

Wastewater Treatment Process as a Potential Sustainable Source of Plant Nutrients and Soil Amendment in Western Canada

Carlos Guzman, M.Sc.
EcoLibra Systems Inc.

Introduction

EcoLibra Systems Inc. commercializes an innovative municipal wastewater treatment technology. This technology, called Resource Recovery System-Municipal Sewage (R2S-MS), employs mechanical processes and the use of safe, non-toxic, soil-friendly additives to turn sewage into clean water that can be re-used or returned to the environment. The technology is a package wastewater treatment and recovery system with flexible design capability that can fit within a small building, mobile cargo trailer, or sea-can.

Wastewater treatment processes produce residuals, known as sewage sludge or municipal biosolids, as a by-product of the treatment processes. Biosolids are nutrient-rich organic materials, which have the potential of decreasing the use of inorganic fertilizers, and promote the conservation of energy (USEPA, 2006). The use of safe, non-toxic, and soil-friendly chemicals in R2S-MS process results in a municipal sludge by-product with potential soil conditioning applications. The sludge produced does not require addition conditioning or stabilization processing for direct land application.

Wastewater Treatment Process

The R2S-MS technology is a patented wastewater treatment process (Lakshman, 2007), which was originally developed in 2003 to treat hog manure. The R2S-MS process is an automated, semi-continuous batch, chemical/physical municipal wastewater treatment system ideal for small communities and developments. The system incorporates both chemical treatment through direct addition of chemicals and physical processes to treat municipal strength wastewater. The process involves a series of consecutive steps to progressively treat wastewater constituents (Figure 1).

R2S-MS has been independently tested and proven at sites across the Canada. EcoLibra Systems' proprietary process is currently a verified technology by the Canadian Environmental Technology Verification (ETV) Program.

Biosolids Handling Issues

Continuous population growth and abatement of wastewater pollution require establishing new regulations and development of new technologies to help reduce the volume of biosolids and improve biosolids characteristics for soil conditioning. Currently, there are no national guidelines or recommendations on best management practices for land application of biosolids in Canada (CCME, 2010). The parameters used to assess the quality of biosolids are generally common among most provinces (trace metals, pathogen and pathogen indicators, etc.). Provinces use different classification/categorization for municipal biosolids and also adopt different names for the various classes of biosolids. Compared with other provincial requirements, Nova Scotia has the most stringent guidelines with regards to standards and testing of biosolids. Under provincial Solids Waste Management Strategy, the disposal of organics in landfills and incinerators is prohibited in Nova Scotia. Only Class A biosolids are not considered a waste and no approval for land application is required.

Biosolids produced by R2S-MS process meet quality standards for Nova Scotia Class A municipal biosolids (Table 1). Thus, R2S-MS makes it is possible to take advantage of the nutrient content and soil conditioning properties of municipal biosolids to supply some of the fertilizer needs of an agronomic crop or for vegetative cover, without further sludge conditioning or stabilization. Improvement of soil physical conditions and addition of nutrient value are the main benefits of biosolids produced by R2S-MS process.

Table 1. Biosolids Characterization

Parameter	Units	Value	
		NS – Class A*	R2S-MS Biosolids
pH	pH units	NA	9.49
Total Cyanide	µg/g	NA	<0.1
E. coli	MPN/g	NA	1
Fecal Coliform	MPN/g	<1000	1
Salmonella	MPN/4 g	<3	ND
Total Kjeldahl Nitrogen	µg/g	NA	<4750
Carbon	%	NA	<13.7
Arsenic	µg/g	13	<0.96
Cadmium	µg/g	3	<0.5
Calcium	µg/g	NA	<268,000
Chromium	µg/g	210	<7.15
Cobalt	µg/g	34	<0.87
Copper	µg/g	400	<49.5
Lead	µg/g	150	<1.82
Mercury	µg/g	0.8	<0.19
Molybdenum	µg/g	5	<1.05
Nickel	µg/g	62	<7.1
Phosphorous	µg/g	NA	<4,650
Selenium	µg/g	2	<0.69
Sodium	µg/g	NA	<6,500
Zinc	µg/g	700	<105

* Nova Scotia Class A Biosolids (Nova Scotia Environment, 2010)

Potential for Collaboration

Sustainable biosolids management requires proper control and influencing the quality and characteristics of biosolids to avoid negative impacts to the environment and optimize beneficial uses. EcoLibra Systems is looking for researchers and industries who can contribute to, and benefit from, our wastewater technology solution and commercial vision. These opportunities could include:

- Laboratory and Field testing of biosolids
- Potential uses of biosolids, or biosolids mixtures, for soil conditioning or other environmentally friendly purposes

References

- [1] U.S. Environmental Protection Agency (USEPA) - Office of Wastewater Management. (2006). Emerging Technologies for Biosolids Management. EPA 832-R-06-005, Washington.
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- [4] Canadian Council of Ministers of the Environment (CCME). (2010). A Review of the Current Canadian Legislative Framework for Wastewater Biosolids. PN 1446.
- [5] Nova Scotia Environment (2010). Guidelines for Land Application and Storage of Municipal Biosolids in Nova Scotia.

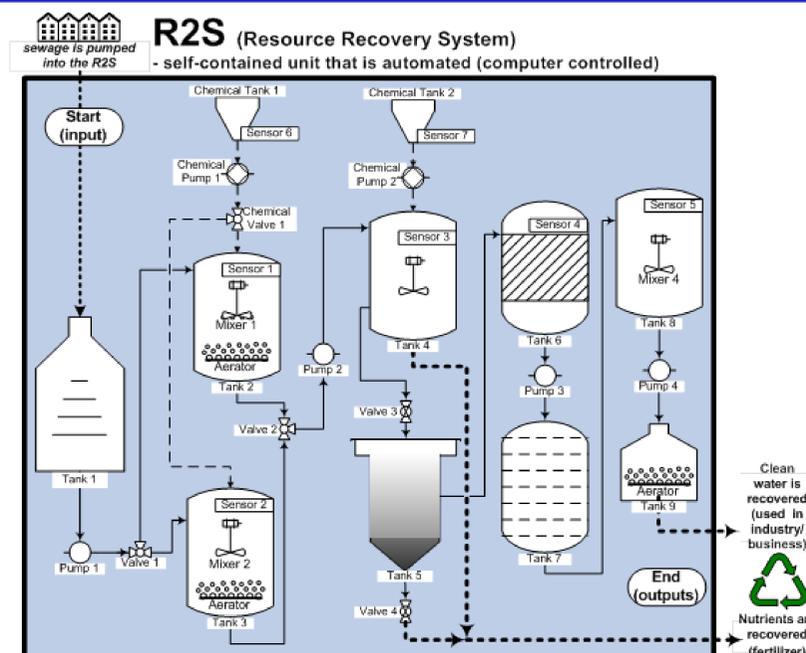


Figure 1. Resource Recovery System-Municipal Sewage