

BIOSOLIDS MANAGEMENT

Factsheet

WHAT ARE BIOSOLIDS?

Biosolids are the nutrient-rich organic materials produced during the treatment of sewage sludge. When treated and processed, sewage sludge becomes biosolids, which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils; as well as stimulate plant growth (US Environmental Protection Agency).



Figure 1 – Raw sewage disposed into the environment (source: www.cof.edu).

WHY TREAT SEWAGE?

When untreated sewage is dumped or overflows into lakes, rivers and oceans (figure 1), it contaminates the ecosystems and can cause disease or death for many species. Further, it pollutes surface water, and in some cases, ground water. As contamination spreads, vital food, water and other natural resources become increasingly toxic. Once treated (stabilized), sewage sludge can be recycled.

MANAGEMENT OPTIONS

A sustainable biosolids management program ensures the following: compliance with regulatory requirements; production of quality biosolids; minimal odour; cost-effectiveness; and public acceptance and safety. See Table 1 for a list of management options.

Under the provincial Solid Waste Management Strategy, the disposal of organics in landfills and incinerators is banned in Nova Scotia.

Table 1 – Common Management Options for Biosolids.

Method	Description
Land Application	Once stabilized, biosolids can be beneficially used at appropriate application rates as soil conditioners (fertilizers, sources of organic material, etc) on agricultural farmland, forest land, public works projects, landscaping activities and land reclamation.
Incineration	Biosolids are processed at high temperatures in an enclosed device. This process produces an ash that must be properly disposed.
Landfilling	Biosolids are placed in a disposal facility that is usually lined. Landfills are monitored continuously and are required to comply with other regulatory design and operational criteria.

STABILIZATION METHODS

Stabilization is the treatment process used to reduce the concentration of disease-causing organisms and odour of the biosolids. The methods are not exclusive; more than one method may be used at a treatment plant. Typical methods include:

Digestion – Complex organic substrates found in untreated biosolids are decomposed by microorganisms. Digestion occurs in a vessel and can be aerobic or anaerobic.

Lime Stabilization – An alkaline material, such as lime, is added to biosolids to raise the pH, which reduces the concentration of disease-causing organisms and reduces the odour of the material.

Air Drying – Biosolids are placed in a layer on a sand bed or paved surface for an extended period of time, and through evaporation and draining a dry material is produced.

Composting – In a controlled environment, aerobic processes are used to accelerate decomposition. The resulting material is humus or soil-like and may be used for landscaping and other soil amendments.

Heat Drying – A drier is used to remove water from the biosolids. The resulting product is pellet-shaped, and this process is often referred to as pelletization.

Chemical Fixation – Biosolids are blended with lime or kiln dust. The addition of an alkaline material produces heat and raises the pH. The resulting material is often used as an agricultural liming agent.

DO BIOSOLIDS DIFFER?

The characteristics of biosolids vary, depending on their origin (vegetative, animal or human) and the treatment process to which they have been subjected. The characteristics determine whether the end use will be beneficial.

Biosolids acceptable for land application and/or storage in Nova Scotia will fall into one of three categories, depending on metal and pathogen content: exceptional quality (EQ); Class A; or Class B.

There are no restrictions for land application of EQ biosolids or biosolids regulated under the Canadian Fertilizer Act, and no Approval is required. However, land application of either Class A or Class B biosolids requires an Approval, and restrictions pertaining to the use of these products will apply.

CONSIDERATIONS

Concerns related to the land application of biosolids generally include odour, nutrient levels in run-off, the presence of pathogens and related health effects, and the social implications or health effects of using what many perceive to be ‘human waste’ to grow crops. The presence of pharmaceuticals, antibiotics, hormones and industrial chemicals has also been a concern amongst the general public.

Further, all biosolids contain variable amounts of metals, some of which are essential to plant nutrients. When applied to soils in excessive amounts, metals may accumulate in the soil. Soil loadings of metals must therefore be controlled in biosolids application. The metal concentration in biosolids intended for land application (EQ or Class A/B) must not exceed Maximum Acceptable Metal Concentrations (Table 1)

If biosolids are properly treated and managed, odour should not be a problem. Land application Approval holders will be required to conduct testing to ensure that odours are minimized. Further, Guidelines and best management practices for the land application of biosolids can prevent odours from becoming a public nuisance.

*Table 1 - Maximum Acceptable Metal Concentrations & Pathogen Reduction Requirements for Biosolids**

	EQ	Class A	Class B
Metals (mg/kg dry wt)			
Arsenic	13	75	75
Cadmium	3	20	20
Cobalt	34	150	150
Copper	400	760	760
Mercury	0.8	5	5
Molybdenum	5	20	20
Nickel	62	180	180
Lead	150	500	500
Selenium	2	14	14
Zinc	700	1850	1850
Pathogens			
Fecal Coliform	<1000 MPN/g dry wt	<1000 MPN/g dry wt	<2,000,000 MPN/g dry wt
Salmonella	<3 MPN/4g dry wt	<3 MPN/4g dry wt	n/a

*Nova Scotia Department of Environment and Labour, *Guidelines for Land Application and Storage of Biosolids in Nova Scotia*.

REGULATING THE LAND APPLICATION OF BIOSOLIDS

In Nova Scotia, the land application of biosolids is regulated by the provincial Department of Environment and Labour, through its *Guidelines for Land Application and Storage of Biosolids in Nova Scotia*. The *Guidelines* may be accessed online (<http://www.gov.ns.ca/enla/water/docs/BiosolidGuidelines.pdf>) or obtained from Nova Scotia Department of Environment and Labour offices.



Figure 2 – Land applied biosolids (source: www.toaks.org).

For more information, please contact AgraPoint Ag Info Centre at 1-866-606-4636.

