

Operations Monitoring Report

First Quarter FY16

Prepared by:

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I. Executive Summary

A review of the fiscal year 2016 (FY16) First Quarter performance and contract obligations between Constellation New Energy (CNE) and the Metropolitan Government of Nashville and Davidson County (Metro) is presented in this report by Thermal Engineering Group, Inc (TEG). The status of the available funds for all active capital construction and repair and improvement projects are also presented. For the fiscal year 2016 to date, CNE has satisfactorily met all of the contract obligations to Metro and has had no contract violations.

For the First Quarter FY16, the chilled water sales decreased 2.9% over the previous First Quarter (FY15). The chilled water sendout was also down 5.9% over the previous First Quarter, thus the system losses were down approximately 46%. The First Quarter FY16 saw a 7.5% increase in cooling degree days. The peak chilled water demand for the current quarter was 19,612 tons, which is 2.4% higher than the previous First Quarter and the highest recorded peak of the EGF.

Steam sendout for the current quarter decreased by approximately 5.9% over the previous First Quarter with no heating degree days for either quarter (FY15 or FY16). Likewise, steam sales also decreased by approximately 24% over the previous First Quarter. Steam system losses, as a percentage of sendout, increased, and the total losses increased approximately 33% over the previous First Quarter. The peak steam demand for the current quarter was 47,812 pounds per hour, which represents a decrease in the First Quarter demand by approximately 23%.

The Energy Generating Facility (EGF) performance continues to surpass the System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels. The chilled water plant electric consumption continues to perform lower than the guaranteed levels and has decreased in the First Quarter due to operational changes implemented by CNE. The steam plant electric consumption decreased marginally over the previous First Quarter, and the amount of electricity per unit of sales of steam increased by approximately 32%. The steam plant fuel efficiency has remains consistent with previous years and quarters. The total water consumption for the steam and chilled water plants decreased 1% from the previous First Quarter marked by a 34% increase in the EDS make-up for the chilled water system and a 26% decrease in the steam plant usage.

Work continued on DES Capital and Repair & Improvement Projects during the First Quarter of FY16. Repair and Improvements to the EDS continue as scheduled. Construction was completed on DES107 and DES112 during the First Quarter FY16. Construction began on DES117 during the First Quarter FY16. No projects were closed during the First Quarter FY16.

The current fiscal year system operating costs to date are \$5,561,630. This value represents approximately 25.7% of the total budgeted operating cost for FY16. The customer revenues from the sales of steam and chilled water for FY16 (to date) are \$5,440,733 which is approximately 27.2% of the budgeted amount. The difference between the operating costs and customer revenue is the Metro funding amount (MFA), which represents the shortfall in cash

flow for the system. The MFA transferred to date for FY16 is \$448,500 (25% of budget). However, the actual MFA required cannot be accurately calculated due to outstanding invoices.

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II. Energy Distribution Sales and Performance

A. Chilled Water

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

1. Sales and Sendout

A comparison for the First Quarter chilled water sales is shown in Figure 1. This data reflects a 2.86% decrease in sales for the current quarter over the same quarter of the previous fiscal year.

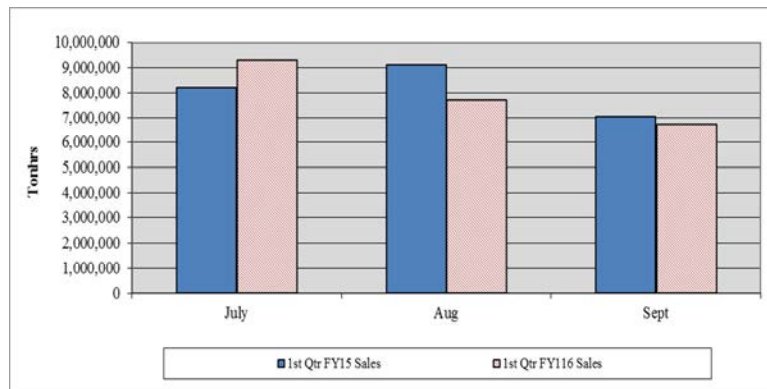


Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 19,612 tons, which represents an approximate 2.4% increase over the previous First Quarter and the highest recorded EGF peak.

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

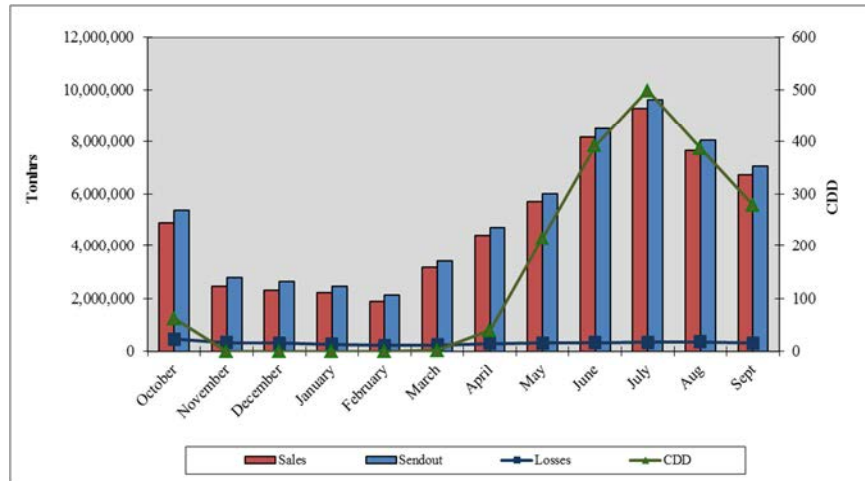


Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

2. Losses

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

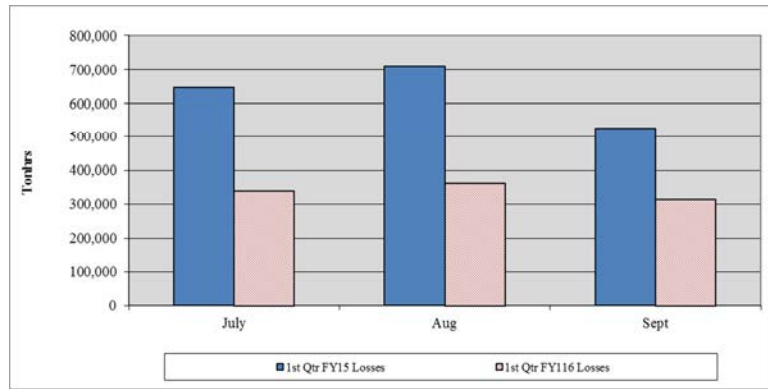


Figure 3. Chilled Water System Loss Comparison

The EDS make-up increased by approximately 33.5% over the previous First Quarter despite numerous attempts by CNE to locate the source of the water leaks. However, the total EDS water usage represents only a small part of the total EGF water usage for the quarter, but the percentage is increasing.

The total energy losses have decreased by approximately 45.7% over the previous First Quarter. The make-up to the cooling towers decreased 2.9% during the quarter. The number of cycles of concentration in the condensing water circuit experienced a marginal increase during the current. The overall city water make-up comparison for the chilled water system is shown in Figure 4.

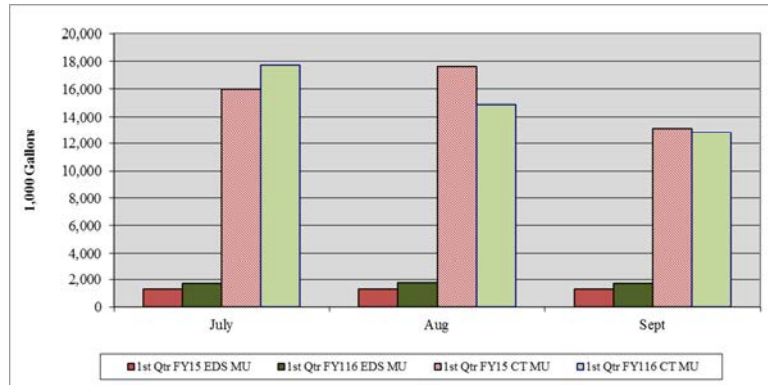


Figure 4. Chilled Water System City Water Usage Comparison

3. Performance

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

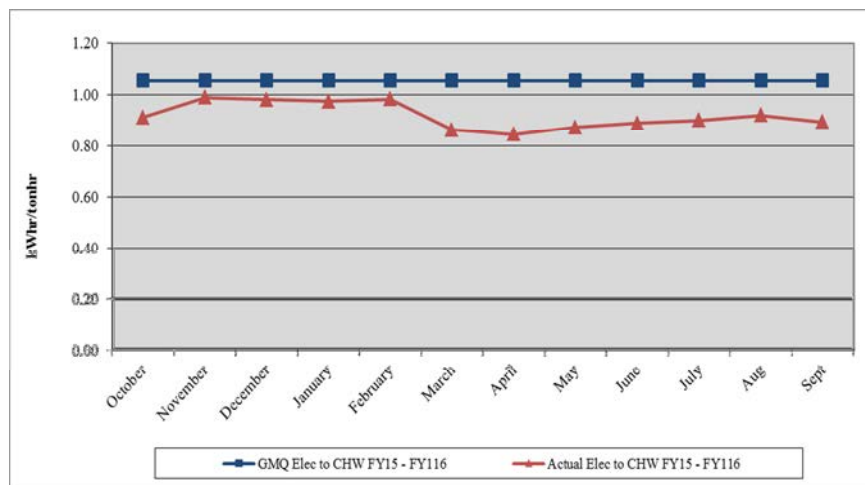


Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

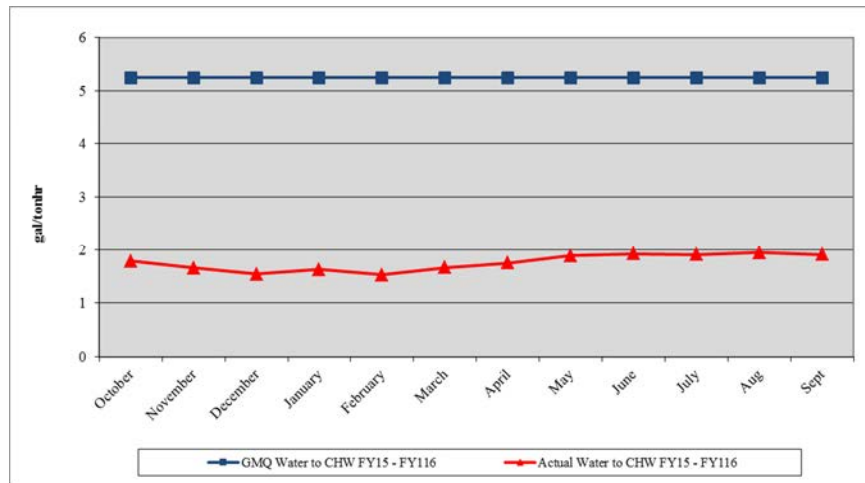


Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 1.055 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. However, the chiller plant electric usage continued to show a steady increase over previous years until March 2015. CNE made some operational changes in the First Quarter FY15 that led to an increase in electric use during the Second and Third Quarters. Additional changes were made in March that appears to have led to a subsequent reduction in electric use. The electric usage per unit of sales decreased approximately 0.6% over the First Quarter for FY15 (Figure 5). TEG and CNE continue to work together to improve the efficiency of the chiller plant.

The actual chilled water plant water conversion factor increased approximately 2.9% over the previous First Quarter. However, the total consumption of city water for the chiller plant for the current quarter increased marginally.

B. Steam

1. Sales and Sendout

The steam sendout decreased by approximately 15.5% over the previous First Quarter (FY15), and the sales also decreased by approximately 24.4%. The First Quarter FY15 and FY16 did not have any heating degree days. The steam system losses increased 33.3% over the previous First Quarter. Whenever steam sales decrease from the previous quarter, the percent of system losses can be expected to increase since the majority of these losses are based on a near constant heat loss of the system. A comparison for the First Quarter steam sales is shown in Figure 7.

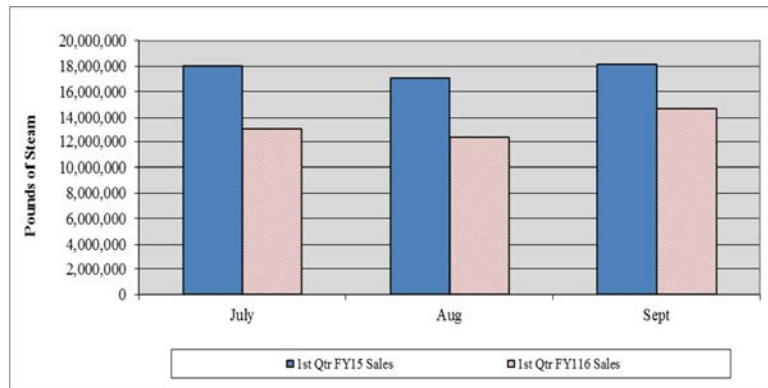


Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 47,812 pph, which reflects an approximate 23% decrease in the peak steam production over the previous First Quarter.

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

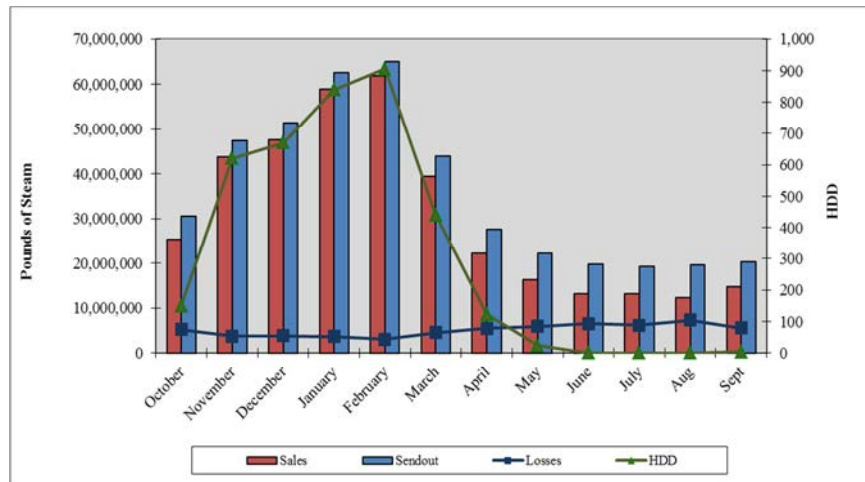


Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

2. Losses

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

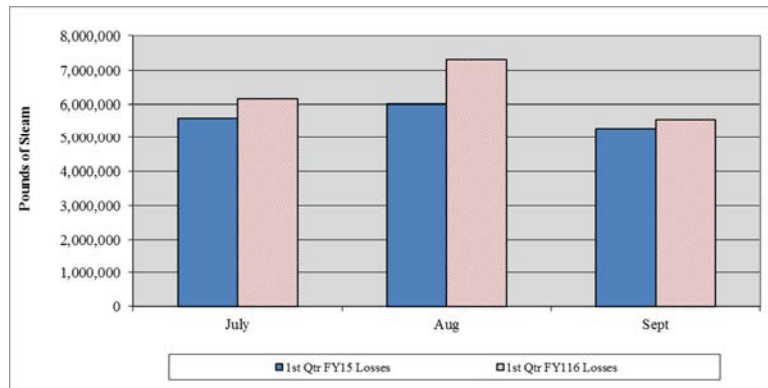


Figure 9. Steam System Losses

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

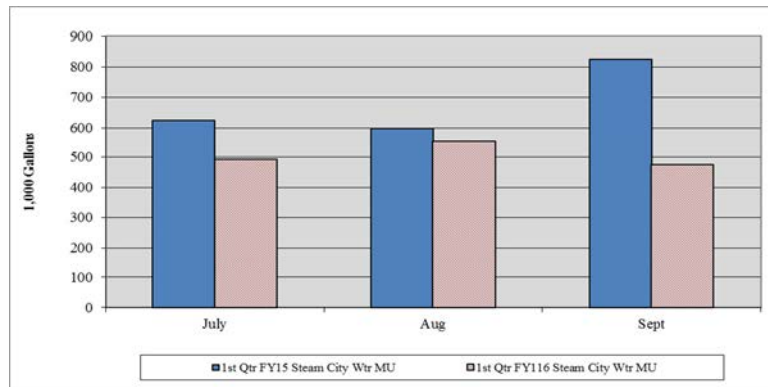


Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system aspect of the EGF is presented by the following three charts, Figures 11, 12 and 13. Under the management of CNE, the System Performance Guarantee levels as described in the ARMA are being achieved satisfactorily.

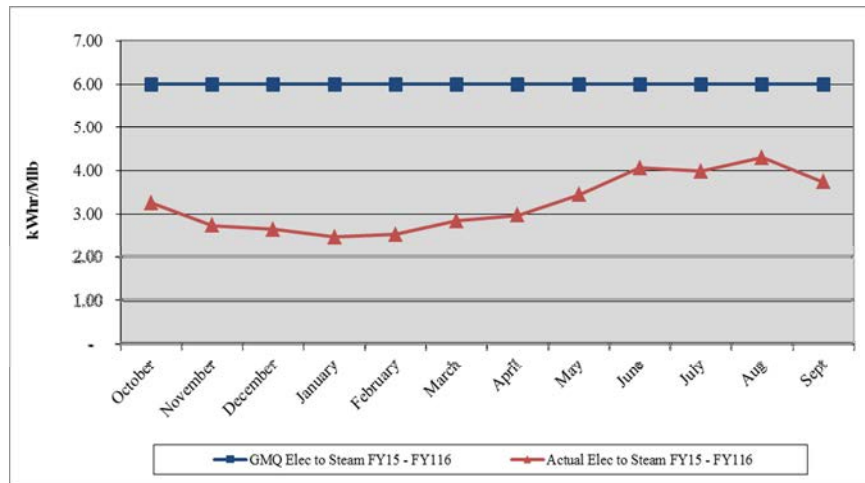


Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

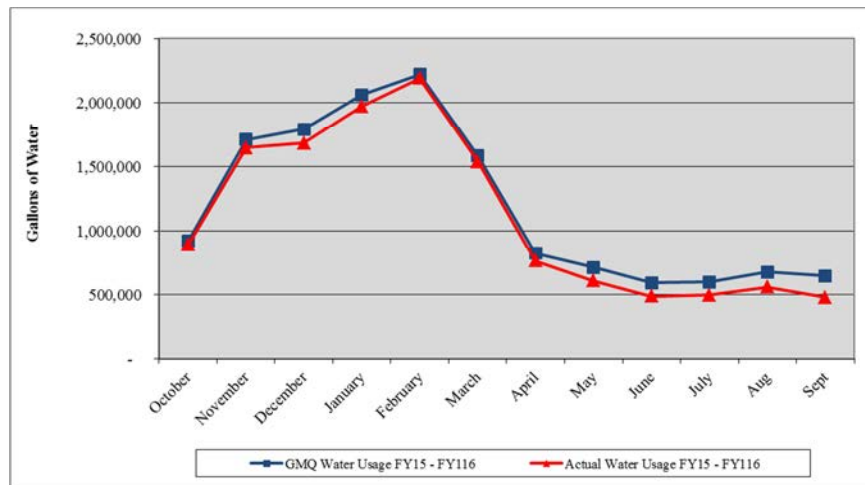


Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

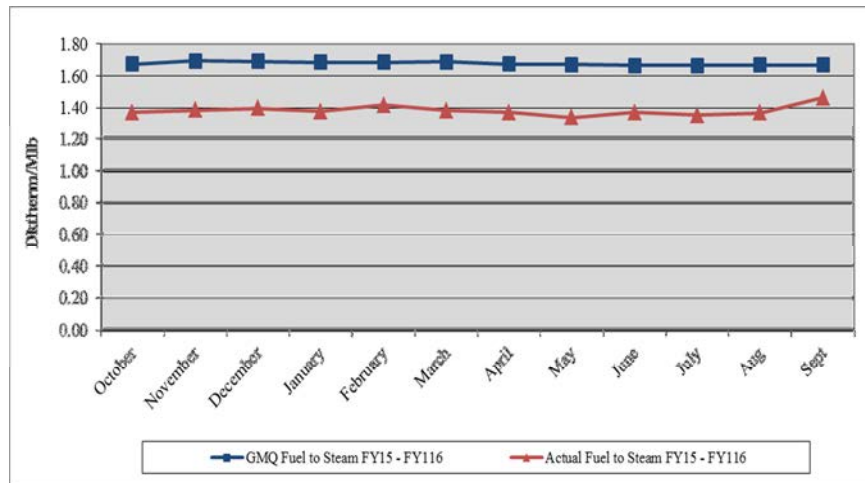


Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The current quarter experienced a 0.5% decrease in the steam plant electric consumption while experiencing a 31.7% increase in the electric conversion factor due to a decrease in sales. The water consumption for the steam plant decreased 26% this quarter as compared to the previous First Quarter. The fuel consumption per unit of steam sales has been relatively constant throughout the the historic data. However, the boiler plant fuel efficiency decreased 3.64% for the current quarter.

C. Contract Guarantee Performance

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

Table 1. First Quarter FY16 Production, Sales and Consumption Summary

Item	Unit	First Quarter FY16	First Quarter FY15	*Percent Difference
	days	92	92	0.00%
Total Electric Use	kWhrs	21,634,862	22,393,989	-3.39%
Chilled Water	kWhrs	21,474,806	22,233,167	-3.41%
Steam	kWhrs	160,056	160,822	-0.48%
Total Water Use	kgal	52,156	52,723	-1.08%
Total Chilled Water	kgal	50,640	50,675	-0.07%
EDS Make-up	kgal	5,189	3,886	33.53%
Cooling Towers	kgal	45,451	46,789	-2.86%
Calc CT Evaporation	kgal	38,103	39,203	-2.81%
CT Blowdown	kgal	7,348	7,586	-3.14%
Calc # Cycles		5.19	5.17	0.34%
Steam	kgal	1,516	2,048	-25.98%
Total Fuel Use	mmBTU	82,728	94,468	-12.43%
Natural Gas	mmBTU	82,663	94,443	-12.47%
Propane	mmBTU	65	25	160.00%
Condensate Return	kgal	5,592	6,593	-15.18%
	lbs	45,609,747	53,772,335	-15.18%
Avg Temp	°F	186.3	187.3	-0.53%
Sendout				
Chilled Water	tonhrs	24,719,500	26,276,500	-5.93%
Steam	lbs	59,226,000	70,092,000	-15.50%
Peak CHW Demand	tons	19,612	19,159	2.36%
Peak Steam Demand	lb/hr	47,812	61,781	-22.61%
CHW LF		57.08%	62.11%	-8.10%
Steam LF		56.10%	51.38%	9.18%
Sales				
Chilled Water	tonhrs	23,697,511	24,394,278	-2.86%
Steam	lbs	40,199,239	53,199,086	-24.44%
Losses				
Chilled Water	tonhrs	1,021,989	1,882,222	-45.70%
Steam	lbs	19,026,761	16,892,914	12.63%
		32.13%	24.10%	33.30%
Degree Days				
CDD		1,165	1,084	7.47%
HDD		3	3	0.00%

*positive percent difference values imply an increase from FY15 to FY16

Table 2. First Quarter FY16 Performance Guarantee Comparison for Steam and Chilled Water

GMQ Calculations	Unit	First Quarter FY16	First Quarter FY15	*Percent Difference
Steam				
GMQ Elec Conversion	kWhr/Mlb	6.00	6.00	
Electric Conversion	kWhr/Mlb	3.98	3.02	31.71%
GMQ Plant Efficiency	Dth/Mlb	1.668	1.666	
Plant Efficiency	Dth/Mlb	1.397	1.348	3.64%
Actual %CR		77.01%	76.72%	0.38%
Avg CR Temp	°F	186	187	-0.53%
GMQ Water Conversion	gal	1,919,934	2,301,123	
Water Conversion	gal	1,531,160	2,068,480	-25.98%
Chilled Water				
GMQ Elec Conversion	kWhr/tonhr	1.055	1.055	
Electric Conversion	kWhr/tonhr	0.906	0.911	-0.57%
GMQ Water Conversion	gal/tonhr	5.25	5.25	
Water Conversion	gal/tonhr	2.14	2.08	2.87%

*positive percent difference values imply an increase from FY15 to FY16

D. Operating Costs

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

The revenues shown reflect the charges to the customers for their respective steam and chilled water service. The difference between the total costs and revenues from the customers is the shortfall that must be paid by Metro. The shortfall exists, in part, due to the remaining capacity at the EGF that was included in the original construction and remains unsold. This capacity is available for potential future customers.

The system operating costs for FY16 to date are \$5,561,630. This value represents approximately 25.7% of the total budgeted operating cost for FY16 and includes expenses to date that have been invoiced but were not paid at the time of this report. Additional invoices that would be charged to the First Quarter have not been issued or

paid at the time of this report. The customer revenues from the sales of steam and chilled water for FY16 are \$5,440,733 which is approximately 27.2% of the budgeted amount. The MFA transferred to date is \$448,500 (25% of budget). However, the actual MFA required cannot be accurately calculated due to the outstanding invoices.

Table 3. DES Expenses and Revenues to Date

Item	FY16 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee							
FOC: Basic	\$ 4,433,800	\$ 1,076,159	\$ -	\$ -	\$ -	\$ 1,076,159	24.27%
9th Chiller	\$ 41,600	\$ 10,084	\$ -	\$ -	\$ -	\$ 10,084	24.24%
C/O 6A	\$ 82,000	\$ 19,908	\$ -	\$ -	\$ -	\$ 19,908	24.28%
C/O 6B	\$ 71,800	\$ 17,429	\$ -	\$ -	\$ -	\$ 17,429	24.27%
C/O 7	\$ 27,100	\$ 6,566	\$ -	\$ -	\$ -	\$ 6,566	24.23%
C/O 8	\$ 11,900	\$ 2,873	\$ -	\$ -	\$ -	\$ 2,873	24.15%
Pass-thru Charges:	\$ 139,500	\$ 42,247	\$ -	\$ -	\$ -	\$ 42,247	30.28%
Insurance	\$ 32,100	\$ 2,675	\$ -	\$ -	\$ -	\$ 2,675	8.33%
Marketing:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
CES Sales Activity	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Incentive Payments	\$ 12,800	\$ 3,139	\$ -	\$ -	\$ -	\$ 3,139	24.53%
FEA:	\$ -	\$ 13,900	\$ -	\$ -	\$ -	\$ 13,900	n.a.
Steam	\$ -	\$ 144,264	\$ -	\$ -	\$ -	\$ 144,264	n.a.
Chilled Water	\$ -	\$ (226,605)	\$ -	\$ -	\$ -	\$ (226,605)	n.a.
Misc:	\$ -	\$ 15,630	\$ -	\$ -	\$ -	\$ 15,630	n.a.
Metro Credit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
ARFA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Deferral	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Man Fee =	\$ 4,852,600	\$ 1,354,873	\$ -	\$ -	\$ -	\$ 1,354,873	27.92%
Reimbursed Management Fee + Chem Treatment		\$ 904,224	\$ -	\$ -	\$ -	\$ 904,224	0.00%
Metro Costs							
Pass-thru Charges:	\$ 9,000	\$ 33,421	\$ -	\$ -	\$ -	\$ 33,421	371.34%
EDS R&I Transfers	\$ 282,100	\$ 279,525	\$ 23,508	\$ -	\$ -	\$ 303,033	107.42%
Metro Marketing	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Project Administration	\$ 54,400	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Metro Incremental Cost	\$ 529,600	\$ 143,244	\$ 30,176	\$ -	\$ -	\$ 173,420	32.75%
Utility Costs:	\$ 745,400	\$ 210,481	\$ -	\$ -	\$ -	\$ 210,481	28.24%
Water/Sewer	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
EDS Water/Sewer	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
EDS Electricity	\$ -	\$ 16,124	\$ -	\$ -	\$ -	\$ 16,124	n.a.
Electricity	\$ 6,545,700	\$ 2,336,989	\$ -	\$ -	\$ -	\$ 2,336,989	35.70%
Natural Gas Consultant	\$ 100,900	\$ 1,333	\$ -	\$ -	\$ -	\$ 1,333	1.32%
Natural Gas Transport	\$ -	\$ 48,964	\$ -	\$ -	\$ -	\$ 48,964	n.a.
Natural Gas Fuel	\$ 3,287,100	\$ 265,110	\$ -	\$ -	\$ -	\$ 265,110	8.07%
Propane	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Metro Costs =	\$ 11,564,200	\$ 3,335,190	\$ 53,684	\$ -	\$ -	\$ 3,388,874	29.30%
Subtotal - Operations =	\$ 16,416,800	\$ 4,690,064	\$ 53,684	\$ -	\$ -	\$ 4,743,748	28.90%
Debt Service							
2012 Bonds	\$ 3,479,500	\$ 878,313	\$ -	\$ -	\$ -	\$ 878,313	25.24%
2005 Bonds -Self Funded	\$ 762,200	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
2007 Bonds -Self Funded	\$ 204,400	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
2008 Bonds -Self Funded	\$ 203,400	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
2010 Bonds -Self Funded	\$ 202,400	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
MCCC Fund -Self Funded	\$ 714,000	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Interest & Misc Revenue	\$ (156,900)	\$ (6,747)	\$ -	\$ -	\$ -	\$ (6,747)	4.30%
MIP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Oper. Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Capital =	\$ 5,409,000	\$ 871,566	\$ -	\$ -	\$ -	\$ 871,566	16.11%
Total =	\$ 21,825,800	\$ 5,561,630	\$ 53,684	\$ -	\$ -	\$ 5,615,314	25.73%
Customer Revenues							
Taxes Collected	\$ -	\$ 113,667	\$ -	\$ -	\$ -	\$ 113,667	n.a.
Taxes Paid	\$ -	\$ 78,946	\$ -	\$ -	\$ -	\$ 78,946	n.a.
Penalty Revenues/Credits	\$ -	\$ (38,116)	\$ -	\$ -	\$ -	\$ (38,116)	n.a.
Energy Revenues Collected	\$ -	\$ 5,444,128	\$ -	\$ -	\$ -	\$ 5,444,128	n.a.
Revenues =	\$ 20,031,300	\$ 5,440,733	\$ -	\$ -	\$ -	\$ 5,440,733	27.16%
Metro Funding Amount =	\$ 1,794,500	\$ 120,897	\$ 53,684	\$ -	\$ -	\$ 174,581	9.73%

The DES serves 28 customers and 41 buildings in downtown Nashville. These customers are divided into three categories: 1) Private customers who privately own their buildings, 2) State of TN owned buildings and 3) Metro owned buildings. A summary of the annual costs for each of these three categories is presented in Table 4. These values include late fees and penalties and any unpaid balances.

Table 4. Customer Revenue Summary to Date

Building	Chilled Water			Steam		
	Total Cost	Consumption (tonhrs/yr)	Unit Cost (\$/tonhr)	Total Cost	Consumption (Mlb/yr)	Unit Cost (\$/Mlb)
Private Customers	\$ 1,270,442	7,256,619	\$ 0.1751	\$ 320,340	11,059	\$ 28.9676
State Government	\$ 1,101,461	5,633,902	\$ 0.1955	\$ 377,049	10,578	\$ 35.6454
Metro Government	\$ 1,895,096	10,806,990	\$ 0.1754	\$ 479,739	18,563	\$ 25.8439
New Customers	\$ 1,190,755	6,937,315	\$ 0.1716	\$ 253,767	13,345	\$ 19.0157
Total	\$ 4,267,000	23,697,511	\$ 0.1801	\$ 1,177,128	40,199	\$ 29.2824

Total Revenue	\$	5,444,128
True-up and Adjustments (Net)	\$	(3,395)
Net Revenue	\$	5,440,733

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY16. Communication between TEG and CNE continues to be excellent, and CNE has reported and managed all EGF operations satisfactorily and according to the ARMA with no contract violations.

A. Reliability

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

- There were no reported excursions or disruptions for the quarter for the chilled water system.
- Emergency steam system interruptions occurred on August 26 and September 2 to make repairs in MH-B and 18.
- A scheduled system outage occurred on July 19 through 20.
- Minor decreases in the steam sendout pressure occurred in July and August while testing the low water cutoff in the boilers.
- A faulty feedwater regulating valve caused the steam sendout pressure to drop to a low of 102.3 psig on August 5. The steam pressure was below 150 psig for approximately 75 minutes.
- Excursions and disruptions in operations that have occurred throughout the year are included in the individual Monthly Operational Reports from CNE.

B. Efficiency

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

C. Environment, Health and Safety

The Semi Annual Monitoring report was sent to the Metro Health Department in July.

No environmental violations were reported during the quarter.

Monthly safety meetings were held on Fire Extinguisher Training, fire protection, emergency escape equipment, first aid, CPR, AED use, Confined Space Entry and Rescue Pre-planning.

CNE continues cross-training its maintenance employees to fill in as relief operators.

D. Personnel

The EGF currently has twenty-five full time employees. Of the current number of employees, seventeen were previously employed by Nashville Thermal Transfer Corporation.

E. Training

Staff training for this quarter consisted of the Health and Safety training discussed previously. CNE continues cross training maintenance personnel to perform the tasks of the operators at the EGF in case of emergency or need.

F. Water Treatment

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

- Steam System
 - The condensate return averaged approximately 77% of the steam sendout during the quarter which represents a marginal increase over the previous First Quarter.
- Condensing Water System
 - The conductivity of the condensing water continues normal with only a few excursions resulting in high cycles of concentration and low blowdown rates.
- Chilled Water System
 - CNE added another dose of the biocide during the First Quarter FY16 in an attempt to eradicate the bacteria. CNE continues to monitor and test for the presence of bacteria in the system and is working towards the installation of a continuous biocide feed. It is also believed that the

presence of the bacteria is reducing the heat transfer abilities of several of the customer heat exchangers. As a result of this on-going issue, DES119 was created as an attempt at reducing the impact the presence the bacteria may have on the heat transfer of customer heat exchangers.

G. Maintenance and EGF Repairs

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

- The belts were replaced or tightened on the fans for cooling towers 8, 9, 11 and 15.
- The safety valve piping on deaerator 1 was re-routed and the deaerator bypass valves were repositioned and chain operators were added.
- The purge unit for chiller 5B was replaced by Trane.
- Several valves at the EGF were replaced.
- The O2 analyzer on boiler 3 was calibrated.
- Other minor repairs and maintenance were made during the quarter and are listed in the monthly reports issued by CNE.

H. EGF Walk-through

A quarterly Walk-through of the EGF was performed on September 7, 2015, by Kevin Jacobs, P.E. with TEG. This review involved a tour of the facility with the primary points of interest and concern noted herein.

- Many of the housekeeping items noted in the previous walk-through have been repaired or resolved.
- Some of the riser pipes in the cooling towers have been painted, but some repairs remain. CNE has dedicated itself to repaint these riser pipes as the tower basins are repaired and the fill is replaced. They estimate a complete restoration of these components over the next couple of winters.
- The damaged door to the motor control center (MCC#1) on the cooling tower deck has been repaired.
- Bricks supporting the water meter lids along KVB are missing. Since this area is prone to unauthorized pedestrian traffic now due to the new Ascend Amphitheater, CNE was instructed to make repairs to the meter box lids and prevent people from being in this area until repairs could be made.
- The bent rung on the ladder between the main operating floor and the water treatment mezzanine has been repaired.

- Cobwebs have reformed in various places throughout the plant and on motor control center #4 located near the boilers; these should be removed. However, progress has been made in removing some of these cobwebs.

IV. Capital Projects

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

A. First Quarter FY16 Open Projects

The following projects remained open at the end of the First Quarter FY16.

1. DES033 – Manhole Lid and Ring Replacement/Restoration

This project relates to the repair and replacement of manhole lids and rings whenever Metro Public Works performs Street re-paving. This project will remain open and on-going.

2. DES090 – Manhole & Tunnel Insulation Repair (Revised from DES060)

Work associated with this project will be on-going as required.

3. DES104 –NES Time of Use Rates

CNE provided a proposal to perform the necessary programming changes for this project during the quarter. DES approved the proposal and CNE anticipates the final implementation of the programming changes during the Third Quarter FY16.

4. DES107 – Manholes A, B and M Repairs and Improvements

Punchlist items were completed during the First Quarter FY16. It is expected that this project will be closed out during the Second Quarter FY16.

5. DES110 – EGF Alternative Fuel

TEG and CNE have evaluated the options for alternative fuel sources during FY15. At this time, no modifications to the EGF are anticipated, but a change in the purchase and delivery of propane will be made by CNE to ensure a consistent and available supply during curtailments. A final report from CNE is anticipated prior to the heating season which will include their proposal for a second propane tank and their propane purchasing plan.

6. DES112 – Condensate Return Piping Replacement
at the Cordell Hull Building

Construction began and was completed on this project during the First Quarter FY16. It is expected that this project will be closed out during the Second Quarter FY16.

7. DES117 - Manhole S5 Rebuild

Design drawings, bidding/award and construction began during the First Quarter FY16. It is anticipated that construction will be completed during the Second Quarter FY16 and the project should be closed out during the Third Quarter FY16.

8. DES119 - Chilled Water System Delta T Issue

In the Fourth Quarter of FY15, TEG and CNE began investigating potential remedies for the newly discovered bacteria in the chilled water system and its effect on the heat transfer at several customer buildings. After investigating the issue and consulting with several vendors, a proposal was requested from Hydroflow. This company manufactures a device that is purported to kill bacteria and remove its residue that may be attached to the piping interiors and effecting the heat transfer.

During the First Quarter FY16, CNE requested a formal proposal for this device to be installed at the Metro Courthouse. The final approval for this work and the installation of the device is anticipated in the Second Quarter FY16.

B. First Quarter FY16 Closed Projects

No projects were closed during the First Quarter FY16.

C. Capital Projects Budget

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

Table 5. Capital Projects Expense Summary

DES Project #	Description	Total Budget	FY16 Spending to Date	Total Spent to Date	Remaining Balance
2010 Bond Projects -49109					
DES070	MH 6 to 23 Cond Line	\$ 20,000	\$ -	\$ 527	\$ 19,473
DES071	Hermitage Hotel Ser Modifications	\$ 20,000	\$ -	\$ 1,119	\$ 18,881
DES072	Sheraton Stm & Cond Line	\$ 11,000	\$ -	\$ 10,462	\$ 538
DES091	NES Time of Use Electric Rate	\$ 100,000	\$ -	\$ 64,616	\$ 35,384
DES089	AA Birch Tunnel Repairs	\$ 175,000	\$ 117	\$ 172,849	\$ 2,151
DES105	Suntrust Shaft Repairs	\$ 160,000	\$ 117	\$ 159,010	\$ 990
DES111	DES CHP	\$ 200,000	\$ 11,880	\$ 78,418	\$ 121,582
	Total Closed Projects	\$ 1,834,533	\$ -	\$ 1,834,533	\$ -
	Metro Project Admin	\$ -	\$ -	\$ -	\$ -
	Project Man, Development, etc	\$ 105,383	\$ -	\$ -	\$ 105,383
	Total 2010 Bond	\$ 2,625,916	\$ 12,115	\$ 2,321,534	\$ 304,382
Customer Connection Fund -49107					
DES104	Time of Use/ Customer Billing	\$ 30,000	\$ 1,659	\$ 8,012	\$ 21,988
DES106	Courthouse CHW Heat Exchanger	\$ 10,000	\$ 1,697	\$ 71,276	\$ (61,276)
DES110	Alternative Fuel Source for EGF	\$ 50,000	\$ -	\$ 19,242	\$ 30,758
	Sub-Total Closed Projects	\$ 7,161,827	\$ -	\$ 6,559,502	\$ 602,325
	Metro Project Admin	\$ 60,000	\$ 7,858	\$ 64,803	\$ (4,803)
	Project Man, Development, etc	\$ 1,188,173	\$ -	\$ -	\$ 1,188,173
	Customer Connection Fund	\$ 8,500,000	\$ 11,214	\$ 6,722,835	\$ 1,777,165

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

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

A. Repairs and Improvements

Several repairs were made to the EDS and at customer buildings during the quarter. The remaining value of the R&I budget at the end of the current quarter is \$17,098 (including a few 2nd Quarter paid invoices). Table 6 provides a summary of the FY16 expenditures and revenues to date associated with the R&I budget.

Table 6. Repair and Improvement Expenditure and Revenue Summary

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Net Market Adjustment	Market Value	Balance
Value at end of FY15						\$ -	\$ 46,884.53	\$ 46,884.53
Reimbursement for Symphony Line Damage	7/29/2015	N/A	N/A	\$ (23,197.62)				
Reimbursement for MCC Line Damage	7/29/2015	N/A	N/A	\$ (31,628.93)				
Reimbursement for MCC Line Damage	7/29/2015	N/A	N/A	\$ (22,294.00)				
CNE June R&I	8/13/2015	DES-1938	CNE	\$ 1,820.59				
DES-107 MH A&B Mech	8/6/2015	DES-2038	TEG	\$ 1,366.75				
DES-112 Cordell Hall	8/6/2015	DES-2038	TEG	\$ 1,565.60				
DES-113 Malley Bridge	8/6/2015	DES-2038	TEG	\$ 85.50				
DES-117 M/H S5 Modification	8/6/2015	DES-2038	TEG	\$ 4,607.90				
DES-118 2015 Steam Outage	8/6/2015	DES-2038	TEG	\$ 1,039.45				
DES-107 MH A&B Mech Rebuild	9/17/2015	DES-2050	TEG	\$ 3,229.50				
DES-112 Cordell Hall Condens	9/17/2015	DES-2050	TEG	\$ 3,214.40				
DES-113 Malloy Bridgestone C	9/17/2015	DES-2050	TEG	\$ 213.75				
DES-117 M/H S5 Modificaton	9/17/2015	DES-2050	TEG	\$ 2,561.15				
DES-118 2015 Steam Outage	9/17/2015	DES-2050	TEG	\$ 156.20				
DES 106.2 Metro Courthouse CHW	6/30/2015	N/A	CNE	\$ (2,164.16)				
DES 106.2 Metro Courthouse CHW	6/30/2015	N/A	CNE	\$ (55,340.67)				
DES 106.2 Metro Courthouse CHW	6/30/2015	N/A	CNE	\$ 2,164.16				
DES 106.2 Metro Courthouse CHW	6/30/2015	N/A	CNE	\$ 55,340.67				
DES-107 MH M, B & 2	9/30/2015	DES-2060	CNE	\$ 12,766.11				
CNE July R&I	9/30/2015	DES-2061	CNE	\$ 3,027.55				
DES-118 2015 Steam Outage	9/30/2015	DES-2062	CNE	\$ 7,643.86				
DES-118 2015 Steam Outage	9/30/2015	DES-2063	CNE	\$ 105,923.70				
DES-107 MH M, B & 2	9/30/2015	DES-2064	CNE	\$ 28,360.11				
			Sub-Total First Quarter	\$ 100,461.57	\$ 70,524.99	\$ -	\$ (29,936.58)	\$ (29,936.58)
DES-107 MH M, B & 2	10/2/2015	DES-2068	TEG	\$ 1,063.40				
DES-109 Indigo Hotel	10/2/2015	DES-2068	TEG	\$ 117.15				
DES-112 Cordell Hull Condensate	10/2/2015	DES-2068	TEG	\$ 2,152.65				
DES-117 M/H S5 Modificaton	10/2/2015	DES-2068	TEG	\$ 7,910.65				
DES-118 2015 Steam Outage	10/2/2015	DES-2068	TEG	\$ 334.60				
DES-107 MH M, B & 2	10/13/2015	DES-2072	TEG	\$ 546.70				
DES-109 Indigo Hotel	10/13/2015	DES-2072	TEG	\$ 312.40				
DES-112 Cordell Hull Condensate	10/13/2015	DES-2072	TEG	\$ 2,310.47				
DES-117 M/H S5 Modificaton	10/13/2015	DES-2072	TEG	\$ 8,610.40				
			Sub-Total Second Quarter	\$ 23,358.42	\$ 23,508.33	\$ -	\$ 149.91	\$ 149.91
			Sub-Total Third Quarter	\$ -	\$ -	\$ -	\$ -	\$ -
			Sub-Total Fourth Quarter	\$ -	\$ -	\$ -	\$ -	\$ -
			FY16 Year to Date	\$ 123,819.99	\$ 94,033.32	\$ -	\$ 17,097.86	\$ 17,097.86

B. Preventive Maintenance

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

1. EDS Manhole Inspections
 - a. Some traps were found not to be functioning properly; CNE is continuing to repair or replace traps in the system.
 - b. Structural metal in the vaults and tunnels need to be cleaned and painted.
 - c. Spalled concrete needs to be repaired in some manholes.
 - d. Some minor insulation repairs are needed in some vaults.
 - e. Mud and debris needs to be removed from some manholes.

2. Other EDS Inspections
 - a. Minor items are included in the CNE monthly reports.

C. Emergencies

No emergencies were reported during the quarter.

D. EDS Walk-through

A walkthrough was conducted on September 22, 24 and 25, 2015 by Jon B. Belcher, PE. The manholes visited included: Manholes 2, 3, 4, 5, 6, 9, 10, 11, 13 and D. The following comments and observations are a result of these visits.

1. Manhole 2

- a. There was water present in this manhole and it required pumping before entry.
- b. There is some moderate insulation repair work that needs to be done in this manhole; the insulation end cap on the steam piping has fallen off and needs to be repaired or replaced. When manhole insulation repairs are scheduled, these repairs should be made.
- c. Significant mud has accumulated in the floor of this manhole, presumably from seepage between the walls and floor. This mud should be cleaned from the manhole; possibly by introducing water into the floor and using a vacuum truck to remove the muddy water mixture. CNE needs to coordinate and schedule this effort. TEG will investigate sealant products to be applied at the wall/floor joints once this cleaning is complete.
- d. The walls and ceiling were patched with a concrete patch in September 2013; CNE personnel should monitor these patched areas and notify TEG if the patches begin to crack, deteriorate, etc.

2. Manhole 3

- a. There was water present in this manhole and it required pumping before entry.
- b. There are some hairline cracks in the concrete walls that should be monitored.
- c. There is some minor debris in the manhole which should be removed.
- d. There are some minor insulation lagging repairs which should be made the next time that manhole insulation repairs are scheduled.
- e. The existing steam slip joint insulation blanket is in poor condition; this blanket should be replaced the next time that manhole insulation repairs are scheduled.

3. Manhole 4

- a. There was water present in this manhole and it required pumping before entry.
- b. The paint on the entry ladder and some steel supports is peeling off. There is some moderate corrosion of essential structures in this manhole. The ladder and structures should be wire-wheeled and painted with cold galvanizing paint to prevent further corrosion.

- c. The ceiling and sidewalls of this manhole interior are steel which remain from the original manhole. Concrete walls and roof were installed outside of these steel walls/ceiling when the manhole was rebuilt several years ago. The steel ceiling and ceiling members have corroded badly and portions could fall on personnel if it is not removed soon. TEG will develop a scope of work to have the steel ceiling removed. CNE personnel should wear hardhats and other protective gear when entering this manhole.
 - d. The manhole vent is located directly above a steam pipe kicker/anchor. Because of this, rainwater drips directly onto this kicker/anchor. CNE should install flashing anchored to the wall to divert this rainwater to the floor without it falling on any of the manhole structural members.
4. Manhole 5
- a. There was water present in this manhole and it required pumping before entry.
 - b. There are some minor insulation lagging repairs which should be made in this manhole the next time that manhole insulation repairs are scheduled.
 - c. Mud has accumulated in the floor of this manhole and should be removed. This mud should be cleaned from the manhole; possibly by introducing water into the floor and using a vacuum truck to remove the muddy water mixture. CNE needs to coordinate and schedule this effort. TEG will investigate sealant products to be applied at the wall/floor joints once this cleaning is complete.
 - d. The entry ladder is corroded and should be replaced within the next 3 months with an aluminum ladder.
5. Manhole 6
- a. There was water present in this manhole and it required pumping before entry.
 - b. There is some spalling of the manhole's concrete wall at the east steam piping entry point that does not appear any worse since the last review. TEG will coordinate repairs for this with CNE.
 - c. Mud has accumulated in the floor of this manhole, presumably from seepage between the walls and floor. This mud should be cleaned from the manhole; possibly by introducing water into the floor and using a vacuum truck to remove the muddy water mixture. CNE needs to coordinate and schedule this effort. TEG will investigate sealant products to be applied at the wall/floor joints once this cleaning is complete.
6. Manhole 9
- a. There wasn't any water in the floor of the manhole, therefore it appears that the existing sump pump has been functioning properly.
 - b. There is corrosion on some of the piping support bases and some of the paint is starting to flake off. CNE personnel should remove this corrosion with a wire wheel and paint these bases with cold galvanizing paint before this corrosion progresses.
 - c. The link seals at the wall penetrations of the steam piping and the City water/drain piping are weeping groundwater. CNE should monitor these link seals and if the

seepage worsens the link seals should be tightened; this will involve the removal of some insulation and lagging to access the link seal bolts.

- d. Some cracking has occurred in the underside of the concrete opening which was cut into the northern wall of the “old” manhole. TEG forwarded pictures from the prior review of this manhole to our structural engineer for comment and he is not overly concerned with the crack but does recommend that the crack be sealed. On 4/15/15 an email was sent to CNE which included product information on two recommended crack sealants to see if sealing the crack is a job which CNE could undertake. To date, TEG has not received a response to this email.

7. Manhole 10

- a. There was a minor amount of water present in this manhole due to the slope of the floor.
- b. The condensate anchor has some minor corrosion on it. CNE should clean this anchor with a wire wheel and paint it with cold galvanizing paint before this corrosion progresses.
- c. The grout surrounding the southern steam piping penetration is starting to spall. CNE should monitor this and inform TEG if it worsens.
- d. The top rung of the entry ladder has fallen out. Since it is an aluminum ladder, it would be difficult to weld on-site. An alternate repair would involve drilling and tapping a 1/4” or 3/8” hole in the center of each end of the rung; drilling a 1/16” larger hole in the side rails of the ladder at the rung location and then installing stainless bolts with lock washers through the side rails into each end of the ladder rung. Please proceed with this repair at the earliest convenience.

8. Manhole 11

- a. There was water in this manhole and was pumped the day prior to entry.
- b. This item first appeared in the Quarterly EDS Walkthrough Report on October 6, 2011. The entry ladder consists of individual ladder rungs embedded into the concrete walls. This type of ladder rung can fail without warning and could result in injury to personnel. These rungs should be removed from the walls and a new ladder installed. Using the aluminum standard ladder detail provided by TEG, CNE should solicit bids for this work to be completed as an R&I project.
- c. The trap was not functioning; CNE should repair or replace this trap as soon as possible.
- d. There is some moderate corrosion in this manhole. CNE should remove this corrosion with a wire wheel and paint it with cold galvanizing paint before this corrosion progresses.
- e. Mud has accumulated in the floor of this manhole. This mud should be cleaned from the manhole; possibly by introducing water into the floor and using a vacuum truck to remove the muddy water mixture. CNE needs to coordinate and schedule this effort. TEG will investigate sealant products to be applied at the wall/floor joints once this cleaning is complete.

9. Manhole 13

- a. There was very little water present in this manhole so it was not pumped prior to entry.
- b. The entry ladder is corroded and should be replaced within the next 3 to 6 months with an aluminum ladder.
- c. There are several locations where concrete has spalled from the ceiling and concrete beams in the manhole and should be repaired. TEG is developing a methodology for this repair.

10. Manhole D

- a. There was water present in the manhole and it required pumping prior to entry.
- b. All of the steel structural components in the manhole need to be cleaned of all rust and painted to prevent further corrosion. Some corrosion is severe. This manhole is a “High” priority on the “MH & Tunnel Structural Corrosion Prevention/Repair”.
- c. There is some minor concrete spalling within this manhole. These areas should be repaired to prevent any further deterioration. TEG will develop a scope for this repair.
- d. There is some minor piping insulation damage in this manhole. These repairs should be made the next time manhole insulation repairs are done.
- e. There is some debris in the manhole and the manhole should be cleaned.
- f. Water/steam hammer was occurring in the manhole. The existing “sparge” station needs to be replaced with a more efficient unit that will eliminate this hammering. TEG will develop a scope for a new sparge tube to be installed as an R& I project.
- g. Mud has accumulated in the floor of this manhole. This mud should be cleaned from the manhole; possibly by introducing water into the floor and using a vacuum truck to remove the muddy water mixture. CNE needs to coordinate and schedule this effort. TEG will investigate sealant products to be applied at the wall/floor joints once this cleaning is complete.
- h. There is an existing drain line installed in this manhole which apparently used to be connected to a sump pump. CNE personnel were asked to re-visit this manhole with a fish tape to see if this drain is clear and could function as a sump pump discharge.

11. Manhole D Sump

- a. No deficiencies to report.

VI. Customer Relations

This section contains descriptions of the marketing efforts made by the DES Team during the quarter. The topics of interactions, meetings and training seminars with the customers are also discussed. There are currently 28 customers, comprised of 41 different buildings, connected to the EDS. Service to each of these buildings continues to prove satisfactory, and the responsiveness to customer issues is handled by CNE in an excellent and professional manner.

A. Marketing

The DES has placed a temporary hold on active marketing at this time due to the uncertainty of the actual steam and chilled water loads on the MCC and due to the higher than normal system temperature differences that may be related to the chilled water chemistry. TEG will continue to monitor this issue and make recommendations to Metro regarding the availability of any additional capacity.

Lifeway contacted DES during the quarter to discuss the potential service from the DES for their proposed office building at Peabody and KVB (adjacent to the EGF). After several meetings with Lifeway personnel and their engineer, a proposal for steam and chilled water service was provided to them. Due to issues related to the sale of their existing properties, Lifeway has not moved forward with accepting the DES proposal.

B. Customer Interaction

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

- Customers were contacted regarding the July 19 steam shutdown.
- CNE assisted the Tennessee Tower personnel in searching for a potential chilled water leak in their in-building system.
- CNE and TEG met with the Schermerhorn Symphony personnel to discuss control changes to their chilled water system.
- A few minor instrumentation issues were found at several customers during the quarter and addressed by CNE in a timely manner.
- An emergency steam outage occurred on September 2 through 3 due to a leak in MH-18. CNE notified the effected customers.
- Several meetings and conversations between CNE, TEG and a few customers occurred during the quarter related to the internal operations of their buildings.
- CNE received an upgrade from Yokogawa (the CX panel manufacturer) during the quarter that should resolve the issue noted in the previous quarter's report regarding the freezing of the metering panels. These upgrades were installed where the freezes previously occurred and will be installed at all customers' buildings as the meters and instruments are calibrated each year.
- Other minor issues and customer interactions are noted in the monthly CNE reports.

VII. Recommendations

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

- Corroded structural steel within the vaults and tunnels should be cleaned and painted or replaced; TEG will continue to coordinate this effort with CNE.
- Insulation which is absent, or in disrepair, in the vaults should be addressed through either additional capital projects, which include work within these vaults, or through DES090.
- Steam traps which need repair or replacement should be addressed as soon as possible.
- Concrete repairs need to be made in some manholes. TEG will continue to coordinate this effort with CNE.
- Mud and debris needs to be cleaned from some manholes.
- Additional monitoring is required to determine the effectiveness of the chilled water chemistry.