

THE CONSERVATION OF CONDENSATE

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The fear of allowing sugar-contaminated condensate to return to the boiler feed tank has been the cause of tremendous wastage of good condensate to our Company in the past and, I presume, we are not alone in this respect. The value of the heat lost alone, apart from the quality of the boilerfeed water is considerable, especially when, as in our case, a portion of the steam used is supplied from coal fired boilers.

Before the installation of a control instrument we were using approximately 50 per cent make-up on our bagasse-fired boilers. On an evaporation of 225,000 lbs. per hour this amounted to 112,500 lbs. per hour of raw water approximately, that went into the feed well and which we had to heat up.

If we assume, that the 112,500 lbs. of lost condensate was at a temperature of 210°F. and our inlet raw water was 70°F. then the sensible heat lost was 112,500 (210-70) = 15,750,000 B.Th.U.s. per hour.

= 12,300 lbs. of steam per hour.

When steam is generated at 200 p.s.i. abs. and 520°F. superheat

= 1,560 lbs. of coal per hour

as our coal-fired boilers give us 7.89 lbs. of steam per lb. of coal. In a 35 week season this amounts to 3,920 tons of coal, at R4.50 per ton burned, this is R17,640—quite a considerable quantity of cash lost, apart from the lovely clean water.

Naturally, we could not expect to recover all our condensates but, by the installation of a condensate control instrument, we have reduced our make-up from an average of 50 per cent to 25 per cent so we can say we have saved R8,820 of coal, by the use of this instrument in one year.

Other companies who do not use additional fuel, such as coal, wood, etc. will not find such cash savings in the heat balance, but the recovery of good condensate will amply repay any instrument cost in the improved quality of feed water to the boiler.

After repeated, unsuccessful attempts at saving condensate by having alpha-naphthol tests manually conducted, we decided to fit a condensate controller, and chose the conductivity type. We realised its shortcomings and the fact that it does not strictly speaking test for sugar, but we felt that its reliability outweighed this disadvantage. The choice has fully justified itself. We have had a complete season's run with no trouble whatsoever and a marked reduction in make-up. We conduct regular alpha-naphthol tests as a check on the instrument and so far the instrument has always given a true reading, with one exception which I shall mention later.

The instrument we use is a Leeds and Northrup Cat. 63362-C7-L1-P12-593-S Speedomax "G" Model S. Strip Chart Conductivity Recording Controller for twelve points. The twelve points, which are checked at 4 second intervals, are:

- Point No. 1—Raw House Pan No. 1
- Point No. 2—Raw House Pan No. 2
- Point No. 3—Raw House Pan No. 3
- Point No. 4—Raw House Pan No. 4
- Point No. 5—Raw House Pan No. 5
- Point No. 6—Raw House Pan No. 6
- Point No. 7—Raw House Primary Juice Heaters
- Point No. 8—Raw House Secondary Juice Heaters
- Point No. 9—Raw House Quad. No. 1
- Point No. 10—Raw House Quad. No. 2
- Point No. 11—Refinery Triple Evaporator
- Point No. 12—Refinery Pans

The range of the instrument is 0-40 micromhos and we have found that when the instrument registers over 9 micromhos, a trace of sugar shows up with the alpha-naphtha test. The controller is set at 9 micromhos and anything over that is automatically rejected by means of air operated flap boxes. Should the particular sample eventually run clear the flap box returns to the "accepted" position.

No supervision is required other than an occasional check on the sampling points to ensure that each sample is running freely.

All samples are cooled before they reach the conductivity cell and each cell is fitted with temperature compensation probes.

The one exception to good operation which I mentioned earlier is Point No. 12, the condensate from our four refinery pans. These pans are boiled either on 7 p.s.i. exhaust steam or 1 p.s.i. vapour from the first vessel of No. 2 Quad. When we boil on vapour we more often than not show a high conductivity on the pan condensate though the condensate shows no sign of sugar when chemically tested. This condition still persists.

The total cost of the installation was in the region of R4,000.

Apart from the savings in heat, the load on our filter beds which supply most of our make-up water is reduced, scale in the boilers is reduced, and we use less boiler water treatment compound.

We are still investigating the conservation of more condensates, such as the 2nd, 3rd and 4th vessel condensates from our quads, though our process staff may view this with a jaundiced eye, as they fear they might not have enough for their own use.

(For discussion on this paper see page 55)