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An Energy Audit That Saved Real Energy and Money

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ABSTRACT

An energy audit can mean many things to many different people. For some, an energy audit or assessment means focusing on processes, operations, or equipment. This particular audit was directed toward the brick , refractory, and insulation, and its direct effect on the boiler's efficiency, reliability, and energy fuel savings. Compared to most components found on a steam-generating boiler the cost of the materials and the installation of the refractory or brick are very small (less than 1% of the total cost of a new boiler). Yet, when properly designed, specified, stored, installed, cured or dried, refractory will save as much as five to seven percent in annual fuel cost (oil, gas, coal, refuse). Refractory and brick problems are found on most steam-generating boilers. These problems directly affected the amount of fuel used to meet heat and steam requirements. A boiler will always use more fuel if the brick and refractory are not installed correctly. After all the changes and corrections were made it was estimated that there will be an annual fuel savings of approximately $100,000 per year. This is why experts say, "Brick and refractory installed to save energy also saves money at a rate that is essential for efficient plant operation."

BACKGROUND

An energy audit can mean many things to many different people. For some, an energy audit sometimes referred to as an energy assessment means focusing on processes (steam traps), operations (lights and computers), or equipment (motors). These areas are all very worthwhile and offer companies an opportunity to save energy as it relates to steam, heat, or electrical output. Energy savings can also be applied to lowering the amount of energy required to make electric power. President George W. Bush was quoted as saying that "Energy is a problem that requires action, not politics, not excuses, but action." Obviously, the action that President Bush was referring to should be applied to industries that use the most energy, the steam and power generating industries. This energy is fuel (oil, gas, coal, refuse) which is used to make electricity. Brick, refractory, and insulation on any steam-generating unit when properly designed and installed will save as much as five to seven percent in annual fuel cost. Therefore, brick, refractory, and insulation have a direct effect on the energy consumption of any steam-generating boiler.

The Lawrence Berkley National Lab recently reported that they estimated for a life-cycle cost of a typical industrial boiler unit, with a $165,000 capital cost and 20-year life, operating 7,000 hours per year uses $8.0 million dollars of fuel (oil, gas, coal, refuse) over the life of the boiler.

Based on our estimates of five percent the energy savings would amount to approximately $500,000 over the life of the boiler assuming, of course, that their brick, refractory, and insulation, were properly designed and installed. Brick, refractory, and insulation are key components of any steam-generating boiler and can last twenty years or more when properly designed and installed.

The boiler used as an example for fuel consumption by Lawrence Berkley National Lab is quite small yet the premise for energy savings can apply to any steam generating boiler regardless of size.

When brick and refractory fail inside a steam-generating boiler fly ash fills the penthouse and vestibules, hot spots begin to show up on the cased wall areas, fuel consumption rises, and in some cases, the boiler will have to be shut down.

Here is an example of an energy audit at a very large power generating facility.