Inappropriate CBD Operation

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In Medieval Europe, **Bloodletting** was a standard treatment for various conditions, from plague and smallpox to epilepsy and gout. For this treatment, the 'Doctors' used to remove blood from hand or, neck by making small incisions in the patient's veins. It was understood all problems rooted in the blood and if you remove some bad blood, you can take care of the problem.

CBD quite often is being used with the same philosophy in a number of power, utility and process boilers even today.

Before discussing about what we gain, let us take a look at how much we could lose. Let us assume a 300 TPH boiler with 88% efficiency is operating with drum pressure of 100 ata is operating CBD @ 1% for about 2 hours every day. Let us assume the feed water inlet temperature is 112^{o}C and this boiler is using coal with GCV 3300 kcal/ kg, costing Rs.3500 per Ton.

This boiler is losing in excess of Rs. 5 lac per year!

And most boilers are operating CBD with much higher frequencies. In fact, there are many O&M personnel who still believe that since the name is Continuous Blow Down; it should be operated continuously!!

Let us now see why and when CBD is to be operated.

As we all know; there are few chemical parameters, which we monitor and control in Feed Water, Boiler (Drum) Water, Steam and Condensate (Hot Well).

The control parameters, which are continuously monitored in Boiler Water of conventionally treated Boilers are; Conductivity, pH, Silica and Phosphate. We also occasionally check for Chloride and Iron.

These parameters are maintained/ controlled primarily to avoid carry over and corrosion in case of high pressure power and utility boilers, and also to control scaling process in case of low pressure process boilers. The control limits vary with pressure as well as requirement of the steam users.

Amongst other reasons, conductivity and silica are two parameters which lead to increase the frequency of blow down quite often.

Let us first take a look at the case of silica.

Sometimes unnecessary stringent limits lead to unnecessary CBD operations.

EPRI guideline suggest < 2 – 3 ppm silica limit in boiler water for 100 bar drum pressure with feed water and steam silica as < 0.02 ppm. With boiler water pH in

the range of 9.4 – 9.6; the silica carry over would remain within the stipulated limit, if we can maintain the boiler water silica less than 3 ppm.

However, most such boilers would keep the boiler water silica limit at <1 ppm; say 0.6 to 0.7 ppm for safety. This leads to a reactionary blow down whenever the boiler water silica exceeds 0.7 ppm.

Since both the feed water and steam silica is maintained at < 0.02 ppm, there is no reason why the boiler water silica would increase, unless there is colloidal silica in the system. Even then, we don't need to jump to the conclusion of operating CBD since we have kept significant margin in the limit. Yes, we should look into the operation of the clariflocculator, where the colloidal silica should be trapped and take necessary corrective measures. CBD should be operated only when the boiler water silica is about to reach 2 ppm, and not before that.

Another time, we lose a lot of money is during the cold start-up. In order to achieve the desired steam silica before turbine admission, most plants need to either dump the steam into the condenser (in case of HP – LP by-pass), or continuously blow down for a long period of time. It can take as long as 36 – 40 hours in some system I have seen.

This time can be reduced significantly if we operate the CBD at the time of shutting down the boiler and ensure boiler water silica at operating limit before we operate MFT.

In boilers using phosphate treatment, sometimes too much phosphate dozing increases the frequency of blow down to control the boiler water conductivity within limit. Though recommended residual phosphate level for 100 kg/ cm^2 drum pressure is 5-10 ppm, modern days practice is to maintain it at 3 – 5 ppm. Due to frequently fluctuating load as experienced in power and utility boiler these days, phosphate hide out phenomenon is quite often observed in many boilers. Low sodium to phosphate molar ratio, if used in coordinated phosphate treatment compounds these problems. These conditions not only increase the possibilities of acid phosphate corrosion in high pressure system, they also lead to higher frequency of CBD operation to control the water chemistry.

Judicial use of CBD operation is only possible when the Boiler O&M personnel start taking initiatives to understand the importance of chemical parameter control instead of completely depending on the Plant Chemist, or DM plant personnel.

It's high time we start reading CBD as Contingency Blow Down instead of Continuous Blow Down.