

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 the environment, and the solids, or 'sludge', may be further processed into stable organic material, called biosolids. Everyone contributes directly or indirectly to biosolids, whether connected to sewer systems or septic tanks. It is therefore important for households and businesses to properly dispose of hazardous materials (chemicals, paint, pharmaceuticals, etc.) and non-biodegradable materials (wipes, sanitary products, diapers, etc.) at the [appropriate waste collection](#) facility and not into a sewer or septic system.

Vermont municipalities can currently manage sludge through **disposal** at landfills, which have limited capacity and are often far from municipalities, and **beneficial use as biosolids** via fertilizers and soil amendments for agricultural land, urban and suburban developments, or land reclamation projects.

BENEFICIAL REUSE

The use of human waste (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 statute 10 V.S.A. §6604 (c) stipulates 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 nutrients 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 macro and micronutrients
- 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 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 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 503s", and continues to conduct biennial reviews of these regulations.

The State of Vermont has also performed its own risk assessments and established more strict standards via the Vermont Solid Waste Rules. The Vermont Department of Environmental Conservation (DEC) [Residuals Management & Emerging Contaminant Program](#) issues permits for biosolids generators and land application sites in Vermont and requires routine testing and reporting of biosolids, soils, groundwater, and plant tissue quality. Prior to beneficial reuse in Vermont, biosolids must meet DEC standards:

Comparison of pollutant 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	1

PCB= polychlorinated biphenyls

NR = no regulatory standard established.

Per- and polyfluoroalkyl substances (PFAS) constitute a large family of fluorinated chemicals used for decades in industrial processes, firefighting foams, and consumer products and they are now found in the majority of environmental media, including biosolids, at trace levels across the globe. Toxicological studies have raised concerns regarding the bioaccumulative nature and potential health concerns of some PFAS. As a result, our understanding of PFAS and the risks they may pose is rapidly evolving as DEC continues to assess and update rules and standards.

In addition to pollutant standards, the EPA and DEC require the use of specific treatment processes such as aerobic/anaerobic digestion, composting, or alkaline stabilization, to reduce vector attraction and pathogenic content to below federally established standards. Based on the level of treatment, there are two classes of biosolids recognized in Vermont: Class B and EQ (Exceptional Quality) biosolids.

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. After land application, further reductions in pathogens are achieved by the soil bacteria. All Class B biosolids managed in Vermont are currently used on agricultural lands under a permit that includes specific setbacks, cropping restrictions, and in accordance with a nutrient management plan per Vermont's Required Agricultural Practices.

EQ biosolids are treated in an advanced process so that pathogens are further reduced to below established levels. All EQ biosolids used in Vermont for landscaping and gardening must meet specific criteria and standards established in the Vermont Solid Waste Rules.

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.