

ENVIRONMENTAL FOOTPRINT COMPARISON TOOL

A tool for understanding environmental decisions related to the pulp and paper industry



EFFECTS OF DECREASED WATER USE ON ENERGY USE

Limitations on Effluent Temperatures

Increasing the reuse of water within mill processes typically results in an increase in the temperature of untreated wastewater. This occurs because excess low-grade heat from the process is lost in a smaller, and therefore warmer, volume of water. Nearly all pulp and paper mill wastewaters are subject to biological treatment and the temperature of the wastewater entering the treatment system is very important to effective treatment of the wastewater.

The microorganisms in biological treatment plants are often classified according to the temperature range within which optimal growth is achieved. Mesophilic organisms, the type found in essentially all of the industry's treatment systems, thrive in a temperature range between 20 and 40°C, with an optimal temperature of between 30 and 35°C. Full-scale operating data and laboratory experiments conducted to evaluate the effects of temperatures in the range of 35 to 49°C indicate that the optimal biorate likely exhibits a plateau over the range of 35 to 45°C, above which a rapid decline in biorate is observed.

When increased reuse of mill process water increases the temperature of mill wastewater above 35 to 40°C, it is often necessary to install a cooling system for the wastewater prior to biological effluent treatment. Thus, the advantages of increasing the reuse of mill process water must sometimes be weighed against the capital costs, operating expenses, and environmental impact (e.g., consumptive water loss due to evaporation) associated with wastewater cooling.