DYNAMIC MODELLING OF THE GOLD BAR ACTIVATED SLUDGE PLANT

CLIENT: **City of Edmonton**

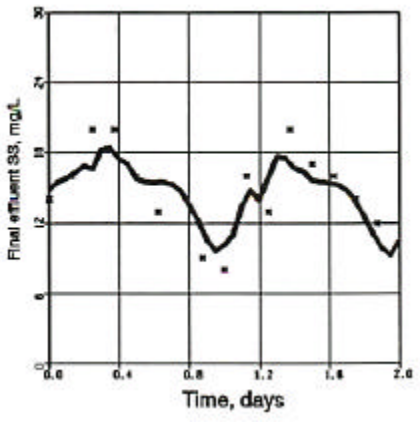
LOCATION: **Edmonton, Alberta, Canada**

PROJECT DESCRIPTION

The Gold Bar wastewater treatment plant is typical of many conventional activated sludge plants designed for carbonaceous BOD and suspended solids removal with rated capacities of 865 MLD and 430 MLD respectively for the primary and secondary facilities.

Modelling was conducted using the General Purpose Simulator (GPS-X™). The model was calibrated for a number of flow conditions, including diurnal and high flow conditions. Stress tests were performed on specific unit processes to determine model parameters under critical loading conditions, including: primary clarifier, final clarifier and step-feed tests.

Calibration of the model for carbonaceous BOD and suspended solids removal was successful. In general, the simulation results agreed very well with plant data.



- Comparison of final effluent SS data with simulation results

RESULTS

As part of this study, several process analyses were carried out using the calibrated model, including:

- The effect of hydraulic and organic load increases over the next 20 years and the necessary plant expansion;
- Rising sludge problems in the final clarifiers;
- Step-feed vs. plug-flow operation;
- The effect of increasing the primary and secondary bypass limits during heavy storms;
- The effect of even flow distribution on the process;
- Nitrification-denitrification operation.

The modelling showed that 3 new biological reactors and secondary settlers will be required to prevent the settlers from overloading at the current setpoint of 4.2 days. These conclusions were reached by assuming a constant influent concentration under increasing hydraulic load.

The modelling confirmed that the current operational practice used to prevent denitrification in the settlers (low SRT, increased rake speed) is optimal. A good solution to the problem will be provided in the future by an efficient nitrification-denitrification operational mode.

Furthermore, it showed that a maximum of two aeration tanks and one clarifier can be taken out of service without jeapardizing process performance. Important energy savings can be realized by the optimal use of biological reactors.

No data were available for the calibration and verification of the model under storm flow conditions. However, for the purpose of this investigation, the performance of the plant was simulated under heavy storm flow conditions (1200 MLD). The results showed that the current primary and secondary plant loading limits before bypass of 950 and 430 MLD, respectively, represent the maximum which the plant can handle without an operational upset.

GPS-X was used effectively to generate operational charts. Operational graphs and tables can be particularly useful in helping to identify optimal operating conditions.