ABSTRACT

One of the consequences of the social and economic change due to industrialisation is the generation of industrial wastewater which requires treatment before being released into the natural aquatic environment. The municipality has wastewater treatment plants which were initially designed for the treatment of domestic wastewater. The presence of industrial wastewater in these treatment plants introduces various difficulties in the treatment process due to the complex and varying nature of the industrial wastewater.

A means needs to be developed, that will allow the municipality to evaluate if a wastewater treatment plant can adequately treat a particular composition or type of wastewater to a quality suitable for release to the environment. Developing a simulation model for a wastewater treatment plant and calibrating it against plant operating data will allow the response of the wastewater treatment plant to a particular wastewater to be evaluated. In this study a model for the Marianridge Wastewater Treatment Plant is developed in the WEST (Worldwide Engine for Simulation, Training and Automation) software package.

The sources of data for modelling were laboratory experiments, historical data from the municipal laboratory and modelling of experiments. Dynamic input files representing the properties of the influent wastewater were generated by characterising the influent wastewater through the use of batch respirometric tests and flocculation filtration on composite samples of wastewater. Kinetic and stoichiometric coefficients of the model were determined from batch respirometric tests on wastewater and activated sludge, and simulation of the batch respirometric experiment. To make the model plant-specific it is calibrated against plant operating data.

It was concluded that the use of laboratory experiments, historical data from the municipal lab and modelling of experiments in order to generate information for the modelling of wastewater treatment plants makes up a methodology which can be adopted and improved by additional experiments.