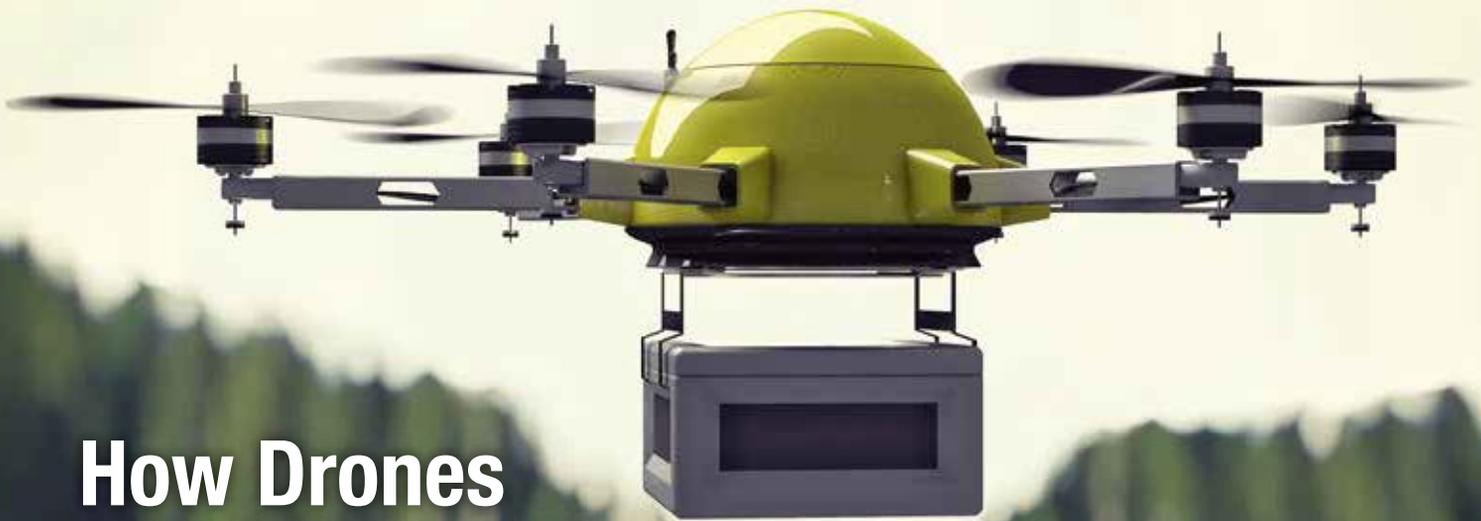




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# Biosolids Management in North Battleford, SK

By Kevin Litwiller



*The biosolids management facility.*



*Lystek International Inc.'s reactor and storage tank.*

The City of North Battleford has a population of almost 14,000 and is located roughly 130 kilometres northwest of Saskatoon, SK. The city's wastewater treatment plant (WWTP) was commissioned in 2003-2004 and treats 5,700 to 6,400 cubic metres of wastewater daily. The plant consists of a headworks (a fine screen and grit removal unit), two trains of bioreactors configured for biological nutrient removal, two secondary clarifiers and a biosolids management facility.



*The sub-surface injection equipment.*

In accordance with the *Permit to Operate* issued by the Saskatchewan Ministry of Environment (MOE), the treated effluent is discharged into the North Saskatchewan River and biosolids from the biosolids management facility were formerly disposed of at the city's waste management facility (WMF).

The biosolids management building houses a rotary drum screen, to thicken sludge, ahead of a centrifuge that dewater the thickened sludge. A polymer is added to the sludge to aid in dewatering. This results in approximately 3,500 metric tonnes of biosolids that were, until recently, being sent

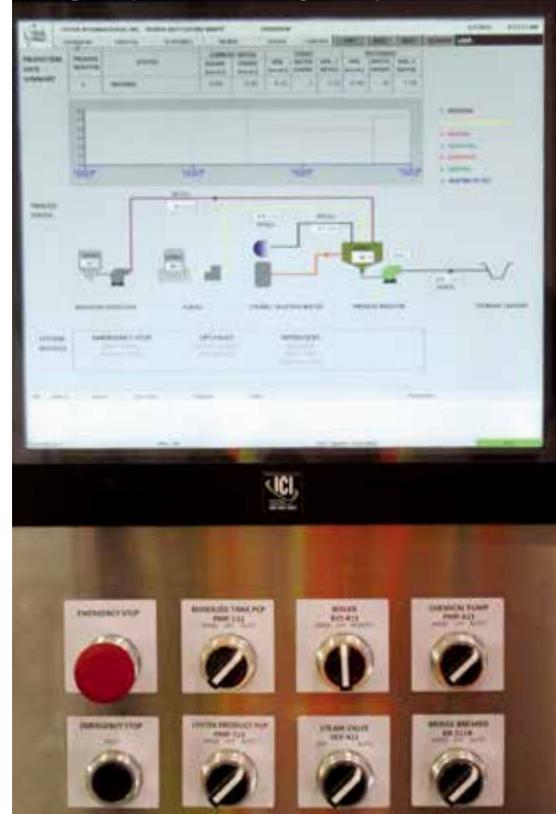
to the WMF and landfilled. There was no beneficial use of the city's biosolids.

The city was experiencing odour complaints, and other issues, with its practice of landfilling the biosolids. An earlier permit required the city to undertake an evaluation of its biosolids disposal program, including recommended options for alternative management measures to minimize odour complaints and potential environmental impact, to be presented to the MOE by November 1, 2009. Associated Engineering completed a biosolids management study for the city.

Key objectives of the 2009 biosolids management report were as follows:

- Satisfy MOE requirements for the foreseeable future;

*The supervisory control and data acquisition system.*



- Address odour and other issues related to biosolids disposal at the WMF;
- Identify a management solution which would be both affordable and sustainable; and
- Develop an engineering solution which would be simple to operate and maintain.

Four biosolids stabilization processes were short-listed for evaluation. They were mesophilic anaerobic digestion, aerobic

digestion, ATAD and composting. This evaluation indicated that composting could be the best option for the city out of these four choices. Associated Engineering prepared a preliminary design for a WWTP biosolids composting facility, completed in May 2012.

However, the city was still not completely convinced that composting was its best option. They really wanted an innovative,

proven and economical biosolids management solution that would function reliably in extreme cold and a prolonged winter climate. The preferred process would also have to function well with the relatively small amount of biosolids generated at the WWTP and to the satisfaction of the city's engineers, WWTP operators and the MOE.

A subsequent permit mandated the city eliminate landfilling and have, in place, an environmentally sustainable, "authorized and approved sewage works biosolids treatment and disposal process" by November 1, 2015. The solution would also need to be constructed and operated in accordance with applicable Water Security Agency (WSA) standards, permits to construct and engineering best practices.

In order to meet this deadline, a formal request for proposal (RFP) process was undertaken by the city with a submission deadline of January 2014. Through the RFP, the city sought to implement a new biosolids management process to allow it to meet regulatory guidelines, be environmentally responsible and fiscally prudent, while providing the city with a proven, year-round management program, as well as a marketable product that is registered with the Canadian Food Inspection Agency (CFIA).

The city received three proposals. The selected submission was from Lystek International Inc., of Cambridge, ON. It involved installation of a patented, low pressure, low heat, thermal hydrolysis processing system that could be retrofitted into the city's existing biosolids management building without major renovations.

The patented process is relatively simple. It involves placing the biosolid material into an enclosed reactor, where a combination of heat (steam injection), high speed shearing and the addition of alkali (potassium hydroxide), are simultaneously applied to the material to break down cell structure and kill pathogens. The end product is a CFIA-registered fertilizer that can be sold to generate revenue.

The system is fully automated and is monitored via the supervisory control and data acquisition, which is also linked to the overall WWTP system for both real-time and remote monitoring. It is a semi-continuous batch system that takes only about



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45 minutes per cycle. What this means is that, upon completion of each cycle, one third of the finished product is pumped into a lined and covered storage reservoir to hold and protect the fertilizer between usage cycles. This system did not require additional staff or heavy equipment to operate and it only needs to run for a few hours each day.

The city chose Lystek because it allowed it to meet the November 2015 deadline set out by the WSA, as well as the city's tight capital and operating budget constraints. It also did not require any special skills to operate. The raw material could quickly be converted into the finished product, a federally-registered, (CFIA) liquid fertilizer which is pumped directly into the storage reservoir.

Finally, the plan further offered a unique, revenue-sharing agreement that allows the city to generate revenue from sales of the product. This allows North Battleford to take something that was once considered waste and turn it into a valuable resource.

An agreement to initiate the project was executed in February 2014. The next step was to provide information to the WSA to obtain the necessary *Permits to Construct* and *Operate* for the new biosolids processing system. A tender was also issued for the construction of the product reservoir. The product reservoir includes a liner and cover. An application to register the product with CFIA was also submitted by Lystek, on behalf of the city, as part of the solution package.

The final design was able to meet all of the requirements of a new biosolids management process without interfering with the day-to-day operations of the WWTP. This design also includes a contingency plan that allows for the biosolids to be disposed of at the WMF, should the system ever experience a major failure. It also allows for future expansion.

Construction was completed in December 2014. The next steps were to start the system, develop the operating parameters and train the plant operators.

Training includes procedures for daily start-up and shut down, sampling/testing of the product, and operating parameters. As part of the CFIA registration process, a sample is submitted every month to an accredited lab for analysis as a fertilizer product.

North Battleford's new Lystek biosolids management system was commissioned in December 2014, making the City of North Battleford the first municipality in Western Canada to adopt and successfully implement this system, on budget and almost a year ahead of schedule.

On June 3, 2015, the city won the 2015 Canadian Association of Municipal Administrators Environment Award for populations under 20,000, for its Lystek Biosolids Management Program. ▶

*Kevin Litwiller is the director of business development for Lystek International Inc., which specializes in the provision of safe, proven, cost effective and sustainable technology solutions for the organic materials recovery sector.*

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