Environmental Assessment of Wastewater Treatment Plant Operation

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A Wastewater treatment plants (WWTP) is designed to minimize the environmental impact of discharging untreated water into natural water systems. Different WWTP options have different performance characteristics and different direct impacts on the environment. If one of the main functions of wastewater treatment systems is to minimize the impact on the environment, they should be designed accordingly.

A Wastewater Treatment Plant is a complex structure (that encompass, biological, transport and hydraulic phenomena, among others) developed to treat domestic, agricultural influent or often a combination of all three. The operation of a WWTP often has the primary objective of ensuring that discharged effluent complies with the local regulations in term of water quality, despite changing influent conditions. However, despite the advances made in recent decades, a large percentage of wastewater treatment plants are still being operated below the optimal performance achievable. This low performance becomes evident in the form of both treated water discharges that do not meet water quality standards and low efficiencies in terms of energy consumption. Additionally, many existing urban treatment plants face more stringent criteria for their wastewater effluent that needs to be treated.

Additionally, in recent years, WWTP operators have experienced increased pressure not only to meet effluent standards, but also to increase energy efficiency, perform resource recovery, and monitor and mitigate greenhouse gas (GHG) emissions. Recent studies have identified WWTPs as potential sources of anthropogenic GHG emissions that contribute to climate change and air pollution, such as methane (CH_4) and nitrous oxide (N_2O). WWTPs also emit carbon dioxide (CO_2) during the production of the energy required for the plant operation.

This presentation emphasizes the importance and usefulness of using multiple evaluation criteria (that included environmental aspects) to compare and evaluate control strategies in a WWTP for more informed operational decision-making. Multiple evaluation criteria of WWTP control strategies includes an additional dimension within the evaluation procedure, thereby increasing the chance of success for the strategies studied.