

# Applied Engineering Services Control System Upgrade Central Heating Plant Indiana University



## Project Profile



The Indiana University Bloomington campus heating plant was built in 1955 and consisted of 2 boilers and their auxiliaries. They were coal boilers, manufactured by Lasker, and they were originally equipped with Hays pneumatic controls. Boilers 3 and 4 manufactured by Erie City were added in 1960, Boiler 5 (manufactured by Union) was added in 1965 and Boiler 6 (manufactured by Riley) was added in 1970. In 2007 and 2008 Boilers 1 and 2 were demolished and a new Boiler 7 was installed in place of the old Boiler 1. The boiler capacities presently range from 100,000 pph to 180,000 pph. All boilers originally had pneumatic controls. Since 1988 single loop controllers gradually replaced the analog pneumatic control. Later, the system was converted to a hybrid of pneumatics, chart recorders and Bailey loop controllers. Presently all of the boiler combustion control is based on Allen-Bradley programmable logic controllers (PLC) of the SLC family.

The design phase of this project was preceded by a study conducted by Applied between March and December 2007 and concluded with a study report. In that study, two potential vendors/integrators of the new distributed control system (DCS), Cornerstone and Rockwell Automation, were selected and their qualifications and qualities of their system were evaluated. Eventually the DCS DeltaV system, manufactured by Emerson and locally represented by Cornerstone Controls, was selected as the future control system for the plant.

The scope of this project encompasses replacement of the various combustion controls with one uniform DeltaV system. Additionally, design of the new Control Room and the new Uninterruptible Power Supply (UPS) Room is part of the project. Architectural and structural design of the Control and UPS Room was provided by Fink Roberts and Petrie. The electrical and instrumentation design covered both new rooms, as well demolition and installation of the control system. Some of the original field instrumentation was also upgraded. The DeltaV system requires a dedicated grounding system, and the design of that was part of the project. P&ID drawings were created for all affected boilers and auxiliary systems, such as ash handling, feed water production and distribution, coal storage, etc. The mechanical system for the new rooms will provide air conditioning and room positive pressurization, preventing infiltration of coal dust to the space where expensive equipment is installed. Separately, purchase specifications for the DCS, including complete input/output summary, were prepared.

In past years the IU heating plant operated predominantly on coal, which has always been the least expensive fossil fuel. Because of the age of the equipment, the primary goal in boiler utilization was to secure an uninterrupted steam production and supply. Therefore, the main emphasis in past plant development was placed on equipment reliability and control stability. Currently tighter environmental regulations limit the use of coal and cause an increase in consumption of the natural gas. Conversion of controls to a distributed control system should allow for application of advanced boiler optimization strategies leading to substantial operation cost savings.

The project will be bid in spring 2010. The estimated cost of the construction package is approximately \$500,000. The cost of DCS hardware and configuration is expected to be approximately \$900,000.



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