U.S. Department of Labor

Occupational Safety and Health Administration
Appleton Area Office
1648 Tri-Park Way
Appleton, WI 54914

February 3, 2023

Frank Bell
Ahlstrom-Munksjo
600 Thilmany Road
Kaukauna, WI 54130

RE: INSPECTION NUMBER 1615213

Dear Mr. Bell:

An inspection of your workplace at 600 Thilmany Road, in Kaukauna, Wisconsin on August 17, 2022, disclosed the following hazards:

1. The Babcock & Wilcox Company Power Boiler No. 11 suffered catastrophic failure in two pipes sections located in the penthouse on August 16, 2022. The boiler was installed in 1966 and was 56 years old. The complexity of the problems increased when the boiler's age, operating history, and failure history were considered.

2. During operation of the Babcock & Wilcox Company Power Boiler No. 11, temperature swings of 60 to 90 degrees were consistently being observed on the charting data. These temperature swings constitute thermal cycling of the exposed metal contributing to creep failure potential. Tubes in such applications are vulnerable to temperature excursions, consequently, the material may enter the creep regime, and with time, creep deformation (bulging), and fracture (longitudinal rupture) may subsequently occur.

3. During a review of the inspections performed by various entities on the Babcock & Wilcox Company Power Boiler No. 11, damage was noted due to potential chemical cleaning performed on the boiler in 2009.

4. During the inspection, a brief mention was made regarding the safety relief valves installed may not have been the correct type for the Babcock & Wilcox Company Power Boiler No. 11.

Since no OSHA standard applies and it is not considered appropriate at this time to invoke Section 5(a)(1), the General Duty Clause of the Occupational Safety and Health Act, no citation will be issued for this/these hazards(s).

In the interest of workplace safety and health, I recommend that you voluntarily take the necessary steps to eliminate or materially reduce your employees' exposure to the hazard(s) described above. Feasible methods of control may include, but are not limited to, the following:

1. Perform an assessment on the pipes where the level of degradation had been found in the pipe system due to the previous chemical cleanings. Through this assessment map out the locations of corrosion and determine at what level of degradation would be acceptable and when the level requires further action. Further action could include but not limit to voluntarily derating the boiler, replace the degraded tubes, or other recognized safety practices.

2. Perform a Pressure Part Inspection During a Boiler Life Extension Program to determine acceptable parameters to operate the No. 11 Power Boiler in a safe manner. The complexity of the problems increases when the boiler's age, operating history, and failure history are considered. By conducting a comprehensive inspection of each pressure component to give baseline data for future reference. A well-planned condition assessment program is essential for the continued availability and reliability of the boiler and associated equipment, as well as the safety of plant personnel. When coupled with an overall plant maintenance strategy, timely condition assessment can provide the basis for long-range asset management and financial planning. Babcock & Wilcox Company had developed a Standard Recommendation for Pressure Part Inspection During a Boiler Life Extension Program[1]. The inspection scope would depend on several factors such as the boiler design type, design temperatures and pressures, materials, fuels, age, unit history, as well as future operating conditions. Inspection criteria shall be developed to cover at a minimum the critical components which have the greatest impact on safety, reliability, and performance. Those critical components include but are not limited to drums (steam, lower), headers (both steam and water), tubing (superheater, generating, waterwall, economizer), piping (steam and feedwater), deaerator, and attemperators. As part of the inspection, also consider conducting a condition assessment. This assessment can assist in also determining the remaining useful life of key boiler components.[2]

3. Conduct annual inspections of the boiler system to determine the condition of the components as outlined in The American Society of Mechanical Engineers An International Code 2007 ASME Boiler & Pressure Vessel Code VII Recommended Guidelines for the Care of Power Boilers 2009. A focus should be applied to those components or boiler sections where the more extensive boiler life extension assessment identifies potential concerns.

4. Follow B&W Plant Service Bulletin regarding Corrosion-Fatigue Failures of Riser Tube Bends, PSB-55[3]. The Safety Alert outlines corrosion fatigue damage found on the inside of bends in riser tubes. The damage appears as crack-like indications parallel to the tube axes, predominantly aligned along the neutral axes of these bends, and limited to the bend areas.

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[1] BR-1701, "Standard Recommendations for Pressure Part Inspection During a Boiler Life Extension Program", Babcock & Wilcox [Online]. Available: http://www.metserve.co.za/pdf/br-170~1.pdf

[2] G.J. Nakoneczny, BR-1635, "Boiler Fitness Survey for Condition Assessment of Industrial Boilers" [Online]. Available: http://www.metserve.co.za/pdf/BR-1635.pdf.pdf

[3] PSB-55, "Corrosion-Fatigue Failures of Riser Tube Bends", B&W [Online]. Available: https://www.babcock.com/assets/PDF-Downloads/Plant-Service-Bulletins/Corrosion-Fatigue-Failures-of-Riser-Tube-Bends-PSB-55.pdf

5. Follow B&W Riser and Tube Attachment Fatigue and Corrosion: Location and Evaluation Experience, Technical Service Bulletin dated November 2006[4]. This TSB provides information and recommendation regarding fatigue and corrosion damage locations in original risers and tube attachments on older; two drum recovery boilers that have been in operation for more than 15 years.

6. Develop parameters placed on the system during the load cycles. During the load cycles, the tubes are subjected to failures such as but not limited to creep damage, thermal fatigue, and mechanical fatigue. During load ramps, the boiler is temporarily overfired, which causes transient thermal shock to the header, resulting in ligament cracking. The external stresses associated with header expansion and contraction can cause damage on the units experiencing frequent load ramps. This will result in fatigue cracks at the attachments over time.[5]

7. Conduct a review of all safety relief valves to ensure OEM installed components are being utilized on the Babcock & Wilcox Company Power Boiler No. 11.

8. Review the above-mentioned hazards and recommendations for the remaining Power Boilers located onsite to ensure they are within a safe working condition prioritizing those that are beyond the nominal design life typically between 20-35 years[6].

OSHA welcomes any report of your efforts to reduce the above-mentioned exposures. If you have any questions concerning this matter, please contact this office.

Sincerely,

Robert J. Bonack
Area Director

[4] "Riser and Tube Attachment Fatigue and Corrosion: Location and Evaluation Experience" Babcock & Wilcox Power Generation Group Technical Service Bulletin [Online]. Available: https://www.babcock.com/assets/PDF-Downloads/Technical-Service-Bulletins/Riser-and-Tube-Attachment-Fatigue-and-Corrosion-Location-and-Evaluation-Experience-November-2006.pdf

[5] D. French, "Effects of Load Cycling", The DNFM Technical News Letter. [Online]. Available: https://www.davidnfrench.com/images/files/Winter%202017%20-%20Effects%20of%20Load%20Cycling.pdf

[6] 2010, American Boiler Manufacturers Association, "Specification Design Life Requirements and Implications Relative to Boilers" [Online]. Available: https://www.abma.com/assets/docs/Tech_Resources/2015%20-%20specification%20design%20life%20requirements_2010.pdf