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GEOTEXTILE SYSTEM PROVIDES LONG-TERM BIOSOLIDS MANAGEMENT SAVINGS FOR SMALL TOWN

By **Kevin Bossy** and **Paul Saulnier**

Prior to 2014, the wastewater plant of North Rustico, Prince Edward Island, was disposing of as many as three truckloads of waste biosolids per week, at an annual cost of nearly \$50,000.

So, when the town of about 600 residents began planning to replace its aging wastewater plant, one of the top priorities was to implement a simple, economical and environmentally sustainable process for biosolids management. The result was the island's first-ever system to incorporate geotextile bags and specially selected polymers to dewater municipal waste biosolids. Also, it produces composted, stabilized biosolids that are suitable for land application.

This simple, low-energy approach eliminated the expense of daily biosolids hauling and enabled the North Rustico wastewater treatment facility to become self-sufficient for biosolids management. Dewatered solids are now composted on-site and either distributed on the property surrounding the plant, or taken by farmers to be used as a soil amendment.

The success of this project was recognized in 2014 with the Excellence in Water Stewardship Award from the Council of the Federation, which is comprised of Canada's provincial and territorial Premiers.

STAKEHOLDERS WEIGH IN

"This was a truly collaborative effort," says Les Standen, chairman of the North Rustico water and sewer committee and deputy mayor. "We brought everyone together to design our new plant and ensure it met our operational, environmental and financial goals. Our operators played a key advisory role in addition to consulting engineers, equipment vendors and our water and sewer committee."

Several factors were considered as the town evaluated biosolids management options. Some of the most important factors included: operational cost savings for



Biosolids produced at the plant have been approved by the PEI Department of Environment, Water and Climate Change for land application.

the community; simple process that does not add significantly to operator responsibilities; easily expandable to accommodate community growth; and operational flexibility.

Although North Rustico only has about 600 permanent residents, this number can swell to as many as 10,000 during the tourist season. Each process in the new treatment plant would have to be adaptable to the variable flow and wastewater characteristics that would be experienced throughout the year.

GEOTEXTILE DEWATERING SYSTEM

In 2014, North Rustico commissioned a new sequential batch reactor (SBR) wastewater treatment plant designed to handle peak flows of 2,600 m³/day. The plant was also equipped with a new biosolids management system, supplied by Bishop Water Technologies. It incorporates Geotube® geotextile dewatering containers, a

unique non-mechanical polymer mixing and activation system and a computerized control system that is integrated to the plant's SCADA system.

The process is simple. Waste biosolids from the plant are first pumped to a storage tank, which usually takes about six to 12 weeks to fill, depending on the time of year. Once full, the storage tank is aerated for several days to create a homogeneous biosolids mixture.

Assistant operator, Lenny Blacquiere, was part of the original operations team for the new plant and was one of the first to begin using the system. He says that once aeration is complete, he performs a simple jar test to measure the solids concentration of the biosolids and calculate the polymer dose. "After the jar test is done, I just set the dose parameters on the control panel, open a few valves, start the pumps and the rest is pretty
continued overleaf...



A VEPAS system monitors the flow rate and injects polymer directly into the biosolids line.

much automatic,” Blacquiere says.

The dewatering system is equipped with a unique venturi emulsion polymer activation system (VEPAS), which mixes and activates polymer in a single step before injecting it directly into the biosolids flow line. Its venturi-based design also eliminates many of the components typically found in mechanical polymer systems, such as mixers and aging tanks.

“Once we finish pumping out the biosolids storage tank, it only takes about an hour to completely disassemble, clean and reassemble the VEPAS,” Blacquiere says. By comparison, conventional polymer systems can take several hours or more to clean.

Polymer is essential to accelerate and enhance the dewatering process and to prevent blockage of the microscopic pores in the woven polyethylene fibres of the geotextile bag. The VEPAS at North Rustico also incorporates PLC controls and sensors that measure biosolids flow rate and automatically adjust the polymer dose to maintain optimal dewater-

ing performance.

Biosolids are pumped at a rate of about 250 L/min into one of four Geotube containers that are positioned on a large concrete lay-down area. Each container measures 17.4 m in length and 13.7 m in circumference. As the bag is filled and dewatering occurs, clear filtrate passes through the pores of the Geotube containers. It is then collected inside the lay-down area and directed back to the plant headworks for additional treatment.

DEWATERING CONTAINERS PROVIDE YEARS OF TROUBLE-FREE SERVICE

Head operator, Preston Silliker, says the plant began operating with two dewatering bags, but an additional cell and two more containers were added in 2018. “With four dewatering containers, we can alternate their use to maximize the capacity of each bag and also provide plenty of time for the biosolids to dewater and compost. We can leave the bags on the pads for several seasons. As they dewater, volume decreases and more



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Biosolids are pumped at a rate of about 250 L/min into one of four Geotube containers that are positioned on a large concrete lay-down area.

space becomes available for us to top them up again and again. Winter freeze also helps since they tend to lose a lot of water in the spring when they thaw.”

As an example, in the prior season some Geotube containers were pumped to about 76 cm in height just before winter. In the spring, their height decreased by half, to about 38 cm, which enabled them to continue accepting biosolids throughout the following season.

One additional Geotube container can be set up in a greenhouse during the winter months, enabling biosolids to be pumped and dewatered year-round.

LONG-LASTING BENEFITS

“Each dewatering container lasts for about three years before it’s full,” says Silliker. “When we open it up, the material inside is dry and light like peat and is odourless. We worked with the Department of Environment, Water and Climate Change to test that there are no harmful residuals in the biosolids and that they can be safely spread on farmland and our property.”

“This system has provided many benefits to plant operation and our community,” Standen says. “Not only do we have on-site biosolids treatment, but also significant savings in labour and hauling fees. We’ve had this new plant for five years now and haven’t had to raise rates. This is in part because this new biosolids management system is helping save money for the community and keep rates low.” ■

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