

Keep Those Bioreactor's Bugs Happy at Night: WWTP Flow Equalization Using Existing CSO Sites

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ABSTRACT

Put 200-300 word abstract here.

EPCOR is operating the City of Edmonton's Gold Bar Wastewater Treatment Plant (WWTP), which serves the City's collection system. Although the plant is equipped with enhanced primary treatment for higher flows, it primarily relies on a biological nutrient removal (BNR) process to treat the dry weather flows (DWF). As the efficiency of this process depends on the health of its biomass, it is sensitive to flow variations, such as those observed in the normal diurnal flow pattern, where the flows decrease considerably at night.

To obtain steadier flow inside the bioreactors, EPCOR evaluated several solutions, but none achieved the desired objective and ultimately, an innovative solution was considered, i.e. using the existing City of Edmonton collection system as an equalization tank. The City is currently operating three inline real time control (RTC) retention sites for combined sewer overflow control, which have a total storage potential of about 38,800 m³. A portion of this inline storage could be used to equalize the flow to the plant and reduce the daily flow range. Water could be stored during the day (when flows are high) and slowly released at night (when flows are low) in order to send a more stable flow to the plant and improve the BNR process. The same principle could also be applied for the Gold Bar influent gates as they could retain some of the wastewater just upstream of the plant.

EPCOR, in a partnership with the City of Edmonton, contracted Tetra Tech, a leader in real time applications for wastewater collection, to evaluate the equalization potential of the proposed solution and to develop a stable real time control strategy for each of the control sites. The study showed that using all three RTC sites and the Gold Bar influent gates would reduce the daily diurnal pattern span by almost 80%.

As part of the study, Tetra Tech developed a control strategy that would ensure good flow equalization and daily dewatering, and remain stable despite daily flow variations. The proposed strategy was approved by both EPCOR and the City of Edmonton and a trial period was scheduled in order to test the equalization performance and gather information about the removal of phosphorus and ammonia at the plant.

Upon completion of the new control logic programming, Tetra Tech and the City of Edmonton implemented and adjusted the new control logic at the RTC sites. The preliminary results showed good equalization of the flow at the plant and improvement in treatment efficiency. This means that City operating WWTP may already have a large flow equalization potential that can be achieved at a very low cost since no major infrastructure investment are required.

ABOUT THE AUTHORS

Maxym Lachance, Eng.: *Mr. Lachance is an automation engineer with over 15 years of experience in his field. He specializes in the management of complex wastewater systems in real time. As a project manager, he led the development of control solutions that have won prizes, including the Tetra Tech Technical Achievement Award in 2012 and the "Visionary" and "Urban Infrastructure" awards from "Association des firmes de génie-conseil du Québec" (the Quebec association of consulting engineering firms) in 2014. (maxym.lachance@tetratech.com)*

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