# Fiscal Year 2023-2024

# Annual Report

*for the*

Metro Nashville
DISTRICT ENERGY SYSTEM

# ***Final Report***

Constellation.

# Contents

# Executive Summary

On behalf of Constellation Energy Solutions (CES), I am pleased to present the twenty first "*Annual Report"* to the Metropolitan Government of Nashville and Davidson County, Tennessee (Metro). The Metro Nashville District Energy System (MNDES) is made up of two basic parts, the Energy Generation Facility (EGF) and the Energy Distribution System (EDS). This report summarizes activities related to the performance of the MNDES for the period July 1, 2023, through June 30, 2024.

CES's experienced work force continues to operate and maintain the MNDES in a manner that produces outstanding results. Both steam and chilled water availability and reliability were greater than 99%. The safety record was 100%, as there were no accidents in the past 12 months. CES's environmental record remains intact with zero excursions, violations, or fines. All data, records, reporting requirements, and submittals are kept up to date and in order.

CES remains committed to providing the best service possible to Metro, State, and private MNDES customers. I would like to thank CES personnel for their continued dedication toward achieving these objectives and Metro Water Services for their partnership with Constellation in this system.

Sincerely,

Mike Winters
General Manager
DE Asset Operations, a subsidiary of Constellation Energy Solutions, LLC
Metro Nashville District Energy System

## Monthly Operations Report Summary

Constellation Energy Solutions, LLC (CES) submits a written report to the Metro Nashville District Energy System (MNDES) team on or about the 10th day of each month to convey the operational activities of the prior month. These reports are broken up in to four major sections. The first item included in each report is the "Summary". This section gives an overview of the entire report and addresses notable news, events, and other business activities. The next section is "Operations", which includes plant reliability and efficiency data, environmental, health & safety data, personnel information, and training participation by CES team members. The third section of the report lists and discusses all maintenance activities in and around the Energy Generation Facility (EGF). Items covered in this section include the building and grounds, warranty issues, preventive and predictive maintenance, and construction projects. The final section of the report is about the Energy Distribution System (EDS). Items discussed in this section are customer issues, Metro sales and marketing, system maintenance and repairs, and distribution system project updates.

## Operations Summary

The EGF continued to furnish reliable steam and chilled water service to the MNDES customers over the past twelve months. There was one scheduled chilled water system maintenance outage this year and one scheduled steam system maintenance outage. An additional emergency outage was executed on June 30th, 2024, to repair a steam leak identified during normal inspections in Manhole B. On November 6, 2023, CES was also contacted by Nashville Electric Service (NES) to alert the team that they required an emergency shutdown to perform maintenance on a tie switch within the MNDES switchyard. This NES maintenance would require CES to de-energize the entire MNDES facility.

Some MNDES customers requested service interruptions so they could make repairs in their respective buildings and some sections of the EDS were isolated to make steam and chilled water repairs. Apart from these, there have been no significant service interruptions.

The plant is staffed with an outstanding work force. There were zero reportable incidents and zero lost time accidents for the year. Training classes were conducted online through our Learning Management System as well as in person. Employees also received training related to plant systems, equipment, CPR/first aid, and corporate programs and requirements. For the twentieth consecutive year, there were no environmental excursions or violations.

Maintenance activities were performed as scheduled in the EGF and in the EDS. A great deal of planning and coordination go into the project work both in the plant and in the distribution system. Communications with the MNDES customers are performed on a routine basis. Any customer issues that exist are dealt with courteously and expeditiously.

## News, Events, and Other Business

Routine business activities such as the Monthly Operations Meeting and Natural Gas Purchasing TEAMS Calls were conducted as scheduled each month. Other news and events include the following:

- The MNDES Advisory Board Meetings were held in person and online on the third Thursday of August 2023, November 2023, February 2024, and May 2024.
- CES issued a draft copy of the FY22 Annual Report to Metro on July 31, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on July 19, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on August 16, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on September 20, 2023.
- Scheduled Steam Outage on September 25, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on October 18, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on November 15, 2023.
- The 20th Anniversary of MNDES was celebrated in an event at the EGF which included the Mayor of Nashville, Director of Metro Water Services, District 19 Councilmember, Jacob Kupin, and the MNDES team.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held, via TEAMS Call on December 21, 2023.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on January 18th, 2024.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on February 21, 2024.
- On February 28, 2024, after many years of service to both NTTC and MNDES, Jimmy Hatcher retired from his role with Constellation.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on March 20, 2024.
- The “R’newal” of Chiller #2 was completed on March 28, 2024. This complete rebuild provided a seven-year warranty on the major equipment provided by the manufacturer.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on April 17, 2024.
- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on May 15, 2024.
- CES and Metro Water Services signed a three-year contract extension, “Amendment 3”, for the system operator scope on May 31, 2024. Amendment 3 went into effect on July 1, 2024, but extends the CES contract through June 30, 2028.
- The annual customer meeting was held on June 7, 2024, at the Downtown Partnership and was hosted by Thermal Engineering Group (TEG).

- The Monthly CES/DES Operations Meeting and Monthly Report review was held via TEAMS Call on June 18, 2024.

# Plant Performance

## Plant Reliability

The EGF continued to provide reliable service to the MNDES customers. Except for uncontrollable circumstances, the guarantees are to maintain 150 psig of export steam pressure leaving the EGF and deliver 43.3-degree F chilled water to each customer. The following items describe minor incidents when the EGF experienced an excursion outside parameters of the performance guarantees:

- On July 8, 2023, while placing an additional chiller online, the temperature exceed the guarantee for approximately 38 minutes with a high temperature of 44.1 °F.
- On July 28, 2023, while placing an additional chiller online, the temperature exceed the guarantee for approximately 38 minutes with a high temperature of 44.5 °F.
- On August 3, 2023, CES ran Chiller #5 following maintenance on the purge unit in an attempt to remove air from the machine. This caused the temperature to exceed the reportable limit for approximately 188 minutes. The high temperature was approximately 45.0 °F.
- On August 9, 2023, while blowing down Boiler # 2, the boiler tripped on low water due to operator error. The Boiler was immediately restarted and was below 150 psi for approximately 45 minutes. The low pressure was 129.3 psi.
- On September 4, 2023, Chillers #7 and #9 tripped due to a condenser water valve issue. The solenoid valves failed on thecondenser water inlet valve. The solenoid was changed out the following day. This caused the temperature to exceed the reportable limit for approximately 62 minutes. The high temperature was approximately 45.0 °F.
- On September 25, 2023, the steam system was taken offline for approximately 17 hours in order to perform maintenance in both the EGF and distribution sytem. This was a planned maintenance outage.
- There was a Plant Outage beginning at 11 p.m on November 6, 2023 due to maintenance required on the Electrical System feeding the Plant required by NES. This outage caused the chilled water to be above the reportable limit for 4 hours and 24 minutes and the steam system to be below 150 psi for 3 hours and 45 minutes.
- On November 7, 2023, there were two instances where the steam system was below 150 psi for 45 minutes, each time down to a low of 116 psi. This was caused by an issue with the Control Air Compressor air dryer. Maintenance personnel were called in and found a bad solenoid valve on the blow down line. The solenoid was replaced with on site spare parts.
- On November 18, 2023, there was one instance where Boiler #3 tripped while performing a mud drum blowdown. This was due to operator error. The boiler was immediately re-started. The pressure dropped to a low of 112 psi for a period of 45 minutes.
- On November 24, 2023, Chiller #6 tripped and would not re-start after multiple attempts. Trane found an issue with the oil pressure regulator and this was replaced on November

27, 2023. Another chiller was placed in service and the chilled water temperature was above 43.3°F for approximately 90 minutes reaching a high temperature of 45.0°F.

- On January 11, 2024, chiller #4 was placed in service due to the increased load on the system. The A side loaded but the B side failed to load; it however did not provide an alarm. The system temperature was above 43.3°F for approximately 88 minutes with a high temperature of 47.8°F. An investigation revealed that the control board failed and Trane replaced the board on January 13, 2024.
- On January 17, 2024, Boiler #3 tripped on low water following a significant increase in steam flow and was immediately restarted. Additonal condensate pumps were placed in service and the Deaerator returned to normal levels. The pressure was below 150 psi for approximately 45 minutes and reached a low pressure of 134.6 psi. The morning low was -1°F on this day.
- On January 24, 2024, Boiler #2 tripped on low water while blowing down the boiler. The boiler was immediately restarted. The pressure was below 150 psi for approximately 60 minutes and reached a low pressure of 137.0 psi.
- On February 21, 2024, the chilled water load increased and an additional chiller was placed in service. The chiller condenser inlet valve failed to open on Chiller #8 Another chiller was then placed in service. This delay caused the temperature to exceed 43.3°F for approximately 42 minutes. The high temperature was 44.9°F. The inlet valve failed to open due to a manual closing that had happened in order to test valve operation prior to executing the planned shutdown. CES was validating what equipment was in working order and what was not. The actuator was unable to overcome the manual torque that had been applied to the valve.
- On February 25-26, 2024, there was a scheduled chilled water outage to replace condenser water isolation valves on Chillers 2,3 and 8. This was a scheduled 12 hour outage. The chilled water was above 43.3°F for approximately 4 hours and 18 minutes though the system was taken out of service from between 10:00PM to approximately 4:00AM on February 26th.
- On February 26, 2024, BFWP #3 began to cavitate and was not pumping as required. # 4 Boiler tripped on low flow and another BFWP was placed in service and # 4 Boiler was re-started. The pressure was below 150 psi for approximately 45 minutes reaching a low of 128 psi. #3 BFWP was identified as needing to be rebuilt.
- On February 26, 2024, prior to the issue with BFWP #3, while placing another boiler in service, the pressure dropped to a low of 145 psi for approximately 75 minutes. The additional boiler was being brought into service to meet the customer load conditions.
- On March 4, 2024, the chilled water load increased and an additional chiller was placed in service. The chilled water inlet valve failed to open on chiller #8. Another chiller was then placed in service, this delay caused the temperature to exceed 43.3°F for approximately 32 minutes. The high temperature was 44.6°F. The inlet valve failed to open due to a defective solenoid valve. The solenoid valve has been replaced.

- There were several dips on the steam pressure during the month of March, however two exceeded 30 minutes in duration. On March 15th and March 18th, the boiler inspector was onsite and requested the tripping mechancisms to be tested. The associated pressure drops on March 15th and March 18th were of a planned nature during the boiler run inspections.
    - On March 15, 2024, while testing the safety interlocks ( low water cut out probes, low water cut out float, and loss of fuel to the unit) on Boiler #2. The boiler tripped on each test as it should. The pressure dropped to a low of 128 psi and was below 150 psi for approximately 45 minutes. The boiler was re-started immediately after each test.
    - On March 18, 2024, while testing the safety interlocks ( low water cut out probes, low water cut out float and loss of fuel to the unit) on boiler #4. The boiler tripped on each test as it should. The pressure dropped to a low of 139 psi and was below 150 psi for approximately 45 minutes. The boiler was re-started immediately after each test.
- On March 19, 2024, Boilers #2 and #4 tripped simultaneously on low water and were immediately re-started. The pressure dropped to a low of 64 psi for approximately 120 minutes. There was no immediate indication of the reason for the trip, however there were some erratic swings in the steam load that CES concludes contributed to the issue.
- On May 29, 2024, while swapping Deaerators in order to perform annual maintenance, boiler #3 tripped on low water level. The Boiler was immediately re-started and the system pressure was restored. The steam pressure was below 150 psi for approximately 60 minutes reaching a low of 128 psi.
- On June 16, 2024, Deaerator Tank #1 Level Controller failed causing the tank levels to rise and this necessatated bringing the boilers down in a safe manner. The other Deaerator was down for annual maintenance. CES personnel were called in to troubleshoot the situation and found a ruptured diaphragm in the DA Controller. The diaphragm was replaced and the steam system was placed back in service. The system was below 150 psi for approximately 4 hours with a low of 4 psi.
- On June 26, 2024, chiller #8 tripped and was attempted to restart a couple of times. After these attempts another chiller was placed in service. The chilled water temperature was above the guarantee for approximately 1 hour and 32 minutes reaching a high of 44.4°F. Trane and Shermco were called in to investigate and found no issue with the chiller or the 4,160V starter and it was placed back in service the following day.This equipment has run without incident when required when it was placed back in service.
- On June 30, 2024, the steam system was shutdown to repair a leak on the dripleg in Manhole B that was discovered during the monthly inspection on June 28, 2024. The system was below 150 psi for approximatley 11.5 hours. All customers were notified prior to the outage. The outage was completed ahead of the scheduled timeframe of 14 hours.

Constellation is required to report upsets that last longer than thirty minutes. The following table includes every minute the plant was outside the contractual service delivery parameters. Reliability does not include scheduled outages allowed per the Amended and Restated Management Agreement (ARMA).

FY2024 included a leap year and thus had one additional day of time to be included in reliability and availability calculations. Total "downtime" to be compared against 527,040 minutes.

| | **Downtime** | | | |
|---|---|---|---|---|
| | **Scheduled** | **Unscheduled** | **Availability** | **Reliability** |
| **Boilers** | 2025 minutes | 825 minutes | 99.459% | 99.806% |
| **Chillers** | 522 minutes | 670 minutes | 99.774% | 99.843% |

## Plant Efficiency

When the annual boiler inspections were completed at the end of July 2023, two boilers were placed in wet lay-up, one in stand-by, and one de-aerator tank was isolated due to the reduced steam demand during the summer months. One boiler and one de-aerator were left online. This equipment is rotated monthly. This is done to increase steam efficiency during the cooling season. Stand-by boilers were taken out of wet lay-up and was put back in service during the month of November 2023 in preparation for the heating season.

Constellation and Metro agreed upon the final version of the Metro MNDES annual reconciliation for FY24 on September 12, 2024. The annual reconciliation for this time consisted of a true-up reflecting actual costs in several categories between Metro and CES, as well Metro and the MNDES Customers. For reference, the annual reconciliation is included in Appendix 4 of this report.

Constellation Energy's efficiency guarantees consist of five key conversion rates:

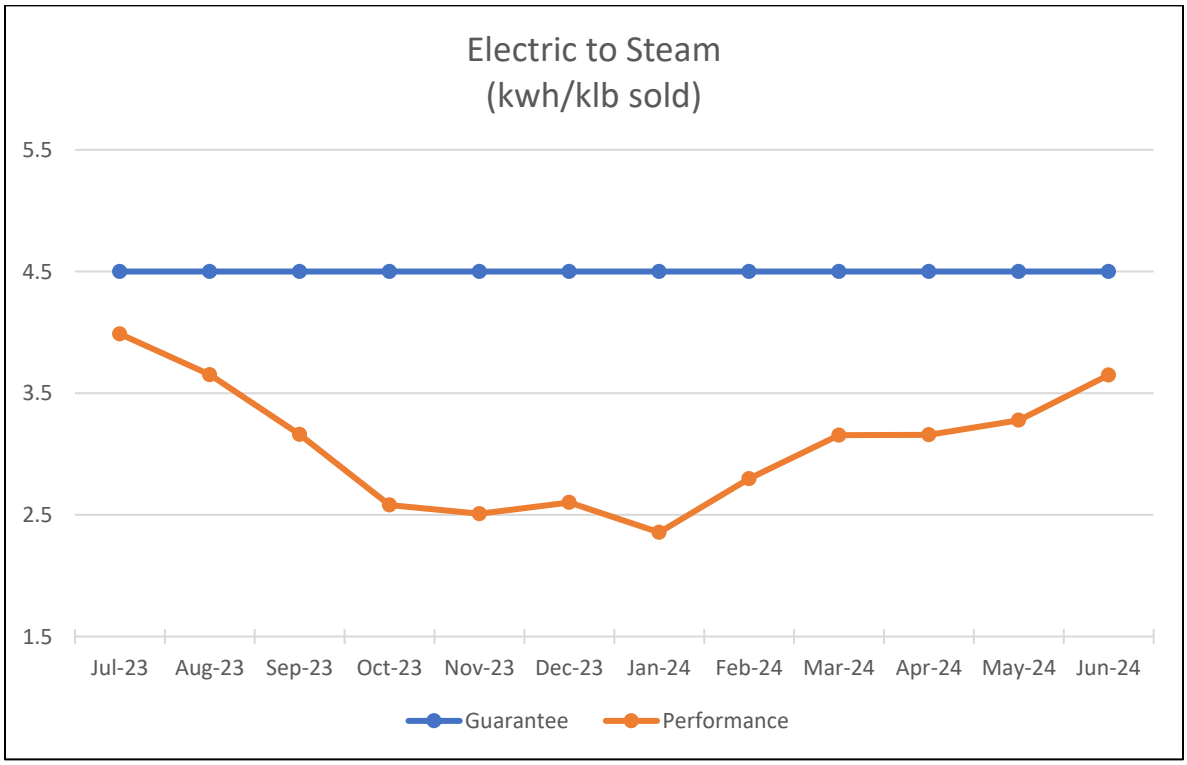
1. Electric-to-Steam (kWh per klb-sold)
2. Fuel-to-Steam (Dekatherm per klb-send-out)
3. Water-to-Steam (gallons)
4. Electric-to-Chilled Water (kWh per ton hr-sold)
5. Water-to-Chilled Water (gallon per ton hr-sold)

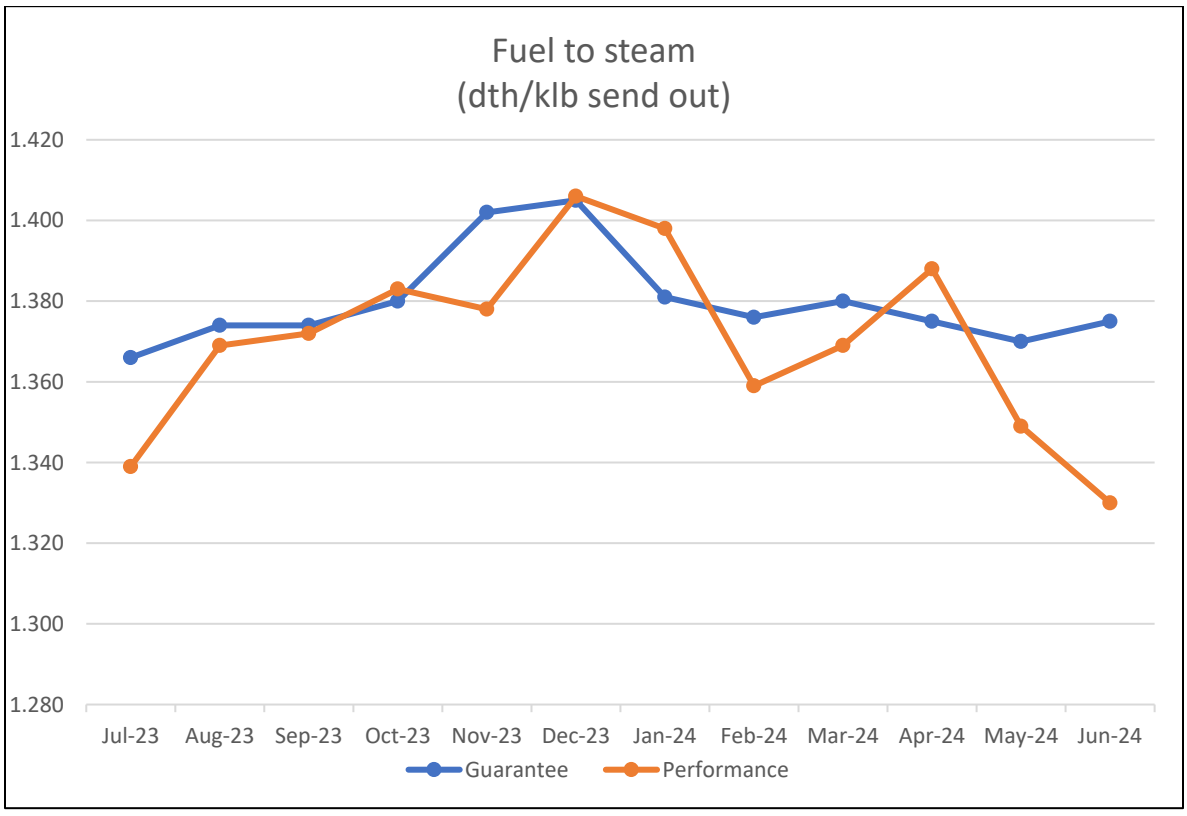
Efficiency for the fiscal year 2023-2024:

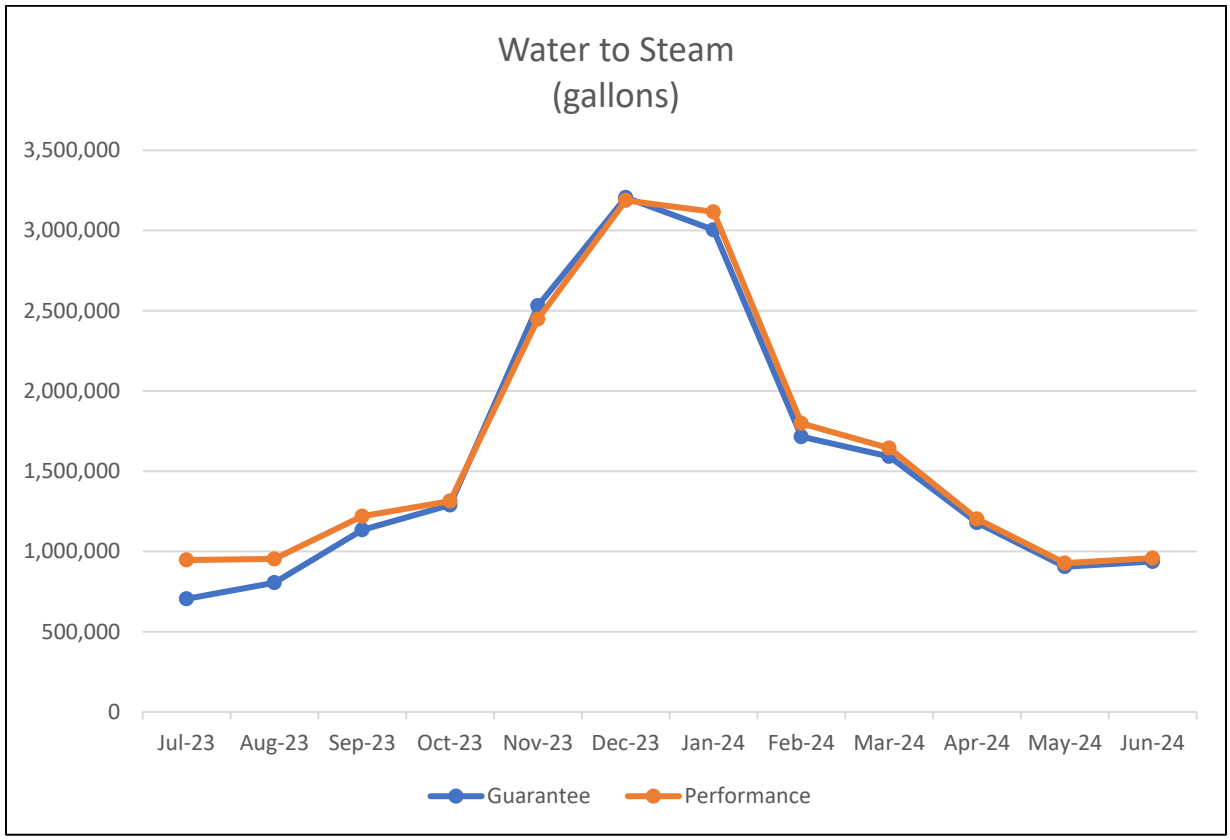
| | Units | Guarantee | Actual Rate |
|---|---|---|---|
| **Electric-to-Steam** | kWh/klb-sold | 4.500 | 2.935 |
| **Fuel-to-Steam** | Dth/klb-sent out | 1.382 | 1.376 |
| **Water-to-Steam** | gallons | 19,000,154 | 19,742,399 |
| **Electric-to-Chilled Water** | kWh/ton hr-sold | 0.930 | 0.888 |
| **Water-to-Chilled Water** | gallons/ton hr-sold | 2.000 | 1.967 |

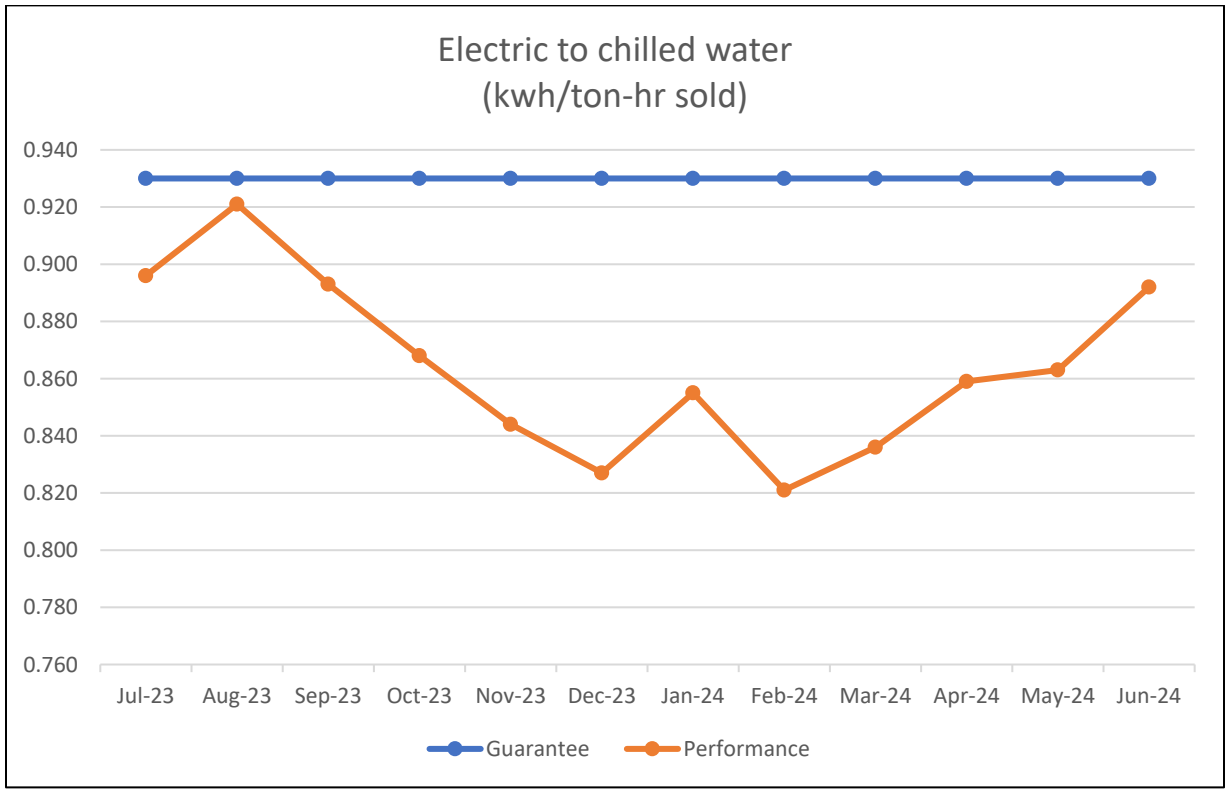
Moving into FY2025, the performance guarantees from Amendment 2 will be updated to reflect the current system operations contract, Amendment 3. There will be minor changes to three of the five guarantee calculations.

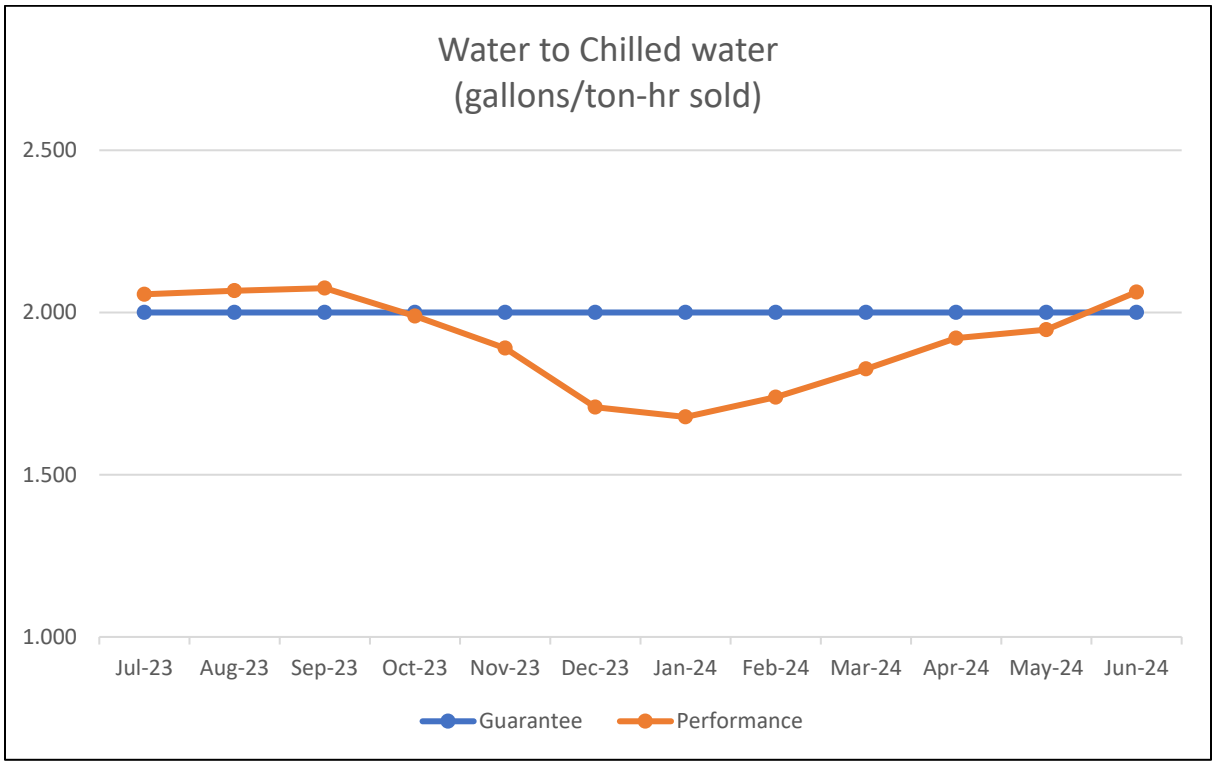
The following graphs represent the efficiency guarantee results from July 2023 through June 2024 monthly:




Water to Steam
(gallons)
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Guarantee
Performance


Electric to chilled water
(kwh/ton-hr sold)
0.940
0.920
0.900
0.880
0.860
0.840
0.820
0.800
0.780
0.760
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Guarantee
Performance




CES did not meet, nor did they exceed every single guarantee each month during the past year. When CES exceeds a performance guarantee, they are accountable for 100% of the overage. When they outperform the guaranteed value, they receive a 25% bonus, allowing the additional 75% to be returned to customers as a savings. CES received a net bonus of $74,842.30 for FY24.

# Environmental, Health, and Safety

## Environmental

There have been no environmental violations since the plant began commercial operations in December 2003.

Storm water samples were collected, inspections conducted, and a report was generated quarterly. Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Controls and Countermeasures (SPCC) training was conducted online.

*Regulatory Compliance*

Required reporting activities were submitted as follows:

- The Semi-Annual Emissions Report were sent to the Metro Health Department on July 11,2024 and January 26, 2024.
- The Tier II Report was sent out on January 17, 2024.
- The Title V Certification of Compliance form was sent to the U.S. EPA and Metro Health Department on January 26, 2024.
- The Annual Greenhouse Gas Report was completed online on February 20, 2024, and sent to the EPA.
- The Annual Emissions Report was delivered to Metro Health Department on March 5, 2024.

## Health

Metro Water Services provided new provisions in dealing with COVID-19. CES reports on this information in each monthly report. There are no complications or health issues to report.

## Safety

CES plant personnel continue to conduct themselves in a safe manner. There were no reportable accidents in the past year. CES has operated 1,431 days without an accident.

Monthly safety meetings were coordinated and scheduled by CES's site Safety Officer. Training classes were also conducted online through Constellation corporate requirements. Safety and accident reports are issued and posted each month.

The refrigerant alarm and gas monitors are checked weekly. Preventative maintenance and calibrations are performed monthly on the portable gas monitors used in the EDS. Fire extinguishers are also checked monthly.

Per OSHA, the NEC and NFPA 70E 1910 Subpart S, arc flash Personal Protective Equipment were sent out for inspection and recertification as required.

***Accident Report***

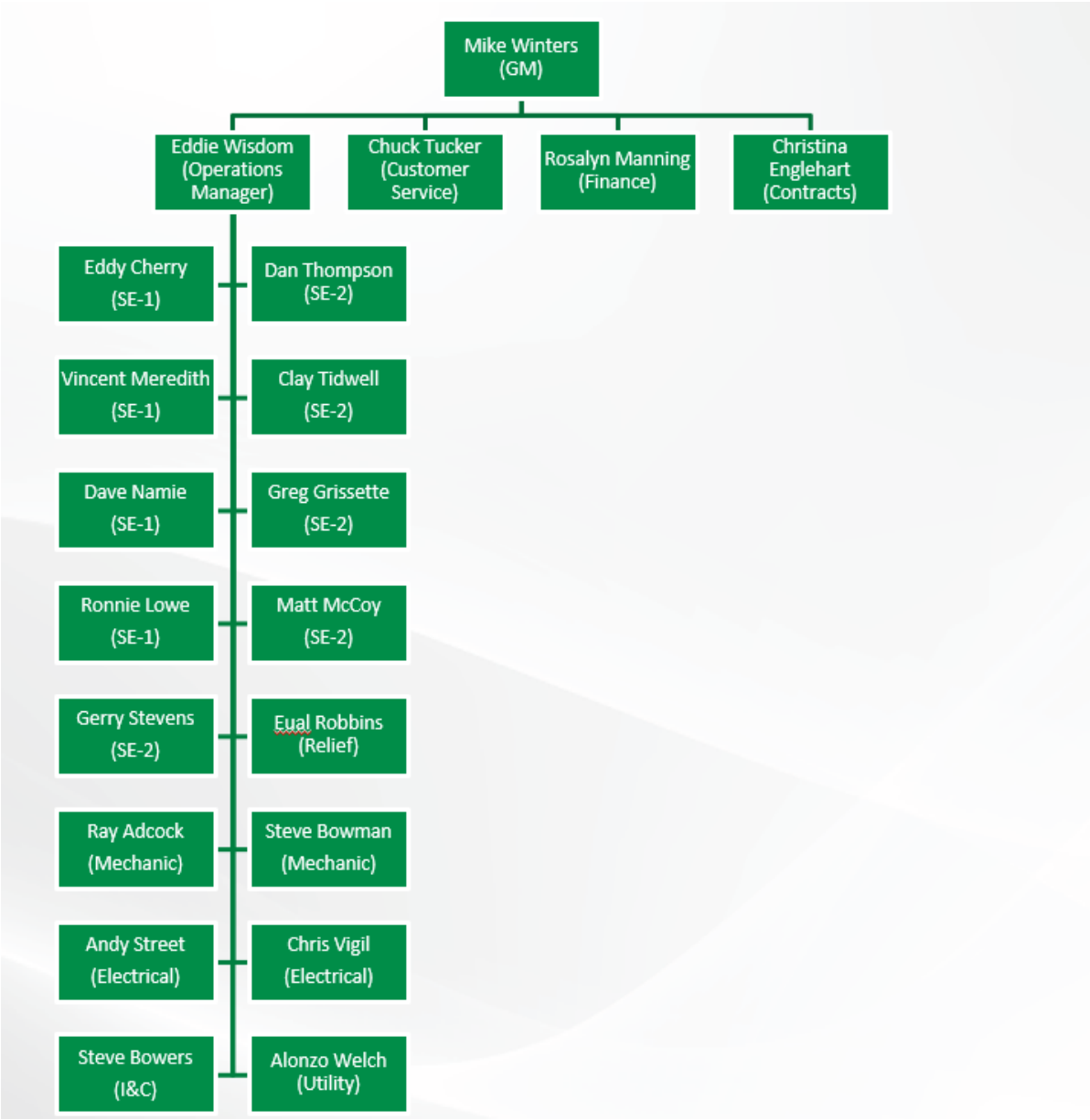
| | Total Accidents | OSHA Reportable | Lost Time Accidents | Total Lost Days |
|---|---|---|---|---|
| July 2023 | 0 | 0 | 0 | 0 |
| August | 0 | 0 | 0 | 0 |
| September | 0 | 0 | 0 | 0 |
| October | 0 | 0 | 0 | 0 |
| November | 0 | 0 | 0 | 0 |
| December | 0 | 0 | 0 | 0 |
| January 2024 | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 0 | 0 |
| March | 0 | 0 | 0 | 0 |
| April | 0 | 0 | 0 | 0 |
| May | 0 | 0 | 0 | 0 |
| June | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** |

# System Assessment and Status

## Personnel

The plant is fully staffed with an exceptional work force of nineteen full time employees, one shared employee, and one remote part-time employee. CES prides itself on keeping employees engaged which results in a very low turnover rate.

As mentioned in the news section above, Jimmy Hatcher retired in February of 2023 and was backfilled by Rosalyn Manning. Rosalyn brings many years of experience and has successfully transitioned into the full-time vacant role.



## Training

To maintain and operate the facility safely, reliably, and efficiently, a significant amount of employee training is required. The following demonstrates some of the training that was conducted throughout the year:

- Employees completed Constellation Retail Electric and Natural Gas compliance training.
- Employees completed corporate on-line security training, FERC Training, IT and Phishing Awareness Training.

Online Training classes were held throughout the year. The following safety classes were completed by CES personnel online using the LMS (Learning Management System):

- Fire Safety
- Accident Investigation, Reporting & Record Keeping
- Tool & Equipment Safety
- Compressed Gas Cylinder Safety & Hot Work
- Confined Space Entry
- Storm Water Pollution Prevention Plan & Spill Prevention, Controls & Countermeasures
- Bloodborne Pathogens, Heat Stress & Cold Stress
- Steam Safety & Refrigerant Safety
- Lock Out/Tag Out (LOTO)
- Safe Work Practices
- Elevated Work & Vehicle Safety
- Personal Protective Equipment
- Chemical Safety & Hazard Communications

## Customer Service

CES personnel routinely communicate with the customers each month through e-mails, phone calls or visits. When customers have heating or cooling issues inside their buildings, we assist them with troubleshooting and attempt to resolve their problems. When a service interruption is required, whether it is project related or an emergency, activities are coordinated closely with the customers to minimize impact within their facilities.

The annual MNDES Customer Meeting, which was hosted by TEG on June 7, 2024, and additional required meetings with customers were conducted throughout the year. These activities build relationships and help further a positive image of the MNDES in the community.

CES's Customer Service Representative reviews each customer's meter readings monthly. For those who do not meet their contractual chilled water return temperature requirements, a Thermal-Inefficiency-Fuel-Surcharge (TIFS) is assessed. The TIFS is added directly to customer invoices per their customer service agreement with Metro.

When a customer exceeds their contractual demand capacity multiple times, the meter data is sent to the MNDES Project Administrator for review and evaluation. The reason for the excursion is investigated and suggestions are made to keep it from occurring again. If a capacity adjustment is deemed appropriate, a letter is sent to the customer with an explanation of the adjustment and its duration.

## Energy Generating Facility (EGF)

During normal operation, preventative, predictive, and routine maintenance items must be scheduled and completed. During the summer months the lawn is mowed weekly, and the landscape is routinely manicured. This includes trimming trees and shrubs, putting mulch in the beds, maintaining the irrigation system, and removing dead plants. The building and grounds are policed daily, and the lighting is maintained year-round. The carpeting is shampooed in the office areas and the tile floors are stripped, waxed, and sealed annually.

### EGF Preventive and Predictive Maintenance

The following items were accomplished to increase equipment life, reliability, efficiency, and safety:

CES personnel perform daily equipment inspections, check bearing temperatures, oil levels, belt tensions, etc. In addition, preventative maintenance is performed on the following equipment monthly: HVAC units, cooling towers, condenser water pumps, chilled water pumps, boiler feed water pumps, condensate pumps, motors, instrument air compressors and driers. The roof surface is inspected and cleaned. The propane system is also test fired and leak checked monthly.

Annual pressure vessel inspections are scheduled to be completed during the cooling season. The inspections are conducted by F. M. Global. They are State Certified Boiler Inspectors, working as a subcontractor to our insurance carrier. These inspections are required to renew our operating permits. Boiler inspections consist of a visual examination of the mud drum, steam drum, economizer, tubes, and fire box. Boilers #2 and #4 and #2 de-aerator tank were inspected in July 2023. Boilers #1 and #3 and de-aerator tank #1 are scheduled to be inspected in July 2024. All inspected boilers received a passing grade and their respective permits have been renewed. Boilers #2 and #4 and de-aerator #2 are scheduled to be re-inspected in August 2024.

Boiler inspections were witnessed by our chemical vendor's representative and plant personnel. When units are offline for inspection, preventative maintenance is performed on the forced draft fans, low water cut out switches, and other associated equipment.

Annual chiller inspections are scheduled and executed during the heating season as a good maintenance practice. These inspections include opening the condensers and cleaning the tubes, performing vibration analysis, and performing oil sample analysis on each chiller. Eddy current testing was conducted on the evaporators and condensers on Chillers #5, #6 and #7. Controls and purge units were also checked for proper operation.

As part of the Preventive and Predictive maintenance program CES had a contractor take alignment and vibration readings on all pumps, fans, and motors. These readings are compared to the previous year's readings. All equipment readings were within acceptable limits.

Infrared testing was conducted on all electrical switchgear and starters. No problems were found during this testing.

The high-voltage switchgear preventive maintenance was scheduled and executed during the fall of 2023. Maintenance on transformers, vacuum breakers, relays, and load break switches was completed, and infrared inspections and oil sample analysis were also executed.

Annual maintenance costs for these activities: $ 177,856.32 (excludes salaried personnel & corporate overhead).

## Repairs and Replacements

The following are routine maintenance items performed daily or weekly:

- Office Janitorial Services & equipment room clean up
- Picked up debris around exterior of EGF
- Mowed and landscaped lawn
- Checked & repaired plant computers & servers
- Repaired plant lighting and electrical
- Checked & adjusted packing on all pumps

From time-to-time repairs and replacements must be made. The following are examples of repairs that have been performed in the EGF in the past 12 months:

**July 2023**

- Repaired Softener # 2 Flow Meter
- Assisted Siemens with Desigo System Repairs
- Repaired plant lighting & electrical
- Installed Lighting around CHWP's
- Forklift/Genie Lift Repairs
- Added Refrigerant on Chiller #8A

**August 2023**

- Assisted with Arc Flash Study
- Installed Heat trace on Boiler Pressure Transmitter Lines
- Assisted Siemens with Desigo System Repairs
- Repaired plant lighting & electrical

**September 2023**

- Repaired 18011 Chemical Pump Leak
- Installed Heat trace on Boiler Pressure Transmitter Lines
- Repaired Backflow Preventer
- Repaired plant lighting & electrical
- Repaired Vaporizer Electrical Switches
- Replaced Ceiling Tiles
- DA # 1 Replaced Vent Hose
- Boiler # 1 Blowdown Valve Replacement
- Repaired Water Softener Drain Valves

**October 2023**

- Repaired Leak on BFWP #2 Oiler
- Removed refrigerant from Chiller #4A for Oil Pump Relay repairs
- Replaced Oil Regulator on Chiller #3B
- Repaired outboard bearing on BFWP #3
- Repaired plant lighting & electrical
- Repaired 40215 Chemical Line Leak
- Repaired leak on Boiler #4 Water Column
- Repaired leak on Boiler #2 Water Column
- Repaired Front Door Latch
- Repaired Cooling Tower #7 Vibration Switch
- Repaired Chiller #8 Evaporator Valve

**November 2023**

- Replaced Chilled Water Makeup Pump Controller
- Performed Switchgear Room Maintenance
- Repaired Cooling Tower Makeup Valve
- Repaired Cooling Tower Level Indicator Line
- Replaced 3 Building Heater Motors (2,5 and 7)
- Replaced Metro Flag
- Repaired Deaerator #1 Door
- Repaired Softener #3 Controls
- Repaired leak on Boiler #3 Boiler Blowdown Valve
- Repaired leak on 12900 Chemical Line
- Repaired Shop Air Tank Leak
- Removed Refrigerant from Chiller #6A
- Trane leak checked Chiller #6
- Peabody Union Blast Monitoring
- Purchased Chiller Valves for Chiller's 1,4,5 and 9
- Repaired Boiler Feedwater Valve #1

**December 2023**

- Replaced breaker on BFWP #1
- Installed new Cooling Tower Blowdown Meter
- Removed refrigerant from Chiller #2
- Replaced Boiler Feedwater Valve # 2 Positioner
- Repaired plant lighting & electrical
- Trane Repaired Chiller # 8 Oil Pump
- Trane replaced Chiller # 1 Oil Transducer
- Repaired Air Curtain # 5

**January 2024**

- Replaced blowdown valve on Boiler # 3
- Installed new Cooling Tower Blowdown Meter permanent wiring
- Completed removal of refrigerant from #2 Chiller
- Assisted Contractor Filling Propane Tank
- Repaired plant lighting & electrical
- Performed Additional Winterization activities
- Performed Annual Boiler Run Inspections
- Repaired Softener Drain Line
- Executed Sprinkler Repairs
- Repaired Air Curtain # 4

**February 2024**

- Replaced blowdown valve on Boiler # 2
- Installed new Cooling Tower Makeup Meter Valve
- Annual Chiller Tube Cleaning
- Installed Electric Transfer Switch at Plant Air Compressors
- Replaced Condenser Valves on Chillers 2,3 and 8
- Replaced Breaker on Cooling Tower #4
- Repaired Air Curtains #3, #4 and #5

**March 2024**

- Repaired # 2 Softener Controls
- Put Refrigerant back in Chiller # 2 following R'newal Repairs
- Re-connected Chiller # 2 Valve Actuators
- Annual Chiller Tube Cleaning (continued from February)
- Replaced Condensate Pump Coupling
- Replaced Breaker on Cooling Tower #16
- Repaired Air Curtain #3

**April 2024**

- Repaired Genie Lift
- Repaired leak on Boiler # 2 low water cut out.
- Repaired Softener # 1 Flow meter
- Annual Chiller Tube Cleaning (continued from February)
- Replaced belt on Cooling Tower # 15
- Adjusted belts on Cooling Towers 10 and 12

**May 2024**

- Chiller #5A refrigerant Removed and Re-installed to replace flat gaskets.
- Purchased Platform Lift
- Painted Chiller Condenser Heads
- Replaced Electrical Connector on # 5 CWP
- Rebuilt Chilled Water Makeup Pump # 3 Pressure Control Valve
- Replaced fan controller on Switchgear 5A
- Purchased and installed two new AED's (Control Room and Chiller Alley)

**June 2024**

- Chiller #3B refrigerant Removed and Re-installed to replace flat gaskets.
- Trane replaced flat gaskets on Chiller # 3B
- Replaced circuit breaker within the MCC feeding Cooling Tower # 9
- Repaired Chiller #5 Condenser Valve Actuator 3
- Replaced drive belt on Cooling Tower # 12
- Replaced check valve on DA # 2
- Cleaned and prepped DA # 2 for Magnetic particle and UT Testing

Annual maintenance costs for these activities: $520,763.11 (excludes salaried personnel & corporate overhead).

- Administrative functions include reports, purchase orders, material acquisition, office supplies, meetings, etc.

Annual costs for these items and activities: $268,546.66 (excludes salaried personnel & corporate overhead).

## Information Technology System Program

The Information Technology System Program is reviewed with Metro annually. The last review was conducted as part of the year-end report effort in September of 2024. Any changes are included in the copy of the program located in Exhibit 2 of this report.

## Modifications and Improvements

The following are improvements that were performed in and around the Energy Generation Facility and in the Energy Distribution System:


Boiler #4 Blowdown Controller (New Panel)

Additional Plant LED Lighting in the Boiler Room


Heat Trace on Steam Pressure Transmitter


Plant Control Air Compressor Transfer Switch


Upgraded Tie Breaker Relay between SWGR 1A and SWGR 1B

## Energy Distribution System (EDS)

### EDS Preventive and Predictive Maintenance

All the direct buried portions of the EDS are checked monthly by means of thermographic imaging. When a hot spot is detected, it indicates a possible piping leak or damaged insulation. Depending on the severity of the thermal temperature variance from the surrounding area, a determination is made by Metro whether to excavate the affected area.

CES maintenance personnel perform monthly inspections of EDS tunnels, as well as the State steam tunnel and the A. A. Birch (AAB) building tunnel. Monthly manhole inspections are also conducted. The condition of the structures, piping, supports, insulation, seals, lighting, and ventilation is documented. Any deficiencies noted are prioritized and scheduled for repair accordingly.

CES personnel have been very diligent in monitoring condensate return quality. When unacceptable levels of iron and hardness contamination are discovered, the condensate return is placed to drain either in the customers building or in the EDS tunnel. This water is not suitable for use in the boilers. Since CES has limited control over what the MNDES customers return, alternative remedies continue to be explored when problems arise.

When the customer meter readings are taken for the preceding month, the readings are reviewed. If they vary 30% high or low, from their three-year average, instrumentation personnel check the questionable metering devices for calibration as required in the customer buildings. Instrumentation personnel may also review customers that have unusual usage when compared to other buildings within the system. For example, if most of the customers have higher than previous year chilled water usage, and there are more cooling degree days for the month, but one building used fewer ton-hrs, that customer's instruments are checked for accuracy.

The air compressor in the Andrew Jackson Building mechanical room, which operates the Pressure Reducing Valve on the State steam loop, is inspected monthly and maintenance is performed as required. An alarm on this air compressor is tested on a regular basis. Sump pump alarms in Manhole D, Manhole 18 and in the AAB Tunnel are also tested periodically. Tempering Stations on the condensate return system in the Fairlane Hotel and in the Municipal Auditorium are inspected for proper operation monthly.

The chilled water loop remains treated with a biocide to kill localized bacteria at customer interfaces. Bacteria levels remain below the acceptable limits.

## Repairs and Replacements

Some repairs can be made without disrupting service to the customers while others require sections of the system to be shut down. When possible, CES will hire an on-line leak repair contractor to facilitate steam leak repairs without interrupting service to the MNDES customers. Several expansion joints, valves and flanges were repaired throughout the system during the past year using this technique.

Most jobs performed in the EDS require professional security to perform security functions and traffic control. The following are examples of the routine maintenance and emergency repairs that have been performed on the EDS in FY23-24.

**July 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with ongoing project Work/Bids
- 4th Avenue Fan Repairs
- Tunnel Electrical/Lighting Repairs were made
- Checked Condensate System for Source of Hardness

**August 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with Project Work/Bids
- Manhole D1 Sump Pump Repairs were made
- Chilled Water Leak Repaired at Hume Fogg Service Line in 7th Ave. Tunnel
- Checked Condensate System for Source of Hardness

**September 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with Project Work
- Manhole B1 Ladder Installation
- Repaired Service Truck Fan

**October 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with Project Work at MH's 11, 18, B2 and 7$^{th}$ Avenue Fan
- Manhole A Steam Trap Replacement
- Made Andrew Jackson Air Compressor repairs

**November 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with Project Work at MH's 9,10,11, 18 and 20
- Andrew Jackson Air Compressor Replaced
- Replaced light bulbs in Broadway and 4$^{th}$ Avenue EDS Tunnel
- Restored steam service to State Loop multiple times due to air compressor failures.

**December 2023**

- Checked sump pumps & pumped out manholes that are subject to steaming
- Assisted with Project Work at MH's 9,10,11, 18 and 20
- State Capitol was isolated to allow the facility's contractor to make a steam leak repair in the customer building.
- Replaced light bulbs in Broadway and 4th Avenue EDS Tunnel
- Restored steam service to State Loop following UPS Failure
- Installed new UPS at State Steam PRV Station
- Replaced condensate pump and motor in State Tunnel

**January 2024**

- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work at MH's 2,9,10,11, and 20.
- Replaced Chilled Water Drain Line at Manhole 18.
- Replaced condensate pump and motor in State Tunnel

**February 2024**

- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work at MH's 2,6,9,10,11,12,13 and 20.
- Replaced strainer in Manhole B8

**March 2024**

- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work
- Tunnel Electrical Repairs
- Replaced trap in Manhole 9 (No shutdown required)
- Repaired leaking strainer in Manhole 11
- Replaced trap in Manhole B3 (No shutdown required)
- Started returning condensate to DES from Hume Fogg following pipe replacement in Manhole 20.

**April 2024**

- Customer Building Meter Calibrations
- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work
- Tunnel Electrical Repairs

**May 2024**

- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work
- Tunnel Electrical Repairs
- Repaired Expansion Joint Leak at Bridgestone Tunnel
- Installed Safety Lights on Distribution Truck

**June 2024**

- Checked sump pumps & pumped out manholes that are subject to steaming.
- Assisted with Project Work
- Tunnel Electrical Repairs
- Replaced discharge hose on Manhole B1 Sump Pump
- Installed replacement Safety Lights on Distribution Truck

Annual maintenance costs for EDS activities: $390,918.19 (excludes salaried personnel & corporate overhead).

## DES Projects

Below is a brief description of the MNDES projects performed during FY23-24 in various stages of completion.

**DES-178** **Manhole 5 Coatings and Repairs**

The Coating portion of this work began on June 16,2022 and was completed on June 25, 2022. The insulation portion was bid on September 2, 2022, and a Change Order #1 for this part of the project was sent to TEG for review on November 8, 2022. The Change Order was approved on November 22, 2022. Contractor installed insulation blankets and completed insulation work on July 28, 2023. TEG reviewed this work on September 12, 2023, with zero punch list items and an invoice was sent to Metro.

**DES-191** **Manhole 20 Repairs**

This project was awarded to TN Underground and excavation began on September 14, 2022. The re-routing of the conduit, installation, and core drilling of the new upper section of the vault was completed on September 19, 2022. The excavation was backfilled, and paving was completed on September 20, 2022. The mechanical tie ins took place the first week in January 2023. A meeting was held with TN Underground and their mechanical contractor to review the remainder of their work April 28, 2023. The balance of the work was completed the week of September 11th. and was reviewed by TEG on September 21, 2023. There were a couple of punch list items as well as the insulation work to be completed following the milling and paving work on 7th Avenue. These items were completed on November 6, 2023, and was reviewed by TEG on November 15, 2023. The Certificate of Substantial Completion was signed, and the warranty period began on November 15, 2023. Metro has been invoiced for this project.

**DES-194** **Manhole B4 Structural Steel and Insulation Repairs**

A Pre-bid Meeting and walkthrough of the project was conducted on January 25, 2023, with Mechanical, Insulation and Coating Contractors. Bids were received on February 14, 2023. A proposal was sent to Metro on February 24, 2023, for review and approval. Metro approved on March 2, 2023, and the Contracts were finalized with the vendors on March 23, 2023. The coating portion of the project began on April 24, 2023, and was completed on April 28, 2023. TEG reviewed this portion on April 28, 2023, and the punch list items were completed while their representative was present. The Insulation Contractor began their portion of this project on May 15, 2023, and was completed on June 1, 2023, except for the blankets which were sent back to the manufacturer for modifications. These blankets were installed on July 12, 2023. TEG reviewed this work on September 12, 2023, and there was one insulation blanket yet to be installed. This blanket was installed on December 6, 2023.

**DES-196** **Manhole 9 to Manhole 10 Condensate Line Replacement**

A Pre-bid Meeting and walkthrough of this project was held on May 31, 2023. This project included the replacement of a substantial portion of the condensate piping from Manhole 9 to Manhole 10 as well as additional small sections to the west of Manholes 10 and 11. The bids were received on June 27, 2023, and were deemed to exceed estimates. CES and TEG representatives reviewed other options and requested an alternate proposal which was approved by TEG on September 1, 2023. The pre-insulated pipe was ordered and delivered mid-October 2023. Excavation for this project outside of Manhole 11 began on October 23, 2023, to expose the condensate line. The anchor was in a different location than was indicated on the as-built drawings. TEG reviewed the anchor location and the pipe penetration condition of the manhole vault on October 31, 2023. TEG sent a description of the procedure for sealing the pipe penetration and the insulation required for the repair portion of the pipe to CES. This was relayed to the Contractor and the material was ordered.

During excavation near Manhole 9, the steam line casing was exposed and had deteriorated significantly. TEG reviewed and sent drawings and a description of the repairs that needed to be made on November 30, 2023. This portion of the work was completed as T&M as a change order to the project.

The excavation between Manholes 9 and 10 is complete, the old pipe removed, and the new pipe was installed in early December 2023.The condensate was restored to normal operation by mid-January.

The excavation on the condensate line on the west side of the vault in MH-10 began in mid- December and was completed on December 27, 2023, with the exception of the insulation. While exposing the condensate line in this area, the steam line casing was revealed which also showed significant deterioration. TEG made

recommendations for repairs in early January 2024 and the repairs were completed the first week of February 2024.

Most of the backfilling and paving was completed by the end of January with the areas to the west of Manholes 9 and 10 being completed on February 5, 2024, and the crosswalk concrete repairs were completed on February 6, 2024.

A walkthrough was conducted on February 23, 2024, and a punch list was created. These items were completed in March 2024 following ENECON's repair of the condensate end can on the south wall of Manhole 9. The backup documentation was approved. CES invoiced Metro for this work.

The record drawings were sent from TEG.

**DES-198** **M/H 18 Condensate Return Pump Replacement**

TEG issued preliminary drawings for the controls on May 27, 2022. Siemens reviewed the control scheme and provided a quote for this portion of the project. Due to the late delivery of the VFD's and the heating season, a decision was initially made to delay this project. A Pre-bid Meeting was held on June 13, 2023, and bids were received on June 23, 2023. The mechanical and electrical portion of the project was awarded to F.M. Sylvan and the controls portion was awarded to Siemens. The project work began on September 25, 2023. A majority of the work was completed on October 1, 2023, and a representative from MRG was onsite to support October 2, 2023. The functional controls portion of the project was approved on November 1, 2023. The remaining punch list items on the mechanical portion of the project were completed December 18, 2023. All invoices have been submitted and paid.

**DES-200** **Chilled Water System Side Stream Filter**

The piping for the side stream filter began in late January 2023. Materials were received the first week of March 2023 and the piping and electrical were completed the first week of May 2023. The commissioning of the unit began on May 9, 2023, and was completed later that day. A representative from TEG reviewed the initial installation and issued a punch list. The backwash meter was installed, and all punch list items were completed in July 2023. CES has invoiced Metro.

**DES-206** **7th Avenue Fan Replacement**

The 7th Avenue Fan broke apart during operation. After review, the best option was to replace the unit. The fan arrived on April 21, 2023, and the fabric expansion joint was delayed and arrived mid-June 2023. CES was given approval to proceed with the replacement and the traffic plan and excavation permits were issued by Metro and the work began on July 28, 2023. All mechanical and electrical work, with the exception of the VFD's was completed by August 18, 2023. The VFD installation was completed on October 30, 2023, and some of the punch list items were completed the same day. The remaining punch list items were completed by mid-December 2023. TEG requested some modifications to the control scheme and the VFD installer reviewed the operation, and the reprogramming was completed on February 21,2024.

**DES-207** **Manhole N1 Insulation**

The insulation contractor, Warren, was issued a purchase order and ordered material. Further discussion was held between the Contractor and TEG and revised drawings were issued for the insulation. A meeting was held on July 7, 2023, to review the project and revised drawings were sent as well as a revised quote which was approved by TEG. The work began early December 2023. Constellation and TEG agreed that Constellation will pay approximately 61% of this project and this will cover the balance of their Amendment 2 Manhole Insulation requirements through the balance of the existing contract, June 30, 2025. The balance of the work was completed by mid-January 2024. Additional insulation was requested on the ceiling of the manhole due to condensation. This work was completed on February 20,2024.

**DES-208** **2023 Steam Outage**

Repairs were made in the EGF and EDS on the steam system requiring a system outage on September 24-25, 2023. All items were completed, and the system was restored to normal operation. The scheduled 24-hour outage was completed in approximately 17 hours. Metro was invoiced.

**DES-209 Manhole B2 Sump Pump Line Excavation**

CES personnel met with GPRS personnel on April 17, 2023, to investigate a potential blockage of the discharge line on the Manhole B2 Sump Pump. The investigation indicated a possible blockage approximately 23 feet into the discharge piping. An exploratory excavation began on October 9, 2023, and a damaged section of pipe was found approximately 25 feet from the Manhole B2. Further investigation indicated there was a blockage approximately 75 feet to the east of this location. Another excavation revealed the pipe was not connected to the storm sewer in this location. The pipe was re-routed to the nearby storm sewer and the sump pump in Manhole B2 was placed in service to ensure proper drainage and flow in the pipe. The concrete and curbing that was removed was replaced on October 13, 2023. The review of the T&M backup was approved on February 26, 2024. CES invoiced Metro. CES and TEG have agreed to close the project until/if NDOT requires any additional paving changes.

**DES-210 Manhole C Sump Pump Installation**

A meeting was held on August 23, 2023, to review possible electrical routing for the proposed sump pump in Manhole C with representatives from CES, TEG and WeGo. Upon further review, this project was cancelled.

**DES-211 Enecon – AA Birch and MH-D Repairs**

TEG approved Constellation's proposal to have Enecon perform this work on March 22, 2024. The quote was based on drawings prepared by TEG. Work began mid-May 2024 and a work completion walkthrough was held on June 20, 2024. There are a couple of punch list items outstanding that should be completed mid-July 2024.

**DES-212 Manhole 2 End Can Repair**

Superior Mechanical began the end can repair on December 20, 2023, and while making repairs they reported some issues with the west wall of the manhole. Following a review with TEG, it was decided that there would need to be some repairs made to the west wall by Proshot Concrete. Superior completed the end can repair and link seal installation on January 11, 2024. Proshot repaired the west wall on February 8, 2024, and TEG asked ENECON to seal the opening between the pipe and the sleeve. This work was completed on March 22, 2024. CES has invoiced Metro.

**DES-214** **Chiller #2 R'Newal Service**

After chiller #2 suffered a rotor bar failure, CES proposed multiple options to Metro. A repair could be made to return the chiller to service and cost would be covered by CES exclusively. Due to the invasive nature of the repair, CES also proposed that an "R'Newal" service be considered. This proposal provided a significant warranty period and would rebuild the machines major components back to factory standard. After consideration by Metro and TEG, it was determined that MNDES would execute the full R'Newal Service offered by Trane to rebuild the unit back to factory specification with new warranties and serial number. The costs were allocated based on Constellation's repair responsibility and Metro's decision to pursue the full rebuild. All paperwork was finalized between Metro and Constellation, as well as Constellation and their subcontractor Trane. Parts were ordered and delivered mid-January. Mobilization began on January 21, 2024, and the project was completed on March 19, 2024 following a startup review by TEG. CES has invoiced Metro.

**DES-216** **Manholes 6, 12 and 13 Enecon Coatings**

Quotes to repair the structural steel in Manholes 6, 12 and 13 based on bid drawings were obtained from ENECON. The proposal was sent to Metro for approval on November 14, 2023, and approved on November 20, 2023. The work in Manhole 12 was completed the week of December 12, 2023. The work in Manhole 13 was completed on January 14,2024. Manhole 6 work began January 26, 2024, and was completed in early February 2024. A walkthrough was performed on February 20, 2024, and all punch list items were completed during the walkthrough. CES invoiced Metro.

**DES-218** **B Manholes and 22B Enecon Repairs**

Quotes to repair the structural steel in Manholes B2, B6, B7, B8, B9 and 22B based on bid drawings were obtained from ENECON. The proposal was sent to Metro for approval on January 23, 2024, and approved on January 24, 2024. ENECON has completed the work, and all punch list items were completed. Metro has been invoiced.

**DES-219** **7th Avenue ProShot Repairs and Piping Relocations**

ProShot visited the job site location in the 7th avenue section of tunnel to provide options and pricing for work to address water infiltration. It was determined that relocating steam lines would allow for better coverage by ProShot and include a reduced price for the work. TEG issued a bid drawing package for Phase 1 of this work which will include the relocation of the steam lines by a mechanical contractor. The pre-bid meeting was held on May 23, 2024, and a walkthrough was also conducted. Bids were received on June 10, 2024, and were evaluated by TEG. TEG recommended that Superior's bid be used for this project with a T&M Not to Exceed value.

**DES-220** **MH-20 Condensate Repairs and Grating Installation**

Superior Mechanical installed the vertical section of condensate piping in Manhole 20 down to the 7th Avenue Tunnel on February 24, 2024. Additional insulation and grating were requested to be installed following this work. The insulation and grating were installed in early April 2024 and following the review it was determined the support structure was installed improperly. The Contractor performed the proper installation on June 17, 2024, and a final walkthrough was completed on June 20, 2024. There were no punch list items. Metro has been invoiced.

**DES-221** **War Memorial Service Modifications**

A partial system shutdown was coordinated for April 26-27, 2024, in order to replace the steam valve in the State Tunnel which isolates the War Memorial and chilled water valves in the War Memorial Building. This partial shutdown only impacted customers on the State Steam loop and those fed from MH-23 on chilled water (Supreme Court, Library and Archives, State Capitol). The chilled water was isolated so that eight-inch supply and return chilled water valves could be replaced within the building by the building contractors. The valves were supplied by MNDES. The drain point for the chilled water was in the old Library and Archives Building using the drain valves installed by Superior Mechanical.

The outage was completed within the scheduled timeframe impacting only State of TN MNDES customers.

Representatives from both Thermal Engineering and CES met with Skanska and Comfort Group on April 29th, to identify steam and condensate lines to be replaced as part of the construction process. The MNDES team will be made aware of the construction schedule and will visit the site again once more line is exposed and the conditions can be verified.

This project will be ongoing throughout most of the first half of FY2025 until the customer services are reconnected. CES has removed and placed the customer's instrumentation in storage at the EGF. Additional instrumentation has been purchased and will be installed upon service restoration at the building.

**DES-222** **EDS Valve Program**

CES has received the valve tag materials and tools and will put together a plan to attach during monthly inspections once the summer weather has passed. This will be a multi-month process.

## EDS Emergency Repair Projects

There were zero Emergency Repair Projects.

## Outstanding Issues and Recommendations

Each year CES meets with Metro representatives in their monthly meetings. As part of this, they discuss outstanding issues and project recommendations. Below is a list of those items.

**Outstanding Issues**

- State of Tennessee to complete repairs to their steam tunnel.

**Recommendations**

- Add expansion loops to steam and condensate lines in Broadway tunnel to allow better access to tunnel from 5th & Broadway parking garage.
- Upgrade DES Tunnel Radio System due to obsolescence.

- **Potential projects that Metro should consider for the EGF:**
  - Automated Oxygen Trim on Boilers

## Sales and Marketing

Marketing for MNDES services is performed by Metro and TEG to new developments within the areas serviced by the system.

The following table, furnished by Thermal Engineering Group, Inc. on March 6, 2023 and validated on March 7, 2024, indicates the remaining current system capacity which may be sold.

| **System Capacity** | | |
|---|---|---|
| **Diversity Factor** | **66.54%** | **72.29%** |
| | Chilled Water (tons) | Steam (pph) |
| Installed capacity including redundant equipment | 23,400 | 260,000 |
| Installed capacity | 20,800 | 195,000 |
| Distribution losses | 600 | 10,948 |
| In-Plant losses (DA,etc.) | - | 17,540 |
| Max Allowable Customer Load | 20,200 | 166,512 |
| Maximum System Peaks | 18,584 | 141,135 |
| Net Undiversified Capacity Available for Sale | 1,616 | 25,377 |
| **Net Diversified Capacity Available for Sale** | **2,429** | **35,105** |
| Diversified Potential for Contract Capacities | 34,328 | 352,798 |
| Contract Capacity for Existing Customers | 30,359 | 284,616 |
| Potential Contract Capacity for Sale | 3,969 | 68,182 |

Ongoing activities include the following:

- A Sales and Marketing Report is included in the Monthly Operations Report.
- CES participates in meetings and social events with business groups, engineers, and developers throughout the year.
- CES provided a significant number of facility tours to real estate developers, local sustainability experts, the Nashville Chamber of Commerce, and Metro Council Members. Many of these tours included guided tunnel tours which were approved by CES and Metro safety teams.

# Utilities and Fuel Procurement

## Natural Gas and Propane

During FY 2023-2024, CES provided proactive support to Metro in the areas of fuel procurement and risk management. Metro, in a collaborative effort with CES, Insight Sourcing Group, and International FC Stone Financial Inc., made natural gas and propane procurement recommendations. Procurement decisions were made based upon a matrix of pricing and consumption factors including but not limited to then-current pricing conditions, future pricing conditions, technical and fundamental pricing trends, consumption variances as a function of incremental demand and conservation and budgetary considerations.

Natural gas supply was procured from Constellation NewEnergy-Gas Division, LLC ("CNEG") under the terms and conditions of an agreement between CES and CNEG for a service period extending through June 2025. The costs include the amount paid to CNEG for the cost of gas less any late fees Piedmont for the cost of transportation from the city gate to the plant, and the risk management fees, but it does not include the Fuel Efficiency Adjustment.

Following is a report of the natural gas and propane purchased in FY2023-2024.

| **Natural Gas** | | | |
|---|---|---|---|
| ***Month*** | ***Quantity (Dth)*** | ***Unit Cost*** | ***Amount*** |
| Jul-23 | 25,259.20 | $5.08628 | $128,475.44 |
| Aug-23 | 26,356.20 | $4.95727 | $130,654.79 |
| Sep-23 | 29,714.20 | $4.78509 | $142,185.19 |
| Oct-23 | 40,087.20 | $5.04557 | $202,262.84 |
| Nov-23 | 52,730.70 | $5.20704 | $274,570.75 |
| Dec-23 | 66,995.10 | $4.94450 | $331,257.33 |
| Jan-24 | 89,966.50 | $5.08927 | $457,863.73 |
| Feb-24 | 58,417.10 | $5.24963 | $306,668.27 |
| Mar-24 | 51,478.50 | $4.83963 | $249,137.11 |
| Apr-24 | 41,619.20 | $4.81269 | $200,300.24 |
| May-24 | 33,540.00 | $4.63762 | $155,545.93 |
| Jun-24 | 27,400.60 | $5.16463 | $141,513.84 |
| | | | |
| **Total** | **543,564.50** | **$5.00481** | **$2,720,435.46** |

On June 27, 2023, 100,000 gallons of propane was purchased for placement in TARGA's storage facility in the event of a natural gas curtailment due to extreme winter temperatures. This propane was purchased for use in FY2024.

Most notably, 803 dth of propane was used during a curtailment during extreme cold weather in January of 2024. The propane already in storage at the EGF was used and replaced by TARGA during one delivery. Additional propane usage during winter was while the vaporizer was in standby and was maintaining temperature per the thermostat.

90,795 Gallons of propane that was in storage was sold back to the supplier, TARGA. The credit memo was received and dated April 22, 2024.

The following is a report of propane used during the fiscal year:

| *Month* | *Quantity (Dth)* | *Unit Cost* | *Amount* |
|---|---|---|---|
| Jul-23 | 0 | $0.00000 | $0.00 |
| Aug-23 | 0 | $0.00000 | $0.00 |
| Sep-23 | 0 | $0.00000 | $0.00 |
| Oct-23 | 33 | $9.91485 | $327.19 |
| Nov-23 | 0 | $0.00000 | $0.00 |
| Dec-23 | 49 | $10.29061 | $504.24 |
| Jan-24 | 803 | $10.88430 | $8,740.09 |
| Feb-24 | 0 | $0.00000 | $0.00 |
| Mar-24 | 0 | $0.00000 | $0.00 |
| Apr-24 | 0 | $0.00000 | $0.00 |
| May-24 | 0 | $0.00000 | $0.00 |
| Jun-24 | 0 | $0.00000 | $0.00 |
| | | | |
| **Total** | **885.00** | **$10.81528** | **$9,571.52** |

## Electricity

During FY 23 – 24, electricity was purchased each month based on the Nashville Electric Service rate schedule. Quantities reported in the Monthly Reports are taken from plant meters. The difference between the plant meter readings and billed quantities have been reconciled as part of the true up process in Appendix 4 and Exhibit I of this report. No late fees are factored into the unit cost calculations.

| **Electricity (NES)** | | | |
|---|---|---|---|
| ***Month*** | ***Quantity (kWh)*** | ***Unit Cost*** | ***Amount*** |
| Jul-23 | 8,101,156.00 | $0.08483 | $687,206.58 |
| Aug-23 | 8,166,424.00 | $0.09078 | $741,357.91 |
| Sep-23 | 6,285,300.00 | $0.08952 | $562,664.15 |
| Oct-23 | 4,555,768.00 | $0.09345 | $425,753.19 |
| Nov-23 | 3,051,832.00 | $0.09609 | $293,244.36 |
| Dec-23 | 2,565,024.00 | $0.09015 | $231,246.54 |
| Jan-24 | 2,359,616.00 | $0.10285 | $242,695.87 |
| Feb-24 | 2,737,728.00 | $0.09832 | $269,162.35 |
| Mar-24 | 3,282,328.00 | $0.09745 | $319,876.98 |
| Apr-24 | 4,137,280.00 | $0.09040 | $373,994.06 |
| May-24 | 5,838,084.00 | $0.07954 | $464,367.99 |
| Jun-24 | 7,207,508.00 | $0.08886 | $640,493.86 |
| | | | |
| **Total** | **58,288,048.00** | **$0.09011** | **$5,252,063.84** |

## Water & Sewer

The following table indicates the water purchased during FY23 -24 based on the Metro Water Services rate schedule. The quantities in this table are from the actual water bills. They differ from those reported in the Monthly Reports because the Water Department's billing cycle is not based on the calendar month.

| **Water and Sewer (MWS)** | | | |
|---|---|---|---|
| ***Month*** | ***Quantity (kGal)*** | ***Unit Cost*** | ***Amount*** |
| Jul-23 | 28,738,908.00 | $0.00688 | $197,743.70 |
| Aug-23 | 21,549,880.00 | $0.00689 | $148,409.08 |
| Sep-23 | 20,722,592.00 | $0.00691 | $143,096.89 |
| Oct-23 | 12,943,392.00 | $0.00692 | $89,527.80 |
| Nov-23 | 9,468,184.00 | $0.00694 | $65,705.43 |
| Dec-23 | 8,871,280.00 | $0.00696 | $61,740.08 |
| Jan-24 | 8,306,540.00 | $0.00696 | $57,821.97 |
| Feb-24 | 6,891,324.00 | $0.00718 | $49,456.47 |
| Mar-24 | 8,112,808.00 | $0.00716 | $58,112.65 |
| Apr-24 | 8,260,164.00 | $0.00716 | $59,138.07 |
| May-24 | 11,873,004.00 | $0.00714 | $84,830.25 |
| Jun-24 | 14,963,740.00 | $0.00712 | $106,502.22 |
| | | | |
| **Total** | **160,701,816.00** | **$0.00698** | **$1,122,084.61** |

## Financial Report

The following is an explanation of the Appendices associated with this financial report.

**Appendix 1 – Customer List**

This chart lists the number of customers served by the District Energy System (MNDES). The customers are sorted according to three categories:

- Private Customers
- State of Tennessee Customers
- Metropolitan Nashville (Metro) Customers

**Appendix 2 – Revenues**

This chart summarizes the revenues charged per month by MNDES to each customer for FY23-24. (This appendix will no longer be published as part of this report, but the data is available to individual customers upon request.)

**Appendix 3 – Customer Rate Reconciliation (**This appendix will no longer be published as part of this report, but the data is available to individual customers upon request.)

The final chart, available upon request, is a Summary Reconciliation table for FY23-24. These tables detail the amount allocable to customers to the amount allocated to customers. The difference in the allocable amount and the amount allocated to customers is paid by Metro and is called the Metro Funding Amount (MFA).

- **Capacity Charge** – Associated with each customer and their agreed upon contracted capacity amount for chilled water and steam services.
- **System Operator Charge** – Includes the system operator's fee which is most of the operations and maintenance costs of the system.
- **EDS Improvements Charge** – FY23-24 for the annual repair and replacement fund.
- **Metro Incremental Administrative Charge** – Per the customer service agreement, these charges are the "actual, reasonable, and necessary" cost over and above current Metro operating costs to manage the MNDES system and operations scope.
- **Pass Through Charges**
    - **Water Treatment & Chemicals** – actual costs of chemical vendor services and chemicals to treat water.
    - **Engineering** – The engineering costs required for any non-capital projects, customer related issues, meetings, etc.
    - **Insurance** – The cost to maintain all-risk property insurance and business insurance policies.
    - **EDS Electricity** – The cost of electricity for tunnel lights, pumps, and safety equipment.
    - **EDS Surcharge** – Surcharge to private initial system customers only to cap their annual cost of any EDS repairs made by Metro.
    - **Water and Sewer** – Actual costs charged by Metro Water Services

- **Energy Charges**
  - **Electricity**
  - **Natural Gas**
  - **Propane**

**Appendix 4 – CES Invoice Reconciliation (FEA)**

**Exhibit 1 – Performance Guarantee Calculation**
**Exhibit 2 – Information Technology System Program**
**Exhibit 3 – Constellation Asset List**
**Exhibit 4 – Spare Parts Inventory**

## Appendix 1 – Customer List

| Metro Nashville District Energy System Customers | | | | | |
|---|---|---|---|---|---|
| **Private** | | **State** | | **Metro** | |
| 1 | Bobby Hotel (fka Wells Fargo) | 20 | Andrew Jackson | 33 | Ben West |
| 2 | Parkway Tower | 21 | Cordell Hull | 34 | A. A. Birch |
| 3 | Sheraton Hotel | 22 | John Sevier | 35 | Metro Courthouse |
| 4 | Hermitage Hotel | 23 | War Memorial | 36 | Municipal Auditorium |
| 5 | 501 Union Building | 24 | Library & Archives | 37 | Downtown Detention Center (fka CJC) |
| 6 | 4th & Church Building | 25 | Supreme Court | 38 | Bridgestone Arena |
| 7 | Fifth-Third Financial Center | 26 | State Capitol | 39 | Nissan Stadium |
| 8 | Renaissance Hotel | 27 | James K. Polk/TPAC | 40 | Hume-Fogg High School |
| 9 | City Space (fka Ren. Office Tower) | 28 | Citizens Plaza | 41 | Nashville Public Library |
| 10 | St. Mary's Catholic Church | 29 | Tennessee Tower | 42 | Music City Center |
| 11 | Nashville City Center | 30 | Tennessee State University | | |
| 12 | Wildhorse Saloon | 31 | Legislative Plaza | | |
| 13 | Ryman Auditorium | 32 | Rachael Jackson | | |
| 14 | Schermerhorn Symphony Center | | | | |
| 15 | Viridian Residential Tower | | | | |
| 16 | Hyatt Place Hotel | | | | |
| 17 | Fairlane Hotel (fka 401 Union) | | | | |
| 18 | 5th & Broadway (fka Nash Conv Ctr) | | | | |
| 19 | Hyatt Centric Hotel | | | | |

*fka = formally known as

## Appendix 2 – Consumption & Revenues

Available to individual customers upon request.

## Appendix 3 – Customer Rate Reconciliation

Available to individual customers upon request.

# Appendix 4 – CES Invoice Reconciliation (FEA)

Constellation

**REV: 1**
**DATE: 07/25/24**

**NASHVILLE, TENNESSEE**

## CES INVOICE RECONCILIATION - FY 2023 - 2024

| SALES SUMMARY FROM CUSTOMER METER READS | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MONTH** | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | | **TOTAL** |
| **STEAM SALES** | Previously invoiced, lbs | | 12,980,301 | 14,162,343 | 16,349,508 | 24,253,714 | 34,604,600 | 44,375,326 | 61,455,950 | 38,074,856 | 31,897,256 | 24,431,607 | 17,431,485 | 14,801,957 | | **334,818,903** |
| | Reconciled, lbs | | 12,980,301 | 14,162,343 | 16,349,508 | 24,253,714 | 34,604,600 | 44,375,326 | 61,455,950 | 38,074,856 | 31,897,256 | 24,431,607 | 17,431,485 | 14,801,957 | | **334,818,903** |
| **CHW SALES** | Previously invoiced, ton-hrs | | 8,908,198 | 8,739,099 | 6,895,684 | 5,090,587 | 3,416,517 | 2,855,370 | 2,483,362 | 3,106,478 | 3,700,241 | 4,753,538 | 6,611,847 | 7,965,627 | | **64,526,548** |
| | Reconciled, ton-hrs | | 8,908,198 | 8,739,099 | 6,895,684 | 5,090,587 | 3,416,517 | 2,855,370 | 2,483,362 | 3,106,478 | 3,700,241 | 4,753,538 | 6,611,847 | 7,965,627 | | **64,526,548** |
| **SUMMARY FROM CUSTOMER METER READS from INVOICES** | | | | | | | | | | | | | | | | |
| START DATE | | | 07/01/23 | 08/01/23 | 09/01/23 | 10/01/23 | 11/01/23 | 12/01/23 | 01/01/24 | 02/01/24 | 03/01/24 | 04/01/24 | 05/01/24 | 06/01/24 | | **07/01/23** |
| END DATE | | | 07/31/23 | 08/31/23 | 09/30/23 | 10/31/23 | 11/30/23 | 12/31/23 | 01/31/24 | 02/29/24 | 03/31/24 | 04/30/24 | 05/31/24 | 06/30/24 | | **06/30/24** |
| CHW SALES | ton-hrs | | 8,908,198 | 8,739,099 | 6,895,684 | 5,090,587 | 3,416,517 | 2,855,370 | 2,483,362 | 3,106,478 | 3,700,241 | 4,753,538 | 6,611,847 | 7,965,627 | | **64,526,548** |
| CHW SENDOUT | ton-hrs | | 9,295,400 | 9,334,100 | 7,364,600 | 5,441,400 | 3,658,100 | 3,030,800 | 2,638,400 | 3,265,300 | 3,934,900 | 5,033,300 | 6,932,500 | 8,374,200 | | **68,303,000** |
| CHW ELECTRIC | kWh | | 7,977,637 | 8,044,373 | 6,157,232 | 4,418,609 | 2,882,619 | 2,360,510 | 2,122,167 | 2,549,747 | 3,094,742 | 3,978,432 | 5,705,650 | 7,103,641 | | **56,395,359** |
| CHW MUW | galls | | 17,527,000 | 17,313,000 | 13,657,000 | 9,628,000 | 6,067,000 | 4,588,000 | 3,847,000 | 5,187,000 | 6,540,000 | 8,976,000 | 12,631,000 | 16,002,000 | | **121,963,000** |
| STEAM SALES | mlbs | | 12,980 | 14,162 | 16,350 | 24,254 | 34,605 | 44,375 | 61,456 | 38,075 | 31,897 | 24,432 | 17,431 | 14,802 | | **334,819** |
| STEAM SENDOUT | mlbs | | 18,865 | 19,258 | 21,662 | 29,006 | 38,270 | 47,697 | 64,947 | 42,971 | 37,610 | 29,977 | 24,860 | 20,607 | | **395,730** |
| STEAM PRODUCTION | mlbs | | 22,903 | 23,042 | 26,290 | 35,078 | 46,041 | 58,061 | 77,914 | 49,973 | 44,705 | 35,753 | 30,641 | 25,000 | | **475,401** |
| NATURAL GAS | mmBtu | | 25,259 | 26,356 | 29,714 | 40,087 | 52,731 | 66,995 | 89,967 | 58,417 | 51,479 | 41,619 | 33,540 | 27,401 | | **543,565** |
| PROPANE | mmBtu | | 0 | 0 | 0 | 33 | 0 | 49 | 803 | 0 | 0 | 0 | 0 | 0 | | **885** |
| STEAM ELECTRIC | kWh | | 51,757 | 51,722 | 51,685 | 62,598 | 86,813 | 115,450 | 144,762 | 106,478 | 100,642 | 77,149 | 57,139 | 54,011 | | **960,206** |
| CONDENSATE RETURN | galls | | 1,700,366 | 1,661,322 | 1,670,097 | 2,435,393 | 2,491,429 | 3,060,892 | 5,351,070 | 3,777,742 | 3,227,300 | 2,650,111 | 2,261,487 | 1,711,918 | | **31,999,127** |
| | mlbs | | 13,868 | 13,549 | 13,621 | 19,863 | 20,320 | 24,964 | 43,643 | 30,811 | 26,321 | 21,614 | 18,444 | 13,962 | | **260,980** |
| | °F | | 182 °F | 180 °F | 194 °F | 177 °F | 178 °F | 175 °F | 177 °F | 175 °F | 173 °F | 176 °F | 178 °F | 183 °F | | **177.9** |
| STEAM MUW | galls | | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | **19,546,930** |
| | mlbs | | 7,819 | 7,875 | 10,075 | 10,853 | 20,473 | 26,337 | 25,746 | 14,856 | 13,579 | 9,935 | 7,661 | 7,916 | | **163,125** |
| Days in Service | | | 31 | 31 | 30 | 31 | 30 | 31 | 31 | 29 | 31 | 30 | 31 | 30 | | **366** |
| Efficiency - Cooling | kWh/ton-hr-Sold | | 0.896 | 0.921 | 0.893 | 0.868 | 0.844 | 0.827 | 0.855 | 0.821 | 0.836 | 0.837 | 0.863 | 0.892 | | **0.87398692** |
| Efficiency - Heating | Dth/klb-Sendout | | 1.339 | 1.369 | 1.372 | 1.383 | 1.378 | 1.406 | 1.398 | 1.359 | 1.369 | 1.388 | 1.349 | 1.330 | | **1.37581053** |

Constellation

Constellation

**REV: 1**
**DATE: 07/25/24**

**NASHVILLE, TENNESSEE**

# CES INVOICE RECONCILIATION - FY 2023 - 2024

## UTILITY INVOICES (Paste Link)

| Month of Service | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ELECTRIC SERVICE (NES)** | | | | | | | | | | | | | | | |
| Service Dates | From | | 6/30/2023 | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/21/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2023 |
| | To | | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/31/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2024 | 6/30/2024 |
| PEAK Demand | kW | | 15,344 | 17,472 | 14,000 | 11,088 | 7,504 | 6,620 | 6,620 | 6,720 | 7,448 | 9,912 | 12,152 | 15,344 | 17,472 |
| Service Period Use | kWh | | 8,101,156 | 8,166,423 | 6,285,300 | 4,555,768 | 3,051,832 | 2,565,024 | 2,359,616 | 2,737,728 | 3,282,328 | 4,137,280 | 5,838,084 | 7,207,508 | 58,288,047 |
| Service Period Charge | $ | | $ 687,206.58 | $ 741,357.91 | $ 562,664.15 | $ 425,753.19 | $ 293,244.36 | $ 231,246.54 | $ 242,695.87 | $ 269,162.35 | $ 319,876.98 | $ 373,994.06 | $ 464,367.99 | $ 640,493.86 | $ 5,252,063.84 |
| Average Charge | $/kWh | | $ 0.084800 | $ 0.090800 | $ 0.089500 | $ 0.093500 | $ 0.096100 | $ 0.090200 | $ 0.102900 | $ 0.098300 | $ 0.097500 | $ 0.090400 | $ 0.079500 | $ 0.088900 | $ 0.090105 |
| **NATURAL GAS SERVICE** | | | | | | | | | | | | | | | |
| Service Dates | From | | 7/1/2023 | 8/1/2023 | 9/1/2023 | 10/1/2023 | 11/1/2023 | 12/1/2023 | 1/1/2024 | 2/1/2024 | 3/1/2024 | 4/1/2024 | 5/1/2024 | 6/1/2024 | 7/1/2023 |
| | To | | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/31/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2024 | 6/30/2024 |
| UTILITY LDC INVOICE DATA | Start | | 1,123,329 | 1,147,131 | 1,171,968 | 1,199,981 | 1,237,611 | 1,287,128 | 1,350,046 | 1,434,474 | 1,489,244 | 1,489,244 | 1,528,229 | 1,559,645 | |
| | Ending | | 1,147,131 | 1,171,968 | 1,199,981 | 1,237,611 | 1,287,128 | 1,350,046 | 1,434,474 | 1,489,244 | 1,537,485 | 1,528,229 | 1,559,645 | 1,585,326 | |
| UTILITY METER Multiplier | | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| HEAT FACTOR | | | 1.061 | 1.061 | 1.061 | 1.065 | 1.065 | 1.065 | 1.066 | 1.067 | 1.067 | 1.068 | 1.068 | 1.067 | |
| Service Period Use | CCF | | 238,020 | 248,370 | 280,130 | 376,300 | 495,170 | 629,180 | 844,280 | 547,700 | 482,410 | 389,850 | 314,160 | 256,810 | 5,102,380 |
| | Dth | | 25,259.2 | 26,356.2 | 29,714.2 | 40,087.2 | 52,730.7 | 66,995.1 | 89,966.5 | 58,417.1 | 51,478.5 | 41,619.2 | 33,540.0 | 27,400.6 | 543,564.5 |
| Service Period Charges | | | | | | | | | | | | | | | |
| CONSULTANTS | $ | | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | $5,409.00 | 64,908.00 |
| NASHVILLE LDC | $ | | $ 17,790.95 | $ 18,262.97 | $ 19,707.85 | $ 30,005.61 | $ 36,679.48 | $ 44,208.96 | $ 56,334.42 | $ 39,681.05 | $ 35,375.25 | $ 30,814.28 | $ 26,597.07 | $ 23,350.61 | 378,808.50 |
| CNEG | $ | | $ 105,275.49 | $ 106,982.82 | $ 117,068.34 | $ 166,848.23 | $ 232,482.27 | $ 281,639.37 | $ 396,120.31 | $ 261,578.22 | $ 208,352.83 | $ 164,076.96 | $ 123,539.86 | $ 112,754.23 | 2,276,718.93 |
| TOTAL | $ | | $ 128,475.44 | $130,654.79 | $ 142,185.19 | $ 202,262.84 | $ 274,570.75 | $ 331,257.33 | $ 457,863.73 | $ 306,668.27 | $ 249,137.08 | $ 200,300.24 | $ 155,545.93 | $ 141,513.84 | $ 2,720,435.43 |
| Average Charge | $/Dth | | $ 5.0863 | $ 4.9573 | $ 4.7851 | $ 5.0456 | $ 5.2070 | $ 4.9445 | $ 5.0893 | $ 5.2496 | $ 4.8396 | $ 4.8127 | $ 4.6376 | $ 5.1646 | $ 5.00480 |
| **WATER SERVICE (DOMESTIC AND PLANT)** | | | | | | | | | | | | | | | |
| Service Dates | From | | 6/30/2023 | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/21/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2023 |
| | To | | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/31/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2024 | 6/30/2024 |
| UTILITY CEPS INVOICE DATA ENTRY | | | | | | | | | | | | | | | |
| DOMESTIC | Start | | | | | | | | | | | | | | |
| | Ending | | | | | | | | | | | | | | |
| PLANT METER #1 | Start | | | | | | | | | | | | | | |
| | Ending | | | | | | | | | | | | | | |
| PLANT METER #2 | Start | | | | | | | | | | | | | | |
| | Ending | | | | | | | | | | | | | | |
| Service Period Use | | | | | | | | | | | | | | | |
| DOMESTIC | CCF | | 39 | 25 | 58 | 25 | 21 | 28 | 27 | 18 | 23 | 22 | 21 | 35 | 342 |
| PLANT METER #1 | CCF | | 38,421 | 28,810 | 27,704 | 17,304 | 12,658 | 11,860 | 11,105 | 9,213 | 10,846 | 11,043 | 15,873 | 20,005 | 214,842 |
| PLANT METER #2 | CCF | | | | | | | | | | | | | | 0 |
| TOTAL | CCF | | 38,460 | 28,835 | 27,762 | 17,329 | 12,679 | 11,888 | 11,132 | 9,231 | 10,869 | 11,065 | 15,894 | 20,040 | 215,184 |
| PLANT ONLY | CCF | | 38,421 | 28,810 | 27,704 | 17,304 | 12,658 | 11,860 | 11,105 | 9,213 | 10,846 | 11,043 | 15,873 | 20,005 | 214,842 |
| | GALLONS | | 28,738,908 | 21,549,880 | 20,722,592 | 12,943,392 | 9,468,184 | 8,871,280 | 8,306,540 | 6,891,324 | 8,112,808 | 8,260,164 | 11,873,004 | 14,963,740 | 160,701,816 |
| Service Period Charges | | | | | | | | | | | | | | | |
| DOMESTIC | WATER $ | | $ 160.38 | $ 117.82 | $ 218.14 | $ 117.82 | $ 105.66 | $ 126.94 | $ 123.90 | $ 99.42 | $ 115.07 | $ 111.94 | $ 108.81 | $ 152.63 | $ 1,558.53 |
| | SEWER $ | | $ 392.10 | $ 301.80 | $ 514.65 | $ 301.80 | $ 276.00 | $ 321.15 | $ 314.70 | $ 264.28 | $ 297.48 | $ 290.84 | $ 284.20 | $ 377.16 | $ 3,936.16 |
| PLANT | WATER $ | | $ 116,989.54 | $ 87,772.10 | $ 84,409.86 | $ 52,793.86 | $ 38,670.02 | $ 36,244.10 | $ 33,948.90 | $ 29,032.08 | $ 34,143.37 | $ 34,759.98 | $ 49,877.88 | $ 62,811.04 | $ 661,452.73 |
| | SEWER $ | | $ 61,952.25 | $ 46,452.90 | $ 44,672.70 | $ 27,902.70 | $ 20,407.80 | $ 19,124.25 | $ 17,905.20 | $ 15,291.92 | $ 18,001.04 | $ 18,326.40 | $ 26,347.52 | $ 33,206.64 | $ 349,591.32 |
| | STATE FEE @ 10% | | $ 18,249.43 | $ 13,764.46 | $ 13,281.54 | $ 8,411.62 | $ 6,245.95 | $ 5,923.64 | $ 5,529.27 | $ 4,768.77 | $ 5,555.69 | $ 5,648.91 | $ 8,211.84 | $ 9,954.75 | $ 105,545.87 |
| TOTAL | | | $ 197,743.70 | $ 148,409.08 | $ 143,096.89 | $ 89,527.80 | $ 65,705.43 | $ 61,740.08 | $ 57,821.97 | $ 49,456.47 | $ 58,112.65 | $ 59,138.07 | $ 84,830.25 | $ 106,502.22 | $ 1,122,084.61 |
| PLANT, WATER ONLY | $ | | $ 116,989.54 | $ 87,772.10 | $ 84,409.86 | $ 52,793.86 | $ 38,670.02 | $ 36,244.10 | $ 33,948.90 | $ 29,032.08 | $ 34,143.37 | $ 34,759.98 | $ 49,877.88 | $ 62,811.04 | $ 661,452.73 |
| Average Charge | $/kGall | | $ 4.0708 | $ 4.0730 | $ 4.0733 | $ 4.0788 | $ 4.0842 | $ 4.0856 | $ 4.0870 | $ 4.2128 | $ 4.2086 | $ 4.2081 | $ 4.2009 | $ 4.1975 | $ 4.1160 |

| MONTHLY FEAs | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Service Dates | From | | 7/1/2023 | 8/1/2023 | 9/1/2023 | 10/1/2023 | 11/1/2023 | 12/1/2023 | 1/1/2024 | 2/1/2024 | 3/1/2024 | 4/1/2024 | 5/1/2024 | 6/1/2024 | 7/1/2023 |
| | To | | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/31/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2024 | 6/30/2024 |
| STEAM | ELECTRIC | | $141.17 | $272.63 | $489.83 | $1,087.94 | $1,655.28 | $1,899.25 | $3,389.58 | $1,593.47 | $1,045.74 | $740.99 | $423.36 | $279.95 | $13,019.19 |
| | FUEL GAS | | $654.37 | $120.27 | $51.95 | -$442.39 | $1,201.18 | -$238.54 | -$5,689.35 | $963.80 | $503.74 | -$1,890.23 | $610.72 | $1,208.87 | -$2,945.61 |
| | WATER | | -$984.14 | -$603.37 | -$348.24 | -$99.16 | $54.37 | $18.34 | -$457.56 | -$351.19 | -$217.50 | -$97.39 | -$94.79 | -$88.36 | -$3,268.99 |
| CHW | ELECTRIC | | $6,421.04 | $1,785.40 | $5,708.76 | $7,377.52 | $7,059.02 | $6,632.02 | $4,791.33 | $8,321.24 | $8,478.19 | $9,990.99 | $8,804.51 | $6,727.38 | $82,097.40 |
| | FUEL GAS | | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| | WATER | | -$2,030.76 | -$2,384.82 | -$2,106.61 | $57.10 | $383.73 | $851.61 | $817.04 | $853.92 | $677.42 | $395.07 | $368.04 | -$2,106.45 | -$4,224.71 |
| | | | $ 4,201.68 | $ (809.89) | $ 3,795.69 | $ 7,981.01 | $ 10,353.58 | $ 9,162.68 | $ 2,851.04 | $ 11,381.24 | $ 10,487.59 | $ 9,139.43 | $ 10,111.84 | $ 6,021.39 | $84,677.28 |

Constellation

Constellation

REV: 1
DATE: 07/25/24

NASHVILLE, TENNESSEE

# CES INVOICE RECONCILIATION - FY 2023 - 2024

## FINALIZE FUEL EFFICIENCY ADJUSTMENTS

| SUMMARY | ELECTRIC FEA | FUEL GAS FEA | WATER FEA | System TOTAL |
|---|---|---|---|---|
| STEAM SYSTEM | $11,806.57 | $2,970.35 | ($3,055.08) | $11,721.84 |
| CHILLED WATER SYSTEM | $60,915.55 | $0.00 | $2,204.91 | $63,120.46 |
| TOTAL | $72,722.12 | $2,970.35 | ($850.17) | $74,842.30 |

| Include FEA in INVOICE (YES/NO) |
|---|
| YES |

### ELECTRICITY-TO-STEAM CONVERSION

| | | | CNE PENALTY/BONUS CALCULATION | | PENALTY | BONUS |
|---|---|---|---|---|---|---|
| CONTRACTUAL GUARANTEE | 4.500 | kWh per mlb sold | | | | |
| Metering Inaccuracy Buffer | 0% | | RATE VARIANCE | kWh per mlb sold | 0.000 | 1.565399 |
| GUARANTEED MAX QUANTITY | 4.500000 | kWh per mlb sold | STEAM SOLD | 334,818.903 mlb | | |
| CEPS FUEL EFFICIENCY ADJUSTME | 4.500000 | kWh per mlb sold | VARIANCE in kWh = RATE VARIANCE x STEAM SOLD | | 0 | 524,125 |
| CEPS ACTUAL CONVERSION RATE | 2.934601 | kWh per mlb sold | AVERAGE ELECTRIC PRICE | $0.090105 / kWh | | |
| | | | CEPS PENALTY / BONUS | | $0.00 | $11,806.57 |
| | | | *NOTE: Penalty at 100% of variance and Bonus at 25% of variance* | | | |

### FUEL GAS-TO-STEAM CONVERSION

| CONTRACTUAL GUARANTEE (varies by Condensate Return, see below) | | | CNE PENALTY/BONUS CALCULATION | | PENALTY | BONUS |
|---|---|---|---|---|---|---|
| Given Condensate Return at | 66% | of Send-out | RATE VARIANCE | Dth. per mlb sold | 0.000 | 0.006 |
| | 178 °F | avg. Temp. | STEAM SEND-OUT | 395,730 mlb | | |
| GUARANTEED MAX QUANTITY | 1.382000 | Dth.per mlb sold | VARIANCE in Dth. = RATE VARIANCE x STEAM SOLD | | 0 | 2,374 |
| CEPS FUEL EFFICIENCY ADJUSTME | 1.382000 | Dth.per mlb sold | AVERAGE FUEL PRICE | $5.00480 / Dth. | | |
| CEPS ACTUAL CONVERSION RATE | 1.376000 | Dth.per mlb sold | CEPS PENALTY / BONUS | | $0.00 | $2,970.35 |
| | | | *NOTE: Penalty at 100% of variance and Bonus at 25% of variance* | | | |

### WATER-TO-STEAM CONVERSION

| CONTRACTUAL GUARANTEE (varies by Plant Send-out, see below)) | | | CNE PENALTY/BONUS CALCULATION | | PENALTY | BONUS |
|---|---|---|---|---|---|---|
| PLANT LOSSES | 15% | | VARIANCE in gallons = GMQ - CES ACTUAL USE | | -742,245 | 0 |
| VOLUMETRIC CONVERSION | 7.4805 | gallons per cft | AVERAGE WATER PRICE | $4.1160 / kGall | | |
| CONDENSATE RETURN SPEC. VOL. | 8.15585 | gall per lb | CEPS PENALTY / BONUS | | -$3,055.08 | $0.00 |
| GUARANTEED MAX QUANTITY | 19,000,154 | gallons | *Average water pice excludes sewer.* | | | |
| CEPS ACTUAL USE | 19,742,399 | gallons | | | | |
| | | | *NOTE: Penalty at 100% of variance and Bonus at 25% of variance* | | | |

### ELECTRICITY-TO-CHILLED WATER CONVERSION

| | | | CNE PENALTY/BONUS CALCULATION | | PENALTY | BONUS |
|---|---|---|---|---|---|---|
| CONTRACTUAL GUARANTEE | 0.930 | kWh per ton-hr sold | | | | |
| Metering Inaccuracy Buffer | 0% | | RATE VARIANCE | kWh per ton-hr sold | 0.000 | 0.04190837 |
| GUARANTEED MAX QUANTITY | 0.93000000 | kWh per ton-hr sold | CHILLED WATER SOLD | 64,526,548 ton-hrs | | |
| CEPS FUEL EFFICIENCY ADJUSTME | 0.93000000 | kWh per ton-hr sold | VARIANCE in kWh = RATE VARIANCE x CHW SOLD | | 0 | 2,704,203 |
| CEPS ACTUAL CONVERSION RATE | 0.88809163 | kWh per ton-hr sold | AVERAGE ELECTRIC PRICE | $0.090105 / kWh | | |
| | | | CEPS PENALTY / BONUS | | $0.00 | $60,915.55 |
| | | | *NOTE: Penalty at 100% of variance and Bonus at 25% of variance* | | | |

### WATER-TO-CHILLED WATER CONVERSION

| | | | CNE PENALTY/BONUS CALCULATION | | PENALTY | BONUS |
|---|---|---|---|---|---|---|
| CONTRACTUAL GUARANTEE | 2.000 | gall per ton-hr sold | | | | |
| Metering Inaccuracy Buffer | 0% | | RATE VARIANCE | gall per ton-hr sold | 0.000000 | 0.033 |
| GUARANTEED MAX QUANTITY | 2.000000 | gall per ton-hr sold | CHILLED WATER SOLD | 64,526,548 ton-hrs | | |
| CEPS FUEL EFFICIENCY ADJUSTME | 2.000000 | gall per ton-hr sold | VARIANCE in gallons = RATE VARIANCE x CHW SOLD | | 0 | 2,142,772 |
| CEPS ACTUAL CONVERSION RATE | 1.966792 | gall per ton-hr sold | AVERAGE WATER PRICE | $4.1160 / kGall | | |
| | | | CEPS PENALTY / BONUS | | $0.00 | $2,204.91 |
| | | | *NOTE: Penalty at 100% of variance and Bonus at 25% of variance* | | | |

## COMPARISON PREVIOUSLY BILLED VS. RECONCILED AMOUNTS

| STEAM SYSTEM | CALCULATED | RECONCILED | VARIANCE |
|---|---|---|---|
| ELECTRIC | $13,019.19 | $11,806.57 | ($1,212.62) |
| FUEL GAS | ($2,945.61) | $2,970.35 | $5,915.96 |
| WATER | ($3,268.99) | ($3,055.08) | $213.91 |
| TOTAL | $6,804.59 | $11,721.84 | $4,917.25 |

| CHILLED WATER SYSTEM | CALCULATED | RECONCILED | VARIANCE |
|---|---|---|---|
| ELECTRIC | $82,097.40 | $60,915.55 | ($21,181.85) |
| FUEL GAS | $0.00 | $0.00 | $0.00 |
| WATER | ($4,224.71) | $2,204.91 | $6,429.62 |
| TOTAL | $77,872.69 | $63,120.46 | ($14,752.23) |

## COMPARISON AMOUNT COLLECTED BY METRO VS 97-13 CAP

| | FEA COLLECTED BY METRO | | | FEA RECONCILED | METRO OWES | CUSTOMER OWES |
|---|---|---|---|---|---|---|
| | STEAM | CHILLED WATER | TOTAL | CNE | CNE * | METRO |
| ELECTRIC | $13,019.19 | $82,097.40 | $95,116.59 | $72,722.12 | ($22,394.47) | ($22,394.47) |
| FUEL GAS | ($2,945.61) | $0.00 | ($2,945.61) | $2,970.35 | $5,915.96 | $5,915.96 |
| WATER | ($3,268.99) | ($4,224.71) | ($7,493.70) | ($850.17) | $6,643.53 | $6,643.53 |
| TOTAL | $6,804.59 | $77,872.69 | $84,677.28 | $74,842.30 | ($9,834.98) | ($9,834.98) |


| PLANT READINGS (Paste Link) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | TOTAL |
| DATE OF READINGS | From | 7/1/2023 | 8/1/2023 | 9/1/2023 | 10/1/2023 | 11/1/2023 | 12/1/2023 | 1/1/2024 | 2/1/2024 | 3/1/2024 | 4/1/2024 | 5/1/2024 | 6/1/2024 | 7/1/2023 |
| (coincides with Customer Dates) | To | 7/31/2023 | 8/31/2023 | 9/30/2023 | 10/31/2023 | 11/30/2023 | 12/31/2023 | 1/31/2024 | 2/29/2024 | 3/31/2024 | 4/30/2024 | 5/31/2024 | 6/30/2024 | 6/30/2024 |
| ELECTRIC METERS | | | | | | | | | | | | | | |
| SWG-2A | Start Reading | 67,268.31 | 68,045.30 | 68,547.71 | 68,646.26 | 68,778.66 | 68,799.15 | 68,930.44 | 68,934.03 | 68,989.36 | 69,346.28 | 70,599.76 | 71,927.78 | |
| | End Reading | 68,045.30 | 68,547.71 | 68,646.26 | 68,778.66 | 68,799.15 | 68,930.44 | 68,934.03 | 68,989.36 | 69,346.28 | 70,599.76 | 71,927.78 | 73,269.93 | |
| Period Use in units = | 1,000 x kWh | 776,990 | 502,410 | 98,550 | 132,400 | 20,490 | 131,290 | 3,590 | 55,330 | 356,920 | 1,253,480 | 1,328,020 | 1,342,150 | 6,001,620 |
| SWG-2B | Start Reading | 135,458.49 | 137,869.29 | 139,610.88 | 141,673.95 | 142,461.10 | 142,981.67 | 143,624.82 | 144,440.02 | 144,888.72 | 145,479.01 | 146,391.24 | 147,650.09 | |
| | End Reading | 137,869.29 | 139,610.88 | 141,673.95 | 142,461.10 | 142,981.67 | 143,624.82 | 144,440.02 | 144,888.72 | 145,479.01 | 146,391.24 | 147,650.09 | 148,789.19 | |
| Period Use in units = | 1,000 x kWh | 2,410,800 | 1,741,590 | 2,063,070 | 787,150 | 520,570 | 643,150 | 815,200 | 448,700 | 590,290 | 912,230 | 1,258,850 | 1,139,100 | 13,330,700 |
| SWG-3A | Start Reading | 108,700.57 | 110,939.62 | 113,155.55 | 114,317.18 | 115,663.09 | 116,404.72 | 117,201.85 | 117,946.74 | 118,668.36 | 119,246.26 | 119,386.66 | 120,260.63 | |
| | End Reading | 110,939.62 | 113,155.55 | 114,317.18 | 115,663.09 | 116,404.72 | 117,201.85 | 117,946.74 | 118,668.36 | 119,246.26 | 119,386.66 | 120,260.63 | 122,055.60 | |
| Period Use in units = | 1,000 x kWh | 2,239,050 | 2,215,930 | 1,161,630 | 1,345,910 | 741,630 | 797,130 | 744,890 | 721,620 | 577,900 | 140,400 | 873,970 | 1,794,970 | 13,355,030 |
| SWG-3B | Start Reading | 12,103.56 | 12,965.44 | 14,799.25 | 16,217.50 | 17,308.49 | 18,223.73 | 18,445.27 | 18,509.96 | 19,245.74 | 20,091.67 | 20,846.26 | 21,763.99 | |
| | End Reading | 12,965.44 | 14,799.25 | 16,217.50 | 17,308.49 | 18,223.73 | 18,445.27 | 18,509.96 | 19,245.74 | 20,091.67 | 20,846.26 | 21,763.99 | 23,076.00 | |
| Period Use in units = | 1,000 x kWh | 861,880 | 1,833,810 | 1,418,250 | 1,090,990 | 915,240 | 221,540 | 64,690 | 735,780 | 845,930 | 754,590 | 917,730 | 1,312,010 | 10,972,440 |
| SWG-4A | Start Reading | 29,229,277.00 | 29,573,070.00 | 30,184,469.00 | 30,755,185.00 | 31,182,041.00 | 31,250,817.00 | 31,319,945.00 | 31,319,945.00 | 31,319,945.00 | 31,340,120.00 | 31,590,644.00 | 32,094,185.00 | |
| | End Reading | 29,573,070.00 | 30,184,469.00 | 30,755,185.00 | 31,182,041.00 | 31,250,817.00 | 31,319,945.00 | 31,319,945.00 | 31,319,945.00 | 31,340,120.00 | 31,590,644.00 | 32,094,185.00 | 32,639,838.00 | |
| Period Use in units = | 1 x kWh | 343,793 | 611,399 | 570,716 | 426,856 | 68,776 | 69,128 | 0 | 0 | 20,175 | 250,524 | 503,541 | 545,653 | 3,410,561 |
| SWG-4B | Start Reading | 12,237,658.00 | 12,614,552.00 | 12,771,256.00 | 12,787,529.00 | 12,800,582.00 | 13,011,087.00 | 13,164,416.00 | 13,351,288.00 | 13,598,391.00 | 13,871,429.00 | 13,973,325.00 | 13,974,988.00 | |
| | End Reading | 12,614,552.00 | 12,771,256.00 | 12,787,529.00 | 12,800,582.00 | 13,011,087.00 | 13,164,416.00 | 13,351,288.00 | 13,598,391.00 | 13,871,429.00 | 13,973,325.00 | 13,974,988.00 | 14,022,972.00 | |
| Period Use in units = | 1 x kWh | 376,894 | 156,704 | 16,273 | 13,053 | 210,505 | 153,329 | 186,872 | 247,103 | 273,038 | 101,896 | 1,663 | 47,984 | 1,785,314 |
| SWG-5A | Start Reading | 17,132,628.00 | 17,276,906.00 | 17,653,757.00 | 17,973,037.00 | 18,027,165.00 | 18,027,165.00 | 18,161,451.00 | 18,342,878.00 | 18,525,676.00 | 18,601,883.00 | 18,705,720.00 | 18,846,313.00 | |
| | End Reading | 17,276,906.00 | 17,653,757.00 | 17,973,037.00 | 18,027,165.00 | 18,027,165.00 | 18,161,451.00 | 18,342,878.00 | 18,525,676.00 | 18,601,883.00 | 18,705,720.00 | 18,846,313.00 | 19,014,268.00 | |
| Period Use in units = | 1 x kWh | 144,278 | 376,851 | 319,280 | 54,128 | 0 | 134,286 | 181,427 | 182,798 | 76,207 | 103,837 | 140,593 | 167,955 | 1,881,640 |
| SWG-5B | Start Reading | 2,091,552.00 | 2,367,553.00 | 2,411,327.00 | 2,451,758.00 | 2,685,766.00 | 2,895,917.00 | 2,951,242.00 | 2,951,242.00 | 2,951,242.00 | 3,083,888.00 | 3,237,998.00 | 3,444,248.00 | |
| | End Reading | 2,367,553.00 | 2,411,327.00 | 2,451,758.00 | 2,685,766.00 | 2,895,917.00 | 2,951,242.00 | 2,951,242.00 | 2,951,242.00 | 3,083,888.00 | 3,237,998.00 | 3,444,248.00 | 3,654,506.00 | |
| Period Use in units = | 1 x kWh | 276,001 | 43,774 | 40,431 | 234,008 | 210,151 | 55,325 | 0 | 0 | 132,646 | 154,110 | 206,250 | 210,258 | 1,562,954 |
| MCC-1 | Start Reading | 3,508,256.00 | 3,775,728.00 | 4,042,439.00 | 4,249,587.00 | 4,382,283.00 | 4,456,142.00 | 4,533,569.00 | 4,587,371.00 | 4,656,207.00 | 4,765,035.00 | 4,917,430.00 | 5,122,019.00 | |
| | End Reading | 3,775,728.00 | 4,042,439.00 | 4,249,587.00 | 4,382,283.00 | 4,456,142.00 | 4,533,569.00 | 4,587,371.00 | 4,656,207.00 | 4,765,035.00 | 4,917,430.00 | 5,122,019.00 | 5,378,815.00 | |
| Period Use in units = | 1 x kWh | 267,472 | 266,711 | 207,148 | 132,696 | 73,859 | 77,427 | 53,802 | 68,836 | 108,828 | 152,395 | 204,589 | 256,796 | 1,870,559 |
| MCC-2 | Start Reading | 62,577.50 | 99,669.10 | 50,445.40 | 69,979.00 | 27,138.20 | 6,030.40 | 39,892.80 | 67,251.30 | 115,087.40 | 83,314.10 | 95,636.90 | 21,152.70 | |
| | End Reading | 299,669.10 | 350,445.40 | 269,979.00 | 227,138.20 | 106,030.40 | 39,892.80 | 67,251.30 | 115,087.40 | 183,314.10 | 195,636.90 | 321,152.70 | 263,853.60 | |
| Period Use in units = | 1 x kWh | 237,092 | 250,776 | 219,534 | 157,159 | 78,892 | 33,862 | 27,359 | 47,836 | 68,227 | 112,323 | 225,516 | 242,701 | 1,701,276 |
| MCC-3 | Start Reading | 21,974.40 | 46,951.60 | 61,036.30 | 63,272.40 | 69,088.40 | 95,166.50 | 36,012.70 | 76,019.50 | 98,996.00 | 130,281.90 | 45,624.60 | 45,624.60 | |
| | End Reading | 46,951.60 | 61,036.30 | 63,272.40 | 69,088.40 | 95,166.50 | 136,012.70 | 76,019.50 | 98,996.00 | 130,281.90 | 145,624.60 | 45,624.60 | 45,756.30 | |
| Period Use in units = | 1 x kWh | 24,977 | 14,085 | 2,236 | 5,816 | 26,078 | 40,846 | 40,007 | 22,977 | 31,286 | 15,343 | 0 | 132 | 223,783 |
| MCC-4 | Start Reading | 95,886.80 | 22,387.10 | 59,740.30 | 8,836.50 | 64,997.60 | 24,471.30 | 96,962.70 | 98,759.80 | 180,547.00 | 248,474.00 | 9,461.60 | 66,154.10 | |
| | End Reading | 122,387.10 | 59,740.30 | 108,836.50 | 64,997.60 | 124,471.30 | 96,962.70 | 198,759.80 | 180,547.00 | 248,474.00 | 309,461.60 | 66,154.10 | 119,699.90 | |
| Period Use in units = | 1 x kWh | 26,500 | 37,353 | 49,096 | 56,161 | 59,474 | 72,491 | 101,797 | 81,787 | 67,927 | 60,988 | 56,693 | 53,546 | 723,813 |
| NOTES: | | | | | | | | | | | | | | |


| OTHER METERS (Paste Link) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT_6120: Propane Gas | Available for Use | | 13,500.00 | 13,500.00 | 13,500.00 | 13,500.00 | 13,140.00 | 13,140.00 | 13,140.00 | 12,240.00 | 12,240.00 | 12,240.00 | 12,240.00 | 12,240.00 | | |
| | Ending Inventory | | 13,500.00 | 13,500.00 | 13,500.00 | 13,140.00 | 13,140.00 | 12,600.00 | 3,780.00 | 12,240.00 | 12,240.00 | 12,240.00 | 12,240.00 | 12,240.00 | | |
| Period Use in units = | Gallons | | 0.00 | 0.00 | 0.00 | 360.00 | 0.00 | 540.00 | 8,820.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 9,720 |
| Period Use in units = | Gallons Per DT | | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | 10.989 | | |
| FIQY_3000: Stm Sendout | Start Reading | | 1,167,226 | 1,186,091 | 1,205,349 | 1,227,011 | 1,256,017 | 1,294,287 | 1,341,984 | 1,406,931 | 1,449,902 | 1,487,512 | 1,517,489 | 1,542,349 | | |
| | End Reading | | 1,186,091 | 1,205,349 | 1,227,011 | 1,256,017 | 1,294,287 | 1,341,984 | 1,406,931 | 1,449,902 | 1,487,512 | 1,517,489 | 1,542,349 | 1,562,956 | | |
| Period Use in units = | 1 x MLB | | 18,865 | 19,258 | 21,662 | 29,006 | 38,270 | 47,697 | 64,947 | 42,971 | 37,610 | 29,977 | 24,860 | 20,607 | | 395,730 |
| WQ_1800: CHW Sendout | Start Reading | | 856,121 | 949,075 | 42,416 | 116,062 | 170,476 | 29,552 | 59,860 | 86,244 | 118,897 | 158,246 | 208,579 | 277,904 | | |
| | End Reading | | 949,075 | 1,042,416 | 116,062 | 170,476 | 207,057 | 59,860 | 86,244 | 118,897 | 158,246 | 208,579 | 277,904 | 361,646 | | |
| Period Use in units = | 1 x TON-HRS | | 9,295,400 | 9,334,100 | 7,364,600 | 5,441,400 | 3,658,100 | 3,030,800 | 2,638,400 | 3,265,300 | 3,934,900 | 5,033,300 | 6,932,500 | 8,374,200 | | 68,303,000 |
| FT_8100: Cond. Return | Start Reading | | 64,155,689 | 65,856,055 | 67,517,377 | 69,187,474 | 71,622,867 | 74,114,296 | 77,175,188 | 82,526,258 | 86,304,000 | 89,531,300 | 92,181,411 | 94,442,898 | | |
| | End Reading | | 65,856,055 | 67,517,377 | 69,187,474 | 71,622,867 | 74,114,296 | 77,175,188 | 82,526,258 | 86,304,000 | 89,531,300 | 92,181,411 | 94,442,898 | 96,154,816 | | |
| Period Use in units = | 1 x GALL | | 1,700,366 | 1,661,322 | 1,670,097 | 2,435,393 | 2,491,429 | 3,060,892 | 5,351,070 | 3,777,742 | 3,227,300 | 2,650,111 | 2,261,487 | 1,711,918 | | 31,999,127 |
| WQ_8100: Cond. Return | Start Reading | | 108,408 | 110,489 | 112,500 | 114,707 | 117,596 | 120,567 | 124,146 | 130,466 | 134,879 | 138,578 | 141,700 | 144,397 | | |
| | End Reading | | 110,489 | 112,500 | 114,707 | 117,596 | 120,567 | 124,146 | 130,466 | 134,879 | 138,578 | 141,700 | 144,397 | 146,506 | | |
| Period Use in units = | 1 x mmBtu | | 2,081 | 2,011 | 2,207 | 2,889 | 2,971 | 3,579 | 6,320 | 4,413 | 3,699 | 3,122 | 2,697 | 2,109 | | 38,098 |
| Condensate Return Temp | | | 182 °F | 180 °F | 194 °F | 177 °F | 178 °F | 175 °F | 177 °F | 175 °F | 173 °F | 176 °F | 178 °F | 183 °F | | 178 °F |
| FT_4500: MUW, Stm. | Start Reading | | 3,130,220 | 4,067,210 | 5,010,830 | 6,218,050 | 7,518,590 | 9,971,850 | 3,127,730 | 16,212,830 | 17,993,030 | 19,620,170 | 20,810,630 | 1,728,640 | | |
| | End Reading | | 4,067,210 | 5,010,830 | 6,218,050 | 7,518,590 | 9,971,850 | 13,127,730 | 6,212,830 | 17,993,030 | 19,620,170 | 20,810,630 | 21,728,640 | 2,677,150 | | |
| Period Use in units = | 1 x GALL | | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | 19,546,930 |
| FT_4200: MUW, CW. | Start Reading | | 89,873,000 | 7,400,000 | 24,713,000 | 38,370,000 | 47,998,000 | 54,065,000 | 58,653,000 | 62,500,000 | 67,687,000 | 74,227,000 | 83,203,000 | 95,834,000 | | |
| | End Reading | | 107,400,000 | 24,713,000 | 38,370,000 | 47,998,000 | 54,065,000 | 58,653,000 | 62,500,000 | 67,687,000 | 74,227,000 | 83,203,000 | 95,834,000 | 111,836,000 | | |
| Period Use in units = | 1 x GALL | | 17,527,000 | 17,313,000 | 13,657,000 | 9,628,000 | 6,067,000 | 4,588,000 | 3,847,000 | 5,187,000 | 6,540,000 | 8,976,000 | 12,631,000 | 16,002,000 | | 121,963,000 |
| FT_4100: MUW, CHW. | Start Reading | | 71,876 | 857,509 | 610,109 | 263,472 | 758,268 | 968,760 | 257,625 | 1,576,475 | 791,433 | 1,006,259 | 1,161,436 | 404,304 | | |
| | End Reading | | 857,509 | 1,610,109 | 1,263,472 | 758,268 | 1,149,896 | 1,257,625 | 576,475 | 1,791,433 | 1,006,259 | 1,161,436 | 1,404,304 | 838,064 | | |
| | 1 x GALL | | 785,633 | 752,600 | 653,363 | 494,796 | 391,628 | 288,865 | 318,850 | 214,958 | 214,826 | 155,177 | 242,868 | 433,760 | | |
| | Excess of Daily Cap | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Period Use in units = | 1 x GALL | | 785,633 | 752,600 | 653,363 | 494,796 | 391,628 | 288,865 | 318,850 | 214,958 | 214,826 | 155,177 | 242,868 | 433,760 | | 4,947,324 |
| 2" PLANT WATER | Start Reading in 10 x scft | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| UTILITY METER | Start Reading in 10 x scft | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Period Use in units = | 1 x SCFT | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| 6" PLANT WATER | Start Reading | | 41,883,700 | 44,457,900 | 47,002,600 | 49,079,300 | 50,608,900 | 51,808,400 | 52,888,600 | 53,862,600 | 54,822,100 | 55,948,900 | 57,331,200 | 59,194,500 | | |
| UTILITY METER | End Reading | | 44,457,900 | 47,002,600 | 49,079,300 | 50,608,900 | 51,808,400 | 52,888,600 | 53,862,600 | 54,822,100 | 55,948,900 | 57,331,200 | 59,194,500 | 61,533,200 | | |
| Period Use in units = | 1 x SCFT | | 2,574,200 | 2,544,700 | 2,076,700 | 1,529,600 | 1,199,500 | 1,080,200 | 974,000 | 959,500 | 1,126,800 | 1,382,300 | 1,863,300 | 2,338,700 | | 19,649,500 |
| 2" DOMESTIC WATER | Start Reading | | 594.0 | 613.0 | 665.0 | 697.0 | 721.0 | 744.0 | 774.0 | 795.0 | 816.0 | 841.0 | 860.0 | 886.0 | | |
| UTILITY METER | End Reading | | 613.0 | 665.0 | 697.0 | 721.0 | 744.0 | 774.0 | 795.0 | 816.0 | 841.0 | 860.0 | 886.0 | 966.0 | | |
| Period Use in units = | 1 x SCFT | | 19 | 52 | 32 | 24 | 23 | 30 | 21 | 21 | 25 | 19 | 26 | 80 | | 372 |


| PERFORMANCE CALCULATIONS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | | **TOTAL** |
| **ELECTRIC-to-STEAM CONVERSION** | | | | | | | | | | | | | | |
| Emainutility kWh | 8,101,156 | 8,166,423 | 6,285,300 | 4,555,768 | 3,051,832 | 2,565,024 | 2,359,616 | 2,737,728 | 3,282,328 | 4,137,280 | 5,838,084 | 7,207,508 | | **58,288,047** |
| Echw,metered kWh | 7,934,250 | 7,999,955 | 6,114,882 | 4,374,350 | 2,840,113 | 2,316,467 | 2,077,829 | 2,508,003 | 3,050,161 | 3,935,785 | 5,660,722 | 7,059,577 | | **55,872,094** |
| Esteam,metered kWh | 51,477 | 51,438 | 51,332 | 61,977 | 85,552 | 113,337 | 141,804 | 104,764 | 99,213 | 76,331 | 56,693 | 53,678 | | **947,596** |
| Esteam,unmetered kWh | 733.0 | 725.0 | 973.0 | 1,625.0 | 3,537.0 | 5,975.0 | 8,412.0 | 4,782.0 | 4,019.0 | 2,309.0 | 1,172.0 | 702.0 | | **34,964** |
| CAPACITY TEST ADJUSTMENT, kWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **0** |
| Esteam,total kWh | 52,210 | 52,163 | 52,305 | 63,602 | 89,089 | 119,312 | 150,216 | 109,546 | 103,232 | 78,640 | 57,865 | 54,380 | | **982,560** |
| Customer Steam, Sn+e lbs | 12,980,301 | 14,162,343 | 16,349,508 | 24,253,714 | 34,604,600 | 44,375,326 | 61,455,950 | 38,074,856 | 31,897,256 | 24,431,607 | 17,431,485 | 14,801,957 | | **334,818,903** |
| **nelec, actual kWh/klb** | 4.022 | 3.683 | 3.199 | 2.622 | 2.574 | 2.689 | 2.444 | 2.877 | 3.236 | 3.219 | 3.320 | 3.674 | | **2.934601** |
| **FUEL GAS-to-STEAM CONVERSION** | | | | | | | | | | | | | | |
| Metered Plant Steam Send-out lbs | 18,865,000 | 19,258,000 | 21,662,000 | 29,006,000 | 38,270,000 | 47,697,000 | 64,947,000 | 42,971,000 | 37,610,000 | 29,977,000 | 24,860,000 | 20,607,000 | | **395,730,000** |
| CAPACITY TEST ADJUSTMENT, lbs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **0** |
| ADJUSTED Plant Steam SO lbs | 18,865,000 | 19,258,000 | 21,662,000 | 29,006,000 | 38,270,000 | 47,697,000 | 64,947,000 | 42,971,000 | 37,610,000 | 29,977,000 | 24,860,000 | 20,607,000 | | **395,730,000** |
| Natural Gas use, NG Dth | 25,259.2 | 26,356.2 | 29,714.2 | 40,087.2 | 52,730.7 | 66,995.1 | 89,966.5 | 58,417.1 | 51,478.5 | 41,619.2 | 33,540.0 | 27,400.6 | | **543,564.5** |
| Propane Gas use, P gallon | 0 | 0 | 0 | 360 | 0 | 540 | 8,820 | 0 | 0 | 0 | 0 | 0 | | **9,720** |
| Dth | 0 | 0 | 0 | 33 | 0 | 49 | 803 | 0 | 0 | 0 | 0 | 0 | | **885** |
| CAPACITY TEST ADJUSTMENT, Dth | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | **0** |
| TOTAL FUEL GAS USE Dth | 25,259.2 | 26,356.2 | 29,714.2 | 40,120.0 | 52,730.7 | 67,044.1 | 90,769.5 | 58,417.1 | 51,478.5 | 41,619.2 | 33,540.0 | 27,400.6 | | **544,449.3** |
| **nhhv,actual Dth/klb** | **1.339** | **1.369** | **1.372** | **1.383** | **1.378** | **1.406** | **1.398** | **1.359** | **1.369** | **1.388** | **1.349** | **1.330** | | **1.3760** |
| Condensate Return, CR gallon | 1,700,366 | 1,661,322 | 1,670,097 | 2,435,393 | 2,491,429 | 3,060,892 | 5,351,070 | 3,777,742 | 3,227,300 | 2,650,111 | 2,261,487 | 1,711,918 | | 31,999,127 |
| % of SO | 73.51% | 70.36% | 62.88% | 68.48% | 53.10% | 52.34% | 67.20% | 71.70% | 69.99% | 72.10% | 74.19% | 67.75% | | 65.95% |
| Condensate Return Energy mmBtu | 2,081 | 2,011 | 2,207 | 2,889 | 2,971 | 3,579 | 6,320 | 4,413 | 3,699 | 3,122 | 2,697 | 2,109 | | 38,098 |
| Condensate Return Temperature avg | 182 °F | 180 °F | 194 °F | 177 °F | 178 °F | 175 °F | 177 °F | 175 °F | 173 °F | 176 °F | 178 °F | 183 °F | | 178 °F |
| **nhhv,guarantee Dth/klb** | | | | | | | | | | | | **GUARANTEED MAX RATE** | | **1.382000** |
| | | | | | | | | | | | | **CES FEA RATE** | | **1.382000** |
| **WATER-to-STEAM CONVERSION** | | | | | | | | | | | | | | |
| Metered Steam Makeup, MW Gallons | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | 19,546,930 |
| CAPACITY TEST ADJUSTMENT, Gallons | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| ADJUSTED Steam Makeup, MW Gallons | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | 19,546,930 |
| Actual Steam Makeup, nwater Gallons | 946,360 | 953,056 | 1,219,292 | 1,313,545 | 2,477,793 | 3,187,439 | 3,115,951 | 1,798,002 | 1,643,411 | 1,202,365 | 927,190 | 957,995 | | 19,742,399 |
| Guarantee Steam Makeup, nguar. Gallons | 704,602 | 804,917 | 1,133,797 | 1,289,233 | 2,531,045 | 3,205,398 | 3,003,997 | 1,714,640 | 1,591,731 | 1,179,222 | 904,627 | 936,945 | | 19,000,154 |
| **ELECTRICITY-to-CHW CONVERSION** | | | | | | | | | | | | | | |
| Emainutility kWh | 8,101,156 | 8,166,423 | 6,285,300 | 4,555,768 | 3,051,832 | 2,565,024 | 2,359,616 | 2,737,728 | 3,282,328 | 4,137,280 | 5,838,084 | 7,207,508 | | 58,288,047 |
| CAPACITY TEST ADJUSTMENT, kWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Echw,metered kWh | 7,934,250 | 7,999,955 | 6,114,882 | 4,374,350 | 2,840,113 | 2,316,467 | 2,077,829 | 2,508,003 | 3,050,161 | 3,935,785 | 5,660,722 | 7,059,577 | | 55,872,094 |
| Esteam,total kWh | 52,210 | 52,163 | 52,305 | 63,602 | 89,089 | 119,312 | 150,216 | 109,546 | 103,232 | 78,640 | 57,865 | 54,380 | | 982,560 |
| Echw,unmetered kWh | 114,696 | 114,305 | 118,113 | 117,816 | 122,630 | 129,245 | 131,571 | 120,179 | 128,935 | 122,855 | 119,497 | 93,551 | | 1,433,393 |
| Echw,total kWh | 8,048,946 | 8,114,260 | 6,232,995 | 4,492,166 | 2,962,743 | 2,445,712 | 2,209,400 | 2,628,182 | 3,179,096 | 4,058,640 | 5,780,219 | 7,153,128 | | 57,305,487 |
| Customer CHW, CHWs+e Ton-hrs | 8,908,198 | 8,739,099 | 6,895,684 | 5,090,587 | 3,416,517 | 2,855,370 | 2,483,362 | 3,106,478 | 3,700,241 | 4,753,538 | 6,611,847 | 7,965,627 | | 64,526,548 |
| **nelec, actual kWh/ton-hr** | 0.904 | 0.929 | 0.904 | 0.882 | 0.867 | 0.857 | 0.890 | 0.846 | 0.859 | 0.854 | 0.874 | 0.898 | | **0.888092** |
| **CW-to-CHW CONVERSION** | | | | | | | | | | | | | | |
| Cond Water Makeup incl loss , CM Gallons | 18,312,633 | 18,065,600 | 14,310,363 | 10,122,796 | 6,458,628 | 4,876,865 | 4,165,850 | 5,401,958 | 6,754,826 | 9,131,177 | 12,873,868 | 16,435,760 | | 126,910,324 |
| Customer CHW, CHWs+e Ton-hrs | 8,908,198 | 8,739,099 | 6,895,684 | 5,090,587 | 3,416,517 | 2,855,370 | 2,483,362 | 3,106,478 | 3,700,241 | 4,753,538 | 6,611,847 | 7,965,627 | | 64,526,548 |
| **nwater,actual Gallons/ton-hr** | 2.0557 | 2.0672 | 2.0753 | 1.9885 | 1.8904 | 1.7080 | 1.6775 | 1.7389 | 1.8255 | 1.9209 | 1.9471 | 2.0633 | | **1.966792** |

Constellation.

## METER CHECKS AND ESTIMATES

| WATER METER CHECKS | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Utility Meters - Utility Dates | gallons | | 28,738,908 | 21,549,880 | 20,722,592 | 12,943,392 | 9,468,184 | 8,871,280 | 8,306,540 | 6,891,324 | 8,112,808 | 8,260,164 | 11,873,004 | 14,963,740 | | **160,701,816** |
| Utility Meters - Customer Dates | gallons | | 19,255,016 | 19,034,356 | 15,533,716 | 11,441,408 | 8,972,260 | 8,079,896 | 7,285,520 | 7,177,060 | 8,428,464 | 10,339,604 | 13,937,484 | 17,493,476 | | **146,978,260** |
| variance (line 184-line 183) | gallons | | -9,483,892 | -2,515,524 | -5,188,876 | -1,501,984 | -495,924 | -791,384 | -1,021,020 | 285,736 | 315,656 | 2,079,440 | 2,064,480 | 2,529,736 | | **-13,723,556** |
| % of TOTAL (line 183) | | | -33% | -12% | -25% | -12% | -5% | -9% | -12% | 4% | 4% | 25% | 17% | 17% | | **-8.54%** |
| Plant Meters | | | | | | | | | | | | | | | | |
| CHW | gallons | | 785,633 | 752,600 | 653,363 | 494,796 | 391,628 | 288,865 | 318,850 | 214,958 | 214,826 | 155,177 | 242,868 | 433,760 | | **4,947,324** |
| CW | gallons | | 17,527,000 | 17,313,000 | 13,657,000 | 9,628,000 | 6,067,000 | 4,588,000 | 3,847,000 | 5,187,000 | 6,540,000 | 8,976,000 | 12,631,000 | 16,002,000 | | **121,963,000** |
| STEAM | gallons | | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | **19,546,930** |
| **TOTAL** | **gallons** | | **19,249,623** | **19,009,220** | **15,517,583** | **11,423,336** | **8,911,888** | **8,032,745** | **7,250,950** | **7,182,158** | **8,381,966** | **10,321,637** | **13,791,878** | **17,384,270** | | **146,457,254** |
| variance (line 191-line 184) | gallons | | -5,393 | -25,136 | -16,133 | -18,072 | -60,372 | -47,151 | -34,570 | 5,098 | -46,498 | -17,967 | -145,606 | -109,206 | | **-521,006** |
| % of TOTAL (line 184) | | | 0% | 0% | 0% | 0% | -1% | -1% | 0% | 0% | -1% | 0% | -1% | -1% | | **-0.32%** |

| CW MUW CHECK | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHW Send-out | ton-hrs | | 9,295,400 | 9,334,100 | 7,364,600 | 5,441,400 | 3,658,100 | 3,030,800 | 2,638,400 | 3,265,300 | 3,934,900 | 5,033,300 | 6,932,500 | 8,374,200 | | **68,303,000** |
| CW MUW Rate | gall/ton-hr | | 1.886 | 1.855 | 1.854 | 1.769 | 1.659 | 1.514 | 1.458 | 1.589 | 1.662 | 1.783 | 1.822 | 1.911 | | **1.786** |

| FINAL MAKEUP WATER RESULTS | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHW | gallons | | 785,633 | 752,600 | 653,363 | 494,796 | 391,628 | 288,865 | 318,850 | 214,958 | 214,826 | 155,177 | 242,868 | 433,760 | | **4,947,324** |
| CW | gallons | | 17,527,000 | 17,313,000 | 13,657,000 | 9,628,000 | 6,067,000 | 4,588,000 | 3,847,000 | 5,187,000 | 6,540,000 | 8,976,000 | 12,631,000 | 16,002,000 | | **121,963,000** |
| STEAM | gallons | | 936,990 | 943,620 | 1,207,220 | 1,300,540 | 2,453,260 | 3,155,880 | 3,085,100 | 1,780,200 | 1,627,140 | 1,190,460 | 918,010 | 948,510 | | **19,546,930** |
| **TOTAL** | **gallons** | | **19,249,623** | **19,009,220** | **15,517,583** | **11,423,336** | **8,911,888** | **8,032,745** | **7,250,950** | **7,182,158** | **8,381,966** | **10,321,637** | **13,791,878** | **17,384,270** | | **146,457,254** |
| variance | gallons | | -5,393 | -25,136 | -16,133 | -18,072 | -60,372 | -47,151 | -34,570 | 5,098 | -46,498 | -17,967 | -145,606 | -109,206 | | **-521,006** |
| % of TOTAL (line 184) | | | 0% | 0% | 0% | 0% | -1% | -1% | 0% | 0% | 0% | 0% | -1% | -1% | | **0%** |

| STEAM PLANT MASS BALANCE CK | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STEAM SENDOUT | klbs | | 18,865 | 19,258 | 21,662 | 29,006 | 38,270 | 47,697 | 64,947 | 42,971 | 37,610 | 29,977 | 24,860 | 20,607 | | **395,730** |
| STEAM PRODUCTION | klbs | | 22,903 | 23,042 | 26,290 | 35,078 | 46,041 | 58,061 | 77,914 | 49,973 | 44,705 | 35,753 | 30,641 | 25,000 | | **475,401** |
| | | | -4,038 | -3,784 | -4,628 | -6,072 | -7,771 | -10,364 | -12,967 | -7,002 | -7,095 | -5,776 | -5,781 | -4,393 | | |
| CALC'D LOSSES | | | | | | | | | | | | | | | | |
| BLOWDOWN 4% | klbs | | 916 | 922 | 1,052 | 1,403 | 1,842 | 2,322 | 3,117 | 1,999 | 1,788 | 1,430 | 1,226 | 1,000 | | **19,016** |
| DEA VENT 0.50% | klbs | | 115 | 115 | 131 | 175 | 230 | 290 | 390 | 250 | 224 | 179 | 153 | 125 | | **2,377** |
| TOTAL CALC'D LOSSES | klbs | | 1,031 | 1,037 | 1,183 | 1,579 | 2,072 | 2,613 | 3,506 | 2,249 | 2,012 | 1,609 | 1,379 | 1,125 | | **21,393** |
| CONDENSATE RETURN | gallons | | 1,700,366 | 1,661,322 | 1,670,097 | 2,435,393 | 2,491,429 | 3,060,892 | 5,351,070 | 3,777,742 | 3,227,300 | 2,650,111 | 2,261,487 | 1,711,918 | | **31,999,127** |
| 8.15585 | klbs | | 13,868 | 13,549 | 13,621 | 19,863 | 20,320 | 24,964 | 43,643 | 30,811 | 26,321 | 21,614 | 18,444 | 13,962 | | **260,980** |
| STEAM MUW 8.3453 | klbs | | 7,819 | 7,875 | 10,075 | 10,853 | 20,473 | 26,337 | 25,746 | 14,856 | 13,579 | 9,935 | 7,661 | 7,916 | | **163,125** |
| TOTAL LEAVING PLANT | klbs | | 19,896 | 20,295 | 22,845 | 30,585 | 40,342 | 50,310 | 68,453 | 45,220 | 39,622 | 31,586 | 26,239 | 21,732 | | **417,123** |
| TOTAL ENTERING PLANT | klbs | | 21,687 | 21,424 | 23,696 | 30,716 | 40,793 | 51,301 | 69,389 | 45,667 | 39,900 | 31,549 | 26,105 | 21,878 | | **424,105** |
| OVERAGE / SHORTFALL | klbs | | 1,792 | 1,129 | 851 | 132 | 451 | 991 | 935 | 447 | 279 | -37 | -133 | 146 | | **6,982** |
| | | | 9.0% | 5.6% | 3.7% | 0.4% | 1.1% | 2.0% | 1.4% | 1.0% | 0.7% | -0.1% | -0.5% | 0.7% | | **1.67%** |
| **FINAL CONDENSATE RETURN CALCULATIONS** | | | | | | | | | | | | | | | | |
| RECALC'D TOTAL ENTERING | klbs | | 20,493 | 20,904 | 23,530 | 31,502 | 41,552 | 51,819 | 70,507 | 46,576 | 40,810 | 32,533 | 27,026 | 22,384 | | |
| RECALC'D COND. RETURN | klbs | | 12,673 | 13,029 | 13,456 | 20,649 | 21,079 | 25,482 | 44,761 | 31,720 | 27,231 | 22,599 | 19,365 | 14,468 | | |
| | gallons | | 1,553,859 | 1,597,497 | 1,649,833 | 2,531,759 | 2,584,514 | 3,124,416 | 5,488,164 | 3,889,242 | 3,338,880 | 2,770,860 | 2,374,362 | 1,773,985 | | |

# Exhibit 1 – Performance Guarantee Calculation

**NASHVILLE, TENNESSEE**

## EXHIBIT 1 - CALCULATION DETAIL FOR PLANT PERFORMANCE

### ELECTRICITY-TO-STEAM CONVERSION

| | | | | | |
|---|---|---|---|---|---|
| (1) | E (MainUtility) = total electric use per main utility meters | | | 58,288,047 | kWh |
| (2) | E (Steam,metered) = metered electric use for steam plant | | | 947,596 | kWh |
| | | *MCC-3* | *223,783* | | |
| | | *MCC-4* | *723,813* | | |
| (3) | E (CHW,metered) = metered electric use for chilled water plant | | | 55,872,094 | kWh |
| | | *SWGR-2A* | *6,001,620* | | |
| | | *SWGR-2B* | *13,330,700* | | |
| | | *SWGR-3A* | *13,355,030* | | |
| | | *SWGR-3B* | *10,972,440* | | |
| | | *SWGR-4A* | *3,410,561* | | |
| | | *SWGR-4B* | *1,785,314* | | |
| | | *SWGR-5A* | *1,881,640* | | |
| | | *SWGR-5B* | *1,562,954* | | |
| | | *MCC-1* | *1,870,559* | | |
| | | *MCC-2* | *1,701,276* | | |
| (4) | Esteam,unmetered = un-metered electric use for steam plant = [ (2) / (1) ] x [ (1) - (2) - (3) ] | | | 34,964 | kWh * |
| (5) | Echw,unmetered = un-metered electric use for chilled water plant = (1) - (2) - (3) - (4) | | | 1,433,393 | kWh * |
| (6) | Esteam,total = total electric use for steam plant = (2) + (4) | | | 982,560 | kWh * |
| (7) | Customer Steam Sales, metered + unmetered | | | 334,818,903 | lbs |
| **n (elec): Actual Steam Plant Electric Conversion = (6) / [ (7) x 0.001 ] =** | | | | **2.935** | **kWh/klb** |

### NATURAL GAS-TO-STEAM CONVERSION

| | | | | | |
|---|---|---|---|---|---|
| (8) | NG = Total Natural Gas Use per main utility meters | | | 543,564.5 | Dth |
| (9) | P = Total Propane Gas | | | 885 | Dth |
| (10) | HHV = Higher Heating Value of Propane | | | 1.002052 | Btu/scft |
| (11) | SO = Plant Steam Send Out | | | 395,730,000 | lbs |
| | | *Meter Reading at the beginning, n-1* | *1,167,226* | | |
| | | *Meter Reading at the end, n (Adjusted for meter reset)* | *1,562,956* | | |
| | | *Units of Measure* | *1 x SCFT* | | |
| **n (HHV): Actual Plant Efficiency = [ (8) + (9) x (10) ] / [ (11) x 0.001) ] =** | | | | **1.376** | **Dth/klb** |
| (12) | CR = Condensate Return per plant meter | | | 31,999,127 | gallons ** |
| | | *Meter Reading at the beginning, n-1* | *64,155,689* | | |
| | | *Meter Reading at the end, n* | *96,154,816* | | |
| | | *Units of Measure* | *1 x SCFT* | | |
| (13) | H = Condensate Return energy | | | 38,098 | mmBtu |
| | | *Meter Reading at the beginning, n-1* | *108,408* | | |
| | | *Meter Reading at the end, n* | *146,506* | | |
| | | *Units of Measure* | *1 x MMBTU* | | |
| **T (cr,avg): Average Condensate Return Temperature =** | | | | **178** | **°F** |

## WATER-TO-STEAM CONVERSION

| | | | | | |
|---|---|---|---|---|---|
| (14) | MW = Steam system makeup water plant meter | | | 19,546,930 | gallons |
| | | *Meter Reading at the beginning, n-1* | *3,130,220* | | |
| | | *Meter Reading at the end, n* | *2,677,150* | | |
| | | *Units of Measure* | *1 x SCFT* | | |
| | **n (water): Actual steam plant water use = (14) * 1.01 =** | | | **19,742,399** | **gallons** |
| | **G (water): Guaranteed steam plant water use = [ (11) / 8.15585 - (12) =** | | | **19,000,154** | **gallons** |

## ELECTRICITY-TO-CHILLED WATER CONVERSION

| | | | | | |
|---|---|---|---|---|---|
| (15) | E (chw,total) = Total CHW Electric use = (3) + (5) = | | | 57,305,487 | kWh * |
| (16) | Customer CHW Sales, metered + unmetered | | | 64,526,548 | tonhrs |
| | **n (elec): Actual chilled water plant electric conversion = (15) / (16) =** | | | **0.888** | **kw/ton** |

## CONDENSER WATER-TO-CHILLED WATER CONVERSION

| | | | | | |
|---|---|---|---|---|---|
| (17) | CM = water makeup | | | 126,910,324 | gallons ** |
| | | *Meter Reading at the beginning, n-1* | *89,873,000* | | |
| | | *Meter Reading at the end, n* | *111,836,000* | | |
| | | *Units of Measure* | *1 x GALL* | | |
| | Cooling Tower Makeup | | | 121,963,000 | |
| | | *Meter Reading at the beginning, n-1* | *71,876* | | |
| | | *Meter Reading at the end, n* | *838,064* | | |
| | | *Units of Measure* | *Excess of Daily Cap* | | |
| | EDS ChW Makeup | | | 4,947,324 | |
| | **n (water): Actual chilled water plant conversion = (17) / (16) =** | | | **1.967** | **gal/ton-hr** |

NOTES: * - There is a 15,886 kWh variance from the FEA due to rounding errors resulting from monthly vs. annual summation.

** - Estimated due to incorrect totalization resulting from "low flow cut-off".

# Exhibit 2 – Information Technology System Program

## Networks

The Operating System for the Metro Nashville District Energy System (DES) Energy Generation Facility (EGF) was provided and installed by Siemens Building Technologies. This System has been upgraded from Apogee Insight to Desigo CC. This software controls all the equipment and machinery in the plant.

Constellation Energy Solutions, LLC (CES) installed an Administrative Computer Network to be used for non-operating office functions, such as, the Computerized Maintenance Management System data base (CMMS), e-mail, reporting, accounting, customer billing, etc. The following addresses equipment, programs, and scheduled activities to support this network.

## Hardware

The computer equipment in the EGF belongs to Metro. CES is obligated to provide equipment which meets or exceeds industry standards. The following table shows equipment acquired by CES for the Nashville DES:

| **Equipment** |
|---|
| Plant Server<br>Dell PowerEdge T330/1 x Xeon e3-1200 v6 3.00 GHz Processor/64 GB RAM/RAID 5 Configuration/DVD drive<br>Siemens Server<br>Dell Precision 5820/duel Xeon W-2223 3.6 GHz Processor/16 GB RAM/RAID 5 Configuration/DVD drive |
| Firewall<br>Sonicwall TZ 400 |
| Desktop Computers<br>Dell OptiPlex 7080 small frame with Intel Core i7-10700 Processor, 16 GB Ram, 2.90 GHz , x64 based processor, 1 TB HD |
| Monitors<br>Dell Professional E2420HS 24” Ultra Sharp LCD Flat Panel |
| Laptop Computers<br>Dell Vostro 15 5501, with Intel i7-1065G7, 15.6 HD Display, 1.50GHz, x64 based processor, 16 GB Ram, 500 GB Hard Drive |
| Docking Stations<br>Dell D6000 Universal Docking Station<br>Ultra slim, wireless, keyboard & mouse |

Per industry standards, computer hardware should be replaced every three to five years. This equipment was most recently replaced in 2020, the Metro computer in 2023. The Siemens server was replaced in 2020 and is continuously updated per the manufacturer's requirements to maintain functionality. The CES server was replaced with a solid-state Dell T330 in 2018. An equipment inventory is located on page 77 of this document.

CES has a performance contract with Metro to operate and manage the Nashville DES. Except for a designated workstation in the Metro office, CES will have exclusive use of and responsibility for this equipment in the same way CES has exclusive rights to boilers, chillers, pumps, etc., as defined in the ARMA.

## Software

Each server has the following software installed:

| | |
|---|---|
| **Operating System** | Microsoft 8 R2 Server/Microsoft Server 2016 Standard |
| **Data base** | Microsoft SQL 2008 |
| **AntiVirus** | Malwarebytes |

Each computer has the following software installed:

| | |
|---|---|
| **Operating System** | Windows10 Professional |
| **Microsoft Office Professional 2019** | Word, Excel, Power Point, Outlook, One Note, Office Publisher |
| **AntiVirus** | Malwarebytes |

Additional software installed on specific machines includes:

- Adobe Acrobat Professional 2019 - General Manager, Operations Manager, Administrative Operations Representative and I&C Technician.
- I-Maint - Control Room, Plant Operations Manager, Maintenance Office, Electrical Office and Metro office.

## Connectivity

| | **Metro** | **Constellation** | **Constellation Backup** |
|---|---|---|---|
| **Internet Connection** | Fiber optic | Comcast Cable | Verizon 4G Wireless System |

CES accesses customer meter data through the internet. The State has granted CES access to their building meters through a VPN at no cost. Metro building meters are accessed through the fiber optic line Metro installed to the EGF.

## Metro Access to Data

A Lenovo desktop computer, furnished by CES, is in the Metro office at the EGF. The purpose of this computer is to give Metro administrative access to plant data. CES personnel check to make sure the required data files are transferred from the CES Administrative server to the Metro workstation periodically. These include: a copy of the Siemens data base, the I-Maint CMMS data base, customer billing system data and customer meter data.

## Data Backup and Storage

CES's Administrative Server is backed up continuously. The offsite, online repository used by CES is Carbonite.

The Siemens SQL database is also backed up to Carbonite. Other trend data is manually backed up on two external drives every Monday, the last day of the month and when any changes or updates are made.

Metro, at their own expense, back up data from the computer in the Metro Office to Carbonite. This is maintained by Metro's Project Administrator.

If issues cause data not to transfer, CES will assist a Metro Representative with troubleshooting. CES personnel check to see if there have been any software security updates and make corrections to reestablish connectivity. Metro checks their backup at least once per month. From time to time, Metro has to purge old data or purchase additional storage space.

## Support and Service

*Administrative System*

CES has contracted with a third-party vendor, Vertical IT Solutions, LLC, for ITS service and support. These services include:

1. Installation and setup of new workstations and servers. Fully test and verify set up.
2. Provide information technology consulting, support, and maintenance services to maintain the IT infrastructure at the Energy Generation Facility. This includes Server and desktop hardware support, troubleshooting, repairing or replacement of system components, and peripherals.
3. Hardware support will include and may not be limited to memory upgrades, hard disk replacement, network card replacement, system board replacement and hardware accessories installation.
4. Software support includes installation, configuration, and troubleshooting of the supported applications. This will also include monthly patches, anti-virus and security upgrades.

5. Response time for critical system and system-down issues will be within 4 hours and non-critical system tasks will be resolved within 24 hours. An on-site equipment inspection will be performed at least once per month.

*Operating System*

The Siemens Desigo CC control system had a one-year warranty beginning in January 2021. Constellation Energy will continue to have Siemens repair, replace, and maintain their proprietary equipment when the warranty expires. Services will include annual software updates, annual network maintenance, annual preventative maintenance to modular panels, routine backups, diagnostics and operator coaching.

*Cyber Security*

Access to the server room is behind a key card monitored, locked door.

There is no outside connectivity to the Siemens server. Building automation is segregated on a separate network. There is no WiFi or Bluetooth on the Siemens network.

The administrative network server is behind a Sonicwall TZ400 firewall. There is no wireless access to the network inside the firewall. Remote access requires a VPN. All network traffic is monitored by Malwarebytes software. Sonicwall and Malwarebytes firmware is kept up to date.

CES employees receive Cyber Security Awareness training and Phishing training.

**Program Review**

The Information Technology Services Program is reviewed with Project Administrator and Metro annually and updated as required. This document incorporates all changes that were made to the program.

## Hardware Inventory

There are two servers, four laptops and ten desktop workstations. Below is a detailed list of what is included at each workstation and where each is located (Equipment descriptions are in the Hardware section of this program above).

| Office Location | Computer | ID Number | Monitor | Keyboard & Mouse |
|---|---|---|---|---|
| Data Room | 2-Servers | CPKGM83 (Siemens)<br>8P8RMN2 (CES) | 2-24" Flat Panels | 1-each |
| Metro Office | 1-Desktop | MJ0JERFT | 1-24" Flat Panel | 1-each |
| General Manager | 1-Laptop with Docking Station | 5R20763 | 1-24" Flat Panel | 1-each |
| Operations Manager | 1-Laptop with Docking Station | 1K20763 | 1-24" Flat Panel | 1-each |
| Finance & Administration Representative | 1-Laptop with Docking Station | D7PRO43 | 1-24" Flat Panel | 1-each |
| Customer Service Representative | 1-Desktop | GBX7673 | 1-24" Flat Panel | 1-each |
| Electrical Office | 1-Desktop | GBX1J63 | 1-24" Flat Panel | 1-each |
| Instrumentation & Controls Technician | 1-Laptop | 2MTZ663 | N/A | N/A |
| Maintenance Office | 1-Desktop | GBWYH63 | 1-24" Flat Panel | 1-each |
| Operations Office | 1 - Desktop<br>1-Docking Station | GBWZH63<br>N/A | 2-24" Flat Panels | 1-each |
| Reception Area | 1-Docking Station | N/A | 1-24" Flat Panel | 1-each |
| Control Room | 3 Desktops | GBX9673<br>GHJXH63<br>GBX0J63 | 8-24" Flat Panels | 1-each |
| Control Room (Security) | 1 Desktop | BYPC8M2 | 1-23" Flat Panel<br>1-42'' Flat Panel | 1-each |

## Exhibit 3 – Constellation Assets

- 2011 GMC Canyon Crew Cab Pickup Truck
- 2015 Chevrolet 3500 Crew Cab Flatbed Pickup Truck
- 2016 Ford F-150 Crew Cab Pickup Truck
- 2021 GMC Sierra Crew Cab Pickup Truck
- Ecom Combustion Analyzer
- Fluke Multi-meter
- Fluke Insulation Tester (megger)
- Greenlee Circuit Analyzer
- Fluke Clamp Meter
- Fluke 87 Multi-meter
- Salisbury Audio/Visual Voltage Detector
- Quad Tech Decade Resistor
- Fluke 719 Pro Pressure Calibrator
- Piecal Thermocouple Tester
- Altek loop Calibrator
- Fluke 45 Dual Display Multi-meter
- Hart Scientific Temperature Bath
- Miller Bobcat 225 Welding Machine
- Miller Bobcat 250 Welding Machine
- Hytorc Hydraulic Torque Wrench System
- Milwaukee Electric Mag-base drill press
- Ryobi portable pressure washer
- Miller Filtair 130 Welding Fume Extractor
- Miller CST 280 Welding Machine
- Goodway RAM-4 Tube Cleaning Machine
- Goodway Cooling Tower Vacuum System
- Vestil 2,000 lb. Capacity Aluminum A Frame
- Vestil 4,000 lb. Capacity Aluminum A Frame
- Vestil 8,000 lb. Capacity Steel A Frame
- 2,000 lb. Capacity Electric Chain Hoist
- 1,000 lb. Capacity Electric Chain Hoist
- 3 – Bucks of scaffolding with braces, safety pins, handrails, walk boards and kick plates
- Hyster Model S50XM Lift Truck
- Buffalo Vaneaxial Exhaust Fan
- Generac XG 10000E Generator
- H&H Pump Com Hydraulic Powered Dewatering Pump (Green Machine)

- Trane 3,400 lb. Refrigerant Recovery Tank
- Service First Refrigerant Recovery Machine
- Distribution Truck hand tools, cones, pry bars, hoses, pumps, etc.
- Zoll AED & cabinet
- (2) Phillips AED and Cabinet
- Epson Video Projector
- Starry Hub Conference Projector and Motorized Screen
- 3-OKI printers
- 2-HP printers
- 1-Brother Printer
- 27” JVC TV
- JVC VCR/DVR
- Honda self-propelled Push Mower
- Echo Weedeater
- Echo backpack blower
- 3 – Kerosene torpedo heaters
- 40 cal/cm$^2$ rated high voltage suit with hood and fan
- 1 pair 10 kV gloves
- 1 pair 20 kV gloves
- Arc protection face shield
- 20 kV mat
- Hot stick
- Voltage detector (Glow stick)
- Remote switch operator (Chicken switch)
- Ricoh Copier (Leased)
- General Manager’s HP Laptop – SN#EXPCT7978
- Platform Lift
- Genie Boom Lift

# Exhibit 4 – Spare Parts Inventory

| Quantity | Description | Location |
|---|---|---|
| 4 | 4 inch 150# Buttweld Valves | Connex |
| 5 | ATS 2 inch TP2W-121 300°F 150 psi 8 inch travel | Connex |
| 1 | ATS 3 inch TP2W-121 300°F 150 psi 4 inch travel | Connex |
| 1 | ATS 18 inch TP2W-131 500°F 300 psi 12 inch Travel | Chiller Alley |
| 1 | Re-wound Toshiba 350HP CWP Motor | Chiller Alley |
| 1 | Trane Chiller Seal Ring | Maintenance Shop |
| 1 | Trane Chiller Vane Actuator | Maintenance Shop |
| 1 | Trane Motor Changeout Gasket Kit | Maintenance Shop |
| 1 | Trane Heater Element | Maintenance Shop |
| 1 | Trane Vane Operator Assembly | Maintenance Shop |
| 1 | Trane Chiller Oil Regulator Valve | Maintenance Shop |
| 12 | Trane Chiller Oil Filters | Maintenance Shop |
| 1 Lot | Goulds Pumps Misc. Gaskets, o-rings, etc | Maintenance Shop |
| 1 | Shaft Sleeve- CWP | Maintenance Shop |
| Various | Misc Pipe Fittings from 1/4 to 1 1/2 | Maintenance Shop |
| Various | Misc Bolts, Nuts and washers from 1/4 to 1 inch | Maintenance Shop |
| Various | Misc Plate and flat bar | Maintenance Shop |
| Various | Misc Pipe from 3/8 to 3 inch | Maintenance Shop |
| 2 | Shaft Sleeves- BFWP | Maintenance Shop |
| 1 | 175# Boiler Safety Valve | Mezzanine |
| 1 | 185# Boiler Safety Valve | Mezzanine |
| 1 | 35# Deaerator Safety Valve | Mezzanine |
| 1 | 60 HP Cooling Tower Fan Motor | Mezzanine |
| 1 | Cooling Tower Fan Shaft | Mezzanine |
| 2 | Cooling Tower Belts | Mezzanine |
| 1 | Weil 460V Sump Pump | Mezzanine |
| 1 | Weil 208V Sump Pump | Mezzanine |
| 6 | Temperature Sensors- Trane | Maintenance Office |
| 5 | Wiring Harnesses- Trane | Maintenance Office |
| 5 | Solenoid Valves-Trane | Maintenance Office |
| 1 | Chiller Purge Unit- Trane | Mezzanine |
| 6 | Air Compressor Filters | Maintenance Office |
| 2 | Differential Gauges- Air Compressor | Maintenance Office |
| 2 | Pressure Switch- Air Compressor | I&E Lab |
| 6 | Weksler Thermometer 30/240F | Main Electrical Room |
| 6 | Weksler Thermometer 0/120F | Main Electrical Room |
| 2 | Weksler Thermometer 50/550F | Main Electrical Room |
| 10 | Trerice Thermometer 0/100F | Main Electrical Room |

| Quantity | Description | Location |
|---|---|---|
| 4 | Trerice Thermometer 50/550F | Main Electrical Room |
| 1 | Siemens Control Valve 1" 274-03131 | Main Electrical Room |
| 1 | Siemens Control Valve 2" 274-03134 | Main Electrical Room |
| 11 | Brass Temperature Wells (assorted lengths) | Main Electrical Room |
| 3 | Stainless Temperature Wells (assorted lengths) | Main Electrical Room |
| 2 | Trerice Steam Pressure Gauge 0-300 psi | Main Electrical Room |
| 4 | Trerice CHW Pressure Gauge 0-300 psi | Main Electrical Room |
| 4 | Steam Pressure Pigtails | Main Electrical Room |
| 8 | Yokogawa Steam & CHW Converter Cables | Main Electrical Room |
| 1 | Yokogawa Pressure Transmitter 0-200 psi | Main Electrical Room |
| 1 | Yokogawa Pressure Transmitter 0-290 psi | Main Electrical Room |
| 1 | Yokogawa Meter Transmitter (Head) | Main Electrical Room |
| 1 | Yokogawa Temperature Transmitter | Main Electrical Room |
| 1 | DP Transmitter for Manhole 18 | Main Electrical Room |
| 2 | Yokogawa Steam Flow Converter | Main Electrical Room |
| 2 | Yokogawa Mag Flow Converter | Main Electrical Room |
| 6 | Yokogawa Transmitter Mounting Brackets | Main Electrical Room |
| 1 | Yokogawa 6 inch MV Steam Flow Meter | Main Electrical Room |
| 1 | Yokogawa 10 inch Mag Flow Meter | Main Electrical Room |
| 1 | Yokogawa ADMAG AXF Flow Meter | Main Electrical Room |
| 1 | Yokogawa 2 inch MV Steam Flow Meter | Main Electrical Room |
| 2 | Maxon Gas Valves for Boilers | Main Electrical Room |
| 3 | Hubbell Replacement High Bay Lenses | Main Electrical Room |
| 1 | Siemens Load Center 12-24 120/208 VAC MLO Panel | Main Electrical Room |
| 1 | ABZ028 Valve Actuator | Main Electrical Room |
| 1 | ABZ015 Valve Actuator | Main Electrical Room |
| 1 | 100 ft of SOOW 6/4 Cable for Temporary Boiler | Main Electrical Room |
| 4 | DAMAR 400 watt Metal Halide Ballasts | Main Electrical Room |
| 4 | DAMAR 175 watt Metal Halide Ballasts | Main Electrical Room |
| 5 | DAMAR Compact Flourescent Ballasts | Main Electrical Room |
| 5 | DAMAR Compact Flourescent Bulbs | Main Electrical Room |
| 4 | DAMAR 400 watt Metal Halide Bulbs | Main Electrical Room |
| 5 | DAMAR 175 watt Metal Halide Bulbs | Main Electrical Room |
| 2 | Tunnel Light Fixtures | I&E Lab |
| 18 | F32T8 Lamps | Main Electrical Room |
| 13 | F96T8 Lamps | Main Electrical Room |
| 16 | F25T8 Lamps | Main Electrical Room |
| 4 | 27 watt LED Lamps | Main Electrical Room |
| 3 | 18 watt LED Lamps | Main Electrical Room |

| Quantity | Description | Location |
|---|---|---|
| 2 | 5 watt LED Lamps | Main Electrical Room |
| Various | Miscellaneous Electrical Wire sizes and amounts | Main Electrical Room |
| Various | Miscellaneous Instrumentation Wire sizes and amounts | Main Electrical Room |
| 2 | Johnson Controls Pressure Switches | Main Electrical Room |
| 1 | Coilhouse 27FC4-M Air Pressure Regulator | Main Electrical Room |
| 6 | Pressure Gauge 0-30 psi | I&E Lab |
| 12 | Pressure Gauge 0-100 psi | I&E Lab |
| 7 | Pressure Gauge 0-160 psi | I&E Lab |
| 17 | Pressure Gauge 0-300 psi | I&E Lab |
| 6 | Pressure Gauge 0-600 psi | I&E Lab |
| 2 | Siemens AEM Micro Server | I&E Lab |
| 2 | Mercoid Switches | I&E Lab |
| Various | Misc. Electrical Switches | I&E Lab |
| Various | Misc. Electrical Relays | I&E Lab |
| Various | Misc. Electrical Connectors | I&E Lab |
| 3 | United Electric DP Switches | I&E Lab |
| 1 | Fire-eye Boiler Flame Scanner | I&E Lab |
| 2 | Power Supply for Chiller Starters | I&E Lab |
| 1 | Power Supply for CX/GX Panels | I&E Lab |
| 1 | Boiler Gas Valve Rebuild Kit | I&E Lab |
| 1 | Walchem Conductivity Controller & Probe | Main Electrical Room |
| 1 | Chiller Flow Switch IFM | I&E Lab |
| Various | Misc. Breakers | I&E Lab |
| 1 | Flow Meter for Water Softeners | I&E Lab |
| 1 | Netbiter Temp Data Collection at Customer Bldgs. | I&E Lab |
| Various | Misc. Fire Alarm Parts | I&E Lab |
| 18 | Glass Fuse Holders | I&E Lab |
| 5 | Misc. Control Transformers | I&E Lab |
| 3 | E-Stop pushbuttons | I&E Lab |
| Various | Misc. Tunnel Radio Parts | I&E Lab |
| 1 | GE 750 Multilin Relay | I&E Lab |
| 1 | WEG Propane Pump Motor | Mezzanine |
| 1 | Cooling Tower Basin Heater | I&E Lab |
|  | Gallons - Distilled Water | I&E Office |