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INTERMITTENT SOFTENER UPSETS

INTRODUCTION:

Many times a boiler owner will detect hard water in his boiler or feedwater, and then check the softener only to find that the water it is producing is soft. This can be a frustrating experience both for the owner and for the softener company who often can find nothing wrong with the softener. Often this problem will require some detective work on the part of the owner or the water treatment representative.

This paper will give you some places to look for the answer to the problem and address its solution.

SOFTENER OPERATION:

As a review, a typical water softener goes through four cycles. They are in-service, backwash, brining, and rinse. Some manufacturers will say there are five cycles since they will differentiate between the fast rinse and the slow rinse.

There are three types of intermittent hardness problems that are common with water softeners. The first one occurs at any time in the in-service cycle, the second one occurs only at the end of the in-service cycle, and the third one occurs only at the beginning of the in-service cycle.

HIGH FLOW RATE PROBLEM:

The first of these intermittent problems occurs at any time during the in-service cycle when the flow rate through the softener exceeds the maximum design flow rate. Under these conditions the softener goes hard in the middle of its in-service cycle and then returns to producing soft water as soon as the flow rate drops off. This is due to the flow rate exceeding the exchange reaction rate of the hardness ions with the sodium ions on the resin beads. If you catch this happening it can be tested by using a hardness test kit. A way to prevent this from happening is by putting a Dole Flow Control Valve in the service line ahead of the softener. This will limit the flow rate of soft water to the maximum design flow rate of the Dole Flow Control Valve and, if you sized the valve correctly, this will limit the flow at or below the maximum design flow rate of the water softener.

SHORT RUN PROBLEM:

The second type of intermittent problem occurs when the softener runs hard water at the end of its in-service run. This is due to insufficient resin capacity. Reduced resin capacity can be caused by iron fouling of the resin bed, resin lost by too vigorous a backwash, resin damage due to high water pressure, resin damage due to thermal degradation, resin decrosslinking due to over chlorinating, or not using enough salt

during regeneration. It is highly unlikely that all of these would occur in any one softener, but all or most of these may need to be checked out. The symptom that this is happening is that your softener suddenly goes hard shortly before regeneration. There are ways to test for this problem. One is to run a hardness test shortly before you know regeneration will occur. If you do not know when regeneration will occur, you can shorten the in-service time by about 20% to see if the incidence of milky white water in the boiler becomes less frequent or non-existent.

SHORT RINSE PROBLEM:

The third type of intermittent problem occurs at the beginning of the in-service cycle when the softener is restored to service. This problem is caused by insufficient rinse water. This is due to an inadequate rinse time, or a restriction in the flow in the line to the drain. There are ways to test for this problem. One is to run a hardness test shortly after you know regeneration has occurred. If you do not know when regeneration has occurred, you can lengthen the rinse time by about 15 minutes to see if the incidence of milky white water in the boiler becomes less frequent or non-existent. On most softeners you can manually force the regeneration and switch over to a new tank to occur, thus making this one of the easiest to test.

In any event, if you see white milky water in your boiler site glass, the immediate action should be to **increase the boiler blowdown, increase the sludge conditioner dosage, and test the water softener (noting where it is relative to the last regeneration).**