# Boiler Plant Optimization - *Overview*

## Facility Name

## Facility Location

In Coordination with

## INTRODUCTION

Cleaver-Brooks, Inc. conducted a Boiler Plant Optimization ***Overview*** at the Plant facility located at their address, on this date. The overview was conducted by Cesar Luevano of Cleaver-Brooks.

A Boiler Plant Optimization ***Overview*** is a complementary site visit from a Cleaver-Brooks factory certified *Boiler Plant Optimization Specialist*™ to review basic operational characteristics of the boiler plant. The visit is typically 2-3 hours on site. During the visit the Boiler Plant Optimization Specialist evaluates and records pertinent information of the major operational pieces of boiler plant equipment including the boiler, burner, controls, heat recovery, and water treatment and other key equipment.

The Boiler Plant Optimization ***Overview*** identifies target areas within the boiler room to further pursue for improving the four cornerstones of Boiler Plant Optimization which are safety, efficiency, reliability and sustainability. These areas are listed in Table 1 – Improvement Opportunity Summary. Once completed, the overview would also identify key areas related to deficiencies to be corrected and to further optimize the boiler room operations. The deficiencies are noted in Table 2 – List of Deficiencies.

## BOILER PLANT OVERVIEW

The facility has one (1) boiler. Boiler details are given below.

| Boiler | Capacity | Manufacturer | Boiler Type | Age |
|---|---|---|---|---|
| Boiler 1 | 70HP | York Shipley | Firetube | 45 years old |

The average steam demand across the operational year is given below.

| Same for all Quarters | Boiler 1 |
|---|---|
| Hours Per Day | 24 |
| Days Per Week | 6 |
| Average Steam Demand | 2149.35 |

Details of boiler ratings, operating pressure and safety valve pressure is listed below.

| Boiler | Pressure Rating | Operating Pressure | Safety Valve Pressure |
|---|---|---|---|
| Boiler 1 | 150 psig | 12 psig | 15 psig |

If the operating pressure is less than the 50% of the maximum allowable, then the velocities out of the nozzle may exceed the recommended levels; which has the potential for carry over.

The deaerator is rated for 5000 lbs./hr. and is operating at 0 Psig, 70°F and should have a dissolved oxygen test performed annually to ensure the system is properly removing corrosive oxygen from makeup water. Non-destructive testing should also be performed on the deaerator to confirm the

vessel integrity.

The boiler system is rated for an input of 70-lbs/hr.  0% condensate is recovered with existing piping layout.

The boiler operates with Single combustion control for air and fuel and does not have the benefit of an economizer to elevate the feed-water temperature. The makeup water volume is 100% and there is no blow-down heat recovery in place. There is no O2 sensing on the flue-gas boiler stack.

There are numerous opportunities to improve the operation and thermal efficiency of the boiler plant such as the Option to upgrade the existing boiler with:

- O2 trim
- Conventional economizers
- Condensing economizers
- Install Blow down controller to module continuous blow down stream
- Install blow-down heat recovery system to reduce energy losses

The economic thresholds are different in various plants. A simple payback milestone suffices at some plants where others require a detailed evaluation of the rate of return. Taxes and depreciation also have impact on new equipment versus repairs or upgrades to older equipment.

Table 1 – Improvement Opportunity Summary provides a detailed description for areas that can be improved to have a further positive impact related to Boiler Plant Optimization. These opportunities can be translated into energy savings and their implementation cost should be discussed with the authorized Cleaver-Brooks representative for a defined roadmap for improvement.

## IMPROVEMENT OPPORTUNITY SUMMARY

Table 1:
**Opportunities**

### Boiler Plant Optimization Program

| Opportunity | Note |
|---|---|
| | |
| O2 trim is not capable on the boiler. | O2 trim continuously monitors the oxygen (or excess air) level in the flue gas in order to constantly adjust the fuel/air mixture. This optimizes the boiler combustion and typically provides an increase of 0.5%. |
| An economizer preheats the boiler feedwater by capturing flue gas energy. | A conventional economizer preheats the feedwater delivered to the boiler. Capturing the energy from the flue gas will increase the boiler efficiency by 2% to 4%. |
| A condensing economizer captures additional flue gas energy in order to provide low grade heat for processes or to preheat the make-up water. | A condensing economizer combined with a conventional economizer will increase the boiler efficiency by 6%. If utilized to heat makeup water, the makeup water volume should be greater than 50% (B1.13.13) |
| A metering valve is used to throttle the continuous blowdown. | A metering valve discharges a continuous stream of boiler water in order to maintain the desired TDS level. A blowdown controller samples the TDS level and only blows down the boiler when necessary. |
| A blowdown heat recovery system is recommended to preheat the makeup water. | The blowdown is a necessary step in boiler operation but is also a loss of valuable energy. A blowdown heat recovery system captures the energy by preheating the makeup water. |
| High percentage makeup water indicates that a large portion of the steam is directly consumed in the process or a large portion of the condensate is discharged to the drain. | Condensate contains approximately 16% of the original energy in the steam. All avenues should be considered to recover wasted condensate. IF the condensate is contaminated, the energy in the condensate can be recovered. |

## LIST OF BOILER ROOM DEFICIENCIES

The List of Deficiencies outline areas related to the Cleaver-Brooks standard for Boiler Plant Optimization and the deficiencies were tabulated as a result of the Boiler Plant Optimization ***Overview*** conducted on this date.

Table 2:
**Deficiencies**

**Date:**

**Plant**

### Boiler Plant Optimization Program

| Deficiency Identified at this Location | Explanation and Proposed Resolution | Owner | Due Date |
|---|---|---|---|
| **Safety** | | | |
| Are the service doors and panels sealed and in good condition? | Replace seals | | |
| Is the glass marked with the Normal, Minimum and Maximum Admissible operational points? | Quick determination of the water level in the boiler is critical. Identify the normal, minimum, and maximum levels on the sight glass. | | |
| Is each boiler equipped with adequate steam pressure gauge? | A pressure gauge is important to ensure the boiler is maintaining set pressure | | |
| Is the boiler blow down water safely piped to a blow down vessel? | Make sure there is no potential for exposure to blowdown water and flash steam. | | |
| Are emergency shut-off devices installed outside the boiler room to provide safe emergency shut-down of the boilers. | Quick access to an e-stop is essential to stop the boiler firing in an emergency. | | |
| Is the general condition of electrical equipment acceptable? | It is important to make sure the electrical equipment is maintained in good condition. | | |
| Deaerator- High water alarm | A high water alarm is necessary to indicate the level control is not working properly. | | |
| Deaerator- Low water alarm | A low water alarm is imperative to protect the equipment and the feed water pumps. | | |
| Deaerator- Low water cut-off | A low water alarm is imperative to protect the equipment and the feed water pumps. | | |

| Deficiency Identified at this Location | Explanation and Proposed Resolution | Owner | Due Date |
|---|---|---|---|
| **Reliability** | | | |
| Are forced and induced draft fans free of excessive noise or vibration? | Have the fan balanced | | |
| Are Flue gas temperatures measured? | Monitor and record the flue gas temperature regularly | | |
| Is the flue gas exit temperature, in the whole operating range of the boiler, kept above minimum limits recommended to avoid corrosion? | Verify that the flue gas temperature | | |
| Is the bottom blow down piping correct with quick opening and slow opening valves? | Proper blowdown is required to lower the dissolved solids | | |
| Are all cables and electrical components inside and outside power and control panels legibly marked? | Clearly identified electrical components are required from clear maintenance practices. | | |
| Deaerator- Automatic Level control | The water level in the deaerator is important and the most reliability method is an automatic level controller. | | |
| Are strainers equipped with blowdown valves? | The particulate matter that the strainer catches must be removed by blowing down the strainer. | | |
| If the boiler control system is modulating control, are the pumps fitted with a minimum flow orifice or Safety relief valve(s)? | If the feed water valve at the boiler ever closes, the pump is subject to dead-heading which will cause the pump to overheat. A bypass that recirculates the water back to the deaerator is necessary. | | |
| Chemical Injection point at Steam Main | An amine is typically injected into the steam line to protect the steam and condensate piping. | | |
| Are the Salt and Brine tanks at normal level? | It is imperative that softeners are always online to remove harsh scale contributors from the makeup water. | | |
| **Efficiency** | | | |
| | No Issues Identified | | |
| **Sustainability** | | | |
| Is the pump shaft seal free of leaks? | The leaking water from the seal not only is a housekeeping issue but also a waste of a valuable resource - water. | | |

## CONCLUSION

The steam boiler system currently installed at the facility has a limited seasonal use and it operates primarily in "colder months" from October through April for *Unit Space Heating* and for *Steam Coil* application. The coil steam heaters service two (2) (HFCS) storage tanks (TKs) located outside. Only one of the HFCS tanks is in use.

Typically, the most common opportunity (Option 1) for energy savings is to upgrade the existing boiler systems to improve the four cornerstones of Boiler Plant Optimization related to *safety, efficiency, reliability and sustainability*. When considering options, maintenance costs and unscheduled downtime must also be taken into consideration. A new packaged firetube boiler has a much higher performance standard than older design units such as the 45-year old York-Shipley boiler at the facility which operates at a lower firing rate and a subsequently lower efficiency at this lower firing rate. Further, the boiler has limited seasonal usage and it might make it difficult to justify its replacement, or to justify the upgrade of the higher efficiency ancillary equipment (Economizer, O2 Trim, etc.). In these cases, other options may become more attractive in the longer term to better match the longer term needs.

Another alternative to consider (Option 2) instead of installing new upgraded ancillary boiler equipment (Economizer, O2 Trim, etc.) is to replace the steam boiler with a hot water system. (Option 2) would require further evaluation such as evaluating the replacement of Steam Coils and Unit Space Heaters to operate with hot water instead of steam. Other key areas need to be factored when considering (Option 2) such as the cost of any additional equipment (hot water space heater and hot water coils) and the usage of existing steam piping would also need to be confirmed for the hot water application.

One of the major benefits gained in this option is that the condensate discharge would be "virtually zero" as the hot water boiler system would operate on a "system loop" compared to the existing configuration where **100% of the condensate is being dumped** for both the space heaters and for heating the tanks.

Secondly, there could be significant operational and thermal advantages that would justify the expense of a hot water boiler system when factoring and comparing the: **1)** cost of additional equipment that is required to bring the existing steam boiler to today's efficiency standards. **2)** Overall yearly maintenance cost that is required to maintain a 45-year old boiler and related equipment to meet today's reliability standards **3)** There would be an improvement to the operating thermal efficiency costs when operating with a hot water boiler vs. the existing steam boiler due to the efficiency gains with a hot water boiler as there would be no conveyance heat

losses from the hot water. The estimated thermal savings can be calculated once the facility has the total fuel usage information available. In addition, the efficiency of a hot water boiler is likely to be operating within 20 – 35% more efficient vs. the existing boiler that is estimated to be operating at a much lower firing range from the design. This estimated yearly energy savings could also be calculated with the usage of the hot water boiler. However, the combustion test results and fuel cost would be required. Further, once the maintenance records related to boiler are available, then the yearly-average maintenance and operating cost can be evaluated and factored into the hot water boiler replacement analysis as this cost would be virtually illuminated with a hot water boiler. Also, the existing steam piping needs to be evaluated to determine if it would be compatible with a hot water boiler, or if the piping system needs to be upgraded to handle the potential hot water loads.

Another alternative (Option 3) is to evaluate the instantaneous heating demands of the Space Heaters and the heating demands of the HFCS Tanks and consider using electric heating units. There are many types of Space Heaters that are available that would offer instantaneous heating. Similarly, the tank can be fitted with an electric powered heating blanket. Electric heating generally is not as efficient when compared to hot water or steam and there would be additional capital cost related to changing-out the space heaters and coils and adding new electrical infrastructure (electric service panels, wiring, etc.) to service this equipment.

There are numerous savings potential opportunities at the facility and the intent of this report it discuss the potential improvements related to the four cornerstones of Boiler Plant Optimization which are related to safety, efficiency, reliability and sustainability. This report is also intended to be an overview and in some cases additional information is required from the facility to offer a more complete and comprehensive approach to boiler plant optimization.

Thank you for inviting the Cleaver-Brooks team into your plant to conduct the boiler plant overview. In particular, Cleaver-Brooks would like to thank the plant personnel for assisting the team and answering all questions.

If you would like additional information on any of the topics discussed in this report, please contact Cleaver-Brooks and we will be happy to help you.

# APPENDIX A

The table below shows the questionnaire shared with the facility and responses captured by Cesar Luevano of Cleaver-Brooks as part of boiler plant optimization overview.

| Section | Question ID | Survey Questionnaire | Units | Response Data |
|---|---|---|---|---|
| Boiler Notes | B1.1.1 | Manufacturer | | Cleaver Brooks |
| Boiler Notes | B1.1.2 | Type (firetube - watertube or other ) | | Firetube |
| Boiler Notes | B1.1.3 | Number of Passes | | 2 |
| Boiler Notes | B1.1.4 | Model | | CB-700-200 |
| Boiler Notes | B1.1.5 | Year built | | 1991 |
| Boiler Notes | B1.1.6 | Serial number | | L000000 |
| Boiler Notes | B1.1.7 | National Board Number | | 0000 |
| Boiler Notes | B1.1.8 | Operator attendance mode (unattended, intermittent, continuous) | | Intermittent |
| Boiler Notes | B1.1.9 | Steam Maximum Capacity Rate (lbs per hour or horsepower) | lbs/hr | 6900 |
| Boiler Notes | B1.1.10 | Maximum Btu Input (MBH) | MBH | 8.369 |
| Boiler Notes | B1.1.11 | Design pressure (Max. allowed working pressure) | Psig | 150 |
| Boiler Notes | B1.1.12 | Does a induced draft fan exist | (Y/N) | Y |
| Boiler Notes | B1.1.13 | Flue gas recirculation | (Y/N) | N |
| Boiler Notes | B1.1.14 | Flue gas emission equipment | | N |
| Boiler Notes | B1.1.15 | Date of last official boiler inspection | | 1/26/15 |
| Boiler Notes | B1.1.16 | Operating Permit properly displayed | (Y/N) | Y |
| Boiler Notes | B1.1.17 | Are the service doors and panels sealed and in good condition? | (Y/N) | N |
| Boiler Notes | B1.1.18 | Is the boiler foundation and structure in good condition? | (Y/N) | Y |
| Burner | B1.2.1 | Manufacturer | | Cleaver Brooks |
| Burner | B1.2.2 | Design (jet, gun, premix) | | Integral |
| Burner | B1.2.3 | Single or multiple burners | | Single |
| Burner | B1.2.4 | Main Fuel (natural gas, propane, fuel oil #2, #6, biomass) | | Natural Gas |
| Burner | B1.2.5 | Maximum Btu Input (MBH) | MBH | 8.369 |
| Burner | B1.2.6 | Minimum Btu Input (MBH) | MBH | .008368 |
| Burner | B1.2.7 | 2nd Fuel Source (natural gas, propane, fuel oil #2, #6, biomass) | | |
| Burner | B1.2.8 | Maximum Btu Input (MBH) | MBH | |
| Burner | B1.2.9 | Minimum Btu Input (MBH) | MBH | |
| Burner | B1.2.10 | 3rd Fuel Source (natural gas, propane, fuel oil #2, #6, biomass) | | |
| Burner | B1.2.11 | Maximum Btu Input (MBH) | MBH | |

| | | | | |
|---|---|---|---|---|
| Burner | B1.2.12 | Minimum Btu Input (MBH) | MBH | |
| Combustion Control System | B1.3.1 | Design (single point, parallel, metering) | | Single Point |
| Combustion Control System | B1.3.2 | Actuators (electric or Pneumatic) | | Electric |
| Combustion Control System | B1.3.3 | Is there a Oxygen Sensor in Flue Gas for continuous measurement of excess air? | (Y/N) | Y |
| Combustion Control System | B1.3.4 | Is the boiler fitted with an automatic steam pressure control system? | (Y/N) | Y |
| Combustion Control System | B1.3.5 | Date of last combustion testing/tuning | | |
| Combustion Control System | B1.3.6 | Are the combustion sheets adequate for the operation and can fuel air ratio's be developed for full firing range (combustion tab)? | (Y/N) | |
| Combustion Control System | B1.3.7 | Who is currently the service company? | | Boiler Systems Co. |
| Combustion Control System | B1.3.8 | -Doing regular service such as tuning? | | Y |
| Combustion Control System | B1.3.9 | -Doing annual servicing? | | Y |
| Burner Management System | B1.4.1 | What type of burner management system is in operation? | | Autoflame |
| Burner Management System | B1.4.2 | Is the combustion inspection port clear and in good condition? | (Y/N) | Y |
| Burner Management System | B1.4.3 | Are manual fuel supply shut off valves installed in each boiler? | (Y/N) | Y |
| Burner Management System | B1.4.4 | Does the train to the gas / oil fired igniter's) and/or burner's) have a system to prevent presence of unburned fuel in the furnace at ignition? | (Y/N) | Y |
| Burner Management System | B1.4.5 | Is the boiler fitted with a high steam pressure cut-off switch? | (Y/N) | Y |
| Burner Management System | B1.4.6 | Are the gas train vents piped (full pipe size) to the outside and away from air intake? | (Y/N) | Y |
| Burner Management System | B1.4.7 | Are forced and induced draft fans free of excessive noise or vibration? | (Y/N) | Y |
| Economizer | B1.5.1 | Is there an economizer in operation? | (Y/N) | N |
| Economizer | B1.5.2 | Manufacturer | | |
| Economizer | B1.5.3 | Model Number | | |
| Economizer | B1.5.4 | Serial Number | | |
| Economizer | B1.5.5 | Is there a bypass valve arrangement for the feedwater? | (Y/N) | |
| Economizer | B1.5.6 | Is there a flue gas bypass damper? | (Y/N) | |
| Condensing Economizer | B1.6.1 | Is there a condensing economizer in operation? | (Y/N) | N |

| | | | | |
|---|---|---|---|---|
| Condensing Economizer | B1.6.2 | Manufacturer | | |
| Condensing Economizer | B1.6.3 | Model Number | | |
| Condensing Economizer | B1.6.4 | Serial Number | | |
| Condensing Economizer | B1.6.5 | Heats makeup water or process water? | | |
| Condensing Economizer | B1.6.6 | Is there a flue gas bypass damper? | (Y/N) | |
| Air Heater | B1.7.1 | Is there an air heater in operation? | (Y/N) | N |
| Air Heater | B1.7.2 | Manufacturer | | |
| Air Heater | B1.7.3 | Model number | | |
| Air Heater | B1.7.4 | Source (flue gas, direct fired, steam, flash steam, etc) | | |
| Accessories on the Boiler | B1.8.1 | Are there visual level indicators? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.2 | Are the gauge glasses accessible, clean, well lit and visible from the operating floor? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.3 | Is emergency lighting provided for the water level indicators? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.4 | Is the water level glass protected? | (Y/N) | N |
| Accessories on the Boiler | B1.8.5 | Is the glass marked with the Normal, Minimum and Maximum Admissible operational points? | (Y/N) | N |
| Accessories on the Boiler | B1.8.6 | Are steam, water and drain cock valves installed and operational on water columns? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.7 | Is each boiler equipped with adequate steam pressure gauge? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.8 | Is the boiler shell fitted with air vents to remove air in cold starts? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.9 | Is there provision for vacuum braking before opening the boiler? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.10 | Are connecting pipes between boiler drum and water gauges free of isolating valves other than steam or water cocks? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.11 | Are drain lines from water gauges discharging safely? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.12 | Is the Main steam valve installed directly on the steam drum and easily accessible? | (Y/N) | N |
| Accessories on the Boiler | B1.8.13 | Is it easy to identify if the main valve is open or closed? | (Y/N) | Y |
| Accessories on the Boiler | B1.8.14 | If several boilers share the same steam distribution line, are they equipped with a non return (Check) valve? | (Y/N) | N |
| Accessories on the Boiler | B1.8.15 | Are Flue gas temperatures measured? | (Y/N) | Y |

| | | | | |
|---|---|---|---|---|
| Accessories on the Boiler | B1.8.16 | Is the flue gas exit temperature, in the whole operating range of the boiler, kept above minimum limits recommended to avoid corrosion? | (Y/N) | Y |
| Drum Level control loop: | B1.9.1 | Is the boiler equipped with an automatic drum water level control? | (Y/N) | Y |
| Drum Level control loop | B1.9.2 | What is level control method (On/off or modulating)? | | On/Off |
| Drum Level control loop: | B1.9.3 | Are level sensors, alarms, and cut-off switches provided to detect high and low water level? | (Y/N) | Y |
| Drum Level control loop: | B1.9.4 | Is the level control system free of by-passes or temporary hardware/wiring modifications? | (Y/N) | Y |
| Blowdown system | B1.10.1 | Is the continuous blow down volume regulated by a metering valve? | (Y/N) | Y |
| Blowdown system | B1.10.2 | Is there a control system to modulate the continuous blowdown stream? | (Y/N) | Y |
| Blowdown system | B1.10.3 | Is the bottom blow down piping correct with quick opening and slow opening valves? | (Y/N) | Y |
| Blowdown system | B1.10.4 | Is the boiler blow down water safely piped to a blow down vessel? | (Y/N) | Y |
| Blowdown system | B1.10.5 | Is blowdown tank designed as pressure vessel to a local or international recognized code? | (Y/N) | Y |
| Blowdown system | B1.10.6 | Is there continuous blow down heat recovery in operation? | (Y/N) | Y |
| Blowdown system | B1.10.7 | Are hot surfaces guarded to prevent accidental contact? | (Y/N) | N |
| Boiler Safety Valves | B1.11.1 | Are boilers equipped with at least one Safety Valve that is designed and approved for the duty? | (Y/N) | Y |
| Boiler Safety Valves | B1.11.2 | Is the capacity of the SPRVs adequate for the duty? | (Y/N) | |
| Boiler Safety Valves | B1.11.3 | Set Pressure (PSIG)/Capacity (PPH) No. 1 Safety Valve | PSIG | |
| Boiler Safety Valves | B1.11.4 | Set Pressure (PSIG)/Capacity (PPH) No. 2 Safety Valve | PSIG | |
| Boiler Safety Valves | B1.11.5 | Set Pressure (PSIG)/Capacity (PPH) No. 3 Safety Valve | PSIG | |
| Boiler Safety Valves | B1.11.6 | Set Pressure (PSIG)/Capacity (PPH) No. 4 Safety Valve | PSIG | |
| Boiler Safety Valves | B1.11.7 | Is the set pressure of the safety valves adequate? | (Y/N) | |
| Boiler Safety Valves | B1.11.8 | Are the pressure relief valves labeled? | (Y/N) | |
| Boiler Safety Valves | B1.11.9 | Are the safety valve's tamper evidence seals intact? | (Y/N) | |
| Boiler Safety Valves | B1.11.10 | Are the exhausts sized, mounted, and vented properly? | (Y/N) | |
| Boiler Safety Valves | B1.11.11 | Are the safety relief valves tested regularly? | (Y/N) | |

| | | | | |
|---|---|---|---|---|
| Boiler Safety Valves | B1.11.12 | Are the safety relief valves replaced or overhauled at least every 5 years? | (Y/N) | |
| Boiler Operation | B1.12.1 | Are metal surfaces in boilers free of signs of overheating? | (Y/N) | Y |
| Boiler Operation | B1.12.2 | Does the boiler always run without loss of water level and trip on low water level? | (Y/N) | Y |
| Boiler Operating Snapshot | B1.13.1 | Does the burner continuously operate without cycling on/off? | (Y/N) | N |
| Boiler Operating Snapshot | B1.13.2 | Operating pressure | Psig | 75 |
| Boiler Operating Snapshot | B1.13.3 | Firing rate | % | 11 |
| Boiler Operating Snapshot | B1.13.4 | Boiler water level | % | 50 |
| Boiler Operating Snapshot | B1.13.5 | Steam flow meter reading | lb/hr | |
| Boiler Operating Snapshot | B1.13.6 | Fuel flow meter reading | SCFM | |
| Boiler Operating Snapshot | B1.13.7 | Flue gas inlet temperature | | 291 |
| Boiler Operating Snapshot | B1.13.8 | Flue gas outlet temperature | | 291 |
| Boiler Operating Snapshot | B1.13.9 | Feedwater inlet temperature | | 178 |
| Boiler Operating Snapshot | B1.13.10 | Feedwater outlet temperature | | 178 |
| Boiler Operating Snapshot | B1.13.11 | Percentage condensate return | % | |
| Boiler Operating Snapshot | B1.13.12 | Percentage makeup | % | |
| Boiler Operating Snapshot | B1.13.13 | Makeup water flow meter (instantaneous) | °F | 57 |
| Boiler Operating Snapshot | B1.13.14 | Makeup water flow meter (totalizer) | °F | |
| Boiler Operating Snapshot | B1.13.15 | Water inlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.16 | Water outlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.17 | Source inlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.18 | Source outlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.19 | Combustion air inlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.20 | Combustion air outlet temperature | °F | |
| Boiler Operating Snapshot | B1.13.21 | Feedwater outlet temperature | | |
| Safety Notes | 1.1.2 | Are all factory guards in place for all equipment (i.e. pump coupling guards, etc.)? | (Y/N) | Y |
| Safety Notes | 1.1.4 | Is there emergency lighting available | (Y/N) | N |

| | | | | |
|---|---|---|---|---|
| Safety Notes | 1.1.5 | Are emergency shut-off devices installed outside the boiler room to provide safe emergency shut-down of the boilers. | (Y/N) | |
| Access to the Boiler Plant Operation | 1.2.2 | Are there a minimum of 2 emergency exits in opposite sides, unlocked and of the outward swinging door type? | (Y/N) | Y |
| Access to the Boiler Plant Operation | 1.2.3 | Are exit ways free and clear? | (Y/N) | Y |
| Maintenance Access | 1.3.1 | Are all platforms, stairs, walkways, and ladders equipped with hand rails for safe access? | (Y/N) | Y |
| Maintenance Access | 1.3.2 | Is there clear space to provide safe access for operation and maintenance to all equipment? | (Y/N) | Y |
| Ventilation | 1.4.1 | Is combustion air unrestricted to the boiler? | (Y/N) | Y |
| Ventilation | 1.4.2 | Is the ventilation of the boiler plant adequate for normal operation of the boiler? (110 percent more) | (Y/N) | Y |
| Electrical / Lighting | 1.6.1 | Is there adequate permanent lighting for the normal operation of the boiler and its auxiliaries, including instruments and any necessary outside facilities? | (Y/N) | Y |
| Electrical / Lighting | 1.6.2 | Is the main Isolator on the electrical supply labeled and lockable? | (Y/N) | Y |
| Electrical / Lighting | 1.6.3 | Are all cables and electrical components inside and outside power and control panels legibly marked? | (Y/N) | Y |
| Electrical / Lighting | 1.6.4 | Are the electrical panels always kept closed and locked? | (Y/N) | Y |
| Electrical / Lighting | 1.6.5 | Are electrical panels installed in a safe location with proper clearances? | (Y/N) | Y |
| Electrical / Lighting | 1.6.6 | Is the general condition of electrical equipment acceptable? | (Y/N) | Y |
| Deaerator/FWT Details | 2.1.1 | Manufacturer | | Cleaver-Brooks |
| Deaerator/FWT Details | 2.1.2 | Type (Tray, spray, packed column, feedwater or other ) | | Spray |
| Deaerator/FWT Details | 2.1.3 | Model No. | | SM-15 |
| Deaerator/FWT Details | 2.1.4 | Year built | | 2002 |
| Deaerator/FWT Details | 2.1.5 | Serial number | | DG-0000 |
| Deaerator/FWT Details | 2.1.7 | Have any repairs or modifications been made? | (Y/N) | N |
| Deaerator/FWT Details | 2.1.8 | - if yes, has the proper documentation been performed? | (Y/N) | |
| Deaerator/FWT Details | 2.1.9 | Date of last non-destructive testing? | | 3/9/14 |
| Deaerator/FWT Details | 2.1.10 | Design Capacity | lb/HR | 6000 |

| | | | | |
|---|---|---|---|---|
| Deaerator/FWT Details | 2.1.11 | Size of deaerator/FWT | Gallons | 800 |
| Deaerator/FWT Details | 2.1.12 | Design pressure (Max. allowed working pressure) | PSIG | 50 |
| Deaerator/FWT Details | 2.1.13 | Current operating pressure (Actual gauge reading) | PSIG | 7 |
| Deaerator/FWT Details | 2.1.14 | Current operating temperature (Actual gauge reading) | °F | 180 |
| Deaerator Safety and Maintenance Inspection | 2.2.1 | Is the Deaerator Tank equipped with vacuum protection? | (Y/N) | N |
| Deaerator Safety and Maintenance Inspection | 2.2.2 | Is the Deaerator Tank equipped with a Safety Relief Valve? | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.3 | - Deaerator SRV Capacity | lb/HR | |
| Deaerator Safety and Maintenance Inspection | 2.2.4 | - Deaerator SRV Set Pressure | PSIG | 50 |
| Deaerator Safety and Maintenance Inspection | 2.2.5 | Is the Deaerator Equipped with Overflow protection? | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.6 | - High water alarm | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.7 | - Low water alarm | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.8 | - Low water cut-off | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.9 | - Sight glass indicators | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.10 | - Automatic Level control | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.11 | - Type of level control (mechanical, electronic, other) | | Mechanical |
| Deaerator Safety and Maintenance Inspection | 2.2.12 | Is makeup water added into the deaerator? | (Y/N) | Y |
| Deaerator Safety and Maintenance Inspection | 2.2.13 | What is makeup water temperature? | °F | 50 |
| Deaerator Safety and Maintenance Inspection | 2.2.14 | Is the Deaerator equipped with a properly functioning continuous vent line to remove non-condensable gases? | (Y/N) | Y |
| Boiler Feedwater Pump Details | 2.3.1 | Manufacturer | | Ebara Pumps |

| | | | | |
|---|---|---|---|---|
| Boiler Feedwater Pump Details | 2.3.2 | Type (centrifugal, turbine, stacked impeller, positive displacement) | | Stacked Impeller |
| Boiler Feedwater Pump Details | 2.3.3 | Model No. | | ABC XYZ 123456 |
| Boiler Feedwater Pump Details | 2.3.4 | Serial No. | | 00000000 |
| Boiler Feedwater Pump Details | 2.3.5 | Year Built | | 2005 |
| Boiler Feedwater Pump Details | 2.3.6 | Number of Pumps | | 3 |
| Boiler Feedwater Pump Details | 2.3.7 | Motor Horsepower | HP | 5 |
| Boiler Feedwater Pump Details | 2.3.8 | Fixed or variable speed? | | Fixed |
| Boiler Feedwater Pump Details | 2.3.9 | Capacity | GPM | 90 |
| Boiler Feedwater Pump Details | 2.3.10 | - at what feet of head? | Ft. | 200 |
| Boiler Feedwater Pump Details | 2.3.11 | Inlet Water Pressure | PSIG | 10 |
| Boiler Feedwater Pump Details | 2.3.12 | Outlet Water Pressure | PSIG | 180 |
| Boiler Feedwater Pump Maintenance | 2.4.1 | Are the boiler feedwater pumps operating without signs of cavitation? | (Y/N) | Y |
| Boiler Feedwater Pump Maintenance | 2.4.2 | Are back-up or emergency pumps cycled into operation? | (Y/N) | Y |
| Boiler Feedwater Pump Maintenance | 2.4.3 | Can the pumps be individually isolated? | (Y/N) | Y |
| Boiler Feedwater Pump Maintenance | 2.4.4 | Are pumps fitted with upstream inline strainers? | (Y/N) | Y |
| Boiler Feedwater Pump Maintenance | 2.4.5 | - If yes, are strainers equipped with blowdown valves? | (Y/N) | NA |
| Boiler Feedwater Pump Maintenance | 2.4.6 | If the boiler control system is modulating control, are the pumps fitted with a minimum flow orifice or Safety relief valve(s)? | (Y/N) | N |
| Boiler Feedwater Pump Maintenance | 2.4.7 | Are pressure gauges available and operational on the discharge of the feedwater pumps? | (Y/N) | Y |
| Boiler Feedwater Pump Maintenance | 2.4.8 | Is the pump shaft seal free of leaks? | (Y/N) | Y |
| Condensate Receiver (Surge Tank) | 3.1.1 | Manufacturer | | NA |
| Condensate Receiver (Surge Tank) | 3.1.2 | Model No. | | NA |
| Condensate Receiver (Surge Tank) | 3.1.3 | Year built | | NA |
| Condensate Receiver (Surge Tank) | 3.1.4 | Serial number | | NA |

| | | | | |
|---|---|---|---|---|
| Condensate Receiver (Surge Tank) | 3.1.5 | Vented properly to ensure tank can never over pressurize? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.6 | Have any repairs or modifications been made? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.7 | Design Capacity | gallons | NA |
| Condensate Receiver (Surge Tank) | 3.1.8 | Current operating temperature (Actual gauge reading) | °F | NA |
| Condensate Receiver (Surge Tank) | 3.1.9 | Is the surge tank equipped with the following: | N/A | |
| Condensate Receiver (Surge Tank) | 3.1.10 | - High water alarm | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.11 | - Overflow piping? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.12 | - Low water alarm | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.13 | - Low water cut-off | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.14 | - Sight glass indicators | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.15 | Is the surge tank void of introduced make-up water? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.16 | - If no, what method is utilized for level control (point or continuous)? | | NA |
| Condensate Receiver (Surge Tank) | 3.1.17 | - If no, what type of level control (mechanical, electronic, other) | | NA |
| Condensate Receiver (Surge Tank) | 3.1.18 | Is treatment chemicals injected into the surge tank? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.19 | Is flash steam vented heavily in another part of the plant? | (Y/N) | NA |
| Condensate Receiver (Surge Tank) | 3.1.20 | Is condensate dumped to the drain in any part of the plant? | (Y/N) | NA |
| Condensate Booster Pumps | 3.2.1 | Are there condensate booster pumps in service? | (Y/N) | NA |
| Condensate Booster Pumps | 3.2.2 | - if yes, is the pump seal leaking? | (Y/N) | NA |
| High Pressure Tank | 3.3.1 | Manufacturer | | NA |
| High Pressure Tank | 3.3.2 | Model No. | | NA |
| High Pressure Tank | 3.3.3 | Year built | | NA |

| | | | | |
|---|---|---|---|---|
| High Pressure Tank | 3.3.4 | Serial number | | NA |
| High Pressure Tank | 3.3.5 | HP Condensate Tank construction Code (ASME, API, other) | | NA |
| High Pressure Tank | 3.3.6 | Have any repairs or modifications been made? | (Y/N) | NA |
| High Pressure Tank | 3.3.7 | - if yes, has the proper documentation been performed? | (Y/N) | NA |
| High Pressure Tank | 3.3.9 | Design Capacity | gallons | NA |
| High Pressure Tank | 3.3.10 | Design pressure (Max. allowed working pressure) | psig | NA |
| High Pressure Tank | 3.3.11 | Current operating pressure (Actual gauge reading) | psig | NA |
| High Pressure Tank | 3.3.12 | Current operating temperature (Actual gauge reading) | °F | NA |
| High Pressure Tank | 3.3.13 | Is the HP Cond Tank equipped with vacuum protection? | (Y/N) | NA |
| High Pressure Tank | 3.3.14 | Is the HP Cond Tank equipped with a Safety Relief Valve? | (Y/N) | NA |
| High Pressure Tank | 3.3.15 | - HP Tank SRV Capacity | #/HR | NA |
| High Pressure Tank | 3.3.16 | - HP Tank SRV Set Pressure | PSIG | NA |
| High Pressure Tank | 3.3.17 | Is the HP Cond Tank Equipped with Overflow protection? | (Y/N) | NA |
| High Pressure Tank | 3.3.18 | Is the HP Cond Tank equipped with the following: | N/A | |
| High Pressure Tank | 3.3.19 | - High water alarm | (Y/N) | NA |
| High Pressure Tank | 3.3.20 | - Low water alarm | (Y/N) | NA |
| High Pressure Tank | 3.3.21 | - Low water cut-off | (Y/N) | NA |
| High Pressure Tank | 3.3.22 | - Sight glass indicators | (Y/N) | NA |
| High Pressure Tank | 3.3.23 | - Automatic Level control | (Y/N) | NA |
| High Pressure Tank | 3.3.24 | - Type of level control (mechanical, electronic, other) | | NA |
| Work Practices | 4.1.1 | Chemical Supplier | | Nalco |
| Work Practices | 4.1.2 | Checks done by the chemical supplier weekly or monthly or none? | | Y |
| Work Practices | 4.1.3 | Is there recorded documentation of regular water chemistry tests conducted by the water treatment supplier (monthly or semi-monthly)? | | Y |
| Work Practices | 4.1.4 | Is daily water testing being carried out by plant personnel? | (Y/N) | Y |
| Work Practices | 4.1.5 | Is there an up to date log book to record water treatment testing and maintenance? | (Y/N) | Y |
| General Overview | 4.2.1 | At Boiler | (Y/N) | Y |
| General Overview | 4.2.2 | At Deaerator | (Y/N) | Y |
| General Overview | 4.2.3 | At Steam Main | (Y/N) | Y |
| General Overview | 4.2.4 | Are the previous locations the only injection locations? | (Y/N) | N |

| | | | | |
|---|---|---|---|---|
| General Overview | 4.2.5 | Are there check valves installed on the chemical injection lines? | (Y/N) | N |
| General Overview | 4.2.6 | Are the water softeners bypass valves securely closed and locked? | (Y/N) | Y |
| Results - Softeners: | 4.3.1 | Are the Salt and Brine tanks at normal level? | (Y/N) | Y |
| Boiler Notes | B2.1.1 | Manufacturer | | Cleaver Brooks |
| Boiler Notes | B2.1.2 | Type (firetube - watertube or other ) | | Firetube |
| Boiler Notes | B2.1.3 | Number of Passes | | 2 |
| Boiler Notes | B2.1.4 | Model | | CB-700-200 |
| Boiler Notes | B2.1.5 | Year built | | 1991 |
| Boiler Notes | B2.1.6 | Serial number | | L00000 |
| Boiler Notes | B2.1.7 | National Board Number | | 0000 |
| Boiler Notes | B2.1.8 | Operator attendance mode (unattended, intermittent, continuous) | | Intermittent |
| Boiler Notes | B2.1.9 | Steam Maximum Capacity Rate (lbs per hour or horsepower) | lbs/hr | 6900 |
| Boiler Notes | B2.1.10 | Maximum Btu Input (MBH) | MBH | 8.369 |
| Boiler Notes | B2.1.11 | Design pressure (Max. allowed working pressure) | Psig | 150 |
| Boiler Notes | B2.1.12 | Does a induced draft fan exist | (Y/N) | Y |
| Boiler Notes | B2.1.13 | Flue gas recirculation | (Y/N) | N |
| Boiler Notes | B2.1.14 | Flue gas emission equipment | | N |
| Boiler Notes | B2.1.15 | Date of last official boiler inspection | | 1/26/15 |
| Boiler Notes | B2.1.16 | Operating Permit properly displayed | (Y/N) | Y |
| Boiler Notes | B2.1.17 | Are the service doors and panels sealed and in good condition? | (Y/N) | N |
| Boiler Notes | B2.1.18 | Is the boiler foundation and structure in good condition? | (Y/N) | Y |
| Burner | B2.2.1 | Manufacturer | | Cleaver Brooks |
| Burner | B2.2.2 | Design (jet, gun, premix) | | Integral |
| Burner | B2.2.3 | Single or multiple burners | | Single |
| Burner | B2.2.4 | Main Fuel (natural gas, propane, fuel oil #2, #6, biomass) | | Natural Gas |
| Burner | B2.2.5 | Maximum Btu Input (MBH) | MBH | 8.369 |
| Burner | B2.2.6 | Minimum Btu Input (MBH) | MBH | .008368 |
| Burner | B2.2.7 | 2nd Fuel Source (natural gas, propane, fuel oil #2, #6, biomass) | | |
| Burner | B2.2.8 | Maximum Btu Input (MBH) | MBH | |
| Burner | B2.2.9 | Minimum Btu Input (MBH) | MBH | |
| Burner | B2.2.10 | 3rd Fuel Source (natural gas, propane, fuel oil #2, #6, biomass) | | |
| Burner | B2.2.11 | Maximum Btu Input (MBH) | MBH | |
| Burner | B2.2.12 | Minimum Btu Input (MBH) | MBH | |

| | | | | |
|---|---|---|---|---|
| Combustion Control System | B2.3.1 | Design (single point, parallel, metering) | | Single Point |
| Combustion Control System | B2.3.2 | Actuators (electric or Pneumatic) | | Electric |
| Combustion Control System | B2.3.3 | Is there a Oxygen Sensor in Flue Gas for continuous measurement of excess air? | (Y/N) | N |
| Combustion Control System | B2.3.4 | Is the boiler fitted with an automatic steam pressure control system? | (Y/N) | Y |
| Combustion Control System | B2.3.5 | Date of last combustion testing/tuning | | 3/4/15 |
| Combustion Control System | B2.3.6 | Are the combustion sheets adequate for the operation and can fuel air ratio's be developed for full firing range (combustion tab)? | (Y/N) | Y |
| Combustion Control System | B2.3.7 | Who is currently the service company? | | ABC Comp. |
| Combustion Control System | B2.3.8 | -Doing regular service such as tuning? | | N |
| Combustion Control System | B2.3.9 | -Doing annual servicing? | | N |
| Burner Management System | B2.4.1 | What type of burner management system is in operation? | | Autoflame 000 |
| Burner Management System | B2.4.2 | Is the combustion inspection port clear and in good condition? | (Y/N) | Y |
| Burner Management System | B2.4.3 | Are manual fuel supply shut off valves installed in each boiler? | (Y/N) | Y |
| Burner Management System | B2.4.4 | Does the train to the gas / oil fired igniter's) and/or burner's) have a system to prevent presence of unburned fuel in the furnace at ignition? | (Y/N) | Y |
| Burner Management System | B2.4.5 | Is the boiler fitted with a high steam pressure cut-off switch? | (Y/N) | Y |
| Burner Management System | B2.4.6 | Are the gas train vents piped (full pipe size) to the outside and away from air intake? | (Y/N) | Y |
| Burner Management System | B2.4.7 | Are forced and induced draft fans free of excessive noise or vibration? | (Y/N) | Y |
| Economizer | B2.5.1 | Is there an economizer in operation? | (Y/N) | N |
| Economizer | B2.5.2 | Manufacturer | | |
| Economizer | B2.5.3 | Model Number | | |
| Economizer | B2.5.4 | Serial Number | | |
| Economizer | B2.5.5 | Is there a bypass valve arrangement for the feedwater? | (Y/N) | |
| Economizer | B2.5.6 | Is there a flue gas bypass damper? | (Y/N) | |
| Condensing Economizer | B2.6.1 | Is there a condensing economizer in operation? | (Y/N) | N |

| | | | | |
|---|---|---|---|---|
| Condensing Economizer | B2.6.2 | Manufacturer | | |
| Condensing Economizer | B2.6.3 | Model Number | | |
| Condensing Economizer | B2.6.4 | Serial Number | | |
| Condensing Economizer | B2.6.5 | Heats makeup water or process water? | | |
| Condensing Economizer | B2.6.6 | Is there a flue gas bypass damper? | (Y/N) | |
| Air Heater | B2.7.1 | Is there an air heater in operation? | (Y/N) | N |
| Air Heater | B2.7.2 | Manufacturer | | |
| Air Heater | B2.7.3 | Model number | | |
| Air Heater | B2.7.4 | Source (flue gas, direct fired, steam, flash steam, etc) | | |
| Accessories on the Boiler | B2.8.1 | Are there visual level indicators? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.2 | Are the gauge glasses accessible, clean, well lit and visible from the operating floor? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.3 | Is emergency lighting provided for the water level indicators? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.4 | Is the water level glass protected? | (Y/N) | N |
| Accessories on the Boiler | B2.8.5 | Is the glass marked with the Normal, Minimum and Maximum Admissible operational points? | (Y/N) | N |
| Accessories on the Boiler | B2.8.6 | Are steam, water and drain cock valves installed and operational on water columns? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.7 | Is each boiler equipped with adequate steam pressure gauge? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.8 | Is the boiler shell fitted with air vents to remove air in cold starts? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.9 | Is there provision for vacuum braking before opening the boiler? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.10 | Are connecting pipes between boiler drum and water gauges free of isolating valves other than steam or water cocks? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.11 | Are drain lines from water gauges discharging safely? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.12 | Is the Main steam valve installed directly on the steam drum and easily accessible? | (Y/N) | N |
| Accessories on the Boiler | B2.8.13 | Is it easy to identify if the main valve is open or closed? | (Y/N) | Y |
| Accessories on the Boiler | B2.8.14 | If several boilers share the same steam distribution line, are they equipped with a non return (Check) valve? | (Y/N) | N |
| Accessories on the Boiler | B2.8.15 | Are Flue gas temperatures measured? | (Y/N) | Y |

| | | | | |
|---|---|---|---|---|
| Accessories on the Boiler | B2.8.16 | Is the flue gas exit temperature, in the whole operating range of the boiler, kept above minimum limits recommended to avoid corrosion? | (Y/N) | Y |
| Drum Level control loop: | B2.9.1 | Is the boiler equipped with an automatic drum water level control? | (Y/N) | Y |
| Drum Level control loop: | B2.9.2 | What is level control method (On/off or modulating)? | (Y/N) | On/Off |
| Drum Level control loop: | B2.9.3 | Are level sensors, alarms, and cut-off switches provided to detect high and low water level? | (Y/N) | Y |
| Drum Level control loop: | B2.9.4 | Is the level control system free of by-passes or temporary hardware/wiring modifications? | (Y/N) | Y |
| Blowdown system | B2.10.1 | Is the continuous blow down volume regulated by a metering valve? | (Y/N) | Y |
| Blowdown system | B2.10.2 | Is there a control system to modulate the continuous blowdown stream? | (Y/N) | Y |
| Blowdown system | B2.10.3 | Is the bottom blow down piping correct with quick opening and slow opening valves? | (Y/N) | Y |
| Blowdown system | B2.10.4 | Is the boiler blow down water safely piped to a blow down vessel? | (Y/N) | Y |
| Blowdown system | B2.10.5 | Is blowdown tank designed as pressure vessel to a local or international recognized code? | (Y/N) | Y |
| Blowdown system | B2.10.6 | Is there continuous blow down heat recovery in operation? | (Y/N) | Y |
| Blowdown system | B2.10.7 | Are hot surfaces guarded to prevent accidental contact? | (Y/N) | N |
| Boiler Safety Valves | B2.11.1 | Are boilers equipped with at least one Safety Valve that is designed and approved for the duty? | (Y/N) | Y |
| Boiler Safety Valves | B2.11.2 | Is the capacity of the SPRVs adequate for the duty? | (Y/N) | |
| Boiler Safety Valves | B2.11.3 | Set Pressure (PSIG)/Capacity (PPH) No. 1 Safety Valve | PSIG | |
| Boiler Safety Valves | B2.11.4 | Set Pressure (PSIG)/Capacity (PPH) No. 2 Safety Valve | PSIG | |
| Boiler Safety Valves | B2.11.5 | Set Pressure (PSIG)/Capacity (PPH) No. 3 Safety Valve | PSIG | |
| Boiler Safety Valves | B2.11.6 | Set Pressure (PSIG)/Capacity (PPH) No. 4 Safety Valve | PSIG | |
| Boiler Safety Valves | B2.11.7 | Is the set pressure of the safety valves adequate? | (Y/N) | |
| Boiler Safety Valves | B2.11.8 | Are the pressure relief valves labeled? | (Y/N) | |
| Boiler Safety Valves | B2.11.9 | Are the safety valve's tamper evidence seals intact? | (Y/N) | |
| Boiler Safety Valves | B2.11.10 | Are the exhausts sized, mounted, and vented properly? | (Y/N) | |
| Boiler Safety Valves | B2.11.11 | Are the safety relief valves tested regularly? | (Y/N) | |

| | | | | |
|---|---|---|---|---|
| Boiler Safety Valves | B2.11.12 | Are the safety relief valves replaced or overhauled at least every 5 years? | (Y/N) | |
| Boiler Operation | B2.12.1 | Are metal surfaces in boilers free of signs of overheating? | (Y/N) | Y |
| Boiler Operation | B2.12.2 | Does the boiler always run without loss of water level and trip on low water level? | (Y/N) | Y |
| Boiler Operating Snapshot | B2.13.1 | Does the burner cycle on/off? | (Y/N) | N |
| Boiler Operating Snapshot | B2.13.2 | Operating pressure | Psig | 75 |
| Boiler Operating Snapshot | B2.13.3 | Firing rate | % | 11 |
| Boiler Operating Snapshot | B2.13.4 | Boiler water level | % | 50 |
| Boiler Operating Snapshot | B2.13.5 | Steam flow meter reading | lb/hr | |
| Boiler Operating Snapshot | B2.13.6 | Fuel flow meter reading | | |
| Boiler Operating Snapshot | B2.13.7 | Flue gas inlet temperature | | 291 |
| Boiler Operating Snapshot | B2.13.8 | Flue gas outlet temperature | | 291 |
| Boiler Operating Snapshot | B2.13.9 | Feedwater inlet temperature | | 178 |
| Boiler Operating Snapshot | B2.13.10 | Feedwater outlet temperature | | 178 |
| Boiler Operating Snapshot | B2.13.11 | Percentage condensate return | % | |
| Boiler Operating Snapshot | B2.13.12 | Percentage makeup | % | |
| Boiler Operating Snapshot | B2.13.13 | Makeup water flow meter (instantaneous) | °F | 57 |
| Boiler Operating Snapshot | B2.13.14 | Makeup water flow meter (totalizer) | °F | |
| Boiler Operating Snapshot | B2.13.15 | Water inlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.16 | Water outlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.17 | Source inlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.18 | Source outlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.19 | Combustion air inlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.20 | Combustion air outlet temperature | °F | |
| Boiler Operating Snapshot | B2.13.21 | Feedwater outlet temperature | | |

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