



## **CIELAP Brief on Biosolids Management in Ontario June 2009**

### **Background**

Biosolids are the solid waste components of wastewater treated by municipal wastewater treatment plants and some industrial processes. While the term "biosolids" is often used interchangeably with "sewage sludge," biosolids are generally defined as sewage sludge that has undergone treatment to meet pre-determined standards.

Biosolids often contain significant concentrations of nutrients such as nitrogen and phosphorus. Biosolids also generally contain low concentrations of pathogens such as bacteria, molds and toxins that can have adverse effects on human health. Biosolids may be contaminated with heavy metals (also referred to as trace metals or trace elements) such as chromium, cadmium, lead and other contaminants that end up in sewage treatment plants after having been discharged into sewers as industrial waste. There are also emerging concerns that biosolids contain contaminants such as antibiotics, hormones and other endocrine-disrupting substances that have originated from the manufacture and use of pharmaceuticals and personal care products.

The composition of biosolids varies between different wastewater treatment plants. It typically depends on the quantity and quality of the wastewater that is inputted into the plant and the type of wastewater treatment system used to remove and stabilize substances contained in the wastewater. There are four possible levels of wastewater treatment that may be used by wastewater management facilities. Each treatment produces a product with different chemical and physical characteristics. The method and degree of treatment affect biosolids quality, their physical form and how they are allowed to be used.

This brief outlines the current regulatory regime governing the use of biosolids in Ontario, summarizes stakeholder perspectives on land application of biosolids for agricultural and soil amendment purposes, and concludes with recommendations that CIELAP has made on this topic.

### **Biosolids Use and Disposal**

Each year, Ontario generates approximately 300,000 dry tons of municipal sewage biosolids. Some 40% are applied to land, 40% go to landfills and 20% are incinerated. Increasingly, the economic and environmental costs of landfilling and incineration are leading municipalities to pursue land application as a means of biosolid disposal.

Some stakeholders have recognized biosolids as potentially useful soil amendments as they can be a source of nitrogen, phosphorus, organic matter, and other nutrients that can enhance soil physical properties as well as plant yield. However, others have expressed significant concerns about the application of biosolids to agricultural land, citing possible risks to people living nearby, to those applying the biosolids, and to those eating any food produced from the land due to the presence of low-level pathogens, heavy metals and organic pollutants that can cause health problems.

In addition to land application, biosolids are being used in some jurisdictions for other types of soil amendment such as landscaping, mine reclamation, composting, landfill closure,

silviculture and soil-surface revegetation. As with agricultural application, biosolids used for other types of soil amendment offer both potential benefits and potential detriments because the soil receives both the good and the bad constituents that make up the biosolids.

### **Regulation of Biosolids in Ontario**

Biosolids are regulated in Ontario under both the *Environmental Protection Act* (EPA) and the *Nutrient Management Act* (NMA). The Ministry of the Environment (MOE) must approve the application of biosolids to land. In order to apply biosolids to be land, a certificate of approval to establish or operate a waste management system or waste disposal site under the EPA must be obtained. In addition, Regulation 347 under the EPA provides details on the regulation of organic soil conditioning sites and the standards applied, such as distance from watercourses, points of access to water, and distance from residences. Many waste management projects are also regulated under the *Environmental Assessment Act*. The application of biosolids to land is permitted as long as these regulatory requirements are met.

MOE issued *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land* in March 1996. These guidelines are used to evaluate the suitability of sites for the application of biosolids. They outline "criteria which must be met before biosolids or other waste materials can be considered for use on agricultural land" including that the materials must be beneficial to crop production or soil health and not degrade the natural environment. These are only guidelines, however, and not enforceable unless compliance with them is made a condition of a certificate of approval.

The NMA regulates biosolids as "non-agricultural source material" intended for application to land as nutrients. O. Reg. NMA 267/03 under the NMA: prohibits application of these materials to land that is unsuitably close to adjacent surface waters and sensitive areas; sets out criteria regarding heavy metal concentrations and suitable soil types and topography; and outlines the amount, method and timing of application. Before being approved for application on farmland, biosolids must be tested for pH, available potassium and phosphorus and regulated metals, and meet sampling requirements set out in the regulation.

In September 2007, MOE solicited public input on proposed regulatory amendments that would create a new framework for managing non-agricultural source materials, eliminating overlapping approval requirements and revising existing standards. In June 2009, MOE began further public consultation on its proposed regulatory framework governing the application of non-agricultural source materials on agricultural land. Under the proposal, non-agricultural source materials would be managed as a nutrient rather than as a waste if it is used to enhance the productivity of agricultural land, and would not require a certificate of approval. The standards in the proposed regulatory framework would focus on the quality of the non-agricultural source materials being applied to land.

### **Stakeholder Perspectives**

**MOE** and the **Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)** have, as a matter of policy, put their support behind the use of biosolids for crop enhancement. OMAFRA suggests that applying sewage biosolids to farmland according to best management practices will:

- improve soil fertility, offsetting the need for commercial fertilizers; and
- add organic matter, enhancing soil structure, moisture retention and permeability, while reducing the potential for wind and water erosion.

OMAFRA contends that the application of biosolids to agricultural land will benefit urban and rural communities alike. The disposal practice recycles essential nutrients and provides economic and environmental benefits. Further, OMAFRA believes that the standards currently in place in the regulations adequately address environmental quality, food safety and human health issues.

**Farmers** generally recognize the potential economic benefits of biosolid application. With the price of commercial fertilizers at all time highs, the economic advantages of using biosolids become more patent.

However, **many stakeholders, including some farmers, residential communities, organizations and academics**, are apprehensive about the use of biosolids on agricultural land. They have put forth the following concerns:

- Some communities oppose the regulatory amendments that were proposed in 2007 because they disagree with the assumption that the spreading of biosolids is beneficial to crop production and safe for human health. Under the proposed amendments, those who transport and apply biosolids would be exempt from certificate of approval requirements under the EPA. MOE claims that the existing approval process would not be necessary because the new regulations would impose stricter requirements on the amount of nutrients needed in biosolids before they can be applied as fertilizer. However, communities are concerned that the new regulations will eliminate transparency. Currently, the easiest way to access information about biosolids application is by reviewing certificates of approval that have been granted, which are available to the public.
- The most frequent complaint associated with land application of biosolids is odour. The strong odours that biosolids emit are a nuisance when applied near residential areas. The odours can plague communities, adversely affecting tourism and quality of life. However, some argue that pig manure is 10 times more malodorous than biosolids.
- Damage to the environment can occur if biosolids wash into waterways. Nitrogen and phosphorus can deplete oxygen, initiate algal blooms and kill fish.
- In addition to domestic sewage, many municipal sewage treatment plants receive industrial sewage and landfill leachate, which are then found in biosolids. Some argue that to combat the hazards inherent in these materials, biosolids should be sterilized and then disposed of in sanitary landfills. Sewage discharge is currently regulated by municipal sewer use bylaws.
- Sewage treatment plants may leave pathogen levels relatively high in treated biosolids. A report released by the University of Ottawa's Faculty of Medicine concluded that treatment may not reduce certain pathogens and may lead to less reduction than expected of other pathogens. It should be noted that treatment successfully lowered most pathogen concentrations.
- Pathogens contained in biosolids can cause infection. Typically, the densities of pathogens are significantly reduced by treatment and processing. However, some stakeholders are concerned that there are pathways through which these pathogens may infect humans and animals. These include direct ingestion, inhalation of bioaerosols and direct contact with an infectious agent through mucous membranes or damaged skin.

### **Options to address concerns about land application**

The Ontario Government recommends that farmers use on-farm biosolids treatment technologies. In July 2007, O. Reg. 267/03 under the NMA was amended to encourage farmers to use either vegetative filter strip systems to treat and improve the quality of

runoff water, or anaerobic digesters, like those in treatment plants, to treat manure and organic wastes. These amendments allow farmers to use anaerobic digesters without government approval, where they previously needed certificates of approval under the EPA to do so.

Some potential benefits from the use of these technologies include: lower pathogen concentrations and odours than those of manure or untreated biosolids; reduced risk of adverse environmental effects; and an increase in the province's ability to treat off-farm organic waste.

Perspectives differ on whether incineration is an appropriate disposal method for biosolids. Incineration offers the greatest potential for reducing the volume of biosolids but the remnant ash must be disposed of in a landfill. Air quality is also a serious concern. The incineration process emits acid gases, carbon dioxide and various toxic chemicals, depending on the composition of the biosolids. Also, incineration fails to make beneficial use of the nutrients available in biosolids.

Some jurisdictions have used municipal biosolids to assist with reclaiming operational and abandoned mine sites, but further assessment of the potential for adverse environmental impacts is needed.

### **CIELAP perspective**

CIELAP believes that where any use of biosolids or any disposal method is being considered, biosolids quantity and quality, as well as the impacts of biosolids on air and water quality, should be studied and assessed to ensure that environmental and human health will be protected. The Ontario Government should carefully consider different stakeholder perspectives in finalizing its regulatory regime governing biosolids application.

It is important that any decisions be made in the context of core principles that include: ensuring a thorough assessment; taking an ecosystem approach; taking a precautionary approach; considering cumulative impacts; addressing risk and uncertainty; and ensuring meaningful and timely public consultation. CIELAP conveyed this perspective on the use of biosolids in our 2008 report, *Biosolids in Mine Reclamation? A Review of the Literature*.