

From: Keith Jones

Sent: Thursday, March 11, 2010 4:40 PM

Tim,

As requested two moons ago here is my evaluation of energy usage improvements we have made in steam generator operation. The evaluation was based on a comparison of the B&R Generator placed on line in June 2009 with the HP 7 generator using data collected on 3/8/10.

- 1) Thermal efficiency has been improved by 11.1% by installing 167% more surface area in the convection box (or economizer).
- 2) Electrical demand by the pump motor has been reduced by:
 - a. Installing a VFD to eliminate the need to by-pass water from the pump discharge to it's suction. Annual savings of 30,719 KW-H.
 - b. Utilizing the split flow design so half the water is directed to each half of the radiant section and convections sections results in a reduction of the pump discharge pressure by up to 220 psi. Annual savings of 132,042 KW-H.
 - c. Increasing the pump discharge piping size from 3" to 4" upstream of the split. Annual savings of 884 KW-H.
- 3) Electrical demand by the blower motor has been reduced by installing a VFD to control excess oxygen in the combustion chamber instead of using louvers and restrictor plates. Annual savings of 130,736 KW-H.
- 4) Installing higher efficiency motors on both the pump and blower results in an annual savings of 18,384 KW-H.