

A SUCCESSFUL MODIFICATION TO THE DORR 444 CLARIFIER

S CHETTY¹, S B DAVIS¹, A RAGHUNANDAN² and S MAHARAJ³

¹*Sugar Milling Research Institute, University of Natal, Durban, 4041, South Africa*

²*Hulett Refineries Ltd, P O Box 1501, Durban, 4000, South Africa*

³*Tongaat-Hulett Sugar Ltd, Maidstone Mill, P O Box 5, Maidstone, 4380, South Africa*

E-mail: Schetty@smri.org

Abstract

CFD modeling was used to design a simple modification to one of four compartments of a Dorr 444 clarifier at Maidstone. The model was validated via tracer testing but the best validation would be implementation of the modification. The modification consisting of a system of two baffles was installed during the season and results in terms of clear juice absorbances were obtained. There was a clear improvement when comparing the clear juice absorbance of the modified compartment to that of the unmodified compartment. There were doubts about the differences between flows to the compartments. Tracer testing did show that the flow characteristics between modified and unmodified compartments were similar.

Keywords: evaporator, caustic, membrane, effluent.

Method

The system of baffles installed at Maidstone consisted of two circular baffles of 100 mm height. One was mounted such that the feed would be directed downwards towards the mud boot. The other was mounted on the scraper arms to create a region where mud settling was promoted. Sample lines were installed from the third compartment (unmodified) and the second compartment (modified). Tracer tests before and after the modification qualitatively confirmed the flow characteristics predicted by CFD simulation.

Results

Figure 1 shows clear juice absorbances from modified and unmodified compartments at high juice flows. Figure 2 shows similar results but at lower flows. It is clear that the modified compartment is consistently less turbid than that of the unmodified compartment. The only doubt that faults the comparison is the possibility of there being different flow rates to each compartment. Figure 3 shows the results of a tracer test after the modification. It is evident that both compartments have similar behaviour but no quantification is possible since the calculation of an average residence time for each compartment is dependent on estimating the inlet flowrate to each compartment.

Future work

Future work is directed towards modifying all the compartments of the clarifier and comparing the total clear juice absorbance with another unmodified clarifier.

Acknowledgements

Tongaat-Hulett Technical Management Department; MS Mill Staff; Pollution Research Group, University of Natal.

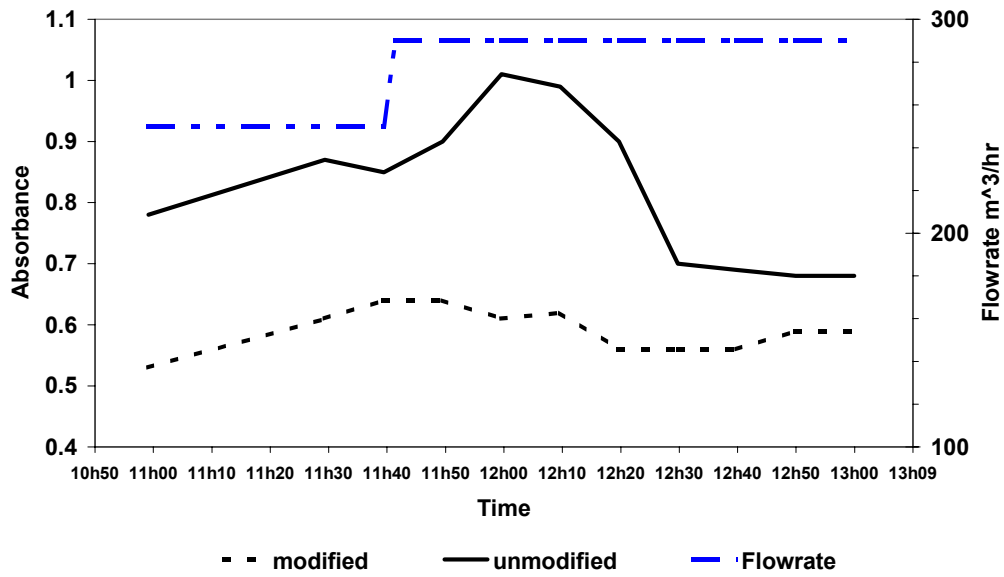


Figure 1. Clear juice absorbance at high flow rate.

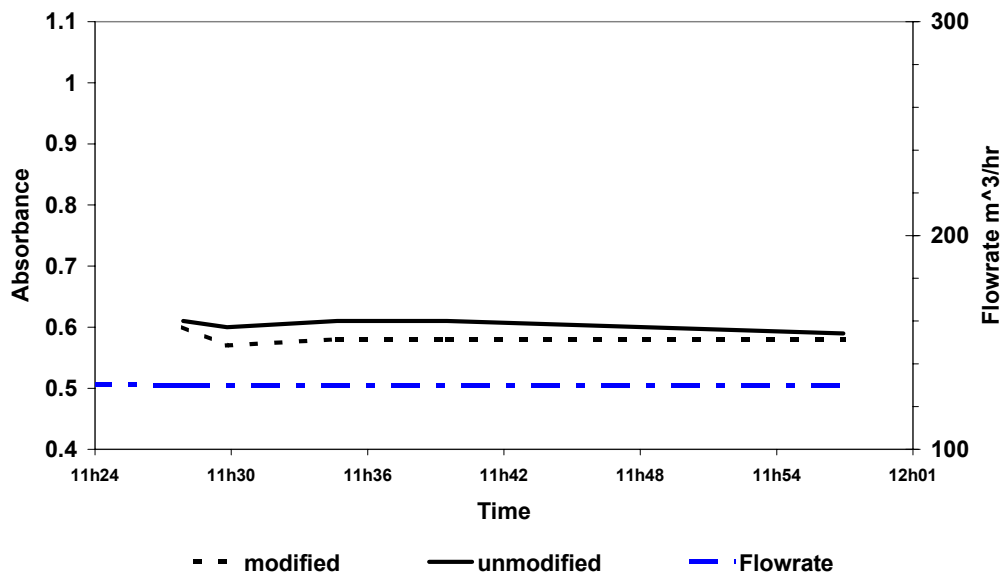


Figure 2. Clear juice absorbance at low flow rates.

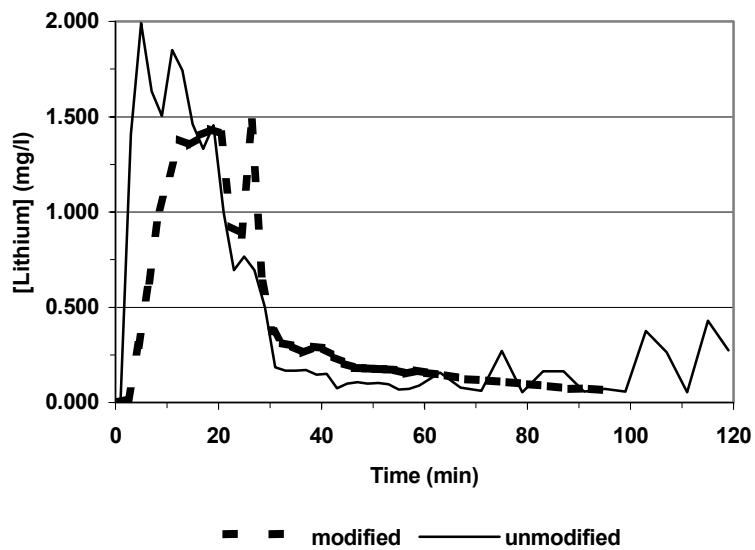


Figure 3. Tracer concentration curves for the modified and unmodified compartments.