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Preventing Boiler Scale Provides Big Savings

In 1955, $75 a week was considered a good wage, you could buy a new Chevy for $2000 and fill it up for three bucks. A half gallon of milk went for a quarter and a tap beer was a dime. The *big* Hershey bar was a nickel. In 1955, $^1/_8$" of scale on a plant's boiler tubes was considered "protective film." Oh, and fuel oil went for 5¢ a gallon.

Today, with oil and natural gas prices going through the roof, facilities engineers and managers cannot afford even onionskin thick scale on their boiler tubes, let alone the one-eighth inch "protective film" of 1955. In fact, at today's energy prices, that $^1/_8$" scale would cost the owner of a 250 HP boiler an additional $48,000 per year in wasted fuel!*

Fortunately, as the cost of having scale on your boiler tubes has increased, the level of modern water treatment technology and the ability of a competent water treatment professional to prevent scale has increased as well. The polymers and phosphonates in today's scale inhibitor formulations enable a sound boiler water treatment program to provide bare-metal boiler waterside conditions. A clean boiler waterside provides both short-term efficiency savings and long-term savings due to extended boiler service life and less frequent repairs.

So what makes a good boiler water treatment program? In most cases, the first step involves utilizing good pretreatment equipment – a sodium zeolite softener or reverse osmosis (RO) system. In boiler systems that get 95+% condensate return, make-up water pretreatment equipment is not absolutely necessary, but for systems with any substantial amount of make-up water, a softener is virtually essential for perfectly clean boiler waterside surfaces.

A well-designed, properly operating zeolite softener will reduce make-up water total hardness to 1 ppm or less, regardless of incoming water characteristics. Given feedwater of this quality, a good internal (chemical) treatment program should be able to provide bare-metal boiler waterside surfaces. If feedwater total hardness is consistently higher than 1 ppm or occasionally spikes higher, a good chemical program can still provide clean boiler surfaces, but precise control will be necessary and the cost will increase. If your softener is not providing a consistent supply of make-up water at or less than 1 ppm total hardness, consult your water treatment representative or have a qualified service technician correct the problem.

The next step in boiler scale control is the application of a good internal chemical program. Your water treatment representative should be able to recommend a program that is appropriate for your system. Not only total hardness, but also overall feedwater chemistry, along with steam pressure, steam uses and other operating characteristics factor into selection of the combination of polymers, phosphonates and hardness control agents that will be best suited for your specific application.

The final, and very critical, aspect of a comprehensive boiler scale control program is proper blowdown control. It must be clearly understood that there are two types of boiler blowdown – surface blowdown or "skimming" and bottom blowdown. Each plays an important role in scale control, and each has a specific function.

Bottom blowdown is conducted by opening a valve on a line from the bottom of the mud drum on a watertube boiler or the lower portion of a firetube boiler. This is done in one or more short blasts, the function of which is to remove "sludge," an accumulation of calcium carbonate and other minerals that have precipitated from the concentrated boiler water. If not removed in this manner, sludge can adhere to boiler tubes and bake into a hard scale. Bottom blowdown frequency is determined by the rate of sludge formation in the boiler. Your water treatment representative should establish a bottom blowdown

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schedule. It is critical to follow this bottom blowdown schedule, even if boiler water TDS levels are low.

Surface blowdown involves removing a small amount of boiler water continuously from near the water surface. The function of surface blowdown is to control the dissolved solids (TDS) concentration in the boiler water. The water is removed from near the surface because the top six inches of the boiler water contains the greatest concentration of dissolved solids. Surface blowdown can be effected manually through the use of a needle- or other type of metering valve, or can be automated with a blowdown controller that senses the TDS of the boiler water and opens an automatic blowdown valve when the TDS exceeds a pre-determined set-point.

Coordination of all three aspects of a boiler scale control program is essential to the program's success. Good pretreatment equipment operation, along with a quality chemical program and precise blowdown control will keep your boiler clean and pay big dividends when the fuel bill arrives.

* Based on 80% load factor, 5 days/week, 52 weeks/year. Boiler firing natural gas at $5.00/MCF

IS your boiler water treatment program performing up to par?

Contact your Chemtex representative for a no charge, no obligation evaluation of your program.