



**Operations Monitoring Report**  
**Third Quarter FY09**

**Prepared by:**

**Thermal Engineering Group, Inc.**  
**105 Hazel Path Court, Ste 2**  
**Hendersonville, TN 37075**

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## **I. Executive Summary**

A review of the fiscal year 2009 (FY09) Third Quarter performance and contract obligations between Nashville District Energy, LLC (CNDE) 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. Thus far in FY09, CNDE has satisfactorily met all of the contract obligations to Metro.

For the Third Quarter FY09, the chilled water sendout decreased by approximately 16% over the previous Third Quarter (FY08), and the sales decreased by approximately 10%. However, the number of cooling degree days increased by approximately 40% over the same periods. The peak chilled water demand for the current quarter is 9,400 tons with a cooling load factor for the quarter of approximately 43%.

The steam sendout is approximately 12% lower this quarter than the previous Third Quarter, and steam sales are down by approximately 10%. The number of heating degree days for the current quarter were approximately the same as in the previous Third Quarter. Steam system losses were approximately 10% of the sendout which was approximately 22% less than in the previous Third Quarter. The peak steam demand for the current quarter is 126,625 pounds per hour, which represents a 3% increase from the previous Third Quarter. The heating load factor for the quarter is approximately 47%, which is a decrease of approximately 14% from the previous Third Quarter.

The Energy Generating Facility (EGF) performance continues to surpass the System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels. The chilled water and steam plant electric consumptions continue to perform considerably lower than the guaranteed levels. The steam plant fuel efficiency decreased marginally from the previous Third Quarter. The total water consumption for the steam and chilled water plants has decreased approximately 20% from the previous Third Quarter due to the extensive repairs to the condensate return system and improved EGF water chemistry.

Work continued on DES Capital and Repair & Improvement Projects during the Third Quarter of FY09. For this quarter, three projects were closed: DES036 - 4<sup>th</sup> Avenue Tunnel Exhaust Fan Repair, DES045 - Condensate Repair Manhole 6 to Manhole 23 and DES052 - Condensate Tempering and Disposal - 120 2<sup>nd</sup> Ave. North. Two FY09 projects were substantially completed during the Second Quarter FY09 (DES054 and DES055) with close-out expected to occur in the Fourth Quarter FY09. The FY09 capital budget has not yet been approved, thus these capital projects are being funded by resources from the previous years' capital budget accounts. Repair and Improvements to the EDS continue as scheduled.

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## II. Energy Distribution System Sales and Performance

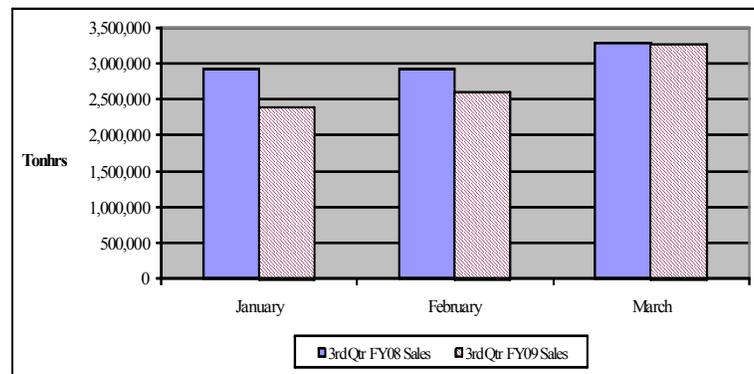
This section of the report discusses and presents performance information regarding the operation of the EGF for the periods described. Charts and tabular data are also presented to provide a more detailed description of the actual EGF performance.

### A. Chilled Water

#### 1. Sales and Sendout

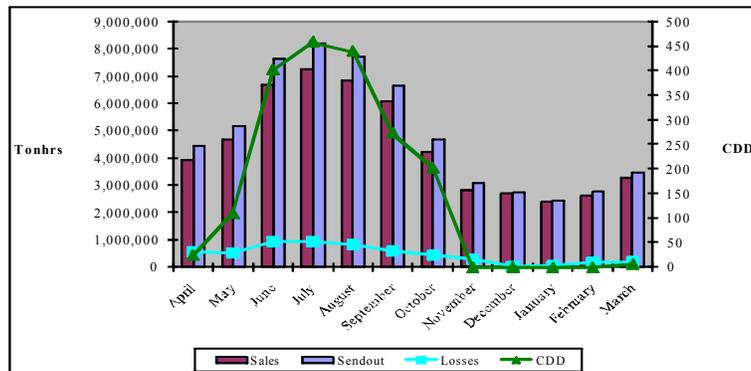
A comparison for the Third Quarter chilled water sales is shown in Figure 1. This data reflects a decrease in sales for the current quarter over the same quarter of the previous fiscal year. Although the number of cooling degree days increased by 40% this quarter, the total number was only 7. The decrease in sales could be attributed to fluctuations in the weather and in customer energy conservation measures.

The peak chilled water demand for the current quarter is 9,400 tons. The cooling load factor for the current quarter, relative to sendout, is approximately 43% and is 11.4% less than in the previous Third Quarter.



**Figure 1. Third Quarter FY09 Chilled Water Sales**

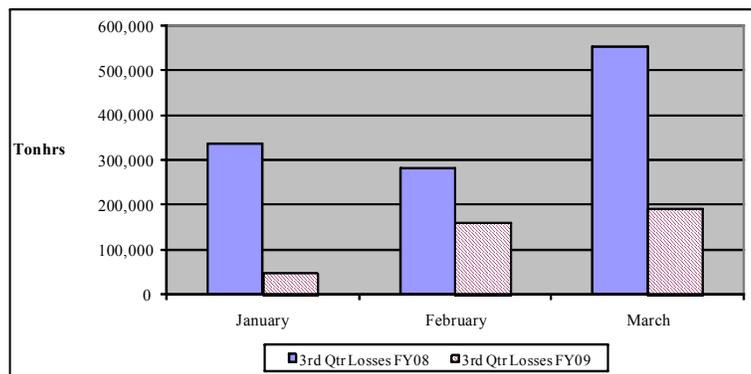
Figure 2 shows the chilled water sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in tonhrs per month between the recorded sendout and sales values and represent the total energy loss for chilled water in the EDS. The number of cooling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



**Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous 12 Months**

2. Losses

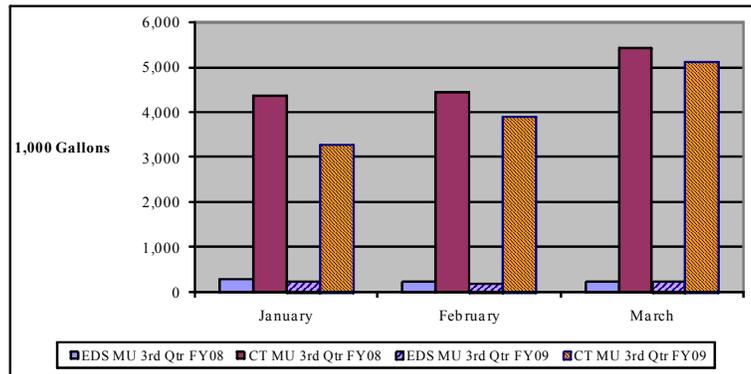
A comparison of the total, chilled water energy losses in the EDS for the Third Quarter is shown in Figure 3. These losses are the difference in chilled water sendout and sales. The energy loss is caused by a combination of the loss in the mass of chilled water and a net heat gain into the chilled water piping. The increase in supply temperature between the EGF and the customers is typically less than 1°F.



**Figure 3. Chilled Water System Loss Comparison for the Third Quarter FY09**

A decrease in the mass loss is noted with a comparison between the Third Quarter EDS city water make-up for FY08 and FY09 of approximately 13%. The energy losses also decreased by approximately 66%. The make-up to the cooling towers also decreased by approximately 13%. The number of cycles of concentration in the condensing water circuit increased in the Third Quarter by approximately 19% over

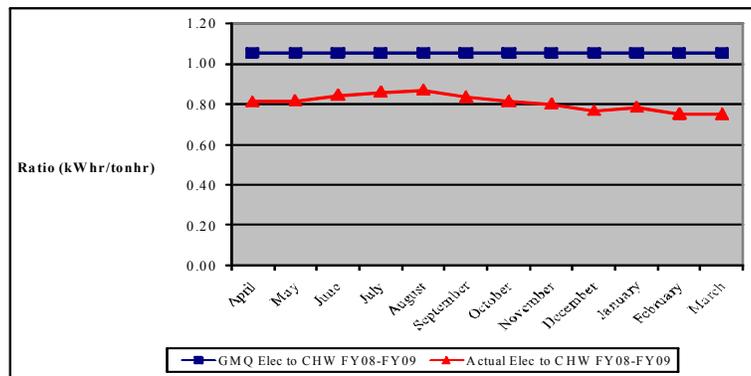
the previous Third Quarter. The average number of cycles was 5.8 in the Third Quarter FY09, which reflects an improvement in EGF water chemistry. The overall city water make-up comparison for the chilled water system is shown in Figure 4.



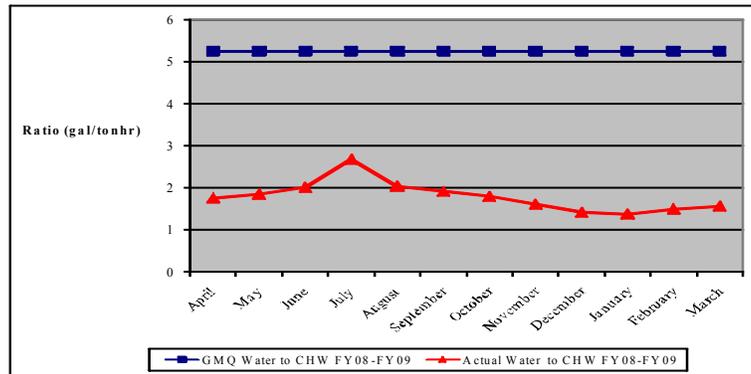
**Figure 4. Chilled Water System City Water Usage Comparison**

### 3. Performance

The performance of the chilled water aspect of the EGF is presented by the following two charts, Figures 5 and 6, for FY09. Under the management of CNDE, 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 12 Months**



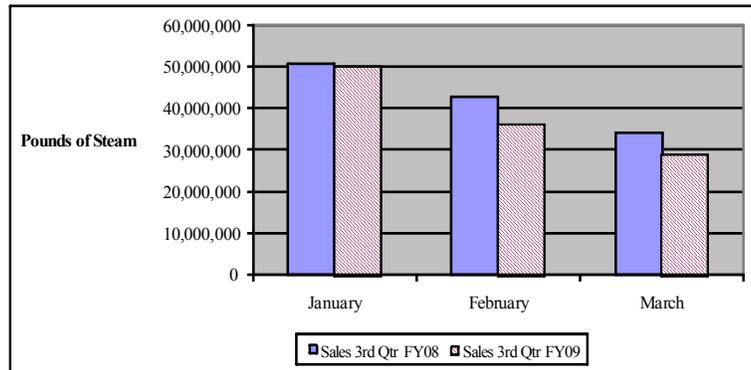
**Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous 12 Months**

The chilled water allocation of the electric consumption falls under the GMQ limit of 1.055 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. The electric usage for the current quarter decreased approximately 13% over the Third Quarter for FY08. The actual chilled water plant water conversion factor is approximately 4% less than in the previous Third Quarter. The consumption of city water for the chiller plant for the current quarter is approximately 20% less than that for the previous Third Quarter.

**B. Steam**

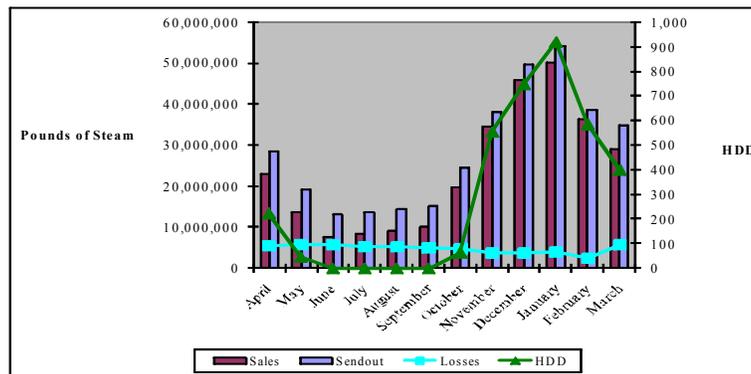
**1. Sales and Sendout**

The steam sendout decreased by approximately 12% for the current quarter over the previous Third Quarter (FY08), and the sales also decreased by approximately 10%. The steam system losses decreased by approximately 32%. The number of heating degree days decreased by approximately 3%. A comparison for the Third Quarter steam sales is shown in Figure 7.



**Figure 7. Third Quarter FY09 Steam Sales**

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.



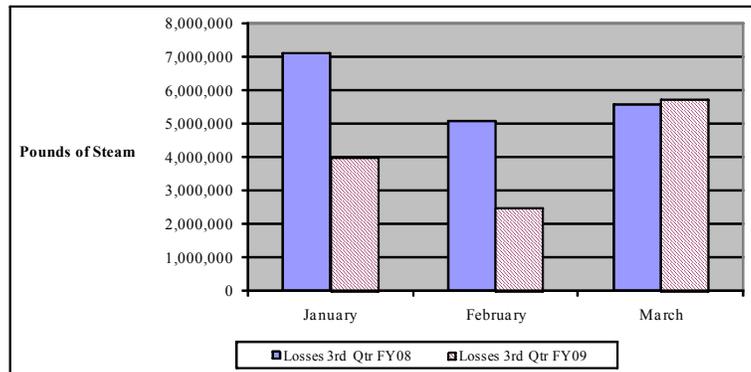
**Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous 12 Months**

The peak steam demand for the current quarter is 126,625 pounds per hour, which is approximately 3% higher than the peak demand for the previous Third Quarter. The heating load factor for the current quarter, relative to sendout, is approximately 47% and represents a decrease in the load factor over the previous Third Quarter of approximately 14%.

## 2. Losses

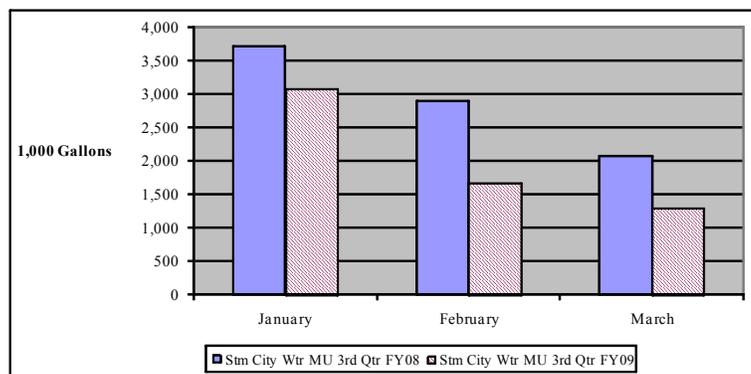
A comparison of the total steam mass losses in the EDS for the Third Quarter is shown in Figure 9. The mass loss is caused by the heat loss in the EDS between the EGF and the customer meters, resulting in a mass loss at steam traps. Faulty traps,

steam leaks or meter error could also be a contributing cause of these losses. The total losses for the current quarter are approximately 22% less than in FY08.



**Figure 9. Third Quarter FY09 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 Third Quarter data in Figure 10. Figure 10 depicts a decrease in city water make-up to the steam system of approximately 30% for the current quarter.

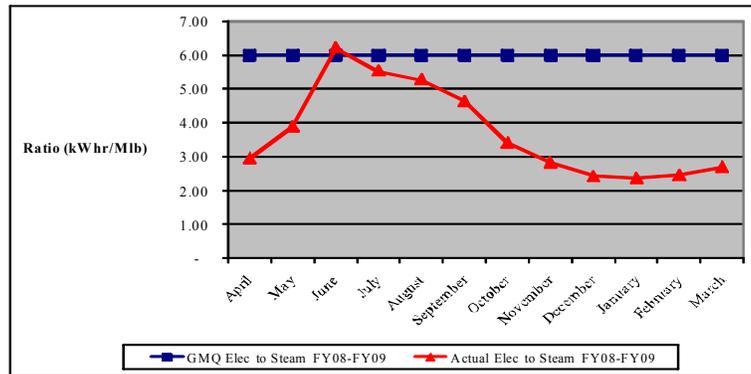


**Figure 10. Third Quarter FY09 Steam System City Water Make-up**

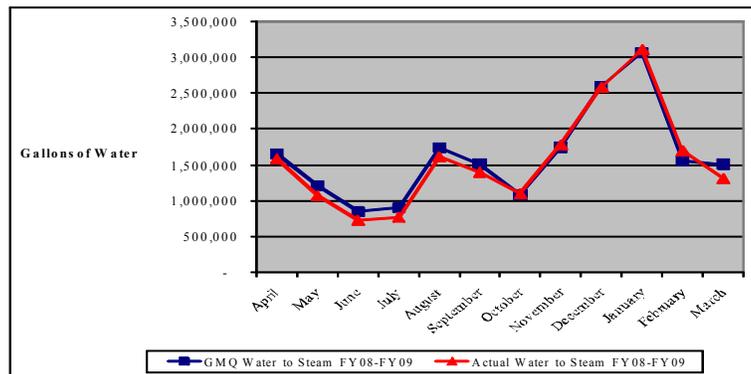
### 3. Performance

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 CNDE, the System Performance Guarantee levels as described in the ARMA are being achieved satisfactorily except for a single excursion in the electric consumption in June 2008.

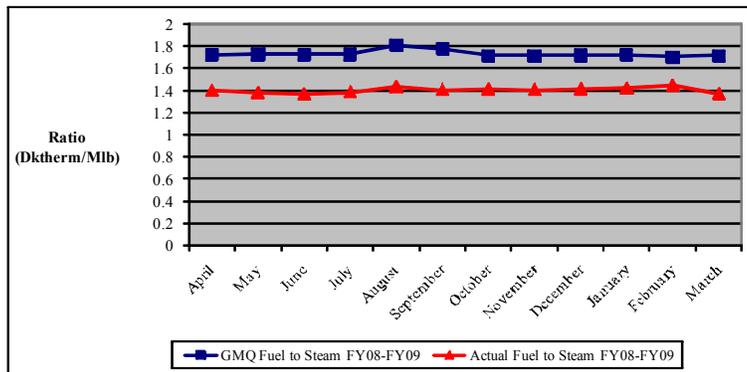
The fuel consumptions remain below the GMQ for the quarter. The electric usage for the current quarter is approximately 12% less than in the previous Third Quarter.



**Figure 11. Steam Plant Electric Consumption Performance Guarantee Comparison for the Previous 12 Months**



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



**Figure 13. Steam Plant Fuel Consumption Performance Guarantee Comparison for the Previous 12 Months**

C. Contract Guarantee Performance

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

**Table 1. Third Quarter FY09 Production, Sales and Consumption Summary**

	Unit	Third Quarter FY09	Third Quarter FY08	*Percent Difference
	days	90	91	-1.10%
<b>Total Electric Use</b>	kWhrs	6,569,295	7,668,016	-14.33%
Chilled Water	kWhrs	6,282,908	7,342,243	-14.43%
Steam	kWhrs	286,387	325,773	-12.09%
<b>Total Water Use</b>	kgal	19,033	23,679	-19.62%
Total Chilled Water	kgal	12,983	14,999	-13.44%
EDS Make-up	kgal	672	776	-13.40%
Cooling Towers	kgal	12,311	14,223	-13.44%
Calc CT Evaporation	kgal	10,511	11,812	-11.01%
CT Blowdown	kgal	1,800	2,411	-25.34%
Calc # Cycles		5.84	4.90	19.19%
Steam	kgal	6,050	8,680	-30.30%
<b>Total Fuel Use</b>	mmBTU	180,567	204,236	-11.59%
Natural Gas	mmBTU	180,345	203,610	-11.43%
Propane	mmBTU	222	626	N/A
<b>Condensate Return</b>	kgal	10,303	10,301	0.02%
	lbs	84,030,179	84,010,149	0.02%
Avg Temp	°F	159.7	171.7	-6.99%
<b>Sendout</b>				
Chilled Water	tonhrs	8,673,600	10,316,300	-15.92%
Steam	lbs	127,599,000	145,454,000	-12.28%
Peak CHW Demand	tons	9,400	9,800	-4.08%
Peak Steam Demand	lb/hr	126,625	122,531	3.34%
CHW LF		42.72%	48.20%	-11.37%
Steam LF		46.65%	54.35%	-14.17%
<b>Sales</b>				
Chilled Water	tonhrs	8,275,471	9,146,430	-9.52%
Steam	lbs	115,417,902	127,672,642	-9.60%
<b>Losses</b>				
Chilled Water	tonhrs	398,129	1,169,870	-65.97%
Steam	lbs	12,181,098	17,781,358	-31.50%
		9.55%	12.22%	-21.91%
<b>Degree Days</b>				
CDD		7	5	40.00%
HDD		1,900	1,950	-2.56%

\*positive percent difference values imply an increase from FY08 to FY09

**Table 2. Third Quarter FY09 Performance Guarantee Comparison for Steam and Chilled Water**

GMQ Calculations	Unit	Third Quarter FY09	Third Quarter FY08	*Percent Difference
<b>Steam</b>				
GMQ Elec Conversion	kWhr/Mlb	6.00	6.00	
Electric Conversion	kWhr/Mlb	2.48	2.55	-2.76%
GMQ Plant Efficiency	Dth/Mlb	1.715	1.714	
Plant Efficiency	Dth/Mlb	1.415	1.404	0.78%
Actual %CR		65.85%	57.76%	14.02%
Avg CR Temp	°F	160	172	-6.99%
GMQ Water Conversion	gal	6,143,338	8,663,772	
Water Conversion	gal	6,110,500	8,766,800	-30.30%
<b>Chilled Water</b>				
GMQ Elec Conversion	kWhr/tonhr	1.055	1.055	
Electric Conversion	kWhr/tonhr	0.759	0.803	-5.42%
GMQ Water Conversion	gal/tonhr	5.25	5.25	
Water Conversion	gal/tonhr	1.57	1.64	-4.33%

\*positive percent difference values imply an increase from FY08 to FY09

### **III. EGF Operations**

Items relating to the facility operations presented herein are derived from the reports issued by CNDE for the months of January, February and March 2009. Communication between TEG and CNDE continues to be excellent, and CNDE has reported and managed all EGF operations satisfactorily and according to the ARMA.

#### **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. CNDE reported several disruptions in service during the quarter, but the duration of each was short and had negligible apparent effects on the customers. The reliability issues are summarized in this section.

- There were no excursions or outages during March. However, an electrical power outage in January caused momentary shut-downs on major equipment.
- A scheduled outage of the chilled water system occurred on January 21 - 22 to replace some valves at the EGF.

- Electrical power was inadvertently shut off to an air compressor on February 11 which subsequently caused the operating boilers to trip. This problem was caused by operator error and was quickly remedied.
- On February 25, chillers 8 and 9 tripped due to partially plugged flow switches. Additional chillers were started immediately. These plugged switches were removed and cleaned.

#### 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 Third 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. There were no employees reported to be on light duty and were no reported lost-time accidents during the quarter. Monthly safety meetings were conducted by HazMat, Inc. The arc flash safety equipment was delivered and placed into service in February.

The semi-annual monitoring report was submitted in January to the Metro Health Department Pollution Control Division. The Title V Annual Certification of Compliance was also submitted to the EPA in January.

The Air Emissions Inventory Report for the calendar year 2008 was submitted to the Metro Health Department Pollution Control Division in February. The Tier II Emergency and Hazardous Chemical Inventory form was submitted in February to the Nashville Fire Department, Tennessee Emergency Response Council and the Davidson County Office of Emergency Management.

#### D. Personnel

The EGF currently has twenty-six full time employees. There were no personnel changes during the quarter.

#### E. Training

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

## F. Water Treatment

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

- Steam System
  - The city water make-up conductivity was consistently reported as being acceptable throughout the quarter. However, the chlorine levels were reported high on several occasions, but the sulfite injection system appears to be controlling chlorine levels prior to boilers.
  - The condensate return was 66% for the quarter, which represents a 14% increase over the previous Third Quarter.
- Condensing Water System
  - The conductivity of the condensing water continues to be normal with only a few excursions resulting in high cycles of concentration and low blowdown rates.
- Chilled Water System
  - The system control and chemistry continues to be excellent.

## G. Maintenance and EGF Repairs

CNDE 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.

- New PVC drain lines on all 18 cooling tower equalizing boxes were installed.
- Some chilled water, condensing water and water softener equipment and piping were repainted.
- The mud drum blowdown valves on boilers #3 and #4 were rebuilt.
- The following maintenance was performed during the chilled water outage on January 21 - 22:
  - The inlet and outlet evaporator valves on chillers #3 and #6 were replaced.
  - The inlet and outlet condenser valves were replaced on chiller #4.
  - The outlet condenser valve was replaced on chiller #5.
  - New isolation valves were installed on the cooling tower make-up piping.
- The drain valve on cooling tower #8 was replaced in February.
- Other minor repairs and maintenance were made during the quarter and are listed in the monthly reports issued by CEPS

#### H. EGF Walk-through

A quarterly Walk-through of the EGF was performed on March 25, 2009, by Kevin Jacobs, P.E. of TEG. This review involved a tour of the facility with the primary points of interest and concern noted herein.

- The caution tape and safety padding on the cooling tower support beams at the south end of the cooling tower bay previously reported as missing or deteriorating have been repaired.
- The insulation on FWP-1 discharge had been damaged and partially removed, but was repaired prior to the completion of this report.
- Numerous minor cracks in the outside concrete walls remain. No additional work has been performed on these cracks. No action is required at this time.
- The re-grading and sloping of the area at the west face of the EGF has not been completed. These repairs could help prevent further settling of the foundation and soil erosion. No action is required at this time.
- Empty boxes and paint are being stored in the electrical room. This item was noted in the previous quarter's walk-through.

#### IV. Capital Projects

The Capital Projects discussed in this section are those projects funded through the issuance of bonds by Metro. As of the end of the Third Quarter, no funds have been appropriated for FY09. Due to construction projects being undertaken by other Metro departments within the city, and their impact to DES planned projects, TEG has re-prioritized the remaining FY08 projects and planned FY09 projects. Costs for these projects will be paid from funds already appropriated.

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

##### A. Third Quarter FY09 Open Projects

The following projects remained open at the end of the Third Quarter of FY09.

##### 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. No work was reported for this project during the Third Quarter FY09. This project will remain open.

2. DES036 - 4th Avenue Tunnel Exhaust Fan Repair (R&I Project)

This project was closed during the Third Quarter FY09.

3. DES041 - Symphony Condensate Repair (Updated to DES054)

This project was bid during the end of the Fourth Quarter FY08/early First Quarter FY09. Construction began in the First Quarter FY09 and was substantially completed during the Second Quarter FY09. Close-out of this project is continuing and is expected to occur in the Fourth Quarter FY09.

4. DES044 - MH 5 to MH 9 Condensate Line Replacement

The condensate line between Manholes 5 and 9, located along 5<sup>th</sup> Avenue between Deaderick and Union Streets, has been isolated due to its poor condition. This segment of condensate line represents a portion of the “main condensate loop” within the downtown distribution system. The replacement of this section of the condensate return system will provide redundancy to enable the return of condensate to the plant from two directions, thus improving the reliability of the system.

During the Second Quarter, DES became aware of the Department of Public Works’ Streetscape project for Deaderick Street. This Streetscape Project involves the refurbishment and revitalization of the Streetscape along Deaderick Street between 3<sup>rd</sup> Avenue North and 6<sup>th</sup> Avenue North. This Streetscape Project began construction during the Second Quarter FY09. Because a significant portion of the condensate line between MH 5 and MH 9 falls within the boundaries of the Streetscape Project, DES had to perform the design, bidding and award this project during the Second Quarter FY09. Scope changes involving the replacement of a leaking steam valve, the replacement of an expansion joint and the repair of the manway was added to this project. Completion of the portion of this project within the boundaries the streetscape project were completed during the Third Quarter FY09. The work outside the Streetscape Boundaries will be completed during the Fourth Quarter FY09.

5. DES045 - MH 6 to MH 23 Condensate Line Replacement and the Sheraton Hotel Condensate Service Line Replacement

This project was closed during the Third Quarter FY09.

6. DES046 - Ryman Auditorium Condensate Line

The condensate service line from the Ryman Auditorium to the main return line in 4<sup>th</sup> Avenue is in very poor condition and has been isolated. Due to this isolation, the condensate is currently being tempered with city water inside the Ryman Auditorium and then discharged to the Ryman's sewer system. As described in prior quarterly reports, it was believed that due to the length of this service line, the return on the capital cost replacement was inadequate. Therefore, the preferred solution was to install a tempering station at the customer's building to cool the condensate for disposal into the city sewer system. Based upon recently received bids on other DES projects, an adequate capital return might exist for the replacement of the condensate piping. Additionally, the Ryman representative's does not favor the tempering station and would prefer that the condensate be returned to the system.

The design of a replacement condensate service was completed during the Third Quarter FY09 and bids will be received early in the Fourth Quarter FY09.

7. DES048 - Tunnel Lighting & Electrical Upgrades Phase III

The lighting and some of the electrical system located in the Broadway, 4<sup>th</sup> Avenue and 7<sup>th</sup> Avenue distribution tunnels were in poor condition and presented a potential safety hazard to maintenance personnel. Therefore, a plan was developed to repair and replace the lighting and some electrical components in three phases over a three year period. The first two phases of this project have been completed, and the final phase is budgeted and scheduled to be replaced during this fiscal year. However, the sections of the tunnel system, which this third phase addresses, have experienced some structural degradation. Therefore, CNDE evaluated the structural aspects of these tunnel sections through a third-party consultant. This third party consultant's evaluation report was completed during the First Quarter FY09. This report was reviewed by both CNDE and TEG during the Second Quarter FY09. TEG has retained a structural engineer to review this report and tour the tunnel during the Fourth Quarter FY09. Upon the completion of his review, the structural engineer will present a report with recommendations on how to proceed. Once the necessary repairs to the tunnel have been completed, this third phase of the lighting and electrical upgrades will proceed.

8. DES050 - Manhole & Tunnel Insulation Repair

Insulation in several of the manholes and some portions of the tunnels is in disrepair. Not only does this present a safety hazard to personnel, but it can also cause damage to manhole equipment, components and the manhole structure. The required work within these manholes has been prioritized, and a standard insulation specification

has been completed. The receipt of bids for the repair and replacement of insulation in the higher priority manholes began during the Third Quarter FY08 with the award of three manholes.

The insulation repair/replacement in the first three manholes began in the First Quarter FY09. Three additional high priority manholes were also bid during the First Quarter of FY09. These bids were evaluated and an award was made and work began during the Second Quarter of FY09. The work related to all of these manholes was substantially completed during the Second Quarter FY09, and final walk through and the presentation of close-out documentation took place during the Third Quarter FY09. The work associated with this project will be ongoing as required.

9. DES051 - Expansion Joint Replacement - 4<sup>th</sup> Ave Tunnel

It has been determined that this project qualifies as a Repair & Improvement project and not a capital project. Therefore, funding for this project will originate from the R&I account.

A new expansion joint was ordered during the Second Quarter FY09 with it was delivered during the Third Quarter FY09. Due to other higher priority projects, design drawings for the installation of this expansion joint has been delayed until the Fourth Quarter FY09.

10. DES052 - Wildhorse Saloon Steam & Condensate Line Replacement

This project was closed during the Third Quarter FY09.

11. DES053 - EDS Tunnel Structural Evaluation, Mapping & Rehabilitation

The tunnels underneath Broadway, 4<sup>th</sup> Avenue and 7<sup>th</sup> Avenue have experienced some structural degradation primarily due to the geology of the area and groundwater infiltration. Some prior structural degradation occurred in these tunnels and repairs were made. CNDE retained the same third party consultant that participated in the prior repairs to evaluate and “map” the tunnels to prioritize the structural degradation of these tunnels. This third party consultant’s evaluation report was completed early in the First Quarter FY09 was reviewed by both CNDE and TEG during the Second Quarter FY09. Even though there is not a concern regarding the collapse of any tunnel section, the report indicated that approximately 1,000 feet of the tunnels should have a high priority ranking to repair/mitigate the dislodged rock areas.

TEG has retained a structural engineer to review this report and perform an on-site review of the tunnel during the Fourth Quarter FY09. Upon the completion of his

review, the structural engineer will present a report with recommendations on how to proceed.

12. DES055 - Rebuild of Manhole “C”

This manhole was rebuilt during the Second Quarter FY09. A final walk through was conducted during the Third Quarter FY09. Due to incomplete close-out documentation and cost substantiation of scope changes, the final close-out of this project has been delayed until the Fourth Quarter FY09.

13. DES057 - Steam & Condensate Valve Replacement: Manhole 13 - Phase I

A 16" main steam valve and an 8" main condensate valve in Manhole 13 have small leaks. These leaks have been repaired on numerous occasions and the valves cannot be further repaired. The existing manhole manway is not large enough to allow for a replacement 16" valve to be brought into the manhole. In addition, this manhole is within the boundaries of the Deaderick Street Streetscape Project. Therefore, Phase I of this project, the replacement of the existing manway with a larger opening, was bid and awarded at the end of the Second Quarter FY09. Work on this project was started and completed during the Third Quarter FY09. Close-out of this project is expected during the Fourth Quarter FY09.

B. Third Quarter FY09 Closed Projects

There were three projects closed during the Third Quarter FY09: DES036, DES045 and DES052.

C. Capital Projects Budget

The following table summarizes the costs and remaining balance of the DES capital projects based on reported expenditures at the end of the Third Quarter FY09. Open projects or completed projects that require some additional management are shown. Projects that were closed to date are shown with a gray highlight. The total, historic budget and expenditures of the 2002A Bond are not shown; the values shown only reflect the more recent projects and expenditures with the remaining project balance.

**Table 3. FY09 Capital Projects and Bond Summary to Date**

	DES Project #	Description	Total Budget	Total Spent to Date	Remaining Balance
<b>2002A Bond Projects</b>					
		Total Closed Projects	\$ 3,727,702.59	\$ 3,727,702.59	\$ -
		<b>Total 2002A Bond</b>	<b>\$ 3,727,702.59</b>	<b>\$ 3,727,702.59</b>	<b>\$ -</b>
<b>2005B Bond Projects</b>					
	DES020	Renaissance Decoupling	\$ 538,818.00	\$ 593,478.75	\$ (54,660.75)
	DES004, 021, 022	Customer Metering	\$ 1,676,439.40	\$ 1,861,579.64	\$ (185,140.24)
	DES050	MH & Tunnel Insul Repair	\$ -	\$ 26,717.79	\$ (26,717.79)
		Total Closed Projects	\$ 5,105,044.00	\$ 4,885,176.90	\$ 560.00
		Project Development	\$ 866,198.60	\$ 315,570.26	\$ 531,072.07
		<b>Total 2005B Bond</b>	<b>\$ 8,186,500.00</b>	<b>\$ 7,936,102.03</b>	<b>\$ 250,397.97</b>
<b>2007 Bond Projects</b>					
		Total Closed Projects	\$ 2,374,348.00	\$ 2,620,770.53	\$ (246,422.53)
		Project Development	\$ 484,152.00	\$ -	\$ 484,152.00
		<b>Total 2007 Bond</b>	<b>\$ 2,858,500.00</b>	<b>\$ 2,620,770.53</b>	<b>\$ 237,729.47</b>
<b>2008 Bond Projects</b>					
	DES044	MH 5 to MH 9 Cond Line	\$ 550,000.00	\$ 61,205.84	\$ 488,794.16
	DES046	Ryman Auditorium Cond Line	\$ 150,000.00	\$ 22,796.84	\$ 127,203.16
	DES048	Tunnel Lighting & Elec Ph III	\$ 90,000.00	\$ -	\$ 90,000.00
	DES050	MH & Tunnel Insul Repair	\$ 100,000.00	\$ 8,584.24	\$ 91,415.76
	DES051	Exp Jt Replacement 4th Ave At MH 17	\$ 220,000.00	\$ 2,263.28	\$ 217,736.72
	DES052	Wildhorse Stm & Cond	\$ 130,000.00	\$ 41,227.94	\$ 88,772.06
	DES053	Tunnel Mapping	\$ 37,606.80	\$ 2,530.13	\$ 35,076.67
	DES054	Symphony Condensate	\$ 925,036.00	\$ 16,726.86	\$ 908,309.14
	DES055	Manhole C Rebuild	\$ 225,000.00	\$ 30,423.34	\$ 194,576.66
	DES056	Citizen's Plaza Steam and Condensate	\$ -	\$ 14,335.18	\$ (14,335.18)
	DES057	Manhole 13	\$ -	\$ 2,233.77	\$ (2,233.77)
	DES063	Sump Pump MH a B and M	\$ -	\$ 905.75	\$ (905.75)
	DES064	Spring 09 Steam Shutdown	\$ -	\$ 3,269.32	\$ (3,269.32)
		Total Closed Projects	\$ 1,118,500.00	\$ 33,609.71	\$ 9849.78
		Metro Project Admin	\$ -	\$ -	\$ -
		Project Man, Development, etc	\$ 352,393.20	\$ -	\$ 352,393.20
		<b>Total 2008 Bond</b>	<b>\$ 2,748,500.00</b>	<b>\$ 253,106.01</b>	<b>\$ 2,495,393.99</b>

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

Several EDS repairs and improvements were made during the Third 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 items listed herein fall outside the scope of the DES Capital Projects. The remaining value of the R&I budget at the end of the Third Quarter FY09 is \$414,395. Table 4 provides a summary of the FY09 expenditures and revenues associated with the R&I budget.

**Table 4. Repair and Improvement Expenditure and Revenue Summary to Date**

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Net Market Adjustment	Market Value	Balance
"Market Value" and "Cost Value" at end of FY08						\$ (526.25)	\$ 357,208.12	\$ 356,620.76
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 6/29/08 - 8/02/08	08/12/08	DES-879	TEG	\$ 1,843.03				
Manhole B2,B3, B4, Expansion Joint Replacement and 4th Avenue Tunnel Vent for period of 8/3/08 - 8/30/08	09/08/08	DES-891	TEG	\$ 34.48				
<b>Sub-Total First Quarter FY09</b>				<b>\$ 1,877.51</b>	<b>\$ 59,972.49</b>	<b>\$ (22.93)</b>	<b>\$ 58,072.05</b>	<b>\$ 58,094.98</b>
4th Avenue Tunnel Vent for period of 9/1/08-9/27/08	10/14/08	DES-901	TEG	\$ 617.50				
Various repairs-to manholes B3 and B4-8/1/08 - 8/31/08	10/14/08	DES-910	CEPS	\$ 1,262.04				
4th Avenue Tunnel Vent for period of 9/28/08 - 10/25/08	11/12/08	DES-912	TEG	\$ 108.00				
Chemical Treatment 10/1/08 - 10/31/08	11/25/08	DES-923	CEPS	\$ 3,756.99				
4th Avenue Tunnel Vent for period of 10/26/08 - 11/29/08	12/10/08	DES-927	TEG	\$ 54.00				
Constellation Energy Source - US Engineering Invoice 7/27/2007 (R&I) - Steam Outage	12/18/08	DES-934	CEPS	\$ 16,264.00				
<b>Sub-Total Second Quarter FY09</b>				<b>\$ 22,062.53</b>	<b>\$ 59,972.49</b>	<b>\$ (226.54)</b>	<b>\$ 37,683.42</b>	<b>\$ 37,909.96</b>
EDS CHW Emergency 2007	01/23/09	DES-938	CEPS	\$ 28,737.48				
Repairs at MH-18, MH-10, MH-13, MH-23, Gay Street, AA Birch MH, MH-K and On-line steam	1/28/2009	DES-949	CEPS	\$ 5,692.06				
DES-036 4th Avenue Tunnel Ventilation Fan Repair	2/5/2009	DES-953	CEPS	\$ 42,092.97				
4th Avenue Tunnel Vent for period of 11/30/08 - 12/31/08	1/1/2009	DES-959	TEG	\$ 170.55				
EDS Repair & Escrow 1/1/09-1/31/09	2/20/2009	DES-969	CEPS	\$ 3,195.21				
Manhole B4 - City Water Leak	2/20/2009	DES-966	CEPS	\$ 4,240.78				
Manhole K - Install Hot Tap	2/20/2009	DES-967	CEPS	\$ 1,450.00				
Manhole K - Excavation R & I (final)	3/18/2009	DES-989	CEPS	\$ 2,784.00				
EDS Repair & Escrow 2/1/09-2/28/09	3/18/2009	DES-987	CEPS	\$ 503.18				
EDS Quarterly Review for period of 1/01/09 - 2/28/09	3/18/2009	DES-972	TEG	\$ 9,336.53				
<b>Sub-Total Third Quarter FY09</b>				<b>\$ 98,202.76</b>	<b>\$ 59,972.49</b>	<b>\$ (299.15)</b>	<b>\$ (38,529.42)</b>	<b>\$ (38,230.27)</b>
<b>Sub-Total Fourth Quarter FY09</b>				<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>FY 09 Year to Date</b>				<b>\$ 122,142.80</b>	<b>\$ 179,917.47</b>	<b>\$ (548.62)</b>	<b>\$ 414,434.17</b>	<b>\$ 414,395.43</b>

**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.

- EDS Tunnel and Manhole Inspections:
  - Rock continues to be in need of repair in the ceilings in the tunnels under Broadway and 7<sup>th</sup> Avenues. "Mapping" of the tunnel was conducted during the First Quarter of FY09. This mapping report was reviewed by TEG and CNDE during the Second Quarter FY09 and was reviewed by a third party structural engineer during the Third Quarter FY09. Please refer to DES053 in Section IV of this report for additional information.
  - Minor repairs were made during the quarter.
- State Tunnel Inspections:
  - There were no ventilation fans operating during the inspection in March. State employees were notified.

- There is a high pressure condensate or steam leak in the northern section of the tunnel system; this leak is under further investigation to identify its source.
- There were minor deficiencies in the AA Birch Tunnel during the quarter.
- The thermographic survey conducted on January 22 revealed two new hot spots: 1) at the intersection of 3<sup>rd</sup> Ave and Molloy and 2) at St Mary's Church outside of MH10. The hot spot at 3<sup>rd</sup> Ave and Molloy was not present during the February survey.
- Several traps and instruments were replaced throughout the system.
- The annual customer meter calibrations and certifications for FY09 were completed in February.
- Other minor items are included in the CNDE monthly reports.

C. Emergencies

CNDE did not report any emergencies with the EDS during the quarter.

D. EDS Walk-through

The primary EDS walkthrough was conducted on March 26, 2009 by Jon Belcher, P.E. of TEG. The tunnels were visited this quarter include: the State Tunnel, Manholes D2 and D3, the AA Birch Tunnel, Manhole 23, the 7<sup>th</sup> Avenue Tunnel, the Broadway Tunnel and the 7<sup>th</sup> Avenue Tunnel. The following comments and observations are a result of these visits.

1. State Tunnel
  - a. Several light bulbs were not working throughout the tunnel. The State of Tennessee is in charge of maintaining the lighting. The State should be contacted and told that several bulbs require replacement.
  - b. There is either a small steam or high pressure condensate leak in the region of Stations N18 and N19 in the northern tunnel section.
  - c. The ventilation fans at Stations N2 and N3 were not running, did not have the drive belts installed nor the belt guards. The State of Tennessee is in charge of maintaining these fans. The State should be contacted and told that these fans are not functioning.
2. Manhole D2
  - a. This vault is located at the west end of the AA Birch tunnel.
  - b. There is groundwater infiltration in this manhole that drains to a sump in the bottom of Manhole D3.
  - c. There are some safety items which need to be addressed.
  - d. There is some minor corrosion of some of the structural components in this manhole.

3. Manhole D3
  - a. This vault is located at the east end of the AA Birch tunnel.
  - b. There is groundwater infiltration in this manhole that drains to a sump in the bottom of the manhole.
  - c. There are some safety items which need to be addressed.
  - d. There is some minor corrosion of some of the structural components in this manhole.
4. AA Birch Tunnel
  - a. An emergency light in the tunnel was found not to be working. This should be investigated and repaired.
5. Manhole 23
  - a. This manhole is located at the northern end of the 7<sup>th</sup> Avenue Tunnel and provides access to the 7<sup>th</sup> Avenue Tunnel.
  - b. There is still a minor amount of debris and construction material in this vault that needs to be cleaned out or removed.
  - c. There is some minor insulation degradation/damage in this manhole. This manhole is listed on the Manhole Insulation priority list developed by CNDE as a “low” priority.
  - d. There are some minor items which require attention in this manhole.
  - e. The isolation valve to Tennessee Tower is leaking slightly; this valve should be repaired or replaced.
6. 7<sup>th</sup> Avenue Tunnel
  - a. There are some minor insulation repairs that need to be made in this tunnel.
  - b. There is some rock spalling in this tunnel that requires attention (see DES053 discussion).
  - c. There is some lighting that is not working in this tunnel and needs to be repaired.
7. Broadway Tunnel
  - a. There are some minor insulation repairs that need to be made in this tunnel.
  - b. There is some rock spalling in this tunnel that requires attention (see DES053 discussion).
  - c. There are some minor repairs which need to be made in this tunnel. Some of these repairs will be made during a system shutdown over the Memorial Day weekend.
  - d. There is some minor clutter and debris in this tunnel which needs to be addressed.
8. 4<sup>th</sup> Avenue Tunnel
  - a. There is a large amount of debris in sections of this tunnel which need to be addressed.

- b. There are some minor insulation repairs that need to be made in this tunnel.
- c. There is some rock spalling in this tunnel that requires attention (see DES053 discussion).
- d. There are some minor repairs which need to be made in this tunnel.

## **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 27 customers, comprised of 40 different buildings, connected to the EDS. Service to each of these buildings continues to prove satisfactory, and the responsiveness to customer issues is handled by CNDE in an excellent and professional manner.

### **A. Marketing**

- TEG, CNDE and Metro DES continue to monitor and remain involved with the progress associated with the development of the New Convention Center.
- The Five Year Anniversary Celebration occurred on January 16.
- The Semi-Annual Customer meeting was held March 19.

### **B. Customer Interaction**

- The CNDE CSR requested that the Cordell Hull, AA Birch and Metro Courthouse adjust their building control systems to raise their chilled water leaving temperature to match the contract value. Only the Cordell Hull was able to comply.
- Several meetings were held with the Sun Trust Bank, Sommet Center and Ryman Auditorium personnel to discuss metering, billing and other operational issues during the quarter.
- The Municipal Auditorium re-activated their chilled water system during the quarter.
- The 401 Union building requested that the steam service to their building be isolated. The isolation was completed on February 26.
- The Library and Archives building personnel contacted CNDE regarding chilled water flow issues in their building. The problems were believed to be related to their in-building system and not the EDS.
- The Viridian Tower began work on the modifications to their in-building chilled water system in March.
- Other minor issues and customer interactions are noted in the monthly CNDE reports.

## **VII. Recommendations**

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

- As mentioned in previous reports, further investigation is recommended regarding the addition of automated O<sub>2</sub>-trim to the boilers. This increase in automation may increase the fuel efficiency of the boilers and may have a relatively short return on investment. TEG will begin the investigation of the economic benefit related to this modification during the fiscal year. Only the customers receive the economic benefit for this investment, thus funding for such projects should be the responsibility of the customers.
- Due to the apparent soil erosion on the west face of the EGF, CNDE should determine if the terrain on the west side of the EGF needs regrading to prevent rainwater from flowing into and under the foundation wall. These repairs could help prevent further settling of the foundation and soil erosion.
- Cleaning, painting, replacement and repair of structural steel within manholes to reduce or eliminate corrosion has been assigned a capital project number of DES061. Due to higher priority projects, repairs are anticipated to begin during the First Quarter FY10 and will be ongoing in a similar method to the Insulation Repair Project (DES050).
- Insulation which is not present or in disrepair within the manholes needs to be addressed through either additional capital projects, which include work within these manholes, or through DES050.
- Potential safety hazards within some of the manholes and tunnels need to be addressed.
- CNDE should continue to remove any debris present in the manholes and tunnels as inspections and schedules allow.