

Biosolids

Beneficial Reuse Fact Sheet

Biosolids are the nutrient-rich organic product of wastewater treatment. During the wastewater treatment process, the liquid portion of the wastewater is treated and returned to rivers or lakes, and the solids, or 'sludge', are further processed into stable organic material, called biosolids. Everyone contributes directly or indirectly to biosolids, whether connected to sewer systems or on septic tanks. It is therefore important for households and businesses to properly dispose of hazardous materials at waste collection facilities and not into a sewer or septic system.

The management options for sludge or biosolids that are currently available to Vermont municipalities include **non-beneficial uses** such as landfill disposal or incineration, both of which are becoming less of a viable option in Vermont due to impending facility closures and distances from municipalities, and **beneficial uses** such as a fertilizer and soil amendment for agricultural land, urban and suburban developments, or land reclamation projects.

BENEFICIAL REUSE

The use of human wastes (night soil) as a fertilizer dates back thousands of years and the recycling of biosolids to the land has historically been an objective at both the Federal and State levels. Vermont statutes at 10 V.S.A. §6604 (c) stipulate that the Vermont Solid Waste Management Plan "*shall set forth a comprehensive statewide program for the collection, treatment, beneficial use, and disposal of septage and sludge.*"

Biosolids contain essential plant nutrient and organic matter and, after an approved pathogen treatment process, can potentially be managed by application to agricultural lands as a valuable nutrient source and soil conditioner.

The noted benefits of biosolids applied to agricultural land include:

- a supply of plant essential nutrients
- addition of organic matter to soil
- reduced soil erosion
- increased soil water holding capacity
- improvement of soil structure
- enhanced soil fertility and crop yields

Additionally, some benefits of reusing biosolids include:

- conserving valuable space in landfills
- reducing greenhouse gas emissions (methane) from landfills
- substitution for fossil-fuel based commercial fertilizers
- carbon sequestration in soils, resulting in a net credit of greenhouse gas



Biosolids ready for land application

Biosolids are also used in the preparation of manufactured top soils and in land reclamation projects to reduce the phyto and bioavailability of lead, zinc and cadmium in smelter contaminated soils and alluvial tailings from mining operations.

Because the land application of biosolids combines cost effective management of these abundant materials with the return of valuable nutrients back to the soil and the enhancement of soil properties and plant yield, the State of Vermont recognizes that biosolids are not a waste but a valuable commodity that can be beneficially recycled.

ARE BIOSOLIDS SAFE?

Biosolids recycling is highly regulated and encouraged by the United States Environmental Protection Agency (EPA) and state authorities. The Vermont Department of Environmental Conservation issues permits for biosolids land application sites in Vermont and requires routine monitoring, testing and reporting of biosolids, soils, groundwater and plant tissue quality. Land application in Vermont is limited to the growing season and sites are typically inspected annually or biannually.

To ensure that biosolids are treated and appropriately managed, the EPA performed extensive risk assessments, conducted field studies and developed comprehensive national standards to reduce the potential environmental and human health risks associated with the land application of biosolids. In 1993, the EPA issued its biosolids use and disposal regulation, 40 CFR Part 503, commonly referred to as "Part 503".

Prior to land application, the metals content of biosolids must meet Vermont standards, which are more strict than the federal standards established under Part 503:

Comparison of metal concentration (mg/kg, dry wt.) standards for land application of biosolids

	As	Cd	Cr	Cu	Pb	Hg	Mo	Ni	Se	Zn	PCB
EPA Part 503	75	85	NR	4300	840	57	75	420	100	7500	NR
Vermont	15	21	1200	1500	300	10	75	420	100	2800	10

NR = no regulatory standard established.

* No standard established in Part 503, but any waste containing >50 mg/kg PCB must be managed per specific regulation for PCBs manufacturing, processing distribution in commerce and use prohibitions (40 CFR Part 761).

In addition to metals standards, the EPA requires the use of specific treatment processes such as aerobic/anaerobic digestion, composting, or alkaline stabilization, that raise temperatures of the biosolids enough to reduce pathogenic content to below federally established standards. Based on the final pathogenic content, there are two classes of biosolids defined by EPA regulations: Class B and Class A.

Class B biosolids still contain pathogens (but less than untreated animal manures) and must, therefore, be managed at sites that are specifically permitted for use where there is little opportunity for public contact, in accordance with regulations. After land application, further reductions in pathogens are achieved by the natural environment – oxygen, sunlight, soil bacteria. All Class B biosolids produced in Vermont are currently used on agricultural land.

Class A biosolids are treated in an advanced process so that pathogens are reduced to below detectable levels. All Class A biosolids used in Vermont for landscaping and gardening must meet the EPA's "Exceptional Quality (EQ)" requirements. Extensive research has shown that EQ biosolids products are safe for use by the general public.

The quality of biosolids has continued to improve as municipalities educate consumers about proper hazardous waste disposal and institute pretreatment and source control programs to regulate the quality of wastewater discharged to the wastewater treatment system. Long-term scientific studies have consistently demonstrated that biosolids recycling is safe and beneficial when performed in accordance with regulations and guidance.