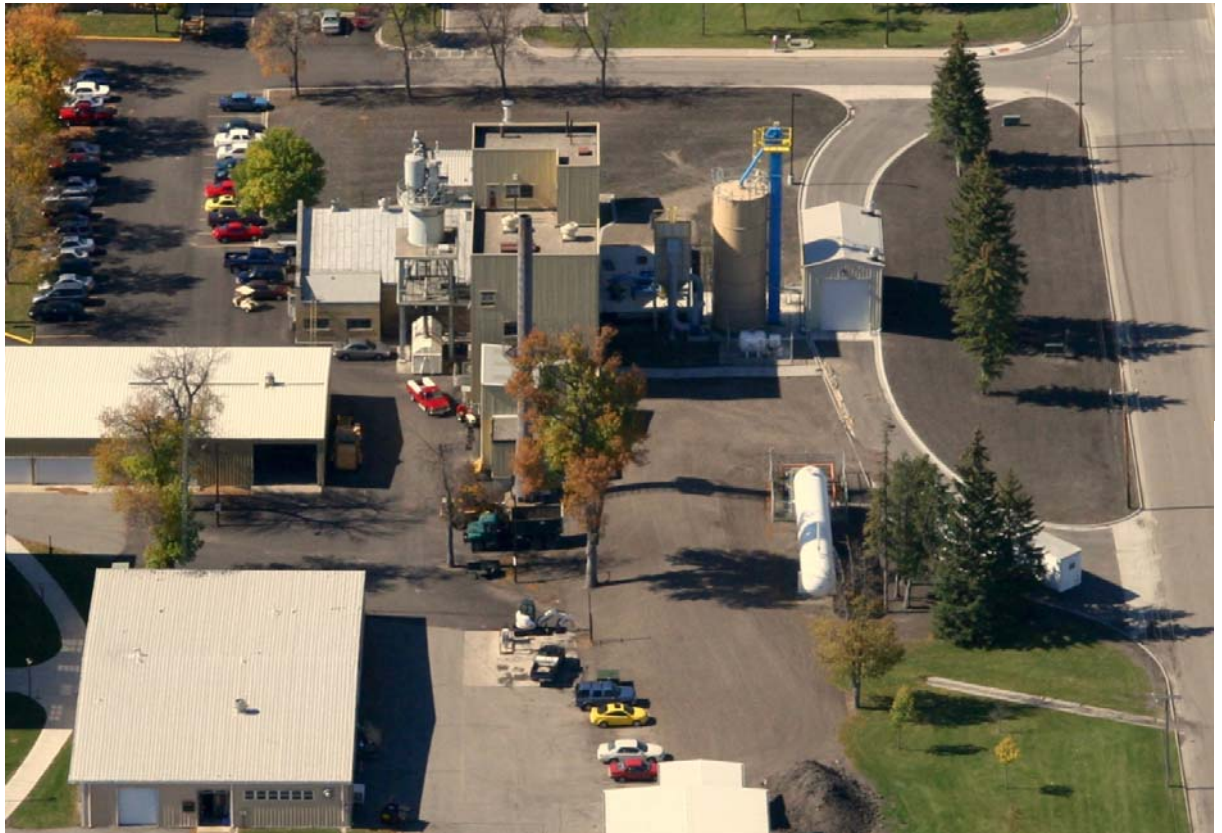


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# OPERATION AND MAINTENANCE PLAN HEATING PLANT

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University of Minnesota-Crookston  
2900 University Ave  
Crookston, MN 56716



The University of Minnesota, Crookston (UMC) is a public, baccalaureate, coeducational institution and a coordinate campus of the University of Minnesota.

UMC proudly carries on a tradition of a century of educational service to Northwestern Minnesota. It was established as an institution of higher learning in 1966. It began offering baccalaureate degree programs in 1993. UMC equips all students and faculty with laptop computers; provides individual attention that leads to success; and offers a hands-on approach for students.

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## Part 1. Introduction

### 1.1 *Facility Description*

The facility in Crookston is an undergraduate rural campus of the University of Minnesota System. The campus consists of approximately 30 buildings, including classrooms, laboratories, dormitories, offices, garages, a central heating plant and the University of Minnesota's Northwest Research and Outreach Center (ROC). This facility currently operates two boilers, five emergency generators and the experiment station, which consists of several pieces of grain processing equipment and several insignificant activities. While the ROC activities are part of the air emission permit issued for this Facility, operations are managed separated, and are not covered within the scope of this document. Emissions from this Facility are permitted by the Minnesota Pollution Control Agency (MPCA) permit number 11900016-002.

### 1.2 *Plan Purpose*

An Operation & Maintenance (O&M) Plan is required by state and federal law for air pollution control equipment serving the coal handling system and coal-fired boiler at the University of Minnesota-Crookston campus. This Plan is prepared to comply with permitting requirements.

Two particulate control devices trigger O&M Plan regulatory requirements:

1. The coal handling system's fabric filter; and
2. The coal-fired boiler's electrostatic precipitator (ESP).

Required O&M Plan details are included in the University's MPCA air emission permit. This document addresses each of these required details.

This Plan also includes other permit limits and reporting requirements related to the coal-fired boiler, including:

- Annual fuel consumption limits;
- Startup and shutdown procedures; and
- General recordkeeping and reporting requirements.

By incorporating all coal-fired boiler requirements into a single plan, we hope to make compliance easier for the steam plant operator. We also intend to fully meet the purpose of an O&M Plan, assuring the Minnesota Pollution Control Agency (MPCA) and the Crookston community that the boiler is meeting permitted emission limits in the absence of continuous emission monitoring equipment.

### 1.3 *Plan Structure*

Each Plan section begins with a list of permit requirements, followed by discussion and instructions that directly pertain to the requirements.

This plan includes information contained in the O&M manuals for each system component. However, this plan is not meant to replace the manuals, supersede any manufacturer's recommendations or to constrain the independent and professional judgment of steam plant staff.

Any changes to O&M procedures that are directly regulated by the air emission permit must be reviewed for compliance before being incorporated into this document.

## Part 2. Compliance Calendar

Table 1 describes the permit requirements for this Facility, and notes on how reportable information is collected and reported.

*Table 1. Permit-required reporting*

| Emission Unit | Item   | Permit Page | Parameters          | Frequency        | Method                                  | Req Type     | Reporting Date                                  | Comments   |
|---------------|--|-------------|---------------------|------------------|---|--------------|---|--|
| ALL           | Shutdowns/Breakdowns                           | A-2         | Emission increase   | More than 1 hour | MPCA Website                            | Notification | Notify MPCA or Duty Officer within 24 hours     | Copy UHS   |
| ALL           | Shutdown/Breakdown Report                      | A-3         | Emission increase   | More than 1 hour | MPCA Website                            | Report       | ASAP thereafter                                 | Submit to UHS for Review & Submittal                   |
| ALL           | Deviation Endangering Human Health/Environment | A-3         | Emission increase   | Any              | MPCA Website                            | Notification | Notify MPCA within 24 hours                     | Copy UHS for Review & Submittal                        |
| ALL           | Deviation Endangering Human Health/Environment | A-3         | Emission increase   | Any              | MPCA Website                            | Report       | Cause / Resolution Report to MPCA within 2 days | Submit to UHS for Review                               |
| ALL           | Emission Inventory                             | A-3         | Emissions           | Annual           | Spreadsheet to UHS for MPCA Web         | Report       | April 1st                                       | Spreadsheet Data to UHS by January 15                  |
| ALL           | Emission Fee Payment                           | A-4         | Emissions           | Annual           | Info Review/ Check by Mail              | Payment      | Within 30 days of receiving bill.               | Copy UHS for Review                                    |
| EU004         | NEHSAP Compliance Certification                | A-18        | Boiler 4 Operations | Annual           | Info Review w/UHS for EPA Web Submittal | Report       | March 15th                                      | Provide Info to UHS                                    |
| ALL           | Deviations                                     | B-3         | Facility Operations | Semi-Annual      | MPCA Website                            | Report       | July 30th<br>and<br>January 30th                | Provide Info to UHS for Submittal                      |
| ALL           | MPCA Compliance Certification                  | B-3         | Facility Operations | Annual           | MPCA Website                            | Report       | January 30th                                    | Provide Info to UHS for Submittal                      |
| EU004         | Fuel Supplier Certification                    | B-3         | Facility Operations | Annual           | MPCA Website                            | Report       | March 31st                                      | Provide Info to UHS. Submit to MPCA if only deviations |

| Emission Unit   | Item              | Permit Page | Parameters          | Frequency | Method       | Req't Type | Reporting Date | Comments   |
|-----------------|-------------------|-------------|---------------------|-----------|--------------|------------|----------------|--|
| EU004 and EU012 | Fuel Usage Report | B-3         | Facility Operations | Annual    | MPCA Website | Report     | March 31st     | Provide Info to UHS. Submit to MPCA if only deviations |

### Part 3. Plan Contact Information

#### 3.1 Facility Owner and Operator

Owner:  
University of Minnesota, Crookston  
2900 University Ave  
Crookston, MN 56716  
Chancellor's Office: (218) 281-8343  
Fred Wood, Chancellor UMC

Operator:  
Dave Danforth, Director Facilities and Operations (Crookston Campus)  
(218) 281-8490 ofc, (218)-280-0024 cell

Doug Langer, Principal Operating Engineer, Heating Plant (Crookston Campus)  
(218) 281-8495 Heating Plant

#### 3.2 Plan Contacts

Tom Feiro, Environmental Health and Safety Specialist (Crookston Campus)  
(218) 281-8300 ofc, (218)-521-0223 cell

Julianne Rantala, Environmental Compliance Specialist (UMTC)  
(612) 626-7957 ofc, (651) 230-6872 cell

#### 3.3 Equipment and Software Vendors/Contacts

##### Electrostatic Precipitator / ESP Software

McGill AirClean Corporation  
Allen-Bradley  
Parts and Service Department: (614) 443-0192  
24-Hour Technical Support: (216) 646-6800  
Emergency Service: (800) 422-4913

##### Coal Handling System/Baghouse

C.P.E. Filters, Incorporated (866)771-2733

##### Boiler Controls/Software/Oxygen Analyzer

Novaspect  
Office: (952)934-5100  
Technical Support Hotline: (847)709-8999

##### Coal-Firing System

Detroit Stoker Office: (800)786-5374

### 3.4 Regulatory Notifications

#### ***Shutdown/Breakdown Notifications***

<https://www.pca.state.mn.us/air/air-emissions-shutdownbreakdown-form>

#### ***Off-Hour Notification***

State Duty Officer, (651) 649-5451 or (800) 422-0798

### **Part 4. Permitted Emission Limits and Operating Requirements**

The permit contains a complete listing of emission limits and operating requirements for this Facility. For the purposes of the O&M Plan, these have been separated into requirements that apply to the Coal-Fired Burner and associated equipment, and everything else (applies to the Facility as a whole or to other emission units). These are described in the following tables.

Internal reporting requirements listed in the following tables assume compliant operation. Any deviation from limits and requirements should be reported to UHS and, if required, the State Duty Officer as soon as possible. This procedure is described in Part 5.5 of this Plan.

#### **4.1 Coal-Fired Boiler and ESP**

For this system, compliance with permitted emission limits are demonstrated by performance testing, as well as by continuous emissions monitors (CEMs). O<sub>2</sub> Limits are tied to the results of carbon monoxide testing and is reflected in the table below. The O<sub>2</sub> limit serves as a “surrogate” for combustion quality and ensures that the CO limit is continuously met.

Testing frequency for particulate matter and carbon monoxide are based on the results of the most recent performance test. This frequency is indicated in the table below.

Likewise, testing frequency for particulate matter and carbon monoxide are based on the results of the most recent performance test. This frequency is indicated in the table below.

The requirements applicable to the Coal-Fired Boiler and ESP system are separated into requirements derived from:

- Performance Testing (Table 2); and,
- Continuous Monitoring (Table 3).

Permit-required calibrations for this system are listed in Table 4.

**Table 2. Performance Testing-Derived Limits and Requirements: Coal-Fired Burner/ESP**

| Emission Unit | Item                         | Permit Page | Limit             | Frequency               | Testing Method  | Most Recent Test Date               | Comments                                 |
|---------------|------------------------------|-------------|-------------------|-------------------------|-----------------|-------------------------------------|--|
| EU004         | Subbituminous Sulfur Content | A-9         | 0.5% Sulfur       | Quarterly from the mine | Vendor Analysis | January 4, 2016 and from new source | Provide copy to UHS. Retain at Facility. |
| EU004         | Mercury                      | A-10        | 0.000022 lb/MMBtu | Quarterly from the mine | Fuel Sampling   | January 4, 2016 and                 | Annual review of coal contract by UHS    |



|       |                    |      |              |               |                  |                  |   |
|-------|--------------------|------|--------------|---------------|------------------|------------------|---|
|       |                    |      |              |               |                  | from new source  |   |
| EU004 | Particulate Matter | A-9  | 0.4 lb/MMBtu | Every 5 Years | Performance Test | January 23, 2013 | Test frequency based on prior test results.                   |
| EU004 | Carbon Monoxide    | A-10 | 420 ppm, dry | Every 3 Years | Performance Test | January 15, 2014 | Test frequency based on prior test results.                   |
| EU004 | Oxygen Content     | A-10 | See Comment  | Every 3 Years | Performance Test |                  | Greater than or equal to O <sub>2</sub> level during CO test. |

**Table 3. Continuous Monitoring-Derived Limits and Requirements: Coal-Fired Burner/ESP**

| Emission Unit   | Item                          | Permit Page | Limit  | Frequency              | Continuous Monitoring Method                     | Data Point Frequency      | Comments   |
|-----------------|-------------------------------|-------------|--|------------------------|--|---------------------------|--|
| EU004           | Subbituminous Limit           | A-9         | 5,000 tons per year                                  | 12-month rolling sum   | Belt Weigh Scale (Confirm with Truck Deliveries) | Continuous, Log Daily     | Upload Data Monthly  |
| EU004           | Oxygen Content                | A-10        | Greater than or equal to 5.5%                        | 30-day rolling average | Continuous Monitoring                            | Minimum 15 minute periods | Upload Data Daily  |
| EU004           | Operating Load                | A-15        | 110% of Most Recent Performance Test                 | 30-day rolling average | Continuous Monitoring of Steam Flow/Pressure     | Minimum 15 minute periods | Upload Data Daily  |
| EU004 and CE001 | ESP Fields in Service         | A-24        | 2 or 3 Fields  | When Operated          | Continuous Monitoring                            | Minimum 15 minute periods | Upload Data Daily  |
| EU004 and CE001 | ESP Specific Collection Area  | A-24        | Equal or greater than last test.                     | When Operated          | Calculated from Continuous Monitoring            | Minimum 15 minute periods | Notify UHS if less than 2 fields in operation. UHS will calculate SCA. |
| EU004 and CE001 | ESP Secondary Voltage/Current | A-24        | 28-30 kV @ full load / Spark Sensitivity @ 1-2 mA(a) | 30-day rolling average | Continuous Monitoring                            | Minimum 15 minute periods | Upload Data Daily  |
| EU012           | Boiler 6 (Propane)            | A-21        | 1,200,000 gallons/yr                                 | 12-month rolling sum   | Continuous Monitoring                            | Minimum 15 minute periods | Upload Data Daily  |

**Table 4. Calibration Requirements: Coal-Fired Burner/ESP**

| Emission Unit | Item            | Permit Page | Frequency            | Items             | Calibrator | Comments Emission Unit         |
|---------------|-----------------|-------------|----------------------|-------------------|------------|--------------------------------|
| EU004         | Oxygen Analyzer | A-16        | Annual or per Vendor | Per Vendor Manual | Facility   | Provide copy of record to UHS. |

|       |                  |      |        |                           |                  |                                |
|-------|------------------|------|--------|---------------------------|------------------|--------------------------------|
| EU004 | Belt Weigh-Scale | A-9  | Annual | Per Vendor Recommendation | Certified Vendor | Provide copy of record to UHS. |
| EU004 | ESP              | A-24 | Annual | On-Line Fields Monitor    | Vendor           | Provide copy of record to UHS. |

## 5.2 Total Facility and Other Emission Groups

In addition to the limits and operational requirements for the coal-fired burner and associated equipment, there are general requirements that apply to the Facility as a whole (Total Facility), as well as to emission units and equipment that are not in the Coal-Fired Boiler group of equipment (Group 1: Solid Fuel Burners). These limits and requirements are listed in Table 5.

**Table 5. Emission Limits and Operating Requirements: Total Facility and Other Emission Units**

| Emission Unit | Item                 | Permit Page | Limit                        | Frequency                | Limit Type | Data Collection Method | Monitoring Period    | Comments                     |
|---------------|----------------------|-------------|------------------------------|--------------------------|------------|------------------------|----------------------|------------------------------|
| GP007         | NOx Limit            | A-7         | 90 Tons/Year                 | 12-month rolling average | Emission   | Various                | Daily                | Provide to UHS Monthly       |
| GP002         | Emergency Generators | A-4         | 500 Hours/Year               | When Operated            | Operating  | Meter                  | Logged When Operated | Provide to UHS Monthly       |
| GP002         | Emergency Generators | A-4         | 0.5 lb/MMBtu SO <sub>2</sub> | Fuel Delivery            | Emission   | Supplier Invoice       | As Received          | Provide to UHS Semi-Annually |
| GP003         | NWROC                | A-6         | Fugitive Emissions           | As Required              | Operating  | Visual                 | As Required          | Clean up spilled grain.      |
| EU012         | Boiler 6 (Propane)   | A-21        | 1,200,000 gallons/yr         | 12-month rolling sum     | Operating  | Propane Fuel Meter     | Daily                | Provide to UHS Monthly       |

## Part 5. Operations: Electrostatic Precipitator (CE001)

The electrostatic precipitator (ESP) is the pollution control equipment for the coal-fired burner. The permit requires the ESP to be operated at all times that EU004 – Coal-fired boiler is in operation.

### 5.1 System Description

#### ***Furnace/Boiler***

|  |   |
|--|---|
| Furnace Manufacturer:                  | Detroit Stoker  |
| Model:                                 | 16972   |
| Maximum Rated Heat Input Capacity:     | 37.7 MMBtu/hr - (Estimated)                           |
| Maximum Permitted Heat Input Capacity: | 37.3 MMBtu/hr = Performance Test dated April 15, 2014 |
| Installation Date:                     | 1985  |
| Boiler Manufacturer:                   | Keeler  |

|                                      |  |
|--------------------------------------|--|
| Maximum Rated Steam Output Capacity: | 25,000 lb/hr   |
| Maximum Permitted Steam Capacity:    | 22,000 lb/hr = 110% Performance Test dated<br>April 15, 2014 |
| Installation Date:                   | 1985   |

### ***Electrostatic Precipitator***

---

|                        |                       |
|------------------------|-----------------------|
| Manufacturer:          | McGill                |
| Model:                 | 3-75 x 1              |
| No. of Fields:         | 3                     |
| Total Collection Area: | 4,285 ft <sup>2</sup> |
| Installation Date:     | 1985                  |

## ***5.2 Operating Range***

The air emission permit requires that an appropriate operating range is established for the following parameters:

|                            |  |
|----------------------------|--|
| Primary Voltage:           | 380 kV   |
| Secondary Voltage:         | 28-30 kV per field at full load (a)                                    |
| Secondary Voltage Setback: | 92 percent of manual setting (b)                                       |
| Maximum Current:           | 100 mA   |
| Spark Rate (Sensitivity):  | Adjust to one spark every 30 to 60 seconds. Switch to<br>AVC operation |
| Rapping Sequence:          | 10 minutes, full cycle at full load                                    |
| Hopper Heaters:            | Maintain above condensation point.                                     |

- (a) The range for secondary voltage is typical. Actual voltage will vary due to system controls design. It will also vary depending on coal quality and steam load.
- (b) Manually set the automatic voltage control (AVC) system at start-up according to Section 5.4 of the McGill O&M Manual. The Secondary Voltage Setback point is a percentage of peak voltage determined during manual operation.

## ***5.3 Sequence of Operations***

### ***Seasonal Start-up***

---

Follow full pre-startup checklist in Section 5.1.1 of the McGill O&M manual.

### ***Startup***

---

See sections 5.3.1 through 5.3.2 of the McGill O&M manual.

### ***Soot Blowing***

---

Blowing soot should be performed at least once every 12 hours; the preheater should be blown at least once per week. Soot blowing should take place when the boiler load is at 50% or higher.

To perform soot blowing, complete the following sequence of operations:

1. Pull ash from precipitator prior to blowing soot.

2. Preset precipitator draft at – 4.0” or lower.
3. Preset boiler draft at -.5 or lower.
4. Blow soot blowers.
5. Reset precipitator draft to standard set point.
6. Reset boiler draft to standard set point.
7. Run ash auger again.

### ***Pulling Ash***

---

Pulling Ash should be done each and every shift regardless of the boiler load.

To perform ash pulling, complete the following sequence of operations:

1. Make sure precipitator draft is -2.0” or higher.
2. Start vibrators for at least 10 min.
3. Run augers until ash is pulled.
4. Reset draft to standard set point.

### ***Shutdown***

---

See sections 6.0.0 through 6.1.7 of the McGill O&M manual.

### ***Emergency Shutdown***

---

See section 6.0 of the McGill O&M manual.

## ***5.4 Corrective Actions***

The following alarms are included as part of the ESP control system. Suggested corrective actions are given for each indicator.

### ***Improper Rapping***

---

Initiate the following sequence of operations to correct the alarm:

1. Check compressed air supply pressure.
2. Verify solenoid valve operation.
3. Check piston seals.
4. Replace components if necessary.

### ***Low Field Voltage***

---

Initiate the following sequence of operations to correct the alarm:

1. Verify alarm set point.
2. Manually rap affected plate.
3. Adjust rapping rate, if necessary.
4. Inspect high-voltage bus on top of ESP.
5. Inspect insulators.
6. Clean ESP.
7. Replace components if necessary.

### ***Field Overload***

---

Initiate the following sequence of operations to correct the alarm:

1. Readjust voltage set point in “manual” mode.
2. Retune variable spark sensitivity setpoint.

### ***Ash Screw Conveyor Zero Speed Switch/Ash Hopper Dust Level***

---

Initiate the following sequence of operations to correct the alarm:

1. Check for motor overload
2. Check drive belts
3. Remove access lid and check for plugging.

### ***ESP Malfunction Lasting More than One Hour***

---

If corrective actions fail to resolve ESP malfunction within one hour:

1. Take all possible steps to minimize air pollution.
2. Initiate shutdown of Boiler No. 4.
3. Follow operating procedure to bring Boiler No. 6 (propane-fired boiler) on-line.
4. Follow notification procedure in next section.

## ***5.5 Notifications Procedure***

The permit requires the University to take all practical steps to modify operations to reduce elevated emissions of air pollutants in the event of a shutdown, breakdown or any other “deviation” from permitted limits. Some types of excursions from permit limitations have required corrective actions and notifications, as described by this section.

### ***Breakdown***

---

In the event of a breakdown, safety is the first priority. Once the unit has been shut down or stabilized, reporting may be required. The boiler operator on duty must complete the following procedure for any ESP breakdown.

1. Record the date, time, duration, and reason for the outage in the University’s shutdown/breakdown report. A copy of the report form is included on the following page.
2. Contact Dave Danforth and Tom Feiro as soon as possible to appraise them of the situation.
3. Determine cause of breakdown and resolve as soon as possible.
4. If the shutdown, breakdown, or power outage that affects the electrostatic precipitator results in the loss of 2 fields for more than a 1 hour duration, complete the following additional steps ***within 24 hours***:
  - a. Determine if the breakdown resulted in an increase in air emissions.
    - i. If no, note this determination on the University log form.
    - ii. If yes, complete the online MPCA form for shutdown/breakdown at this link: <https://www.pca.state.mn.us/air/air-emissions-shutdownbreakdown-form>
    - iii. Report the shutdown, breakdown of the ESP at the University of Minnesota, Crookston Heating Plant Boiler #4, with the following information about the event:

- Date
  - Time breakdown or shutdown
  - Reason for breakdown/shutdown ex. power outage, boiler malfunction.
- b. Determine if the breakdown resulted in an imminent threat to human health or the environment.
    - i. If yes, complete the University Spill or Incident Reporting Form (Appendix A) and then contact the State Duty Officer at 800-422-0798. The “Material Spilled” is “Other/Emissions”; indicate the pollutant released or equipment involved. The information requested by the State Duty Officer will be on the completed form.
    - ii. If no, there is no need to contact the State Duty Officer.
  - c. Email the completed MPCA Initial Notification Form and Spill or Incident Reporting form (if State Duty Officer was contacted) to [jrantala@umn.edu](mailto:jrantala@umn.edu). Copy the email to Dave Danforth and Tom Feiro.
5. Contact Dave Danforth and Tom Feiro during the working hours or the next working day with an update of the current situation.
  6. As soon as possible within the next several days, provide UHS with a complete description of the problem, identified solution and completion date.
  7. UHS will provide an update to the shutdown/breakdown notification, if necessary, as well as any updates to the State Duty Officer in the event they were contacted.

### ***Other Deviations***

---

Other deviations are episodes where systems are not operating within permit requirements but have not necessarily caused an increase in emissions from the boiler. These may include:

- Operating on less than two fields for less than an hour.
- Missing continuous monitoring data or continuous monitor malfunction.
- Failure to follow required maintenance and operating procedures.
- Failure to maintain records.

All deviations must be recorded and UHS must be notified as soon as possible. Deviations are reported by UHS staff periodically on permit-required submittals.

## ***5.6 Periodic Inspection and Maintenance***

### ***Daily Inspection***

---

- Confirm ESP control system set points.
- Ensure pressure drop within recommended operating range.
- Ensure daily continuous parametric monitoring system (CPMS) data has been properly logged and uploaded.

### ***Weekly Inspection***

---

- Inspect hopper vibrator bolts for tightness.
- Check hopper access doors for air leakage.
- Verify proper operation of the rapper system.

### ***Quarterly Inspection***

---

- Inspect control equipment components that are subject to wear or plugging, for example: bearings, belts, hoses, fans, nozzles, orifices, and ducts.

***Pre and/or Post Operating Season (May and September) Inspection***

---

- Inspect expansion joints.
- Inspect for dust buildup an ESP inlet and outlet.
- Clean rappers and T-R sets. Clean all contacts.
- Clean high voltage line, bushings and insulators. Check for corrosion.
- Inspect plate alignment.
- Clean plates with air lance.
- Adjust anvils as necessary.
- Inspect and maintain augers, motors and gear boxes.
- Inspect hoppers for cracks or other disrepair.
- Clean electrical cabinet.
- Calibrate measurement devices

**5.7 Spare Parts List**

This section lists the ESP parts that are recommended to be kept on hand for routine maintenance and repairs. This list is revised as necessary to reflect wear parts or critical parts to maintain equipment operability.

**Table 6. Spare Parts List: ESP**

| Item   | Number/Amount to be Maintained Onsite |
|--|---------------------------------------|
| Lumigraph retransmitter  | 4100-1-6 / 1 ea.                      |
| Solenoid Valve assembly (688055, 688056,688057) (valve, manifold, and end plate) | 1100-1-801 /1 ea.                     |
| DC variable power supply( 673045)  | 4100- 4- 7015 / 1 ea.                 |
| Top and side insulators with gaskets (685445)                                    | 1100 -1 -800 / 2 ea.                  |
| High voltage bushing (HB2254)  | HB2254 / 3 ea.                        |
| Rapping Box air cylinder   | 1100 – 1 - 805 / 2 ea.                |

## Part 6. Operations: Coal Handling Baghouse (CE002)

The coal handling baghouse is the pollution control equipment for the coal handling equipment. The permit requires the baghouse to be operated at all times that the coal handling system is in operation.

### 6.1 System Description

#### **Coal Handling System/Baghouse**

---

|                    |                      |
|--------------------|----------------------|
| Manufacturer:      | C.P.E. Filters, Inc. |
| Model:             | 120-TNFD-196-C       |
| Bag Manufacturer:  | C.P.E.               |
| Bag Model:         | 8247-1202            |
| Installation Date: | 2002                 |

### 6.2 Operating Range

The air emission permit requires that the baghouse is operated and maintained in accordance with manufacturer's recommendations. Differential pressure drop should range from 3" to 5" for maximum bag life.

### 6.3 Sequence of Operations

#### **Seasonal Start-up**

---

Follow full pre-startup checklist in Section 3.1 of the C.P.E. O&M manual.

#### **Startup**

---

1. Energize compressed air supply system.
2. Activate conveyance system and associated air locks.
3. Confirm all doors are properly sealed and secured.
4. Start and adjust exhaust fan for proper pressure drop.
5. Monitor differential pressure until bags have become "seasoned".
6. Ensure bag pulse timers are properly set.

#### **Shutdown**

---

Follow reverse sequence to startup.

### 6.4 Corrective Actions

The following alarms are included as part of the baghouse control system. Suggested corrective actions are given for each indicator.

#### **Excessive Pressure Drop**

---

1. Check pressure gauge tubing leading to the baghouse.
2. Check compressed air supply pressure.
3. Verify solenoid valve operation and/or leakage.
4. Replace components if necessary.

#### **Dust Caking or Dampness**

---

1. Check for moisture or oil in compressed air supply.
2. Replace components if necessary.



### ***Baghouse Dust Overload (Blinding)***

---

1. Check air flow supply and adjust exhaust rate, if necessary
2. Check for bridging in hopper.
3. Adjust removal rate if filling too quickly.
4. Confirm system capacity and typical operation.

### ***Low Pressure Drop/Dusting***

---

1. Inspect entire system for leaks.
2. Verify proper compressed air pressure.

### ***Pulse System Failure***

---

1. Test timer board.
2. Verify proper compressed air pressure.
3. Confirm Solenoid valve operation.

## ***6.5 Notifications Procedure***

The permit requires the University to take all practical steps to modify operations to reduce elevated emissions of air pollutants in the event of a shutdown, breakdown or any other “deviation” from permitted limits. Some types of excursions from permit limitations have required corrective actions and notifications, as described by this section.

Follow the notification procedure given for the electrostatic precipitator.

## ***6.6 Periodic Inspection and Maintenance***

### ***Daily Inspection***

---

- Confirm baghouse control system set points.
- Ensure pressure drop within recommended operating range.

### ***Weekly Inspection***

---

- Check hopper access doors for air leakage.
- Verify proper operation of the pulse system.

### ***Pre and/or Post Operating Season (May and September) Inspection***

---

- Inspect for ash buildup.
- Clean all solenoid valve system components.
- Inspect cage alignment and bag integrity.
- Check and service air lock, motor and gearbox as necessary.

## ***6.7 Spare Parts List***

This section lists the baghouse parts that are recommended to be kept on hand for routine maintenance and repairs. This list is revised as necessary to reflect wear parts or critical parts to maintain equipment operability.

**Table 7. Spare Parts List: Baghouse**

| Item                                      | Number/Amount to be Maintained Onsite |
|---|---------------------------------------|
| 6" Diameter x 120" Long Filter Bags       | 196                                   |
| 6" Diameter x 120" Galvanized Steel Cages | 20                                    |
| Solenoid Valves                           | 2                                     |
| Diaphragm Valve Repair Kits               | 2                                     |
| Timer Board                               | 1                                     |
| Neoprene Sponge for gaskets               | 100 feet                              |
| Nyaflow Tubing                            | 20 feet                               |
| Magnahelic Gauges                         | 2                                     |
| Explosion Vents                           | 4                                     |

## **Part 7. Operations: Continuous Monitoring and Data Collection Systems (EU004)**

The coal-fired boiler and ESP are continuously monitored to ensure safe and efficient operation. In addition, the University is required to monitor certain parameters to demonstrate compliance with air pollution regulations and permitted operating and emission limits. Required systems are discussed below.

### **7.1 Electrostatic Precipitator – Operations**

When Boiler #4 and the ESP are running, the following data are continuously recorded:

- Secondary voltage and current on each of the three fields: Readings will be taken at least every minute.
- An aggregate or average every 15 minutes will be calculated.
- A rolling 3-hour average.
- Readings will be taken at least every minute on the number of fields in operation.
- At least twice per day these reports will be backed up to an external drive.

### **7.2 Electrostatic Precipitator – Annual Monitor Calibration**

Calibrate the online fields monitor at least once every 12 months and maintain a written record of the results and any action resulting from the calibration. Secondary voltage and current signals should be brought within +/- 5% tolerance on the monitoring screen.

### **7.3 Boiler Flue Gas Oxygen Content - Operations**

When Boiler #4 and the ESP are running, except during Startup and Shutdown, the following data will be continuously recorded:

- Flue gas oxygen content will be recorded each minute and aggregated into 15 minute averages.
- Each four 15-minute values for each hour will be averaged. At least four data values are required for the value to be valid.

- You may use two 15-minute values for each hour that the sensor is being calibrated. This should be noted in the calibration report.
- A 30-day average will be updated each hour.
- An alarm will be maintained to signal when the oxygen reading is less than the average oxygen content of the last carbon monoxide emission test. (5.5% in 2014)
- At least twice per day these reports will be backed up on to an external drive.

#### ***7.4 Boiler Flue Gas Oxygen Content – Annual Sensor Calibration***

The oxygen sensor will be calibrated at least once per year, according to vendor recommendations. Track performance using the vendor-supplied (or similar) calibration record sheet.

Before calibrating, verify that the calibration gas parameters are correct by setting the correct gas concentrations and by setting the calibration gas flowmeter. The calibration gas flowmeter regulates the must be set to 5 scfh.

##### ***Manual Calibration***

---

Use the following procedure to perform a manual calibration:

1. Place control loop in manual.
2. Verify the calibration gas parameters are correct per "Calibration with Keypad".
3. If performing a manual calibration with the CALIBRATION RECOMMENDED LED off and the CAL LED off, start at step a. If performing a manual calibration with the CALIBRATION RECOMMENDED LED on and the CAL LED on, start at step b.
  - a. Push the CAL key. The CALIBRATION RECOMMENDED LED will come on and the CAL LED will be on solid. If a multimeter is attached across TP5 and TP6, the reading will display the percentage of oxygen seen by the cell.
  - b. Push the CAL key. The CALIBRATION RECOMMENDED LED will turn off and the CAL LED will flash continuously. The probe can be configured so that the 4-20 mA signal will hold the last value. The default condition is for the output to track. A flashing LED indicates that the probe is ready to accept the first calibration gas.
  - c. Apply the first calibration gas. (Electronics will abort the calibration if step 4 is not done within 30 minutes).
  - d. Push the CAL key; the CAL LED will be on solid. A timer is activated to allow the calibration gas adequate time to flow (default time of five minutes). When the timer times out, the probe has taken the readings using the first calibration gas and the CAL LED will flash continuously. The flashing indicates the probe is ready to take readings using the second calibration gas.
  - e. Remove the first calibration gas and apply the second calibration gas. (Electronics will abort the calibration if step f is not done within 30 minutes).
  - f. Push the CAL key; the CAL LED will be on solid. The timer is activated for the second calibration gas flow. When the timer times out, the CAL LED will flash a 2 pattern flash or a 3 pattern flash (2 pattern flash equals

a valid calibration, 3 pattern flash equals an invalid calibration). If the slope or the constant is out of specification, a diagnostic alarm LED will be flashing. The diagnostic alarm will remain active until the purge cycle is over. If the three pattern flash occurs without a diagnostic alarm, the calibration gases could be the same or the calibration gas was not turned on.

4. A flashing CAL LED indicates the calibration is done.
5. Remove the second calibration gas and cap off the calibration gas port.
6. Push the CAL key; the CAL LED will be on solid as the unit purges. (Default purge time is three minutes). When the purge is complete, the CAL LED will turn off
7. If the calibration was valid, the DIAGNOSTIC ALARMS LEDs will indicate normal operation. If either new calibration value (slope or constant) is not within parameters, the DIAGNOSTIC ALARMS LED will indicate an alarm.
8. Place control loop in automatic.

### 7.5 Boiler Flue Gas Oxygen Content – Corrective Actions

The following alarms are included as part of the oxygen sensor system. Follow the vendor manual for each of these alarms.

- Thermocouple
- Heater Temperature
- Oxygen Cell
- Calibration Recommended

Other general corrective actions include:

1. Suspected elevated oxygen levels – check for probe leakage.
2. Suspected dampened oxygen levels – check for probe plugging.
3. Slow response time – check for probe plugging.

### 7.6 Spare Parts List

This section lists the oxygen sensor parts that are recommended to be kept on hand for routine maintenance and repairs. This list is revised as necessary to reflect wear parts or critical parts to maintain equipment operability.

**Table 8. Spare Parts List: Oxygen Sensor**

| Item                       | Number/Amount to be Maintained Onsite |
|----------------------------|---------------------------------------|
| Heater Strut Assembly      | 1                                     |
| Snubber Diffusion Assembly | 2                                     |
| Cell Replacement Kit       | 2                                     |
| Calibration Gases          | 2                                     |

## 7.7 Boiler Operating Load (Steam Flow) - Operations

The permit requires that operating load is continuously measured by either coal feed or steam flow. As Boiler #4 has an analog coal counter, steam flow is used as the data source to comply with the requirement.

- Steam flow and header pressure readings will be taken at least once every 15 minutes.
- An aggregate or average every 1 hour will be added to each report.
- A 30-day rolling average will be calculated every hour.
- At least twice per day these reports will be backed up on to an external drive.

The steam flow will be calibrated at least annually and maintenance will be completed according to the vendor operating manual.

## Part 8. Recordkeeping

Retain all records for a period of five (5) years from the date of monitoring, sample, measurement or report. Records which must be retained at this location include all calibration and maintenance records, all original recordings for continuous monitoring instrumentation, and copies of all reports required by the permit.

In general, retain the following documents:

- All maintenance performed on the pollution control equipment.
- Each period during which a continuous monitoring system (CMS) has malfunctioned.
- All required measurements needed to demonstrate compliance.
- Performance test results.
- CMS performance evaluations.
- CMS calibration checks;
- Adjustments and maintenance performed on CMS;

Specifically, the following information must be collected and maintained.

### **Coal Deliveries**

The truck scale is used to demonstrate the amount of coal delivered. The following actions are performed to document coal deliveries:

- Supply a weigh ticket to the driver for each load of coal delivered.
- Maintain an electronic report of all coal shipments.

### **Coal Weigh Belt**

The coal weigh scale belt is used to demonstrate the amount of coal burned in boiler 4. The following actions are performed to document coal consumed in the boiler.

- The coal weigh scale belt will be in operation when Boiler # 4 is running.
- Coal scale readings will be taken every day and recorded the log report.
- Verify scale belt accuracy by recording both daily steam output and daily coal throughput.

### ***Coal Analyses***

---

Maintain the following information pertaining to coal burned:

1. The type and amount of all fuels burned in each boiler during the reporting period.
2. Coal proximate analyses provided by the coal vendor.

### ***Boiler Operation***

---

Maintain all required records for steam flow and pressure and coal throughput.

### ***ESP and Oxygen CMS Operation***

---

For each monitor, maintain a record of all calibrations, including the date conducted, and any corrective action that resulted.

Maintain all required records for oxygen content, ESP secondary voltage and current and number of fields in operation.

## **Part 9. Employee Training**

Appendix B to this Plan is the Heating Plant Operator Training Log is completed as each plant operator completes training, and ensures knowledge of operations at the Facility.



UNIVERSITY OF MINNESOTA

# Environmental Health & Safety

## Spill or Incident Reporting Form

Rev.12/2015

**Instructions:** Complete this form for any spill or other incident involving a petroleum product, hazardous materials/waste or refrigerant. The information provided on this form is used when contacting Emergency Responders and making required regulatory reports. Refer to the DEHS Fact Sheet: **Responding to Spills and Releases** for more information.

### Part A. Caller Information

Name of Reporter: \_\_\_\_\_ Name of Receiver: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Phone Number: \_\_\_\_\_

- University Employee     Contractor  
 City Employee         State Duty Officer  
 Other: \_\_\_\_\_

### Part B. Spill Information

Material Spilled<sup>1</sup>:     Petroleum         Refrigerant         Wastewater/Liquid Manure  
 SARA Chemical     Non-SARA Chemical     Other/Emission \_\_\_\_\_

Location Spilled:     Indoors, fully contained         Outdoors, fully contained  
 Indoors, not fully contained     Outdoors, not fully contained

Discharge to:         None                                 Air                                 Storm Sewer  
 Ground                                 Sanitary Sewer                 Surface Water \_\_\_\_\_

Specific Location of Spill<sup>2</sup>: \_\_\_\_\_  
 GIS Coordinates: X = \_\_\_\_\_  
 Y = \_\_\_\_\_

Duration of Spill<sup>3</sup>:        Start Date/Time: \_\_\_\_\_ End Date/Time: \_\_\_\_\_ Volume of Spill (est): \_\_\_\_\_  
 Gallons     Pounds

Cause of Spill<sup>4</sup>: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Corrective Actions Plan<sup>5</sup>: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### Part C. Notifications

|   | Name and Badge No/Ext No | Ticket No | Date/Time |
|---|--------------------------|-----------|-----------|
| State Duty Officer <sup>6</sup> :       | _____                    | _____     | _____     |
| National Response Center <sup>6</sup> : | _____                    | _____     | _____     |
| DEHS Central <sup>6</sup>               | _____                    | _____     | _____     |
| DEHS Campus <sup>7</sup>                | _____                    | _____     | _____     |
| Other <sup>7</sup>                      | _____                    | _____     | _____     |

<sup>1</sup> See <http://homer.ornl.gov/rq/> for a convenient online tool to determine SARA chemicals and RQs.

<sup>2</sup> Indicate the Campus Number, Building Number and Room Number or closest University asset (such as an electrical, sanitary, communications manhole), street intersections and directionals.

<sup>3</sup> Indicate date and time of when spill began and ended. If exact start/stop date is not known, use the date University staff became aware of the spill start/stop.

<sup>4</sup> Describe the situation, equipment involved, and other information/causative factors about how the spill occurred.

<sup>5</sup> Describe corrective actions taken at the time of spill. DEHS staff to additionally describe any additional corrective actions needed, including time schedule for implementation, and additional reporting.<sup>6</sup> Immediate notification to the State Duty Officer is required for releases to the environment of more than 5 gallons of petroleum product, or any volume of other regulated substances. Immediate notification to the National Response Center is additionally required for releases exceeded the Reportable Quantity (RQ) for identified substances. **Consult with central DEHS staff for a determination on when regulatory notifications are required.**

<sup>7</sup> Notify Campus DEHS and central DEHS staff. Notify CMR or Prime Contractor management if spill is at a construction site. Notify operational unit manager, lead principal investigator (PI) or Project Manager.



UNIVERSITY OF MINNESOTA | Environmental Health and Safety

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**HEATING PLANT OPERATOR I TRAINING PROGRESS REPORT**

**A. GENERAL**

|   | <b>YOUR<br/>INT.</b> | <b>INITIALS<br/>TRAINED<br/>BY</b> | <b>DATE</b> |
|---|----------------------|------------------------------------|-------------|
| 1. <b>TIMESHEET, SHIFT HOURS &amp; BREAKS.</b>    | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 2. <b>TIME CARD, VAC. AND SICK LEAVE SLIP.</b>    | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 3. <b>SICK LEAVE CALL IN POLICY.</b>              | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 4. <b>SMOKING POLICY.</b>                         | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 5. <b>SHIFT LOG; PURPOSE AND PROPER USAGE</b>     | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 6. <b>PLANT PHONE LOG.</b>                        | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |
| 7. <b>ACCIDENT/INCIDENT REPORTING</b>             | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 month eval.-----</b> | _____                | _____                              | _____       |



**A. GENERAL----cont.**

|  | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|--|--------------|----------------------------------|-------|
| 8. READ OPERATOR I TRAINING MANUAL.        | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |
| 9. OVERTIME POLICY.                        | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |

**B. ASH HANDLING SYSTEM**

|   |       |       |       |
|---|-------|-------|-------|
| 1. LOCATION AND PURPOSE OF ALL LINES.<br>GATES AND HOPPERS. | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                  | _____ | _____ | _____ |
| 2. SAFETY EQUIPMENT.  | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                  | _____ | _____ | _____ |
| 3. CHECK OIL AND TROUBLESHOOTING.                           | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                  | _____ | _____ | _____ |
| 4. PLANT SERVICES AUTHORIZATION CALL.                       | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                  | _____ | _____ | _____ |
| 5. PULLING HOT ASH; BAGHOUSE TEMP.                          | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                  | _____ | _____ | _____ |

**B. ASH HANDLING SYSTEM-----cont.**

|  | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|--|--------------|----------------------------------|-------|
| 6. SUMP PUMP "RED" INDICATOR LIGHT.        | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |
| 7. SYSTEM LINE-UP & PULLING PROCEDURE.     | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |

**C. INSIDE COAL EQUIPMENT**

|  |       |       |       |
|--|-------|-------|-------|
| 1. LOCATION AND PURPOSE OF ALL INSIDE EQUIPMENT.       | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----             | _____ | _____ | _____ |
| 2. SERVICE AND INSPECT EQUIPMENT.                      | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----             | _____ | _____ | _____ |
| 3. USE OF COAL CONVEYOR PANEL.                         | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----             | _____ | _____ | _____ |
| 4. LINE UP, START & STOP SEQUENCE USING MAIN ELEVATOR. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----             | _____ | _____ | _____ |
| 5. LINE UP, START & STOP SEQUENCE USING EAST ELEVATOR. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----             | _____ | _____ | _____ |

**C. INSIDE COAL EQUIPMENT-----cont.**

|  | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|--|--------------|----------------------------------|-------|
| 6. CLEAN, SERVICE AND INSPECT THE MAIN COAL PIT RECIPROCATOR AREA. | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                         | _____        | _____                            | _____ |
| 7. BUNKER FULL ALARM PANEL, INCLUDING NO FLOW ALARMS.              | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                         | _____        | _____                            | _____ |

**D. PAYLOADER**

|  |       |       |       |
|--|-------|-------|-------|
| 1. READ PAYLOADER OPERATORS MANUAL.                      | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----               | _____ | _____ | _____ |
| 2. DAILY MAINTENANCE CHECKS/GREASING.                    | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 month eval.-----               | _____ | _____ | _____ |
| 3. SATISFACTORY OPERATION.                               | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----               | _____ | _____ | _____ |
| 4. REMOVE AND REPLACE BUCKET/KNUCKLE.                    | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----               | _____ | _____ | _____ |
| 5. CLEAN TRACKS USING PAYLOADER KNUCKLE CLEANING DEVICE. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----               | _____ | _____ | _____ |

**D. PAYLOADER-----cont.**

|  | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|--|--------------|----------------------------------|-------|
| 6. CLEAN & WASH LOADER AT PLANT SERVICES.  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.----- | _____        | _____                            | _____ |
| 7. REFUEL PAYLOADER AT PLANT SERVICES.     | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |
| 8. STOCKPILE COAL USING PAYLOADER.         | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.----- | _____        | _____                            | _____ |
| 9. ENTER DAILY CHECKS INTO P.C./LOG BOOK.  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.----- | _____        | _____                            | _____ |

**E. UNLOAD/MOVE RAILCARS**

|  |       |       |       |
|--|-------|-------|-------|
| 1. CLEAN TRACKS TO RECEIVE OR MOVE RAILCARS.                               | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----                                 | _____ | _____ | _____ |
| 2. TAKE DOWN RAILCAR NUMBERS AND LOG IN APPROPRIATE PLACES, CALL IN EMPTY. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----                                 | _____ | _____ | _____ |
| 3. MOVE RAILCARS USING CAR PULLERS.  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----3 month eval.-----                                 | _____ | _____ | _____ |

**E. UNLOAD/MOVE RAILCARS----cont.**

|   | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|---|--------------|----------------------------------|-------|
| 4. MOVE RAILCARS WITH KNUCKLE ON LOADER<br>LOCATION OF DERAILER SWITCH. | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |
| 5. OPEN AND CLOSE RAILCAR DOORS.  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |
| 6. OPERATE CAR SHAKERS.   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |
| 7. OPERATE BACK HOE.  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |
| 8. SAMPLE AND RIFFLE COAL.  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |
| 9. OPERATE COAL SHED DOORS  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 month eval.-----                              | _____        | _____                            | _____ |

**F. OUTSIDE COAL UNLOADING EQUIPMENT**

|  |       |       |       |
|--|-------|-------|-------|
| 1. SERVICE AND INSPECT EQUIPMENT.          | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.----- | _____ | _____ | _____ |

**F. OUTSIDE COAL UNLOADING EQUIPMENT**

|  | YOUR<br>INT. | INITIALS<br>TRAINED<br>BY | DATE  |
|--|--------------|---------------------------|-------|
| 2. ELECTRICALLY CONNECT AND MOVE THE UNDER THE CAR UNLOADER. | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                   | _____        | _____                     | _____ |
| 3. PROPERLY SET UP EQUIPMENT TO UNLOAD.                      | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                   | _____        | _____                     | _____ |
| 4. PROPERLY UNLOAD COAL ACCORDING TO PROCEDURES.             | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                   | _____        | _____                     | _____ |

**G. BOILERS**

|   |       |       |       |
|---|-------|-------|-------|
| 1. EXPLAIN OR DRAW BASIC STEAM CYCLE.   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____ | _____ | _____ |
| 2. EXPLAIN THE FUNCTION OF THE MAIN STEAM NON-RETURN VALVE.   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____ | _____ | _____ |
| 3. INDICATE LOCATION OF STEAM AND FEEDWATER PRESS. GAUGES ON EACH BLR. ALONG WITH WATER LEVEL INDICATORS. | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____ | _____ | _____ |

**G. BOILERS-----cont.**

|   | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|---|--------------|----------------------------------|-------|
| 4. BLOWDOWN GAUGE GLASS & WATER COLUMN ON EACH BOILER. (INCLUDING GAS/OIL)                  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----  | _____        | _____                            | _____ |
| 5. BOTTOM BLOW ALL BOILERS.   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----  | _____        | _____                            | _____ |
| 6. EXPLAIN PROPER USE AND PURPOSE OF COAL-FIRED BOILER GRATE DRIVES.                        | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                            | _____ |
| 7. EXPLAIN THE FUNCTION OF ALL STOKER ADJUSTMENTS ON EACH BOILER.                           | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                            | _____ |
| 8. GREASE ALL MOVING PARTS ON STOKERS OF EACH BOILER ALONG WITH GRATES.                     | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                            | _____ |
| 9. KEEP FIRE BED CHECKS ON LIQUID BOARD.  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----  | _____        | _____                            | _____ |
| 10. EXPLAIN LOCATION & FUNCTION OF ALL BOILERS I.D. FANS; MAKE PROPER SHIFT CHECKS ON EACH. | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                            | _____ |

**G. BOILERS-----cont.**

|  | <b>YOUR<br/>INT.</b> | <b>INITIALS<br/>TRAINED<br/>BY</b> | <b>DATE</b> |
|--|----------------------|------------------------------------|-------------|
| 11. EXPLAIN LOCATION & FUNCTION OF ALL BOILER F.D. FANS; MAKE PROPER SHIFT CHECKS ON EACH.   | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----6 month eval.-----   | _____                | _____                              | _____       |
| 12. EXPLAIN LOCATION & FUNCTION OF ALL BOILER O.F.A. FANS; MAKE PROPER SHIFT CHECKS ON EACH. | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----6 month eval.-----   | _____                | _____                              | _____       |
| 13. EXPLAIN PURPOSE AND FUNCTION OF HARD-AUTO STATIONS ON BOILER BAILEY BOARDS.              | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----6 month eval.-----   | _____                | _____                              | _____       |
| 14. DEMONSTRATE CHANGING THE SET POINT AND LOCAL OUTPUT MODE ON ANY GIVEN HARD-AUTO STATION. | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----1 year eval.-----  | _____                | _____                              | _____       |
| 15. LIGHT FIRES AND TURN ON FANS, ON ALL COAL FIRED BOILERS FOR WARM-UP                      | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----1 year eval.-----  | _____                | _____                              | _____       |
| 16. PROPERLY BRING COAL-FIRED BOILERS ON LINE.   | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----1 year eval.-----  | _____                | _____                              | _____       |
| 17. PROPERLY BRING COAL-FIRED BOILERS OFF LINE.  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| FINAL QUALIFICATION-----1 year eval.-----  | _____                | _____                              | _____       |



**G. BOILERS-----cont.**

|   | <b>YOUR<br/>INT.</b> | <b>INITIALS<br/>TRAINED<br/>BY</b> | <b>DATE</b> |
|---|----------------------|------------------------------------|-------------|
| <b>18. PROPERLY BRING COAL-FIRED BOILER<br/>SIDE-STREAM BAGHOUSES ON LINE.</b>          | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>19. PROPERLY BRING COAL-FIRED BOILER<br/>SIDE-STREAM BAGHOUSES OFF LINE.</b>         | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>20. EXPLAIN FUNCTION OF FUEL OIL SYSTEM<br/>FOR BOILERS AND BUTLER GENERATOR.</b>    | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>21. PROPERLY LIGHT OFF GAS/OIL BOILERS.</b>  | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>22. PROPERLY BRING GAS/OIL BOILERS<br/>ON LINE.</b>                                  | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>23. PROPERLY BRING GAS/OIL BOILERS<br/>OFF LINE.</b>                                 | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| <b>24. EXPLAIN LOCATION AND FUNCTION OF ALL LOW<br/>PRESS. STEAM REDUCING STATIONS.</b> | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
|   | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----6 month eval.-----</b>                                       | _____                | _____                              | _____       |

**H. SOOTBLOWING**

|  | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|--|--------------|----------------------------------|-------|
| 1. EXPLAIN PROPER USE AND PURPOSE OF SOOT BLOWING THE BOILERS.   | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----   | _____        | _____                            | _____ |
| 2. EXPLAIN PROPER USE AND PURPOSE OF BLOWING SOOT ON #. 5 BOILER F.W. ECONOMIZER.                          | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----   | _____        | _____                            | _____ |
| 3. EXPLAIN OR DRAW PROPER SEQUENCE OF SOOT BLOWING FOR EACH BOILER.  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----   | _____        | _____                            | _____ |
| 4. BLOW SOOT AND PREHEATERS ON EACH BOILER.  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----   | _____        | _____                            | _____ |
| 5. EXPLAIN PURPOSE AND FUNCTION OF SETTING BOILER I.D. FAN DRAFT USING HARD-AUTO STATION FOR SOOT BLOWING. | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____        | _____                            | _____ |
| 6. OPERATE I.D. FAN HARD-AUTO STATION WHILE SOOT IS BEING BLOWN.   | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
|  | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____        | _____                            | _____ |

**I. BAILEY NET 90 SERVERS**

|  | <b>YOUR<br/>INT.</b> | <b>INITIALS<br/>TRAINED<br/>BY</b> | <b>DATE</b> |
|--|----------------------|------------------------------------|-------------|
| <b>1. EXPLAIN PRIMARY FUNCTION OF THE SERVER STATION.</b>                              | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----6 month eval.-----</b>                                      | _____                | _____                              | _____       |
| <b>2. DEMONSTRATE THE RETRIEVAL OF ANY GIVEN AREA/GROUP.</b>                           | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |
| <b>3. EXPLAIN PURPOSE AND FUNCTION OF EVERY SCREEN AVAILABLE ON SERVERS.</b>           | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |
| <b>4. DEMONSTRATE THE USE OF RETRIEVING PAST INFORMATION OFF TREND SCREEN.</b>         | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |
| <b>5. EXPLAIN THE FUNCTION AND LOCATION OF THE PLANT AND BOILER MASTERS ON SERVER.</b> | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |
| <b>6. DEMONSTRATE GOING FROM AUTO TO MAN. MODE OR VICE-VERSA ON AN GIVEN STATION.</b>  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |
| <b>7. DEMONSTRATE CHANGING THE SET POINT OR LOCAL OUTPUT MODE ON ANY GIVEN STATION</b> | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
|  | _____                | _____                              | _____       |
| <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                       | _____                | _____                              | _____       |

I. BAILEY NET 90 SERVERS---cont.

|  | YOUR<br>INT. | INITIALS<br>TRAINED<br>BY | DATE  |
|--|--------------|---------------------------|-------|
| 8. DEMONSTRATE PRINTING OUT ANY GIVEN SCREEN OFF THE SERVER PRINTER. | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----1 year eval.-----                            | _____        | _____                     | _____ |
| 9. ABILITY TO ACKNOWLEDGE ALARMS THAT COME IN ON THE SERVER.         | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
|  | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                           | _____        | _____                     | _____ |

J. PLANT PERSONAL COMPUTOR

|  |       |       |       |
|--|-------|-------|-------|
| 1. BASIC KNOWLEDGE AND USE OF PERSONAL COMPUTOR USING WINDOWS.   | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____ | _____ | _____ |
| 2. ABILITY TO TRACE RAILCARS USING USING P/C.  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____ | _____ | _____ |
| 3. BASIC USE OF PERSONAL COMPUTOR USING MICROSOFT EXCEL AND WORD.  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____ | _____ | _____ |
| 4. DEMONSTRATE ABILITY TO USE PERSONAL COMPUTER PRINTER.   | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----   | _____ | _____ | _____ |
| 5. COMPLETE DAILY OPERATION SHEET, ENTER INTO P.C. AND PROPERLY MAKE END OF THE MONTH PRINTOUTS & FILE AWAY. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 year eval.-----  | _____ | _____ | _____ |

**J. PLANT PERSONAL COMPUTER----cont.**

6. DEMONSTRATE THE ABILITY TO GET GAS HOUSE READING AND ENTER INTO P/C & LOG.

YOUR  
INT.

INITIALS  
TRAINED  
BY

DATE

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----1 year eval.-----

**K. PLANT FEEDWATER SYSTEM**

1. EXPLAIN THE FUNCTION OF THE BOILER FEEDWATER PUMPS; THEIR LOCATION, G.P.M. AND PROPER LIGHT OFF PROCEDURE.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

2. EXPLAIN FUNCTION OF THE CONDENSATE VACUUM PUMPS AND THEIR LOCATION.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

3. SHUT OFF, LIGHT OFF & SERVICE VACUUM PUMPS ACCORDING TO PROCEDURE.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

4. EXPLAIN THE FUNCTION OF THE D.A TRANSFER PUMPS AND THEIR LOCATION.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

5. EXPLAIN THE FUNCTION OF THE D.A RECIRCULATING PUMPS AND THEIR LOCATION.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

6. EXPLAIN PRIMARY FUNCTION OF THE D.A SYSTEM INCLUDING THE D.A., STORAGE AND SURGE TANKS.

|       |       |       |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

FINAL QUALIFICATION-----6 month eval.-----

**K. PLANT FEEDWATER SYSTEM-----cont.**

|   | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|---|--------------|----------------------------------|-------|
| 7. EXPLAIN THE FUNCTION OF THE WATER SOFTENER-MAKEUP SYSTEM AND THE LOCATION. | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                                    | _____        | _____                            | _____ |
| 8. REGENERATE WATER SOFTENERS.  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 year eval.-----                                     | _____        | _____                            | _____ |
| 9. DRAW AND TEST CONDENSATE RETURN WATER.                                     | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 year eval.-----                                     | _____        | _____                            | _____ |
| 10. DRAW AND TEST BOILER WATER .  | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 year eval.-----                                     | _____        | _____                            | _____ |
| 11. ADD CHEMICALS TO BOILER FEEDWATER SYSTEM & EXPLAIN SYSTEM.                | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----1 year eval.-----                                     | _____        | _____                            | _____ |
| 12. EXPLAIN OR DRAW THE PLANT FEEDWATER SYSTEM TO EACH BOILER.                | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                                    | _____        | _____                            | _____ |
| 13. EXPLAIN THE FEEDWATER SYSTEM ON EACH BOILER.                              | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                                    | _____        | _____                            | _____ |

**K. PLANT FEEDWATER SYSTEM-----cont.**

|     |   | <b>YOUR<br/>INT.</b> | <b>INITIALS<br/>TRAINED<br/>BY</b> | <b>DATE</b> |
|-----|---|----------------------|------------------------------------|-------------|
| 14. | <b>CLEAN AND INSPECT MED PARK CONDENSATE<br/>RETURN LINE STRAINER.</b>                      | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     | <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| 15. | <b>CLEAN AND INSPECT THE BADGER METER<br/>TO MED PARK CONDENSATE RETURN TANK</b>            | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     | <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |
| 16. | <b>EXPLAIN AND PROPERLY ADJUST THE<br/>CONTINUOUS BLOWDOWN STATIONS ON<br/>ALL BOILERS.</b> | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     |   | _____                | _____                              | _____       |
|     | <b>FINAL QUALIFICATION-----1 year eval.-----</b>  | _____                | _____                              | _____       |

**L. MISCELLANEOUS**

|    |  |       |       |       |
|----|--|-------|-------|-------|
| 1. | <b>UNDERSTAND ALL SHIFT RELATED CLEANING<br/>DUTIES AND PRFORM SATISFACTORILY.</b> | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    | <b>FINAL QUALIFICATION-----3 month eval.-----</b>                                  | _____ | _____ | _____ |
| 2. | <b>EXPLAIN PLANT COOLING WATER SYSTEM<br/>AND ITS FUNCTION.</b>                    | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    | <b>FINAL QUALIFICATION-----1 year eval.-----</b>                                   | _____ | _____ | _____ |
| 3. | <b>EXPLAIN THE PURPOSE OF AND OPERATE THE<br/>CONFINED SPACE TESTER.</b>           | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    |  | _____ | _____ | _____ |
|    | <b>FINAL QUALIFICATION-----1 month eval.-----</b>                                  | _____ | _____ | _____ |

L. MISCELLANEOUS----cont.

|   | YOUR<br>INT. | INITIALS<br>TRAINED<br>BY | DATE  |
|---|--------------|---------------------------|-------|
| 4. FAMILIAR WITH LOCATION OF EMERGENCY EYE WASH STATION AND FIRST AID KITS.   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----1 month eval.-----  | _____        | _____                     | _____ |
| 5. FAMILIAR WITH LOCATION AND PURPOSE OF MATERIAL SAFETY DATA SHEETS. (MSDS)  | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----1 month eval.-----  | _____        | _____                     | _____ |
| 6. COMPLET AT LEAST ONE MONTHLY CHECK OF ALL PLANT FIRE EXTINGUISHER AND BE FAMILIAR WITH THE LOCATION OF EACH.     | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                     | _____ |
| 7. EXPLAIN PLANT AIR COMPRESSOR SYSTEM.   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----1 year eval.-----   | _____        | _____                     | _____ |
| 8. PROPERLY TAG OUT EQUIPMENT/BOILERS WITH DANGER SIGNS AND LOCKS WHEN PERFORMING MAINTENANCE OR REPAIRS.           | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____        | _____                     | _____ |
| 9. EXPLAIN OR DEMONSTRATE PROPER USE OF THE EMERGENCY DIESEL GENERATOR FOR GAS OIL BOILERS AND AUXILIARY EQUIPMENT. | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
|   | _____        | _____                     | _____ |
| FINAL QUALIFICATION-----1 year eval.-----   | _____        | _____                     | _____ |



|   | YOUR<br>INT. | <u>INITIALS</u><br>TRAINED<br>BY | DATE  |
|---|--------------|----------------------------------|-------|
| 10. READ ALL STANDARD PRACTICE PROCEDURES FOR PLANT OPERATION | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
|   | _____        | _____                            | _____ |
| FINAL QUALIFICATION-----3 month eval.-----                    | _____        | _____                            | _____ |

L. MISCELLANEOUS-----cont.

|  |       |       |       |
|--|-------|-------|-------|
| 11. EXPLAIN LOCATION & FUNCTION OF ALL PLANT COMBUSTION AIR HEATERS. | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
|  | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----                           | _____ | _____ | _____ |

|   |       |       |       |
|---|-------|-------|-------|
| 12. EXPLAIN LOCATION, PURPOSE AND PROCEDURES FOR USING THE STEAM FIRE SUPPRESSION FOR THE FUEL OIL VAULT. | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----6 month eval.-----  | _____ | _____ | _____ |

|   |       |       |       |
|---|-------|-------|-------|
| 13. EXPLAIN LOCATION AND TROUBLESHOOTING PROCEDURES FOR ALL THE STEAM PLANT SUMP PUMPS. | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
|   | _____ | _____ | _____ |
| FINAL QUALIFICATION-----1 year eval.-----   | _____ | _____ | _____ |

## **Starting Boiler #4 from cold boiler**

- 1. Fill boiler to 2" below level and check for leaks. Start hopper heaters on precip.**
- 2. Take coal scale reading.**
- 3. Set I.D. fan at 2" draft and start. Put in auto**
- 4. Set F.D. fan at least 6% and start. Put in auto**
- 5. Start coal scale.**
- 6. Make sure the dogs are off the stokers and set stokers to 10% and start them.**
- 7. Put coal bed on boiler about 1"-2" thick and Place 3 flares on each half of the bed.**
- 8. Start precipis.**
- 9. As Flares start to die add a little more coal to spread the fire.**
- 10. When fire on complete bed let the boiler warm up should be about 12 hours for first fire of the year.**
- 11. Leave the plant master at "0"**
- 12. When the boiler is warm and ready to be brought online make sure all header valves are open.**
- 13. Place the boiler control face plates in "auto" position**
- 14. Using the plant master face plate move the plant master in 10 psi increments, hesitating until header pressure matches the pressure set point. This can be done in lower increments when under the PRV setting. (5psi)**
- 15. When the desired pressure is reached walk through the plant and check for any leaks or problems that came about during the light off and firing procedure.**

## **Starting Boiler after short shutdown**

- 1. Boiler water level should be at or near working level. If a little low 1"-2" continue, if not bring water level up to that level.**
- 2. I.D. should have been left on if down for repairs. If power outage and I.D. tripped start it.**
- 3. Place I.D. face plate in "Auto" and set to 2 ½-3 inches let run at least 2 min. before starting any other fan. (FD or OFA)**
- 4. If coal is burnt up replace coal bed over ash. Place 4 flares on bed.**
- 5. Start the F.D. fan at 6%.**
- 6. Start the O.F. fan at minimum. (55%)**
- 7. Add coal as necessary to keep fire going and spreading out the fire.**
- 8. When fire is on complete bed start to move Plant Master Faceplate in increments of 10 psi until header pressure matches set point. This can be done in lower increments when the header pressure is under PRV set point. (5 psi)**
- 9. When the desired plant set point is reached and boiler stabilized walk through the plant insuring everything is running according to specs and nothing is leaking.**

## **Boiler shut down for repairs**

1. If we are blowing soot on the boiler blow through the sequence twice.
2. Pull the dogs off the stokers.
3. Leaving all boiler controls in manual bring down the Plant Master set point in increments of 10 psi. (Stepping it down will prevent alarms for being outside of set point range only.)
4. When the boiler is down to 10 psi or lower open the front doors to boiler for cooling.
5. When the boiler has reached 1 psi-2 psi open the vent on top of steam drum to prevent implosion of drum or unsealing of manhole covers.
6. Grates should be left running.
7. Shutdown O.F.A. fan and F.D. fan after all of bed coal is burnt and cooled.
8. Stokers and I.D fan should remain running until boiler is completely cooled.
9. Feed water pump should remain running in auto and drum level control in auto.
10. Coal scale must remain on if there is coal in the bunker and coal on the belt.
11. Precip must remain turned on until all coal is burnt, cooled, and ash is run off grates.
12. Log when precip is turned off and restarted.
13. Repair work can begin.

## **Boiler shutdown for season**

1. Make sure the coal bunker and silo are completely empty
2. Blow soot on all blowers twice before running out of coal.
3. Blow down all water walls and bottom blow down valves
4. Let coal run out and pressure drop answering all alarms.
5. Shut down O.F.A. and F.D. fans when coal is burnt and cooled.
6. Stokers and I.D fan should remain running until coal is burnt and boiler cooled.
7. Feed water pump and control should remain in auto.
8. Precip must remain on and running until all coal is burnt, cooled, and all ash is run off bed.
9. Log when precip is turned on and turned off
10. Bearing cooling for I.D. fan, stokers, grate doors, and feed water pumps can be turned off when all is cool.
11. Leave condensate and vacuum pumps running until next morning.

## **The next work day**

12. Blow plant down and sweep up.
13. Drain boiler and D.A storage tank.
14. Rinse drums and Tank as soon as possible after draining. Open or remove hand holds and man holds on boiler and set up fan for drums
15. Pull plugs from under both feed water pumps.
16. Pull ash from all sources.
17. Begin summer work if training has been completed.

## **Boiler #6 Start-up**

- 1. Add Boiler chemical to boiler through manhole and close up boiler. Make sure boiler vent is open until boiler is at 5 psig**
- 2. Fill Boiler with water slowly to operating level with boiler feed water valve by-pass.**
- 3. Start vaporizers (use SOP in book)**
- 4. Check all resets (gas, panel, and LWCO)**
- 5. Start boiler in manual and in lowest position.**
- 6. Warm up to 10 psi shut down until pressure drops.**
- 7. Restart boiler in manual and in lowest position until 25psig.shut off.**
- 8. Restart boiler in the lowest setting when pressure drops off until 50 psig. Shut off until pressure drops.**
- 9. Restart boiler in manual at lowest setting slowly turning it up until 75 psig. Try moving to Auto position.**
- 10. Run up to operating pressure and then blow down LWCO/Gage glass and bottom blows.**
- 11. From initial start until operation should be a minimum of 12 hours.**

## **Boiler #6 Shut-down**

- 1. Slug boiler with 2 Gallons of Oxygen Scavenger. (pot feeder)**
- 2. Shut king valve on Propane tank. (1<sup>st</sup> valve right under propane tank.)**
- 3. Run boiler until boiler trips on low fuel.**
- 4. Reset and restart until pressure stays off fuel line.**
- 5. Shut down all valves on vaporizers and gas lines. (sop on vaporizer shut down)**
- 6. Leave water pumps running until boiler has cooled.**
- 7. Open vent on boiler when pressure is 5 psig.**

## **Electrostatic Precipitator**

### **Start-up**

1. Visually inspect to be sure all access doors are locked and there are 4 keys in the key block. (The number 1 key should be in the cabinet allowing the breaker to be turned on.)
2. Start the hopper heaters and insulator heaters prior to starting the boiler.
3. Start the fields in succession.
4. Start the ash augers. These must be running 24/7 while the precip is exposed to ash.
5. Turn on rapper air and check for moisture by blowing down the line on #1 rapper.
6. Place the precip rappers in the "Auto" position
7. Check the precip for air leaks.
8. Check that the rappers are operating correctly.
9. Check that the fields are somewhat stable.

### **Shut- down**

1. After the air cools to below 160 at the flue gas outlet temp, shut the fields off and answer the alarms.
2. Manually rap each rapper for 5-10 seconds.
3. When ash has been run out shut off the hopper and insulator heaters.
4. Shut off air to the rappers.
5. Check for air leaks and equipment for need of repair.

### **Lock-out procedure**

1. Shut the main breaker off (the upper left corner of the cabinet.)
2. Turn and remove the #1 key to lock out the main breaker.
3. Close the cabinet door and lock out the cabinet.
4. Take the #1 key and after removing the coil cover, place in 1<sup>st</sup> lock and unlock the switch, turn switch toward the #2 key, turn the #2 key and remove. (This will lock the #1 switch off.)
5. Place the #2 key in the 1<sup>st</sup> lock and unlock the switch, turn the switch toward the #3 key, turn the #3 key and remove. (This will lock the #2 switch off)

6. Place the #3 key in the 1<sup>st</sup> lock and unlock the switch, turn the switch toward the #4 key, turn the #4 key and remove. (This will lock the #3 switch off) the Precipitator is now locked out.
7. Take the #4 key and place it in the key block and turn this will turn the 4-#5 keys already in the block and allow them to be taken out to unlock the access doors and the insulator accesses on the top of the precipitator.
8. To unlock the precipitator reverse steps 7-1

### **Unlock procedure**

1. Place the 4- keys #5 back into the key block and turn so that key #4 turns and remove #4 from the block.
2. Place the #4 key into the #3 switch and turn switch toward the #3 key. Remove the key.
3. Place the #3 key into the #2 switch and turn switch toward the #2 key. Remove the key.
4. Place the #2 key into the #1 switch and turn switch toward the #1 key. Remove the key.
5. Unlock the lockout/tagout from the cabinet
6. Place the #1 key into the lock on the main breaker in the cabinet. This will unlock the breaker allowing a start up procedure.

**UMC Heating Plant Procedure  
Electrostatic Precipitator (ESP)  
Shutdown/Breakdown Notification**  
(updated: 9/1/17)

**MPCA rules require notification within 24 hours if an ESP field is not functioning for more than 1 hour.**

In the event of a shutdown, breakdown, or power outage that affects the electrostatic precipitator or the loss of 2 fields for more than 1 hour duration, the boiler operator on duty must:

1. Record the date, time, duration, and reason for the outage in the log.
2. Contact Dave Danforth and Tom Feiro.
3. Call MPCA within 24 hours at the following number (8:00am-4:30pm) 1-651-296-7300.
  - Report the shutdown, breakdown of the ESP at the University of Minnesota, Crookston Heating Plant Boiler #4
  - Beginning and ending date & time of breakdown or shutdown
  - Duration of breakdown or shutdown
  - Reason for breakdown/shutdown ex.) power outage, boiler malfunction
  - Corrective actions taken to minimize emissions during breakdown or shutdown.
  - Record the date/time of the phone call, and the first and last name of the AQ Staff that you spoke to (or that a message was left).
4. Email Dave Bordson – UM DEHS, [dbordson@comcast.net](mailto:dbordson@comcast.net) and copy the email to Dave Danforth, Tom Feiro and Julianne Rantala ([jrantala@umn.edu](mailto:jrantala@umn.edu)).
  - Indicate your name and position
  - State the UMC Heating Plant is/has reporting a shutdown or breakdown of Boiler #4 ESP
  - Provide a copy of the form/information reported to MPCA (see list above)
  - Date and time of your notification to MPCA (if it has happened)
  - Give him your call back number to the Heating Plant
5. Notify Dave Danforth and Tom Feiro during the working hours or the next working day.
6. Dave Danforth will complete the MPCA's shutdown/breakdown form, and electronically submit it to the MPCA.
  - The electronic form is located at: <https://www.pca.state.mn.us/air/air-emissions-shutdownbreakdown-form#Notification> form
  - Provide a copy of the submittal to Dave Bordson and Julianne Rantala, along with operating details during the event:
    - Fuel Consumption
    - Steam Output
    - Operating Field Chart (kw, secondary voltage)
    - Oxygen Content Chart or Data (preferably data)



7. Dave Bordson will calculate the emissions rate during the shutdown/breakdown to determine if a permit deviation occurred.
  - Provide a copy of the calculation and deviation determination to Dave Danforth, Tom Feiro and Julianne Rantala.
  - This documentation is the basis for semi-annual reporting.

## Summer Maintenance

### Boiler # 4

- \_\_\_ 1. Drain and clean
  - \_\_\_ 2. Repair brick work
  - \_\_\_ 3. Remove and replace bad grates
  - \_\_\_ 4. Drill out air holes in grates
  - \_\_\_ 5. Check out grease lines for grates
  - \_\_\_ 6. Check stokers- all chains, pinion gears-all three cluches and clean.
  - \_\_\_ 7. Blow back yarway water level-feed water
  - \_\_\_ 8. Remove reducing valve control lines, check for blockage
  - \_\_\_ 10. Steam gauges, check lines for blockage and flush.
    - \_\_\_ 1. Boiler #1(big gauge)
    - \_\_\_ 2. Gauge for putting up coal
    - \_\_\_ 3. Gauge on preheater
    - \_\_\_ 4. High pressure gauge in pump room
    - \_\_\_ 5. Low pressure gauge in pump room
  - \_\_\_ 11. Remove and inspect chem. Line to boiler
  - \_\_\_ 12. Grease all stoker and draft linkage
  - \_\_\_ 13. Check feed water valve for packing and stem
- Boiler #4 continued
- \_\_\_ 14. Flush and blow down flash tank

- \_\_\_ 15. Remove and replace packing on retractable soot blowers
- \_\_\_ 16. Remove and replace packing on both hand soot blowers
- \_\_\_ 17. Check all valves for use on air heaters
- \_\_\_ 18. Run turbine cutter thru tubes in boiler
- \_\_\_ 19. Check all blowdown valves repack if necessary
- \_\_\_ 20. Check all chemical lines
- \_\_\_ 21. Check chemical pump and flush
- \_\_\_ 22. Check all roofs
- \_\_\_ 23. Complete plant blow down

#### precip and stack

- \_\_\_ 1. Clean and check hopper bottom
- \_\_\_ 2. Clean all insulators
- \_\_\_ 3. Clean stack
- \_\_\_ 4. Check belts and grease augers

#### Ash handler

- \_\_\_ 1. change oil air pump
- \_\_\_ 2. Remove plates and paint
- \_\_\_ 3. Blow ash from top receiver blow tubes
- \_\_\_ 4. Check all electric heat tapes
- \_\_\_ 5. Check all hoses on top for deterioration
- \_\_\_ 6. Drain glasses
- \_\_\_ 7. Check all belts

### Coal handling

- \_\_\_ 1. Check bucket elevator for centering in chute
- \_\_\_ 2. Grease and service bucket elevator
- \_\_\_ 3. Check flex coupling
- \_\_\_ 4. Check bar flight alignment, loose bars, broken or missing bars
- \_\_\_ 5. Grease bar flight and regrease flex
- \_\_\_ 6. Service coal scale
- \_\_\_ 7. Service unloading belt conveyer
- \_\_\_ 8. Service drag auger to elevator
- \_\_\_ 9. Service coal silo elevator
- \_\_\_ 10. Service Auger from silo to main elevator
- \_\_\_ 11. Service dust collector air valves
- \_\_\_ 12. Service dust collector air seal
- \_\_\_ 13. Service dust collector motor and belts

\_I.D, F.D and over fire air fans

- \_\_\_ 1. Clean ID – change oil in bearings- repack flex and clean fan
- \_\_\_ 2. Clean FD – grease and repack flex and clean fan
- \_\_\_ 3. Clean over fire – check motor and clean fan

### Feed pumps

- \_\_\_ 1. Clean up – repack steam driven pump
- \_\_\_ 2. Clean up repack steam driven pump flex
- \_\_\_ 3. Change oil in turbine governor
- \_\_\_ 4. Repaint pumps
- \_\_\_ 5. Clean up – repack electric pump
- \_\_\_ 6. Clean and repack electric pump coupler
- \_\_\_ 7. Check and re-pack all valves on pumps
- \_\_\_ 8. Check and clean out gauge lines and gauges
- \_\_\_ 9. Check and repack run around valves on pumps
- \_\_\_ 10. Drain pumps of water at shutdown
- \_\_\_ 11. re-plug drain plugs at start up.

### Water softeners

- \_\_\_ 1. Clean brine tank
- \_\_\_ 2. Check all lines and repair any leaks

### Condensate pumps

- \_\_\_ 1. Remove all motors and check impellers
- \_\_\_ 2. Remove tubes and check orifices
- \_\_\_ 3. Repack float valve
- \_\_\_ 4. Check and replace pump seals
- \_\_\_ 5. Clean out interior of tank
- \_\_\_ 6. Clean and repaint outside

### D.A tank

- \_\_\_ 1. Drain and clean
- \_\_\_ 2. Patch all broken covering
- \_\_\_ 3. Replace gauge glasses that are dirty or stained
- \_\_\_ 4. Replace any bad valves
- \_\_\_ 5. Repack valves
- \_\_\_ 6. Check and service gauges
- \_\_\_ 7. Clean out control lines on Spence valves and service

### Sump pumps and drains

- \_\_\_ 1. Run snake in all drains and clean out all catches or traps
- \_\_\_ 2. Grease and check float and clean out mud in pits
- \_\_\_ 3. Flush flash tank

## Air compressors and dryers

- \_\_\_ 1. Change oil and filter on air compressors
- \_\_\_ 2. Oil small motor on air dryer in old plant
- \_\_\_ 3. Blow out dryers with air

## Boiler 5

- \_\_\_ 1. Drain and Clean water sides
- \_\_\_ 2. Open crosses on LWCO's
- \_\_\_ 3. Remove Gauge glass clean or replace.
- \_\_\_ 4. Remove burner and inspect.
- \_\_\_ 5. Open north and south ends.
- \_\_\_ 6. Inspect fire sides.
- \_\_\_ 7. Run Goodway brushes through fire sides.
- \_\_\_ 8. Check refractory on doors.
- \_\_\_ 9. Calibrate Gauges.
- \_\_\_ 10. Repack valves
- \_\_\_ 11. Leave boiler open for inspection
- \_\_\_ 12. Replace safeties as needed.
- \_\_\_ 13. Perform hydro if necessary (do not exceed safety valve lifting pressure).
- \_\_\_ 14. Remove and replace all gaskets.
- \_\_\_ 15. Leave fan running in manhole until boiler fill.
- \_\_\_ 16. Close up fire and water sides of boiler.
- \_\_\_ 17. Clean boiler 5 area (put away all tools, hoses and equipment.)

## CAMPUS MAINTENANCE

### Service B&G and taco pumps

- |                            |                    |
|----------------------------|--------------------|
| ___ 1. Heating plant       | ___ 2. Library     |
| ___ 3. Dowel               | ___ 4. UTOC        |
| ___ 5. Food service        | ___ 6. Kiehle      |
| ___ 7. Hill                | ___ 8. Owen        |
| ___ 9. Arc                 | ___ 10. McCall     |
| ___ 11. Tunnels            | ___ 12. Skyberg    |
| ___ 13. Brink              | ___ 14. Gym        |
| ___ 15. New science center | ___ 16. Children's |
| ___ 17. Westside apt.      |                    |

### Service air compressors

- |                |                     |
|----------------|---------------------|
| ___ 1. Library | ___ 2. McCall       |
| ___ 3. Selvig  | ___ 4. Hill         |
| ___ 5. Owen    | ___ 6. Arc          |
| ___ 7. Kieser  | ___ 8. Food service |
| ___ 9. Gym     | ___ 10. utoh        |



## Mechanical rooms

Service all unit heaters, air handlers, exh.fans, furnaces, pumps; Spence valves control lines, repack valves as necessary

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Grounds shop    | <input type="checkbox"/> 2. Food service       |
| <input type="checkbox"/> 3. Hill (both)     | <input type="checkbox"/> 4. Owen               |
| <input type="checkbox"/> 5. Selvig          | <input type="checkbox"/> 6. McCall             |
| <input type="checkbox"/> 7. Arc             | <input type="checkbox"/> 8. Gym                |
| <input type="checkbox"/> 9. New science     | <input type="checkbox"/> 10. Skyberg           |
| <input type="checkbox"/> 11. Lee            | <input type="checkbox"/> 12. Brink             |
| <input type="checkbox"/> 13. Westside apt.  | <input type="checkbox"/> 14. Robertson         |
| <input type="checkbox"/> 15. Kiele          | <input type="checkbox"/> 16. Library           |
| <input type="checkbox"/> 17. Dowell & annex | <input type="checkbox"/> 18. Children's center |
| <input type="checkbox"/> 19. Church         | <input type="checkbox"/> 20. Kiser             |
| <input type="checkbox"/> 21. Hoop houses    | <input type="checkbox"/> 22. Heating plant     |
| <input type="checkbox"/> 23. Utah           | <input type="checkbox"/> 24. Well house        |

## Summer projects per building

Dowell hall

Selvig hall

Library  
Childcare

Gym

McCall hall

Robertson

Auri

Skyberg

Lee

Brink

Grounds shop

Arc

Owen

Utoc

Food service

New science

Kiele

Kiser

Hill

Heating plant

1. Tube thickness testing for both boilers. Must in 2014.

## SHIFT LOG FOR UMC HEATING PLANT Boiler #4

DATE \_\_\_\_\_ OPERATOR \_\_\_\_\_ SHIFT \_\_\_\_\_ TEMP \_\_\_\_\_

BEGINNING OF SHIFT CHECKS

- \_\_\_\_\_ WATER METER AND D.A. LEVEL
- \_\_\_\_\_ WATER SOFTENERS
- \_\_\_\_\_ FEEDWATER PUMPS
- \_\_\_\_\_ HURLING TANK 4 /SHIFT
- \_\_\_\_\_ BOILER WATER LEVEL
- \_\_\_\_\_ FEED WATER PRESSURE
- \_\_\_\_\_ BOILER DRUM PRESSURE
- \_\_\_\_\_ CHECK PRECIP MONITOR
- \_\_\_\_\_ WATER COLUMN BLOW OFF
- \_\_\_\_\_ SIGHT GLASS BLOW OFF
- \_\_\_\_\_ GREASE STOKERS
- \_\_\_\_\_ BOTTOM SIDE CHECKS
- \_\_\_\_\_ TOPSIDE CHECKS
- \_\_\_\_\_ CHEMICAL TESTS
- \_\_\_\_\_ MUD DRUM BLOW OFF

END OF SHIFT CHECKS

- \_\_\_\_\_ GREASED GRATES
- \_\_\_\_\_ CBD/TDS
- \_\_\_\_\_ RAN PRECIP AUGERS

WEDNESDAY A.M. CHECKS

- \_\_\_\_\_ LOW WATER CUTOFF
- \_\_\_\_\_ COAL SCALE GREASE
- \_\_\_\_\_ GREASE SLOW MOVING
- \_\_\_\_\_ GREASE ZERKS
- \_\_\_\_\_ PLENIUM ASH

DAILY OPS 7A.M.

- \_\_\_\_\_ COAL SCALE TOMARROW
- \_\_\_\_\_ COAL SCALE TODAY
- \_\_\_\_\_ TOTAL COAL USED
- \_\_\_\_\_ TOTAL STEAM FLOW
- \_\_\_\_\_ AVERAGE STEAM FLOW
- \_\_\_\_\_ HOURS RUN

**ALWAYS MONITOR BOILER**

shift comments:

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OPERATORS INITIALS:

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# SHIFT LOG FOR UMC HEATING PLANT Boiler #5

DATE \_\_\_\_\_ OPERATOR \_\_\_\_\_ SHIFT \_\_\_\_\_ TEMP \_\_\_\_\_

BEGINNING OF SHIFT CHECKS

DAILY OPS 7A.M.

|  |   |                                      |
|--|---|--------------------------------------|
| <u>          </u> FEEDWATER PUMPS            | <u>          </u> BOTTOM BLOW OFF<br>North                      South | <u>          </u> GAS METER TOMARROW |
| <u>          </u> WATER METER AND D.A. LEVEL |   | <u>          </u> GAS METER TODAY    |
| <u>          </u> WATER SOFTENERS            | <u>          </u> CHEMICAL TESTS                                      | <u>          </u> TOTAL GAS USED     |
| <u>          </u> HURLING TANK 4 /SHIFT      |   |                                      |
| <u>          </u> BOILER WATER LEVEL         |   | <u>          </u> TOTAL STEAM FLOW   |
| <u>          </u> FEED WATER PRESSURE        |   | <u>          </u> AVERAGE STEAM FLOW |
| <u>          </u> BOILER DRUM PRESSURE       |   | <u>          </u> HOURS RUN          |
| <u>          </u> WATER COLUMN BLOW OFF      |   |                                      |
| <u>          </u> SIGHT GLASS BLOW OFF       |   | <b>ALWAYS MONITOR BOILER</b>         |

shift comments:

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OPERATORS INITIALS:

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