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"Cycle Up" Your Boiler and Save Fuel $

Blowdown is an important function in the operation of a steam boiler system. In fact, blowdown is critical in maintaining steam quality and preventing waterside deposition and scale. The most carefully designed and maintained program of pretreatment and chemical technology will not provide trouble-free boiler operation and clean waterside surfaces without correctly controlled blowdown.

Boiler blowdown has two distinct functions. Bottom blowdown, as the term implies, is water drawn off the bottom of the boiler and sent to drain. Its function is to remove precipitated material, or "sludge," preventing it from adhering to waterside surfaces and forming scale. Bottom blowdown must be conducted properly on a regular schedule to assure complete removal of boiler sludge.

Surface blowdown is water drawn off at or near the boiler water surface, typically on a continuous or semi-continuous basis. Its function is to control the concentration of boiler water dissolved solids at a level where the treatment chemicals can prevent scale formation and boiler water carryover is controlled. Surface blowdown can be automated using a conductivity-based blowdown controller, or it can be conducted manually using a needle- or other type of throttling valve.

It is important to effect enough blowdown of both types to completely prevent scale and carryover, but any amount more than just enough to accomplish this is a waste of costly water, chemicals and, especially, fuel. Skyrocketing fuel costs are straining operating budgets, and it is increasingly necessary for building owners, facilities managers and plant engineers to find ways to conserve fuel wherever possible. One way many facilities can do this is by "cycling up" their boilers, or increasing boiler water cycles of concentration.

The term "cycles of concentration" is defined as the ratio of the concentration of the boiler water to the concentration of the feedwater. Often referred to simply as "cycles," this ratio is inversely proportional to the total blowdown rate – cycles increase as blowdown decreases, and vice versa. So, by increasing his boiler water cycles, an operating engineer will save fuel that would otherwise be lost in blowdown. When considering whether increased cycles is a sound cost-saving option for his facility, the engineer must be able to answer two questions: – Will increasing cycles result in scaled boiler tubes, and will the fuel cost savings justify this risk? A qualified water treatment professional should be able to help the engineer answer these questions for his boiler system.

First, the question of scale. Water treaters have traditionally set target cycles of concentration for prevention of scale in a client's boiler system using guidelines established by the American Society of Mechanical Engineers (ASME). The ASME guidelines set limits that are not to be exceeded for the concentration of three specific boiler water constituents – total alkalinity, silica and unneutralized conductivity. Based on the corresponding values in the feedwater, total blowdown rates are set that will assure that the ASME guidelines are not exceeded.

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CHEMTEX
INTERNATIONAL CHEMTEX CORPORATION

8287 - 214th Street West
Lakeville, MN. 55044
(952) 469-4965

The ASME guidelines were established over 30 years ago; boiler water treatment chemical scale control technology has advanced dramatically over that time. Where operating conditions warrant, scale inhibiting chemicals using the latest technology are capable of maintaining bare-metal internal boiler conditions in a carefully applied program operating in excess of ASME limits.

As to the second question – are the fuel cost savings worth the effort? The answer is a qualified yes. In systems where the feedwater is of very high quality and the boiler is operating at relatively high cycles and is still within ASME guidelines, the answer is probably no. In many systems, however, increasing cycles using the best chemical technology available will pay substantial dividends.

As an example, a 100 psig boiler producing 300 horsepower of developed load for 18 hours per day and operating at 10 cycles of concentration based on feedwater will have total blowdown of 20,700 pounds per day. This represents an energy loss in blowdown of 5,918,130 BTUs per day. Increasing boiler water cycles to, say, 17 will reduce total blowdown to 11,644 pounds per day. This cuts the energy loss to 3,329,000 BTUs per day, a savings of 2,589,130 BTUs per day. At a natural gas price of $13.00/MCF and assuming average boiler efficiency, this amounts to a savings of $44.88 per day, or $13,464 per year, based on a 300 day operating season. This change also saves over 300,000 gallons of water per year, saving an additional $1200 - $1500 per year in water and sewer costs, bringing the total savings to almost $15,000 per year, a number that most facility owners and managers would welcome added to their bottom line.

This type of change is not appropriate for all boiler systems. Factors such as feedwater quality, percentage of condensate return, boiler load and other operational characteristics may decrease the potential savings or make the change too risky. For example, a system with erratic feedwater quality might be at greatly increased risk of scale if cycles are increased. Some systems, on the other hand, may be able to achieve even greater savings by cycling up. Annual fuel savings of $50,000 or more are not unheard of. By carefully analyzing system operating data, a qualified water treatment professional will be able determine if cycling up a boiler system makes sense, and if so, project the fuel dollar savings such a change would make. With today's fuel costs, it makes sense to check it out.

Could you save big $ by cycling up your boiler?

Ask your Chemtex Representative to do a survey today and find out!