OPTIMIZATION OF ACTIVATED SLUDGE PROCESS FOR A BREWERY WASTE WATER TREATMENT UNDER LOCAL CONDITIONS : PLANT PROCESS CONTROL AND MANAGEMENT BY A QUALITY SYSTEM

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The wastewater treatment plant (WWTP) at Lion Brewery uses Activated Sludge Process. Water used to produce 1 m^3 beer (Water Index) is high in brewery operations and can vary from 4 - 12 m^3 depending on the nature of operations. Lion brewery water index is in the rang 6 - 7. The COD, BOD levels are also on the high side averaging

This WWTP was commissioned in 1998 and in continuous operation since then. Periodical disturbances occurred several times resulting poor treatment efficiencies. Although periodic disturbances occurred no in-depth investigations were carried out to establish the root cause. Production volumes increased since 1998 but no data on COD, BOD Loadings, Hydraulic volumes and Dissolved Oxygen concentrations were available.

Proper studies started in October 2002.COD; BOD Loads, Hydraulic volumes, Dissolved Oxygen, pH and temperature at important points were recorded on regular basis.

It was evident from these data that the Dissolved Oxygen level in the Activated Basin was even below the critical limit of 0.5 mg/l whereas the requirement for optimum operation is 1.2 - 2.5 mg/l. The corresponding COD and BOD removal efficiencies were on or below 97% mark. Experiments carried out to find out the Oxygen uptake rate by Activated sludge revealed that the uptake of Dissolved Oxygen by Yeast added activated sludge was about

20 times grater than the sludge used as a control. Based on this experimental results management decided to stop Yeast discharges to WWTP. This resulted in raising of Oxygen levels above 1.2 mg/l. COD and BOD removal efficiencies reached above 97% mark. The Treated water quality also reached the Lion Brewery specifications for effluent discharge. It was evident that the condition known as sludge bulking due to Filamentous bacteria formation associated with low Dissolved Oxygen was the root cause for the disturbances to WWTP.

It was also evident that the plant was already overloaded in terms of COD, BOD and hydraulic volumes specified for the plant. Accordingly these loads had to be distributed equally within a day at least to ensure consistent loading and avoid shock loads to Activated Basin. Influent loading rates to Activated Basin , Equalization basin level and pH controls were established using the computer based control system in the WWTP. Daily monitoring system established and monthly reporting on performance of the plant, treated water quality and key figures such as electricity consumption, waste production per unit beer productions were reported.