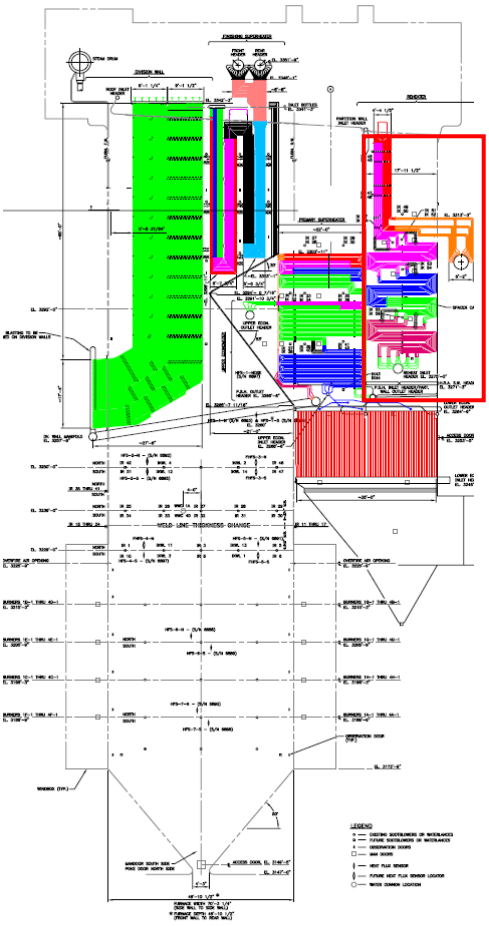
CTI POWER

REHEATER REBUILD FOR ENHANCED RELIABILITY& REDUCED MAINTENANCE

September 14, 2010

Nebraska's Largest Electric Utility
Sutherland, NE

Commercial Operation	**1975**
Electrical Generation	**665 MWe**
Main Steam Flow lbs./hr.	**4,700,000**
RH Design Pressure	**750 psig**
SH/RH Steam Temp.	**1005/1005 F**
Type of Firing	**Coal**
Boiler OEM Manufacturer	**Foster Wheeler**



VIEW LOOKING NORTH

This boiler has typically been operated, as a base-loaded unit since its initial installation. Customer analysis indicated that the expected service life for the reheater alloys were exceeding the maximum recommended within the industry, and viewed this replacement as routine maintenance.

No serious issues have been noted with regard to boiler, including reheater operating performance. Observed problems tend to relate to ash and sootblower erosion with the tubes routinely monitored by operating personnel via UT measurements.

Other concerns related to deformation at the upper elevations of the HRA partition wall, and more importantly the initiation of header cracks forming adjacent to the tube stubs on the outlet header.

The cause of that cracking has been tied to the original design that used the reheater outlet legs to support the outlet header vestibule enclosure.

Consequently, a redesign of that header vestibule support was a key requirement within the specification, and presented several unique challenges. Specifically, the utility personnel wanted provisions to simplify future outage inspections to conduct ongoing monitoring of the header. Close teamwork with the customer's personnel and extensive engineering work ultimately delivered a workable final design.

The surface arrangement in this particular design is parallel gas flow design (horizontal primary SH and a horizontal reheater) with the steam essentially counter-flow to the gas stream. Each element is end supported with a span between the supporting tube centerlines wall of 18'-0".

This reheater is arranged into five (5) banks of heating surface with nine (9) flow paths per element. Tube material in the inlet bank was upgraded from 2.75" OD x 0.180" MWT SA-226 to the same OD and thickness, but using SA-210A1 material, as the 226 material is now an obsolete specification. The lower portion of the intermediate bank was also upgraded from SA-178C to 210A1, with no change in the OD or wall thickness. The material in the upper portion of this bank was also upgraded from 2.75" OD x 0.180" MWT SA-213T2 to SA-213T11 material.

The tube materials in the upper horizontal bank, inverted pendant bank, and horizontal outlet rows remained unchanged from the original design.

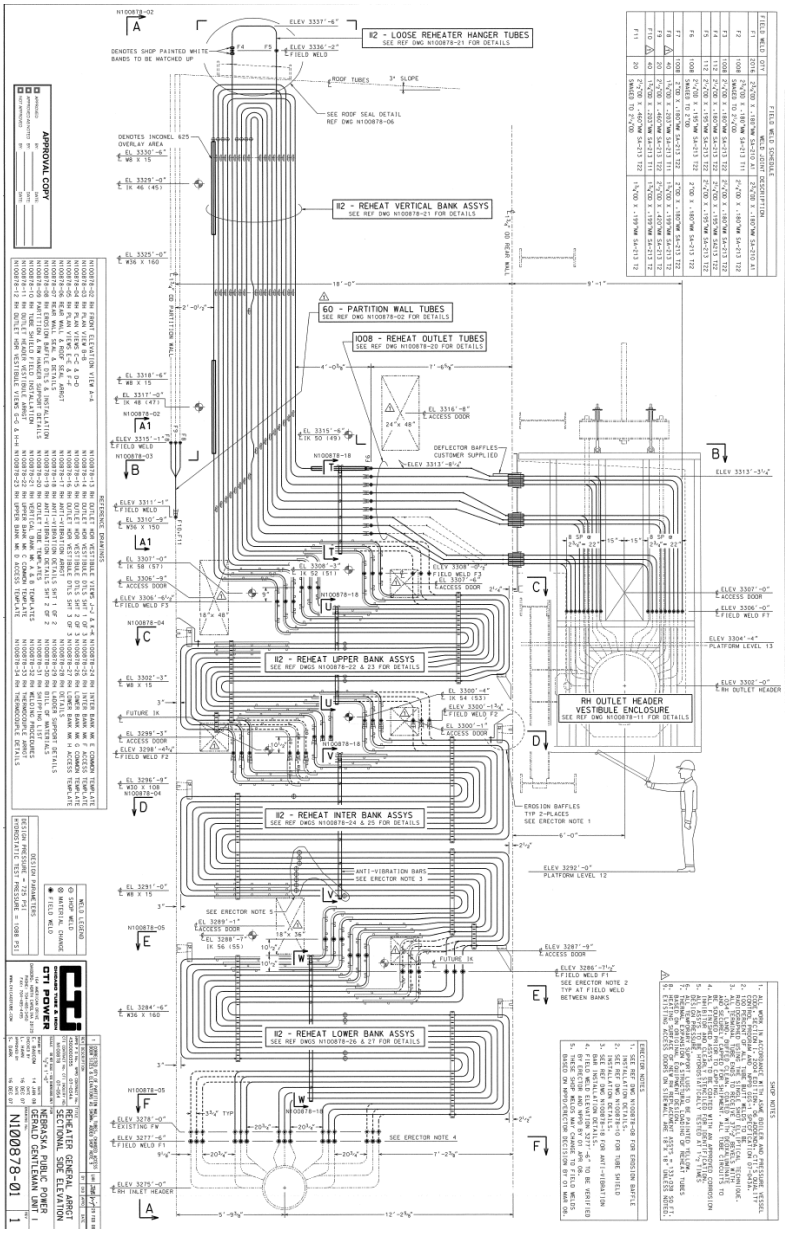
While the original support configuration relied on compression supports from below each bank, a field modification had already been implemented to utilize pendant 309 SS hanger straps supported by wall brackets, at most locations. This design modification was continued, and allowed us to simplify the lower loop bends on most of the banks. A series of 309 SS ladder supports were then employed for both elements support in tension or

compression, and also served for alignment and vibration damping. Side-to-side alignment was achieved through the use of bolt-on SS angles in multiple locations at the top and bottom of each bank.

Without affecting heat absorption and thermal performance, slight changes were made in the design details to improve installation efficiency. Primary among these changes was an increase in the spacing between tubes, to permit the use of orbital welding machines, during the field construction phase. Spacing and layout between tubes in the horizontal outlet rows, also aided access for field construction personnel to gain access to both the field welds, and the rear wall seals.

The design of those wall seals was also significantly modified to ease constructability, as well as improve sealing effectiveness.

Working closely with this utility's project personnel, we selectively located 0.070 thick Inconel 625 spiral weld overlay adjacent to sootblower wash areas in the leading edge tube of the inverted vertical pendant elements, as well as the top horizontal tube at the swage transition to the horizontal outlet rows.



Elsewhere within the horizontal banks 180 degree 304 SS shields were located three (3) rows deep adjacent to each sootblower. Horizontal shields were no less than 4' long while bends employed either outside or inside shields, depending on their relative position to each sootblower location.

All materials were delivered on-time and fit-up proceeded without difficulty. Unit re-start occurred in late 2008.

Overall, a number of design, maintenance, and reliability problems within this boiler were corrected, while staying within project budget constraints.

What can we help you accomplish at your power plant?

For additional information on this project or to discuss your particular plant needs, please contact Gerry Osborne at (704) 425-5722.