

THERMAL IMPACT TESTING OF WATERCANNON AND WATERLANCE

INTRODUCTION

Holcomb Station is Sunflower Electric's 380 GMW powder river basin coal fired generating unit. In March of 1999 two Clyde-Bergemann model WLB watercannons were installed on the side walls of the fire box to clean the boiler water wall tubes. Before the installation was complete Sunflower Electric was approached by Diamond Power who had concerns about the watercannons thermal impact on the boiler water wall tubes. Sunflower Electric and Clyde-Bergemann then agreed to allow a side by side test to be run to determine the actual thermal impact on the boiler walls. Special thermocouple devices were built by both companies and installed in the boiler water wall around an existing IR steam wall blower opening. These devices had thermocouples imbedded in them at specific depths to measure the thermal impact of the cleaning devices. The thermal impact was measured by the ΔT measurement obtained when the water jet passes over these devices. Diamond Power installed their waterlance in the existing IR port and set up a test pumping skid for the water supply. The initial waterlance installed was a model IK-4M-PA (partial arc) with a 20E backrake angle. The partial arc was installed due to the location of the IR opening being close to a corner. After initial testing and after collecting data on the Clyde-Bergemann watercannon, Diamond Power made the decision to switch to a model IK-4M-WL (full arc) with a 15E backrake angle. The test was run during the week of 7/12/99. Both companies measured temperature data from their own device with their own equipment.

TEST PROCEDURE

Each device was given the opportunity to operate over a 24 hour test period. Data was taken with data logging equipment that sampled temperature measurements 10 times each second. Both companies recorded data during each testing period. The unit was at full load for at least 12 hours for each test. The watercannons were operated based on when the furnace cleanliness module supplied by Applied Synergistics indicated the walls were dirty. The waterlance was operated on visual indications from Diamond Power's infrared camera.

RESULTS

All data collected by Diamond Power and Clyde Bergemann compared favorably with

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$\Delta T = 52EF$ and the waterlance showed an average $\Delta T = 23EF$. These numbers are the total average temperatures submitted from both companies and cannot be compared to the test reports submitted by either company. The number of thermal cycles per waterlance operation was four to five compared to one to two for the watercannon.

CONCLUSION

Either of these two devices worked well in our application. The tube crack depth estimates over 40 years as determined by Clyde Bergemann are as follows: Watercannon (WLB) - 16%, Waterlance (IK-4M-WL 15E) - 4%. In the past Diamond Power has published that a 31% crack depth over 40 years was acceptable. Diamond Power did not estimate the tube crack depth over 40 years for either device used in this test. Please note that Diamond Power sells three other models of waterlances. These other three models are more aggressive in cleaning the boiler walls and would show different thermal impacts and tube crack estimates. Therefore, the results of this test are for the specific model watercannon and waterlance noted in this report. If you have any question or want further details about this test feel free to contact Mike Shreves - Sunflower Electric at phone number (316) 277-4562 or e-mail me at shreves@sunflower.net.