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Chemically Enhanced Primary Treatment: Full Scale Trial Results Conducted at a South African Wastewater Works

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Abstract : Chemically enhanced primary treatment (CEPT) can be used at wastewater works to improve the quality of the final effluent discharge, provided that the plant has spare anaerobic digestion capacity. CEPT can transfer part of the organic load to the digesters thereby effectively relieving the hydraulic loading on the plant and in this way can allow the plant to continue operating long after the hydraulic capacity of the plant has been exceeded. This can allow a plant to continue operating well beyond its original design capacity, requiring only fairly simple and inexpensive modifications to the primary settling tanks as well as additional chemical costs, thereby delaying or even avoiding the need for expensive capital upgrades. CEPT can also be effective at plants where high organic loadings prevent the wastewater discharge from meeting discharge standards, especially in the case of COD, phosphates and suspended solids. By increasing removals of these pollutants in the primary settling tanks, CEPT can enable the plant to conform to specifications without the need for costly upgrades. Laboratory trials were carried out recently at the Umbilo WWTW in Durban and these were followed by a baseline assessment of the current plant performance and a subsequent full scale trial on the Conventional plant i.e. West Plant. The operating conditions of the plant are described and the improvements obtained in COD, phosphate and suspended solids, are discussed. The PST and plant overall suspended solids removal efficiency increased by approximately 6% during the trial. Details regarding the effect that CEPT had on sludge production and the digesters are also provided. The cost implications of CEPT are discussed in terms of capital costs as well as operation and maintenance costs and the impact of Ferric chloride on the infrastructure was also studied and found to be minimal. It was concluded that CEPT improves the final quality of the discharge effluent, thereby improving the compliance of this effluent with the discharge license. It could also allow for a delay in upgrades to the plant, allowing the plant to operate above its design capacity. This will be elaborated further upon presentation.

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