,969	\$ -	\$ 773,458	104.88%
EDS Water/Sewer	\$ -	\$ 45	\$ 154	\$ 798	\$ -	\$ 997	n.a.
EDS Electricity	\$ 62,100	\$ 16,764	\$ 16,088	\$ 13,585	\$ -	\$ 46,438	74.78%
Electricity	\$ 6,122,000	\$ 1,750,697	\$ 933,362	\$ 715,419	\$ -	\$ 3,399,478	55.53%
Natural Gas Consultant	\$ 12,400	\$ 1,000	\$ 5,000	\$ 6,000	\$ -	\$ 12,000	96.77%
Natural Gas Transport	\$ -	\$ 46,378	\$ 70,590	\$ 89,712	\$ -	\$ 206,680	n.a.
Natural Gas Fuel	\$ 2,401,200	\$ 314,641	\$ 844,001	\$ 974,653	\$ -	\$ 2,133,295	88.84%
Propane	\$ 111,900	\$ -	\$ 95,983	\$ -	\$ -	\$ 95,983	85.78%
<b>Subtotal - Metro Costs =</b>	<b>\$ 10,185,000</b>	<b>\$ 2,665,331</b>	<b>\$ 2,366,189</b>	<b>\$ 2,134,550</b>	<b>\$ 30,117</b>	<b>\$ 7,196,186</b>	<b>70.65%</b>
<b>Subtotal - Operations =</b>	<b>\$ 14,589,700</b>	<b>\$ 3,732,841</b>	<b>\$ 3,433,762</b>	<b>\$ 3,196,482</b>	<b>\$ 30,117</b>	<b>\$ 10,393,201</b>	<b>71.24%</b>
<b>Debt Service</b>							
2012 Bonds	\$ 3,478,700	\$ 869,303	\$ 880,082	\$ 869,138	\$ 289,713	\$ 2,908,235	83.60%
2005 Bonds -Self Funded	\$ 340,600	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
2007 Bonds -Self Funded	\$ 170,300	\$ 42,575	\$ 42,575	\$ 42,575	\$ 42,575	\$ 170,300	100.00%
2008 Bonds -Self Funded	\$ 170,400	\$ 42,600	\$ 42,600	\$ 42,600	\$ 42,600	\$ 170,400	100.00%
2010 Bonds -Self Funded	\$ 173,500	\$ 43,375	\$ 43,375	\$ 43,375	\$ 43,375	\$ 173,500	100.00%
Fund 49107 -Self Funded	\$ 612,000	\$ 153,000	\$ 153,000	\$ 153,000	\$ 153,000	\$ 612,000	100.00%
Fund 49116 -Self Funded	\$ 137,700	\$ 34,425	\$ 34,425	\$ 34,425	\$ 34,425	\$ 137,700	100.00%
MIP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Oper. Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
<b>Subtotal - Capital =</b>	<b>\$ 5,083,200</b>	<b>\$ 1,185,278</b>	<b>\$ 1,196,057</b>	<b>\$ 1,185,113</b>	<b>\$ 605,688</b>	<b>\$ 4,172,135</b>	<b>82.08%</b>
<b>Total =</b>	<b>\$ 19,672,900</b>	<b>\$ 4,918,119</b>	<b>\$ 4,629,819</b>	<b>\$ 4,381,594</b>	<b>\$ 635,804</b>	<b>\$ 14,565,336</b>	<b>74.04%</b>
<b>Customer Revenues</b>							
Taxes Collected		\$ 109,591	\$ 97,050	\$ 94,308	\$ -	\$ 300,949	n.a.
Taxes Paid		\$ 113,349	\$ 97,051	\$ 62,874	\$ -	\$ 273,274	n.a.
Interest & Misc Revenue	\$ 128,100	\$ -	\$ 127	\$ -	\$ 131	\$ 258	0.20%
Penalty Revenues/Credits		\$ (9,022)	\$ 4,328	\$ 6,279	\$ -	\$ 1,586	n.a.
Energy Revenues Collected		\$ 4,847,654	\$ 4,436,890	\$ 4,304,642	\$ -	\$ 13,589,186	72.31%
<b>Revenues =</b>	<b>\$ 19,042,200</b>	<b>\$ 4,834,874</b>	<b>\$ 4,441,344</b>	<b>\$ 4,342,355</b>	<b>\$ 131</b>	<b>\$ 13,618,705</b>	<b>71.52%</b>
<b>Metro Funding Amount =</b>	<b>\$ 630,700</b>	<b>\$ 83,245</b>	<b>\$ 188,475</b>	<b>\$ 39,239</b>	<b>\$ 635,673</b>	<b>\$ 946,632</b>	<b>150.09%</b>

The DES serves 21 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	\$ 3,073,529	15,803,561	\$ 0.1945	\$ 1,281,410	75,658	\$ 16.9370
State Government	\$ 2,473,711	9,877,042	\$ 0.2505	\$ 1,609,682	87,318	\$ 18.4347
Metro Government	\$ 3,500,600	18,761,045	\$ 0.1866	\$ 1,650,253	112,573	\$ 14.6594
New Customers	\$ 2,260,848	11,614,848	\$ 0.1947	\$ 1,116,560	80,798	\$ 13.8191
<b>Total</b>	<b>\$ 9,047,840</b>	<b>44,441,648</b>	<b>\$ 0.2036</b>	<b>\$ 4,541,346</b>	<b>275,549</b>	<b>\$ 16.4811</b>

**Total Revenue** \$ 13,589,186  
**True-up and Adjustments (Net)** \$ 29,519  
**Net Revenue** \$ 13,618,705

### III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CES for FY22. TEG and CES continue to meet monthly and regularly communicate about important issues and on-going projects. CES 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.

- ) A pilot valve froze on the main gas line regulator due to snow and ice on January 6. The gas company responded, thawed, and rebuilt the regulator. The system did experience a drop in steam pressure below 150 psig for approximately 105 minutes, but service was not interrupted.
- ) The boilers tripped due to a low water level caused by an issue with the condensate pumps in MH-18 on January 7. The system was below 150 psig for approximately 30 minutes.
- ) A safety relief valve lifted on boiler 3 on February 8. The steam pressure was below 150 psig for approximately 45 minutes.
- ) All the boilers were tuned on February 24 and 25. The tuning required the boiler loads to be raised and lowered in increments. The steam pressures was below 150 psig for approximately 5 hours and 30 minutes on February 24 and 7 hours and 15 minutes on February 25.
- ) Boiler 2 tripped on March 2 resulting in the system steam pressure being less than 150 psig for approximately 45 minutes. CES could not determine the cause of the trip.

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- ) Chillers 7 and 8 tripped on March 17 causing the chilled water supply temperature to exceed 43.3°F for approximately 38 minutes. CES could not determine the cause of the trip.
  - ) While investigating the chiller trip from March 17, chillers 7 and 8 tripped again on March 18 causing the chilled water supply temperature to exceed 43.3°F for 42 minutes. CES reported that the cause of the trips remain under investigation as of the time of this report.
  - ) Boiler 3 tripped causing the safety valve to lift on March 31. The steam pressure was below 150 psig for approximately 75 minutes.
  - ) A partial chilled water interruption was required in January to repair a leak. The repairs were completed six hours ahead of schedule and only customers along 3<sup>rd</sup> Ave N were affected.
  - ) 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.

CES 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**

CES is currently staffed with eighteen full time employees, one remote part-time employee and two shared employees. CES continues 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

- o The condensate return averaged approximately 71.3% of the steam sendout during the quarter, which represents a 1.9% decrease over the previous Third Quarter.
- o Feedwater iron, pH, and hardness remained within their acceptable ranges during the quarter.

) Condensing Water System

- o The conductivity of the condensing water continues to be normal with only a few excursions.
- o The cooling tower blowdown increased 16.6% over the previous Third Quarter. This increase resulted in an average decrease in the cycles of concentration in the cooling towers by 7.2%. 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

- o CES continues to monitor and test for the presence of bacteria in the system. 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.
- o Metro and CES are evaluating options for the installation of a side stream filter at the EGF.

G. Maintenance and EGF Repairs

CES 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;
- ) Repaired oil leak on BFWP 4;
- ) Rebuilt BFWP 3;
- ) Repaired leak on the flash tank;

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- ) Repaired steam isolation valve on boiler 1;
  - ) Replaced the actuator on the condensate probe on boilers 2 and 3;
  - ) Assisted IB&M attempt to locate a potential tube leak on boiler 4;
  - ) Replaced condenser fan motor on chiller 8;
  - ) Replaced start module on chiller 8B;
  - ) Assisted Colt Atlantic repair steam isolation valve on de-aerator 2;
  - ) Assisted Ware tune the boilers;
  - ) Assisted in the repair of the PRV station;
  - ) Realigned, wired, and test ran CWP 5 motor;
  - ) Assisted repair of 2” domestic water meter;
  - ) Replaced regulator on chiller 8 valve actuator;
  - ) Adjusted boiler 4 FD fan linkage;
  - ) Replaced boiler 1 low water cut out;
  - ) Other repairs, maintenance and preventative maintenance were made during the quarter and are listed in the monthly reports issued by CES.

#### H. EGF Walkthrough

The EGF Walkthrough was conducted on March 29, 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. Constellation Energy Solutions, LLC (CES) has made significant efforts since the previous Walkthrough to address many of the issues contained in the previous reports. These items are noted herein

- ) CES 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 continued to worsen. CES applied a new coating on the riser tubes to four of the cooling towers prior to the First Quarter FY22 Walkthrough. The riser tubes in four additional cooling towers (12, 13, 15 and 16) were coated prior to the Third Quarter FY22 Walkthrough. **Only a few more cooling towers require the new coating before this issue has been addressed entirely**
- ) 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. **CES reported after the Second Quarter FY22 Walkthrough that**

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**they have requested a quote from their contractor make these repairs. The repairs had not been made prior to the Third Quarter Walkthrough.**

- J The presence of algae on the cooling towers and cooling tower deck remains from the previous Walkthroughs. Algae was also noted beneath the water level in nearly every basin. CES reported after the Second Quarter FY22 Walkthrough that they would work with their water treatment vendor to adjust the water treatment to address the algae. CES injected biocide into the condensing water circuit during the quarter to shock and kill the algae and pressure-washed the interior and exterior of the cooling towers. **The towers reviewed looked exceptionally clean. Some algae remained on the cooling tower deck, but the growth appeared less significant than previously. CES stated that they plan to address the algae on the cooling tower deck as they complete the annual cooling tower PMs this spring. Unless the algae returns, this item will be removed from future reports.**
- J 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 FY21 Walkthrough, insulation on the condensate piping near the unit heaters for the boiler plant make-up air was missing. **CES made these repairs during the quarter. This item will be removed from future reports.**
- J CES, Metro and TEG have discussed the need for CES to perform additional cleaning of the EGF and to maintain an increased level of cleanliness through the plant. CES stated in the First Quarter FY21 that they intended to address the overall cleanliness of the EGF. **CES has made some improvement from the level noted in the Third Quarter FY21 Walkthrough Report. CES reported that they hired an extermination contractor that also helped remove cobwebs. Additional work is required, but CES is continuing in their efforts to clean the EGF.**
- J The concrete facade of the EGF has noticeable water stains and has blackened in some places. This item was discussed with CES during the Fourth Quarter FY21 Walkthrough, and they indicated that they plan to pressure wash and clean the concrete portion of the façade soon. **CES was pressure washing the concrete portions of the building's façade during the Walkthrough and completed the pressure washing by April 1. This item will be removed from future reports.**
- J 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. This item was first noted in the Second Quarter FY22 Walkthrough report. **CES has not cleaned these areas nor repaired the leaking joints.**
- J 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. **CES reported that they made the repairs to the leaking valve on the de-aerator on January 11. CES made all of these repairs during the quarter. There were no observable steam leaks in the plant. This item will be removed from future reports.**
- J 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

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water leak in the FGR line is unusual. CES was informed of this leak during the Walkthrough. CES 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. **CES reported that they hired a contractor to investigate, locate and repair these leaks. However, they reported that no boiler tube leaks could be found. The leak on the FGR line was repaired. This item will be removed from future reports.**

- J An overhead lamp was not working properly at the south end of the expansion tank catwalk. **CES should repair the lamp.**
- J The CHWS sign on the 42” chilled water piping at the wall had a broken tie and was hanging down. The insulation of the piping adjacent to this sign was also stained. **These items need to be repaired.**
- J The zip ties holding some of the signs on the piping along the catwalk near the expansion tanks have broken or have become loose. One sign had fallen or was removed. This item was reported in the Third Quarter FY21 Walkthrough report. Some clean-up appeared to have been performed prior to the Second Quarter Walkthrough. Only one sign needed to be re-installed; however, some of the zip ties have loosened on some of the signs that have been installed. CES reported that they have removed one sign with a broken zip tie due to its inaccessibility and installed the other sign subsequent to the initial issuance of this report. **CES has repaired all of the zip ties and signs related to this item. This item will be removed from future reports.**
- J Other action items previously noted to be addressed by CES have been completed. (See also the “Quarterly EGF Walkthrough Report,” dated March 30, 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. Third Quarter FY22 Open Projects

The following projects remained open at the end of the Third 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 5<sup>th</sup> + 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

This work was completed during the Third Quarter FY22 and is now in close-out.

4. DES154 – Manhole K Repairs

The initial scope for this project has been completed. However, there were some other items that were added as change orders. The change order items are expected to be completed during the Fourth 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 and is in close-out.

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)

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. Unfortunately, they have elected to not be a DES customer. This project number will be used to track costs and activities associated with the new road and its impact to DES.

7. DES177 – Manhole B1 Ladder and Platform

Manhole B1 is in 1<sup>st</sup> 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 CES and DES regarding scope items that CES is requesting additional compensation to perform this work, therefore this project is on hold until the matter is resolved.

8. 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 and 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. CES has received a quotation on the cleaning and coating of the structural steel which has been reviewed and approved by TEG. It is anticipated that this work will begin and be completed during the Fourth Quarter FY22.

9. 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.

Work began on this project during the Third Quarter FY22. It is anticipated that the work will be completed during the Fourth Quarter FY22 with close-out occurring during the First Quarter FY23.

10. 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 and CES met with the State and their newly

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hired structural engineer and conducted a walk-through of the tunnel on March 3, 2022. It is TEG's understanding that the structural engineer will develop a report on the findings within the tunnel and make repair recommendations to the State. Items needing immediate attention may be addressed through emergency funding. Other items will be entered into the State's budget to be addressed in 2 to 3 years.

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.

11. 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 Fourth Quarter FY22.

12. DES185 – 5<sup>th</sup> Avenue North Exploratory Excavation

This project is complete and is in close-out.

13. DES187 – Exploratory Excavation at Manhole 22B

Water has been leaking for several months into Manhole 22B (located on 7<sup>th</sup> 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.

CES 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 were addressed during the Third Quarter FY22. A final walk-through will be conducted during the Fourth Quarter FY22. CES is awaiting cost substantiation information. It is anticipated that this project will be closed out during the First Quarter FY23.

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

Chilled water, steam and condensate return service piping to the 4<sup>th</sup> and Church Building, and the Fifth Third Financial Center originates in the 4<sup>th</sup> Ave Tunnel, comes up a vertical shaft and then turns horizontal through an access tunnel into the underground parking garage of the 4<sup>th</sup> & 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.

After power washing the tunnel liner plates, some severe corrosion was discovered. In addition, it was discovered that grout does not exist behind many of the liner plates. These discoveries have caused delays and design changes. It is now anticipated that the work will be completed during the Fourth Quarter FY22.

15. 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. CES 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. CES has obtained a quotation from Enecon, and this work will begin during the Fourth Quarter FY22.

It is anticipated that this project will be completed during the Fourth Quarter FY22.

16. 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 7<sup>th</sup> 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.

This project was bid during the Third Quarter FY22. It is anticipated that this project will be awarded, and the work will commence during the Fourth Quarter FY22.

17. 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 4<sup>th</sup> Avenue South was commissioned and provided to DES during the quarter. TEG is using this information to develop a plan to cross Hermitage Ave with new DES service and to formulate a course of action for a potential new parking area (DES195).

18. DES193 – Manhole 13 Repairs

This work was completed during the Third Quarter FY22. It is expected that this project will be in close-out during the Fourth Quarter FY22.

19. 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 completed construction documents for this work during the Third Quarter FY22. It is anticipated that CES will obtain a quotation for this work, and work will begin during the Fourth Quarter FY22.

20. DES195 – DES Parking Area

With the addition of Guthrie St adjacent to the east side of the DES property line (see DES163), the new road may impact the north and south ends of the DES property. This change will decrease the available parking area at the DES and also eliminate laydown areas used by CES and the DES contractors. Therefore, DES is investigating adding a parking area on the west side of the EGF that may be accessible from either Peabody St or Korean Veterans Blvd and could include a new doorway access to the expansion yard. Options will be evaluated during the Fourth Quarter FY22.

21. DES196 – Exploratory Excavation and Condensate Leak Repair at MH 9

CES has identified condensate entering the condensate pipe wall penetration in MH 9.

22. DES197 – Manhole 3 Coatings and Repairs

The structural steel piping supports in Manhole 3 are corroded and need to be cleaned and coated to mitigate further degradation. Some of the existing pipe insulation also needs repair or replacement. CES has obtained a quotation from Enecon, and the cleaning and coating work will begin during the Fourth Quarter FY22.

23. DES198 – Manhole 18 Condensate Pump Replacement

With the frequent issues with the existing condensate return pumps located in Manhole 18, DES has seen the need to evaluate the appropriateness of the pumping system and determine if a more consistent and reliable operation is plausible. TEG

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performed this evaluation during the quarter and anticipates completing the design in the Fourth Quarter. With the long delivery time for the pumps, construction would not be anticipated under the First or Second Quarters of FY23.

24. DES199 – Manhole D3 Sparge Tube Addition

The bottom of an existing pipe stanchion is severely corroded rendering the support ineffective. Due to the absence of this support, when a nearby trap discharges, the condensate piping shakes due to steam hammer. This project addresses the replacement of the support and the installation of a sparge tube to address any steam hammering.

It is anticipated that CES will obtain pricing for this work during the Fourth Quarter FY22. Therefore, it is anticipated that this work will begin during the Fourth Quarter FY22.

25. DES200 – Chilled Water Side Stream Filter

A number of years ago, DES requested CES to provide information and a proposal for the installation of a side stream filter on the chilled water system. This filter would be located at the EGF and would operate continuously to filter solids from the chilled water system. The filter should improve the heat transfer capabilities of the customer coils and clean the system.

The original proposal was delayed due to the potential sale of the DES. In FY21, discussions resumed between Metro, CES, and TEG for the need to install the filter. CES was asked to receive bids on the new filter in FY22. The DES has approved this proposal and the construction and installation are anticipated in the Second Quarter FY23 due to the long lead time on the equipment.

Since the filter will be considered part of the chemical treatment system, the DES customers will be charged for its capital cost over the course of approximately five (5) years.

B. Third Quarter FY22 Closed Projects

DES152, DES161, DES190 and DES185 were closed during the Third 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. Projects discussed in this report that are not listed did not have any expenses during the quarter. Total costs for projects that are closed are shown with a gray highlight. Only the funds currently available are shown.

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**Table 5. Capital Projects Expense Summary**

DES Project #	Description	Total Budget	FY22 Spending to Date	Total Spent to Date	Remaining Balance
<b>Fund-49116</b>					
DES133.1	NCC Blasting Issue	\$ 200,000	\$ 19,379	\$ 158,554	\$ 41,446
DES139	Options Review	\$ 450,000	\$ 2,639	\$ 318,440	\$ 131,560
DES143	MH N1, N2 and S6 Insulation	\$ 30,000	\$ 3,136	\$ 6,548	\$ 23,452
DES152	MH A & M Repairs	\$ 28,000	\$ 67,983	\$ 76,798	\$ (48,798)
DES153	MH L Repairs	\$ 169,475	\$ 129,614	\$ 165,709	\$ 3,766
DES154	MH K Repairs	\$ 75,085	\$ 33,954	\$ 34,628	\$ 40,456
DES161	MH S6 Insulation	\$ 6,500	\$ 7,759	\$ 7,759	\$ (1,259)
DES162	3rd and Molloy Service	\$ 150,000	\$ -	\$ 143,602	\$ 6,398
DES163	Parcel K Service	\$ 1,018,802	\$ 10,719	\$ 22,193	\$ 996,609
DES171	Broadway Tunnel Support Repair	\$ 268,907	\$ 7,436	\$ 119,367	\$ 149,540
DES172	Viridian Pipe Support Repair	\$ 256,250	\$ 68,125	\$ 244,715	\$ 11,535
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	\$ 2,887	\$ 6,689	\$ 90,811
DES179	MH-11 Repairs	\$ 58,500	\$ 43,040	\$ 47,406	\$ 11,094
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	\$ 273,321	\$ 297,122	\$ (12,122)
DES186	Printers Alley Exploratory Excavation	\$ 110,000	\$ 90,552	\$ 95,901	\$ 14,099
DES187	Exploratory Excavation/Steam Repair MH22B	\$ 153,750	\$ 70,692	\$ 72,315	\$ 81,435
DES188	4th and Church Access Tunnel Repairs	\$ 125,000	\$ 15,935	\$ 22,845	\$ 102,155
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	\$ 24,343	\$ 24,343	\$ 70,532
DES192	Peabody Developments	\$ 40,000	\$ 27,370	\$ 27,370	\$ 12,630
DES193	MH-13 Repairs	\$ 30,000	\$ 5,949	\$ 5,949	\$ 24,051
DES194	MH-B4 Repairs	\$ 80,000	\$ 6,541	\$ 6,541	\$ 73,459
DES195	DES Parking Lot	\$ 275,000	\$ 1,315	\$ 1,315	\$ 273,685
Total Closed Projects		\$ 1,335,927	\$ -	\$ 1,335,927	\$ -
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ 19,406,090	\$ -	\$ -	\$ 19,406,090
<b>Fund Total</b>		<b>\$26,000,000</b>	<b>\$ 1,078,880</b>	<b>\$3,897,774</b>	<b>\$22,102,226</b>

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

Several EDS repairs and improvements were made during the Third 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 \$221,707. 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
<b>Value at end of FY21</b>				<b>\$ 383,359.85</b>		<b>\$ 20.97</b>	<b>\$ 47,950.15</b>	<b>\$ 47,950.15</b>
CNE July 2021 R&I	12/3/2021		CNE	\$ 1,792.37				
CNE Aug 2021 R&I	1/31/2022	DES-2408	CNE	\$ 15,254.82				
CNE Sept 2021 R&I	2/7/2022		CNE	\$ 6,618.84				
<b>Sub-Total First Quarter</b>				<b>\$ 23,666.03</b>	<b>\$ 73,700.01</b>	<b>\$ -</b>	<b>\$ 50,033.98</b>	<b>\$ 97,984.13</b>
CNE Oct 2021 R&I	02/08/22		CNE	\$ 2,770.38				
CNE Nov 2021 R&I	01/21/22		CNE	\$ 2,212.34				
CNE Dec 2021 R&I	01/19/22		CNE	\$ 1,552.50				
<b>Sub-Total Second Quarter</b>				<b>\$ 6,535.22</b>	<b>\$ 73,700.01</b>	<b>\$ -</b>	<b>\$ 67,164.79</b>	<b>\$ 165,148.92</b>
CNE Jan 2022 R&I	02/16/22		CNE	\$ 5,959.11				
CNE Feb 2022 R&I	03/16/22		CES	\$ 10,968.26				
FVB Energy Inc	02/23/22		FVB	\$ 17,252.50				
CNE Mar 2022 R&I	04/20/22		CNE	\$ 7,528.46				
<b>Sub-Total Third Quarter</b>				<b>\$ 41,708.33</b>	<b>\$ 73,700.01</b>	<b>\$ -</b>	<b>\$ 31,991.68</b>	<b>\$ 197,140.60</b>
<b>Sub-Total Fourth Quarter</b>				<b>\$ -</b>	<b>\$ 24,566.67</b>	<b>\$ -</b>	<b>\$ 24,566.67</b>	<b>\$ 221,707.27</b>
<b>FY22 Year to Date</b>				<b>\$ 71,909.58</b>	<b>\$ 245,666.70</b>	<b>\$ -</b>	<b>\$ 221,707.27</b>	<b>\$ 221,707.27</b>

## 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. CES continues to replace trap assemblies within the EDS as needed.
  - d. CES 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 CES monthly reports.

## C. Emergencies

There were no emergencies reported during the quarter.

## D. EDS Walkthrough

This quarter's walkthrough was conducted on March 3 and March 15, 2022. The manholes and tunnel systems that were visited include Manhole 15, Manhole 23, the State Tunnel, the AA Birch Tunnel, the 4<sup>th</sup> Avenue Tunnel, the 7<sup>th</sup> Avenue Tunnel and the Broadway Tunnel. To streamline this report, a brief Summary has been added followed by the Action

Items. The details of the balance of the walkthrough report are included at the end of this section.

### **State Tunnel**

There are several locations within the tunnel with minor, moderate or major instances of concrete cracking and/or spalling, shifting of structures and/or groundwater infiltration. The maintenance of the tunnel structure is the responsibility of the State. On March 3, the State had a structural engineer accompany TEG and CES during a review the tunnel. The purpose of the engineer's review was to assess the condition of the tunnel and then formulate a repair plan to address any deficiencies. As of this report, TEG and CES have not received any updates from the State regarding this task.

As a result of water infiltration, several of the structural steel pipe supports have varying degrees of corrosion. If possible, the cleaning/coating and repair of these supports will be delayed until the State has addressed the water intrusion.

There are a few small steam leaks at valves and expansion joints that need to be addressed by CES. There are also some minor insulation repairs needed along with some bolting issues. Several of these items have appeared in past reports and need to be addressed within the next quarter. For more in-depth information, please refer to the detailed listing below.

### **AA Birch Tunnel**

There are a few small steam leaks at two locations; some corrosion issues that need to be addressed by a combination of CES's routine cleaning and painting and by professional cleaning and coating which TEG is coordinating. Other minor maintenance issues that need to be addressed include groundwater seepage at a pipe penetration and a lighting repair. For more in-depth information, please refer to the detailed listing below.

### **4<sup>th</sup> Avenue, 7<sup>th</sup> Avenue and Broadway Tunnels**

There are some minor insulation repairs/additions needed (some of these items have appeared in several past reports and need to be addressed immediately); some minor piping/piping support corrosion issues and minor lighting issues that need to be addressed. There are some electrical service corrosion issues that are more severe that have appeared on several past reports that need to be addressed immediately. There are also some grout repairs that are needed that CES is coordinating. In addition, several of the pipe supports incorporate Teflon slides that are worn or damaged – TEG is investigating a solution to this problem. For more in-depth information, please refer to the detailed listing below.

### **Manholes 15 and 23**

Some corroded and damaged valves need to be replaced as soon as possible; some groundwater intrusion needs to be monitored and a small steam leak that needs to be repaired. For more in-depth information, please refer to the detailed listing below.

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## ACTION ITEMS

### CES:

1. State Tunnel
    - a. Repair the concrete underneath the baseplate at station N33. **This item appeared in the 4/30/19, 4/13/20 and 4/22/21 reports.**
    - b. Coordinate with TEG the cleaning and coating of the pipe supports.
    - c. Repair the steam valve stem packing leak at Station W1. **This item appeared in the 4/22/21 report.**
    - d. Repair the insulation at Station W1. **This item appeared in the 4/22/21 report.**
    - e. Repair the steam expansion joint leaks at Stations E1 and W17 when it is large enough for the repair to be effective.
    - f. Furnish/install anchor bolt nuts at Stations W19 and W63. **This item appeared in the 4/22/21 report.**
    - g. Investigate if the missing anchor bolt at station E19 can be re-installed and report findings to TEG. **This item appeared in the 4/30/20 and 4/22/21 reports.**
    - h. Continue to notify the State about the excessive spider webs within the tunnel.
    - i. Repair/replace the blind flange studs at Station N20. **This item appeared in the 4/22/21 report.**
    - j. Perform insulation repairs at Station N20. **This item appeared in the 4/22/21 report.**
    - k. Install a blowdown valve on the trap strainer at Station E1. **This item appeared in the 4/22/21 report.**
    - l. Notify the State regarding the damaged light bulb at Station N8.
  
  2. AA Birch Tunnel
    - a. Coordinate and execute the installation of the pipe support and sparge tube in the bottom of Manhole D3.
    - b. Monitor groundwater infiltration and report any significant changes to TEG.
    - c. Retain Enecon to install hydraulic cement in the link seal cavities on the chilled water penetrations in Manhole D2.
    - d. Monitor the hairline cracks at chilled water penetrations in Manhole D2.
    - e. Repair/replace the light at Station 2+03 as soon as possible.
    - f. As needed, continue to clean/remove corrosion on pipe supports at Stations 0+08, 0+47, 0+65, 0+85, 1+05, 1+25, 1+45, 1+65, 2+03, 2+20, 2+38, 2+58, 3+00 and 3+20 and then paint with cold galvanizing paint.
  
  3. 4<sup>th</sup> Avenue Tunnel
    - a. Remove insulation jacketing debris at Station 4-95.
    - b. Repair insulation damage at Stations 4-57, 4-71, 4-87 and 4-94.
    - c. Clean corrosion at base of pipe supports at Stations 4-1 and 4-38 and apply cold galvanizing paint.
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- d. Repair lights at Stations 4-15, 4-23 and 4-34 as soon as possible.
  - e. Remove temporary supports underneath lower pipes (both sides of tunnel) at Station 4-15 that were placed during the execution of DES-172.
  - f. Clean corrosion from valve gear box at Station 4-13 and verify operation of valve. Install aluminum sheeting above the valve to prevent further corrosion and calcium deposits.
  - g. Repair corroded electrical junction box and conduits at Station 4-12 (**this item appeared in the 4/30/19, 4/13/20 and 4/22/21 reports**).
  - h. Add PVC fittings and pipe to existing drain at Station 4-12 to divert water to the tunnel floor.
  - i. Tighten the expansion joint packing injection bolts at Stations 4-45 and 4-79. If this does not stop the leaks, continue to monitor, and make repairs once the leaks are sufficient for the repairs to be effective.
  - j. Coordinate with TEG to have the Teflon pipe support slides repaired/replaced at Stations 4-2, 4-3, 4-4, 4-5, 4-10, 4-26, 4-27, 4-28, 4-29, 4-30, 4-32, 4-35, 4-39, 4-40, 4-42, 4-45, 4-49, 4-56, 4-57, 4-68, 4-69, 4-72, 4-74, 4-77, 4-84, 4-89, 4-91 and 4-94.
  - k. If repairs are not made under DES-188, repair the steam and condensate return insulation in the vertical shaft at the 4<sup>th</sup> & Church Building (Manhole 16). **This item appeared in the 4/30/19, 4/13/20 and 4/22/21 reports.**
  - l. Coordinate with Pro-Shot the needed grout repairs at stations 4-34, 4-45/46, 4-50, 4-51, 4-52, 4-53, 4-54, 4-55, 4-56, 4-57, 4-58, 4-59, 4-60, 4-67, 4-78 and 4-79.
  - m. Repair junction box hangers at 4<sup>th</sup> and Broadway “crossover” platform.
4. 7<sup>th</sup> Avenue Tunnel
- a. Repair the emergency light at Station 7-14.
  - b. Clean corrosion from base of pipe support at Station 7-34 and apply cold galvanizing paint.
  - c. Coordinate with TEG to have the Teflon pipe support slides repaired/replaced at Stations 7-3, 7-5, 7-6, 7-9, 7-11, 7-12, 7-14, 7-15, 7-18, 7-20, 7-28, 7-29, 7-32, 7-37, 7-41, 7-44, 7-45, 7-46, 7-55, 7-65 and 7-68.
  - d. Repair the corroded electrical conduit at Station 7-12.
  - e. Install blowdown valve on trap strainer at Station 7-45.
  - f. Repair/replace the electrical junction box at Station 7-71.
  - g. Tighten the packing bolts on the steam expansion joint at Stations 7-61 and 7-81. If unsuccessful in stopping the leak, continue to monitor the leak and make repairs with injection when the leaks are sufficient for the repair to be effective.
  - h. Tighten/replace the packing of the trap isolation valve at Station 7-81.
  - i. Remove the dirt/soil buildup around the pipe support stanchions at Station 7-81 to prevent the retention of moisture.
  - j. Continue to monitor the groundwater infiltration and notify TEG if there are any significant changes.
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5. Broadway Tunnel
    - a. Tighten the packing bolts on the steam expansion joints at Stations B-20, B-82 and in the Bridgestone Tunnel. If unsuccessful in stopping the leaks, continue to monitor the leaks and make repairs with injection when the leaks are sufficient for the repair to be effective.
    - b. Investigate the emergency chilled water service connections in the sidewalk area in front of the Bridgestone Arena for evidence of surface water run-off or groundwater intrusion into the Bridgestone Arena Service Tunnel.
    - c. Repair the lights at Stations B-8 and B-15.
    - d. Repair the emergency light at Station B-52.
    - e. Repair/replace the damaged/missing insulation on the condensate return piping in Manhole 18. Before making repairs, coordinate this work with the work associated with DES-198.
    - f. Repair the corroded conduit on the eastern wall of Manhole 18.
    - g. Monitor the grout at the baseplate at Station B-19.
    - h. Repair the damaged grout under the western wall plate at Station B-38.
    - i. Repair the missing or damaged insulation near the Bridgestone Arena mechanical room and at Stations B-96, B-82, B-80, B-50, and B-49.
    - j. Insulate the trap piping at Station B-20. **This item appeared in the 4/10/17, 4/13/18, 4/30/19, 4/13/20 and 4/22/21 reports.**
    - k. Clean/remove debris in Manhole 18.
    - l. Coordinate with TEG to have the Teflon pipe support slides repaired/replaced at Stations B-6, B-8, B-10, B-13, B-14, B-16, B-17, B-19, B-20, B-21, B-22, B-26, B-31, B-33, B-34, B-35, B-37, B-41, B-43, B-46, B-53, B-57, B-60, B-62, B-63, B-65, B-68, B-69, B-72, B-74, B-75, B-77, B-78, B-80, B-81, B-85, B-86, B-88, B-89, B-93, B-94 and B-96.
    - m. Insulate the chilled water drain piping at Station B-62.
    - n. Monitor the hole in the northern wall at Station B-49 and report any significant changes to TEG.
    - o. Insulate the newly added drain piping on the condensate return piping at Station B-96.
  
  6. Manhole 15
    - a. Monitor the beams at the air inlet entry and clean/paint them as needed to prevent corrosion.
    - b. Monitor groundwater infiltration at the eastern steam piping wall penetration.
    - c. Coordinate/schedule the replacement of the chilled water vent valves as soon as possible.
    - d. Coordinate/schedule the replacement of the western steam butterfly valve as soon as possible.
    - e. Unclog/clean the grating openings.
    - f. Monitor/replace (if necessary) sidewalk grating section(s).
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7. Manhole 23
  - a. Monitor cracks in steam and condensate concrete slip joint pedestal and report any significant changes to TEG.
  - b. Repair the steam leak at the steam valve flange.
  - c. Monitor the floor drain in the sidewalk entry area and pump this area out as needed.

**TEG:**

1. State Tunnel
    - a. Provide CES with a scope and specifications to clean and coat the piping support columns/structural steel.
    - b. Develop a repair scope for the support at W18.
    - c. Follow-up with CES regarding the anchor bolt at E19.
  2. AA Birch Tunnel
    - a. Develop scope for cleaning and coating structural components within the tunnel.
  3. 4<sup>th</sup> Avenue Tunnel
    - a. Develop scope for repair of Teflon pipe support slides and coordinate repairs with CES.
    - b. Follow up with CES regarding the baseplate grout repairs.
  4. 7<sup>th</sup> Avenue Tunnel
    - a. Develop a scope of work for repairing the Teflon pipe support slides and coordinate repairs with CES.
  5. Broadway Tunnel
    - a. Develop a scope of work for repairing the Teflon pipe support slides and coordinate repairs with CES.
  6. Manhole 15
    - a. Develop remedy for groundwater leak at eastern steam piping wall penetration.
    - b. Coordinate with CES the replacement of the:
      - (1) Chilled water vent valves
      - (2) The western steam high performance butterfly valve.
    - c. Develop a scope for the replacement of the grating at the top of the vertical shaft.
  7. Manhole 23
    - a. None.
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## Detailed Description of Observations

The following comments and observations are a result of these visits:

1. State Tunnel

- a. There are several locations, where the concrete tunnel structure has minor, moderate and major cracking, spalling, exposed/corroded rebar and/or shifting of structures. Some of these locations have also experienced, or are currently experiencing, water intrusion. Minor repairs are needed at the following locations: E4, E7, E8, E18, E19, E23, E25, E27, E29, E30, E31, E44, E47, E48, E52, E55, E60, E63, E68, N28, N29, N39, N48, W8, W10, W11, W17A, W18, W26, W29, W37, W42, W46, W48, W53, W57, W64, W68, W72 and W73. Moderate repairs are needed at the following locations: E11, E12, E13, E28, E37, E47, E51, E67, E69, N4, N5, N6, N8, N12, N31, N45, N49, N50, N51, N55, N59, N60, N61, N62, W4, W5, W15, W59, W67 and W71. Major repairs are needed at the following locations: E26, E66, N19, N20, N53, N54, N63, W27, W43, W44 and W45. There were several additions to these categories since the last review approximately one year ago. Maintenance of the tunnel structure is the State's responsibility. In late 2018 or early 2019, the State hired a professional structural engineer to review the major repair areas at E1 and N19/ N20. Repairs were made in these areas however, not all areas at N19/N20 were addressed. The original plans for repairs at E1 included the demolition of the existing manhole and the construction of a new cast-in-place manhole. Instead, the actual construction included the installation of galvanized steel supports, application of concrete to areas of exposed rebar and the installation of a new precast manhole upper section. However, what was originally a difficult point of egress is now complicated with a lower manhole roof (due to the addition of galvanized steel) which makes egress even more difficult. The State has hired a different structural engineer who accompanied TEG and CES on this review. A representative of the State told TEG that the purpose of the review was to evaluate the structural needs of the tunnel and then budget funds for repairs in the next 2-3 years. TEG responded that that were a couple of areas in the tunnel that probably cannot wait 2-3 years to be addressed. The State representative stated that provisions could be made for repairs up to \$250,000 in emergency situations. This review was conducted on March 3. To date, neither TEG or CES has received any updates regarding conclusions from this review or repair plans.
- b. Several of the pipe support columns/beams have minor, moderate and severe corrosion. Locations with minor corrosion include: E5, E11, E18, E20, E24, E29, E34, E38, E46, E47, E51, E52, E53, E54, E55, E56, E58, E59, E60, E62, E63, E65, N2, N3, N7, N11, N21, N22, N27, N28, N51, W1, W5, W6, W8, W13, W14, W19, W54 and W69. Moderate corrosion exists at the flowing locations: E1, E2, E3, E4, E7, E8, E9, E12, E17, E26, E28, E37, E44, E64, E69, N4, N5, N8, N9, N10, N12, N13, N14, N15, N16, N17, N18, N23, N24, N25,

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N26, N29, N30, N31, N32, N34, N35, N36, N37, N38, N39, N40, N41, N42, N43, N44, N45, N47, N48, N49, N50, N52, N53, N54, N55, N56, N57, N58, N59, N60, N61, N63, N64, W2, W4, W7, W9, W55, W56, W59, W60, W62, W63, W67, W71, W73 and W74. Major corrosion exists at the following locations: E13, E66, E67 N20, N62, W3, W27 and W75. These members support DES piping and are not considered part of the structure and need to be cleaned and coated. Most of this corrosion is due to leaks in the tunnel structure and therefore should not be repaired until the leaks are repaired (as stated above, it is the State's responsibility to repair structure leaks). TEG will coordinate with CES the hiring of a contractor to clean and coat these support members.

- c. The steam valve at station W-1 has a small packing leak. CNE should tighten or replace the packing as soon as possible. Some insulation repairs needed at this location also. CES should either perform these insulation repairs as part of their obligation under Amendment 2 or coordinate these repairs with an insulation contractor as an R&I expense.
- d. The State has removed several unused communications cables and inner ducts throughout the tunnel which were creating trip hazards. There are still several areas which contain an excessive quantity of cables and inner ducts, but do not appear to present a hazard to maintenance personnel.
- e. The concrete underneath the base plate of the piping support column at Station N33 needs to be repaired. TEG has confirmed that the use of Enecon's Duraquartz product is suitable for this repair. Now that Enecon is an approved vendor, CES should retain Enecon to make this repair and submit it as an R&I expense. **This item appeared in the 4/30/19, 4/13/20 and 4/27/21 reports.**
- f. There is a small steam expansion joint leak at Stations E1 and W17. Once these leaks are large enough to be sealed, CNE should make this repair.
- g. There is some concrete cracking at the guide support at Station W18. TEG is evaluating a repair for this area.
- h. The anchor bolt nuts are missing on the baseplates at Stations W19 and W63. CNE should furnish and install nuts on these anchor bolts as soon as possible. **This item appeared in the 4/27/21 report.**
- i. One of the anchor bolts on the top plate of the pipe support at station E19 is missing. CNE should investigate if the bolt can be reinstalled and notify TEG of its findings. **This item appeared in the 4/30/20 and 4/27/21 report.**
- j. There is an excessive amount of spider webbing at Stations E1, E2, E3 and W57. CES has notified the State of this condition through their monthly reporting.
- k. There is a blind flange on the steam piping at Station N20 that the studs do not pass completely through the nuts. CNE should either re-work or replace these studs so that there is a minimum of 3 threads exposed outside of these nuts. **This item appeared in the 4/27/21 report.**
- l. At Station N20, there are some insulation repairs needed. CNE should address this either through their obligation under Amendment 2 or by having

- an insulation contractor make these repairs and submitting it with their monthly R&I expenses. **This item appeared in the 4/27/21 report.**
- m. The trap strainer at Station E1 does not have a blow down valve installed. CNE should add a blow down valve to this strainer as soon as possible. **This item appeared in the 4/27/21 report.**
  - n. There is a damaged/broken light bulb at Station N8. CES should notify the State of this deficiency.
2. AA Birch Tunnel
- a. There is a steam trap located at the bottom of Manhole D3. When the trap discharges into the condensate return piping, it causes the return piping to shake. TEG believes that the shaking is the result of the trap discharge and steam hammer. TEG has presented a design to CES to add a pipe support and a sparge tube at this location. CES should coordinate with a contractor to have the support and sparge tube installed.
  - b. Although the tunnel is still experiencing groundwater infiltration, the amount of infiltration is significantly less than what is has been in the past. It is believed that this is due to the recent chilled water leak repair near Manhole D in 3<sup>rd</sup> Avenue North. CES should continue to monitor the active groundwater infiltration locations and report any significant changes to TEG/
  - c. Groundwater is leaking into Manhole D2 at the chilled water piping penetrations. CES has tightened the link seals to try and reduce or eliminate this leak, but these attempts have been unsuccessful. CES should hire Enecon to install hydraulic cement in the Linkseal cavities of these pipe penetrations and charge it to R&I.
  - d. There are some hairline cracks radiating from the chilled water piping penetrations in Manhole D2. CNE should continue to monitor these cracks and report any significant changes to TEG.
  - e. The grating and some of the structural members supporting the grating in Manhole D2 is moderately to severely corroded. The grating in this area should be replaced with new grating. The structural framing should be cleaned and coated using the Enecon products. TEG will prepare a scope to address this along with other areas of corrosion within the tunnel.
  - f. The light at Station 2+03 is not functioning properly. CES should repair or replace this light as soon as possible.
  - g. There is minor to moderate corrosion on the piping supports at Stations 0+08, 0+47, 0+65, 0+85, 1+05, 1+25, 1+45, 1+65, 2+03, 2+20, 2+38, 2+58, 2+79, 3+00 and 3+20. These supports should be cleaned and coated with Enecon products. TEG will prepare a scope to address this along with other areas of corrosion within the tunnel. Until this scope is executed, CES should continue to monitor these areas and clean them and paint them with cold galvanizing paint as needed.

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3. 4<sup>th</sup> Avenue Tunnel
- a. There is some debris at Station 4-95. It appears that it is aluminum insulation jacketing. This needs to be removed/disposed if it isn't going to be used.
  - b. There is some insulation damage at Stations 4-94, 4-87, 4-71 and 4-57. These repairs should be made under CES's Amendment 2 obligations or through monthly R&I reimbursements.
  - c. Repairs are being made to the 4<sup>th</sup> & Church Building access tunnel (DES-188) to address corrosion issues.
  - d. There is some minor corrosion at the base of the pipe support at Station 4-38 and 4-1. CES should clean these areas with a wire brush and apply cold galvanizing paint to slow the corrosion.
  - e. The light is either out or not functioning properly at Stations 4-34, 4-23, 4-15.
  - f. Temporary supports underneath the lower pipe supports on both sides of the tunnel that were installed for work executed during DES-172 were never removed at Station 4-15. The 12 month warranty for the DES-172 work expires September 1, 2022. CES should have the contractor remove these supports under warranty. After removal, the existing horizontal support member coating may need to be touched up. If so, the support member should be cleaned and coated at this position.
  - g. The gearbox and handwheel of the butterfly valve at Station 4-13 is corroded. The gearbox/handwheel should be cleaned and the operation of the valve confirmed. CES should install aluminum sheet metal above this valve to divert groundwater. **This item appeared in the 4/22/21 report.**
  - h. Some of the electrical conduits and a junction box at Station 4-12 are badly corroded. The junction box is open and might not fully close. CES should investigate the needed repairs/replacements for this junction box and the associated conduits and put together a repair plan and make the needed repairs as soon as possible. **This item appeared in the 4/30/19, 4/13/20 and 4/22/21 reports.**
  - i. There is a vertical drain at Station 4-12 that drains water to the tunnel floor near pipe supports. The drain appears to be PVC. CES should add PVC fittings to this drain line to divert the water to the western tunnel wall and then southward to the tunnel floor.
  - j. The steam expansion joints at Stations 4-45 and 4-79 are leaking. CES should first tighten the packing injection bolts to try and stop this leak. If this is not successful, CES should make repairs once the leak is sufficient that injection repairs will be successful.
  - k. The piping support Teflon slides at locations 4-2, 4-3, 4-4, 4-5, 4-10, 4-26, 4-27, 4-28, 4-29, 4-30, 4-32, 4-35, 4-39, 4-40, 4-42, 4-45, 4-49, 4-56, 4-57, 4-68, 4-69, 4-72, 4-74, 4-77, 4-84, 4-89, 4-91 and 4-94 need repair. TEG will develop a scope of work and coordinate with CES to have this work accomplished.
  - l. The branch steam piping at station 4-62 in the vertical shaft (Manhole 16) at the 4<sup>th</sup> and Church Building has a blind flange connection at the top of the vertical piping. The gasket at this blind flange connection was replaced due
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to a leak, but the insulation has not been repaired/replaced. Since there will be insulation repairs in the access tunnel (DES-188), TEG has asked the contractor to make insulation repairs to this piping and to the condensate return piping in this vertical shaft also. **This item appeared in the 4/30/19, 4/13/20 and 4/22/21 reports.**

- m. The grout beneath the baseplates of the pipe supports at stations 4-34, 4-45/46, 4-50, 4-51, 4-52, 4-53, 4-54, 4-55, 4-56, 4-57, 4-58, 4-59, 4-60, 4-67, 4-78 and 4-79 need to be repaired. These were repaired during DES-166 and are still covered by warranty. The contractor has been contacted and will make the needed repairs.
  - n. The hangers for the electrical junction box above the 4<sup>th</sup>/Broadway “crossover” platform have broken and the junction box is only being supported by the conduit. CES should replace the broken hanger supports as soon as possible.
4. 7<sup>th</sup> Avenue Tunnel
- a. The emergency light at Station 7-14 is not functioning properly. CES should repair this light as soon as possible.
  - b. The base of the pipe support at Station 7-34 is slightly corroded. CES should clean this area with a wire brush and apply cold galvanizing paint to slow the corrosion.
  - c. The piping support Teflon slides at locations 7-3, 7-5, 7-6, 7-9, 7-11, 7-12, 7-14, 7-15, 7-18, 7-20, 7-28, 7-29, 7-32, 7-37, 7-41, 7-44, 7-45, 7-46, 7-55, 7-65 and 7-68 need repair. TEG will develop a scope of work and coordinate with CNE to have this work accomplished.
  - d. Some of the electrical conduit at Station 7-12 is badly corroded. CES should investigate the needed repairs/replacements for this conduit and make the needed repair as soon as possible.
  - e. The trap strainer at Station 7-45 does not have a blow down valve. CES should add a blow down valve to this strainer as soon as possible.
  - f. The electrical junction box at Station 7-71 is not anchored. The anchoring “tab” is broken off. CES should investigate the needed repairs/replacements for this conduit and make the needed repair as soon as possible.
  - g. The steam expansion joints at Station 7-61 and 7-81 are leaking. CES should tighten the packing bolts to see if this stops the leak. If this is not successful in stopping the leak, CES should make repairs once the leak is sufficient that injection repairs will be successful.
  - h. The trap isolation valve at Station 7-81 has a packing leak. CES should tighten/replace the packing as needed.
  - i. The stanchion baseplates at Station 7-81 that were recently cleaned and painted are covered with dirt. CES should clean the dirt/soil buildup on these baseplates to help prevent corrosion.
  - j. Continue to monitor the groundwater infiltration and notify TEG of any significant changes.



5. Broadway Tunnel

- a. The steam expansion joints at Stations B-20, B-82 and in the Bridgestone Arena's Service Tunnel are leaking. CES should tighten the packing bolts to see if this stops the leak. If this is not successful in stopping the leak, CES should make repairs once the leak is sufficient that injection repairs will be successful.
- b. There is evidence of groundwater or surface water intrusion at the emergency chilled water branch connections in the Bridgestone Arena Service Tunnel. CES should review the covered emergency service connections in the sidewalk area in front of the Bridgestone Arena to see if there is evidence of why the water intrusion has suddenly appeared.
- c. A light is out or not functioning properly at Stations B-15 and B-8. CES should repair these lights as soon as possible.
- d. The emergency light at Station B-52 is not working. CES should repair this light as soon as possible.
- e. There is some missing/damaged insulation in Manhole 18 at a steam dripleg and the condensate return piping. Before making repairs, CES and TEG need to coordinate the required insulation work associated with DES-198 (MH 18 Condensate Pump Replacement).
- f. There is a ~2" conduit at the eastern wall of Manhole 18 approximately 10-12 feet above the floor that is corroded. CES needs to review this conduit and see if it can be repaired or if it needs to be replaced. CES should repair or replace this conduit as soon as possible.
- g. There is a portion of the grout at the baseplate at Station B-19 that is missing. The missing grout is not underneath the baseplate. CES should monitor this and if any of the grout underneath the baseplate cracks or becomes damaged, the grout should be repaired.
- h. There is some damaged grout under an existing western wall plate at Station B-38. This grout needs to be repaired as soon as possible.
- i. One of the traps in Manhole 18 is not functioning properly. TEG believes this is due to steam lock (piping elevation changes) because of the trap piping configuration. TEG has presented a revised piping layout to CES. Prior to this report, CES has had a contractor re-route the trap piping and the trap is functioning properly.
- j. The trap at Station B-65 is not functioning properly. TEG believes this is due to the trap piping configuration (elevation changes). TEG has presented a revised piping layout to CES. Prior to this report, CES has had a contractor re-route the trap piping and the trap is functioning properly.
- k. Some insulation is missing on a Bridgestone Arena chilled water service line near the Arena's mechanical room. It appears this insulation was removed when some instrumentation was installed. This insulation should be replaced under CES's Amendment 2 obligation or by a contractor with the expense included in CES's monthly R&I charges. **This item has appeared in prior reports.**

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- l. There is some insulation damage at Stations B-96, B-82, B-80, B-50 and B-49. Some of this is the result of the contraction of the piping from system shutdowns. CES should make repairs to these areas using aerogel insulation thus reducing the overall diameter to eliminate any interference with the piping supports. This insulation should be replaced under CNE's Amendment 2 obligation or by a contractor with the expense included in CNE's monthly R&I charges.
  - m. The trap piping at Station B-20 should be insulated for personnel protection. Requires action within the next quarter. **This item appeared in the 4/10/17, 4/13/18, 4/30/19, 4/13/20 and 4/22/21 reports.**
  - n. The piping support Teflon slides at locations B-6, B-8, B-10, B-13, B-14, B-16, B-17, B-19, B-20, B-21, B-22, B-26, B-31, B-33, B-34, B-35, B-37, B-41, B-43, B-46, B-53, B-57, B-60, B-62, B-63, B-65, B-68, B-69, B-72, B-74, B-75, B-77, B-78, B-80, B-81, B-85, B-86, B-88, B-89, B-93, B-94 and B-96 are in need of repair. TEG will develop a scope of work and coordinate with CES to have this work accomplished.
  - o. The chilled water drain piping at Station B-62 is uninsulated. This piping should be insulated to prevent sweating and potentially prevent freezing of this piping in the winter months. This insulation should be replaced under CES's Amendment 2 obligation or by a contractor with the expense included in CES's monthly R&I charges. **This item appeared in the 4/22/21 report.**
  - p. There is some debris in Manhole 18 that needs to be cleaned/removed. CNE should have this debris removed within the next quarter.
  - q. There is a small hole in the northern wall at station B-49, next to the upper horizontal support connection. CNE should monitor this hole and notify TEG if there are any significant changes.
  - r. A drain has been added to the condensate return piping at Station B-96. This piping needs to be insulated under CES's Amendment 2 obligation or by a contractor with the expense included in CES's monthly R&I charges.
6. Manhole 15
- a. CES has cleaned and applied cold galvanizing paint to the beams in the sidewalk area of Manhole 15. CES should continue to monitor these beams and clean/paint areas of corrosion as needed.
  - b. Groundwater is occasionally leaking into Manhole 15 through the eastern steam piping wall penetration. TEG is researching a remedy to this problem. CES should continue to monitor this and report any significant changes to TEG.
  - c. The vent valves on top of both the supply and return chilled water piping are badly corroded and need to be replaced. A partial system isolation/shutdown should be planned and scheduled to replace this valve as soon as possible. The replacement valve body and trim should be non-corrosive. The replacement valves should then be insulated.
  - d. The western steam butterfly isolation valve is extremely difficult to operate. CES has determined that the valve can be closed with some effort. CES
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should plan/schedule a partial system outage to replace this valve as soon as possible. The replacement valve should be a high-performance butterfly valve manufactured by either Adams or Zwick.

- e. Some of the “openings” in the grating at the top of the 4<sup>th</sup> Avenue Tunnel vertical shaft are clogged with debris (this is an air intake for the 4<sup>th</sup> Ave Tunnel fans. Therefore, these openings should be clear) and portions of the grating is corroded and needs to be repaired or replaced. TEG will develop a scope for the replacement of the grating and coordinate with CES to have this work done.
  - f. Continue to monitor/inspect the sidewalk intake grating. If portions of the grating become damaged or warped resulting in a pedestrian trip hazard, replace grating sections as needed.
7. Manhole 23
- a. There are some surface cracks in the steam and condensate slip joint concrete pedestal. CES should monitor these cracks and notify TEG of any significant changes.
  - b. There is a flanged steam valve in this manhole that is blind flanged. The pipe blind flange connection is leaking. This flange has a clamp on it with injection nozzles presumably because of prior leaks. CES should monitor this steam leak and make repairs once the leak is sufficient that injection repairs will be successful.
  - c. The drain in the air intake area in the sidewalk is not draining and water has accumulated. A camera was used to scope this drain piping and it was discovered that this drain line has collapsed so the drain is not able to drain continuously and at times water will accumulate in this area. The location of the drain line collapse is about 15 feet below grade in 7<sup>th</sup> Ave. CES should monitor this floor drain and pump out this area on an as-needed basis.
  - d. The upper two steps of the grating staircase which leads to the ventilation opening are corroded because they are not galvanized. CES should monitor these steps and before they become a safety hazard, replace them with new galvanized grating sections.

## **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 21 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 CES in an expeditious and professional manner.

#### D. Marketing

Although the original design and development team for the two proposed hotels at 1<sup>st</sup> 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 Fourth Quarter.

Unfortunately, the development team for Lot K (Peabody Union) elected to not be a DES customer. Construction on the site is anticipated to begin in the First Quarter FY23.

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.

The development of the small boutique hotel at 333 Union St has stalled. This potential customer will be removed from this list unless a new developing entity assumes the site.

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).

TEG was contacted by the engineer for a new development located on 3<sup>rd</sup> Ave N at Printer's and Banker's Alley. This potential customer could have a load as much as 600 tons serving its multi-story residential and retail structure. The engineer indicated that they are not currently interested in steam. Due to their limited footprint, DES may be their only practical option for cooling.

A hotel is proposed to be installed at 7<sup>th</sup> Ave N and Commerce St. TEG has had several conversations with the engineers and developers and all discussions appear favorable for DES service. This site would include hotel, restaurant, and retail spaces requiring approximately 700 tons of chilled water and 11,000 pph of steam.

#### E. Customer Interaction

The CES customer service representative (CSR) continues to respond to customer issues as they arise. Much of the communication involves minor problems with the customers'

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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 CES, which was provided. Some of these repairs involved isolating the steam or chilled water services to the building for the customers.
- ) The James K Polk Building engineer reported a small steam leak on a DES metering device in the building in January. CES personnel investigated and determine that since the leak was small, they would make repairs after the heating season. Repairs were made in February.
- ) The Renaissance Hotel reported a lack of steam pressure to their building in January. CES's CSR reported that there were no problems at the EGF at that time and suggested that they check their pressure reducing valve. The customer later reported that the issue was with their valve.
- ) 5<sup>th</sup> and Broadway reported that one of their chilled water coils had frozen and burst during the night (January 6 to 7). The customer isolated the coil and made repairs the same day.
- ) The Hyatt Place reported a condensate leak inside their building in January. CES investigated and determined that the leak was the customer's responsibility.
- ) The Cordell Hull Building also called in January to ask the CSR if there was an issue with the steam system. At that time, the CSR found no issues. The issue with the building was later determined to be the customer's responsibility.
- ) The Hermitage Hotel reported lower than normal steam pressure in February. The CSR investigated and determined that the building was having an issue with their controls.
- ) TEG requested CES investigate the tempering station at the Fairlane Hotel for proper operation in February. CES determined that the unit was operating properly, but there was more hot water than usual being dumped into the sump.
- ) Municipal Auditorium reported a chilled water leak in their building in February and that building personnel had isolated their system. They made repairs and service was restored within two days.
- ) The Cordell Hull Building contacted the CSR in March to report that their building chilled water pumps were not moving any water. The CSR reported that adjacent buildings and the system had no issues. The building engineer later reported that he had discovered the issue.
- ) The State Library and Archives building reported a chilled water leak on a coil in their building in March. The coil was isolated until repairs can be made.
- ) Other minor issues and customer interactions are noted in the monthly reports from CES.

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## VII. Recommendations

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

Based on the review of the Third Quarter FY22 EGF and EDS operations, the following recommendations are made.

- ) CES needs to address the maintenance items included in the EGF and EDS Walkthrough sections of this report as soon as possible.
- ) CES 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.
- ) CES 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. CES has operated the EGF for twenty-one consecutive months with at least one performance guarantee excursion each month.
- ) CES 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.
- ) CES 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 CES'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.
- ) CES should continue to remove debris and mud from manholes.