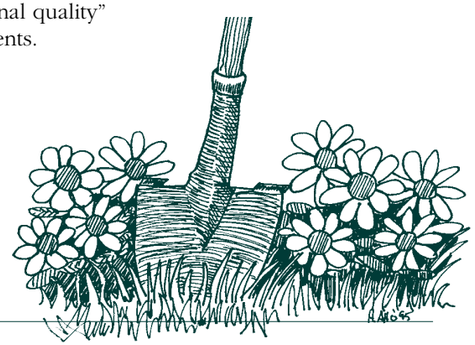
Doing What Comes Naturally

Every day millions of gallons of wastewater containing human and household wastes pass through sewer lines to municipal treatment facilities. During treatment, solid, semi-solid, and liquid residues, or sludges, are removed from the wastewater. These sludges are composed of water, organic matter, nutrients, such as nitrogen, phosphorus, calcium, and magnesium, and micronutrients such as zinc and iron. Over the past several years, the quality of municipal sludges has improved considerably, due in part to the enforcement of federal, state, and local regulations and in part to pretreatment standards that indirect dischargers, such as industries, must comply with before they can send their wastewater to public facilities for final treatment.

Historically, sewage sludge has been considered a waste and has been dumped in municipal and commercial landfills or the ocean—such practices were easy and cheap. But times have changed and so, too, have our attitudes regarding sludge management. We have come to recognize that, like animal wastes, wastewater residuals are a part of the natural cycle of life. They have nutrient and soil-enhancing properties that make them a practical choice for a variety of beneficial uses.

In general, biosolids are processed and treated to suit their ultimate applications. Traditionally, liquid or dewatered biosolids have been applied successfully to agricultural lands, forests, or reclaimed lands. More recently, however, greater emphasis has been placed on processing biosolids so that they can be suited to such markets as landscaping, nurseries, sod farms, and direct use by home owners. Biosolids are safe for unrestricted use by the public if they meet EPA's "exceptional quality" requirements.



"Exceptional Quality" Biosolids

The term "exceptional quality" (EQ) is a category that was developed by EPA to characterize biosolids that may be used in beneficial use programs without a lot of regulatory oversight. EQ biosolids are considered to be of sufficient quality for use in a broad range of applications. Technologies such as composting, heat drying, and alkaline stabilization can produce an EQ material if they meet specific 503 pathogen, metals, and vector attraction requirements.

Composted Biosolids

Composting is nature's way of fertilizing and reconditioning soil by decomposing plant material and animal wastes into a rich, dark humus—nature's own soil elixir. Sewage sludge composting technologies accelerate this natural process under controlled conditions—the sludge is dewatered, mixed with a bulking agent (e.g., wood chips, leaf and yard waste, saw dust), and allowed to decompose aerobically for a period of time. The process produces a well-mixed, fully-decomposed soil amendment.

During the composting process, naturally occurring microorganisms consume organic matter and, at the same time, generate heat. The elevated temperatures increase microbial activity, allow for the evaporation of moisture, kill most weed seeds and assure high levels of pathogen reduction. (Pathogens are disease-causing organisms.)

Optimal microbial development requires oxygen, which is generally provided by mechanical means. Bulking agents also facilitate oxygen flow and moisture control by creating voids in the mixture through which air can readily pass. Detention times of 50 to 60 days are required to ensure the decomposition of readily degradable materials.

This composted organic mixture improves soil tilth, increases water holding capacity, improves aeration, and increases cation exchange capacity. Composted biosolids can be used as a soil conditioner, in topsoil, and in potting soil blends. They can also be used to top dress turf and lawns, recreational fields, parks, and golf courses and can be tilled into existing subsoil to create a loam.

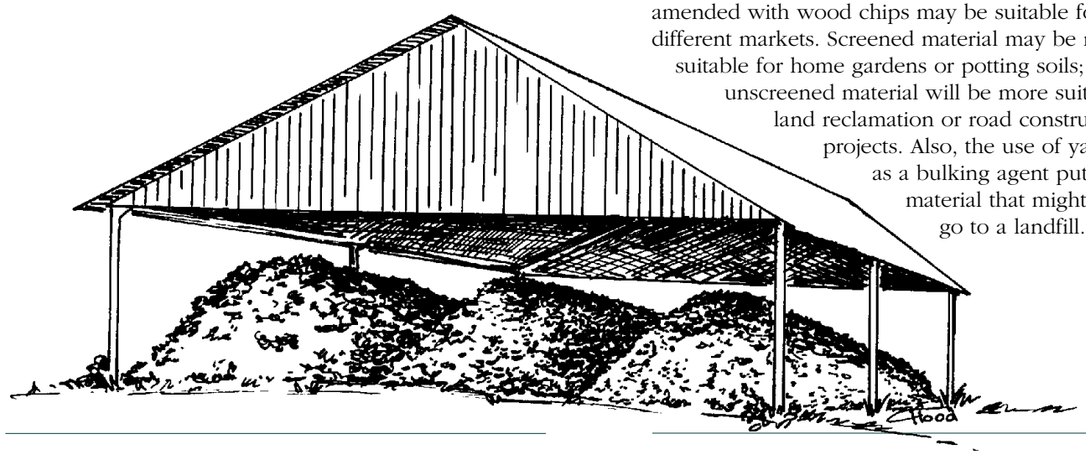
Composting Systems

The processes most commonly used in composting biosolids are windrows, aerated static piles, and in-vessel systems.

- **Windrow composting** is a process in which the biosolids/bulking agent mixture is placed in long open-air piles and turned frequently to provide aerobic conditions and ensure that all parts of the pile are exposed to temperatures that will kill pathogens. This relatively "low tech" process has seasonal limitations, primarily because it does not work well in cold or wet weather.

- **Aerated Static** systems are designed so that aerobic conditions are maintained by blowing or drawing air through the compost piles by way of perforated pipes. The piles are usually insulated with finished compost or a bulking agent to maintain temperatures. There may be an additional curing period of several months. Aerated static piles can function year round in various climates when designed properly.

- **In-Vessel** composting systems are located inside completely enclosed buildings where environmental conditions are closely monitored and controlled. Compost material is located in long bins where aerobic conditions are maintained by mechanical means. These more capital-intensive systems, if designed and operated properly, help assure a year-round, consistent, and marketable product.



The Odor Factor

Odors from composting operations must be adequately controlled if the public is to accept this beneficial use option. Although no biosolids composting process is odor-free, the potential for odor emissions decreases as the material becomes stabilized. Biosolids composting products emit a "musty" or "earthy" odor. If properly sited, designed, and operated, however, composting facilities need not and should not cause odor problems.

To Market To Market

To be successful, a biosolids composting operation must produce a consistent, quality, marketable product. To accomplish this, the biosolids generator must set up a quality control program that ensures that:

- The material that goes into the municipal wastewater treatment system meets certain standards;
- There is a high level of process control;
- The industrial and business base supports the program;
- The compost product is suited to its intended market; and
- The product will be marketed.

There are many potential markets for composted biosolids, but not all compost products are suited to all markets. For example, a compost that has been amended with wood chips may be suitable for two different markets. Screened material may be more suitable for home gardens or potting soils; whereas unscreened material will be more suitable for land reclamation or road construction projects. Also, the use of yard waste as a bulking agent puts to use a material that might otherwise go to a landfill.

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Biosolids are a Natural Resource!

Composting Biosolids

This fact sheet was funded through a grant from EPA-New England to the New England Interstate Water Pollution Control Commission (NEIWPCC). The fact sheet was prepared by NEIWPCC's Residuals Workgroup, which is comprised of the state sludge coordinators from the Northeast States.

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A Residual of Worth

Sludge is an organic solid, semi-solid, or liquid by-product of the wastewater treatment process. Sludge characteristics vary depending on each treatment facility's wastestream and the processes that are used. Sludges that meet EPA standards for land application, which include reduction or elimination of pathogens and very low limits for heavy metals, are referred to as ***Biosolids***.

Although there has been significant research on the beneficial use of biosolids, and history has demonstrated, in the U.S. and other regions of the world, that high quality biosolids can be beneficial soil additives and plant nutrients when applied properly, concerns still exist. These concerns relate primarily to the quality of the biosolid material and its impact on soil productivity, water resources, and adjacent land uses.

To ensure that sludges that are used as biosolids are treated and managed in a manner that protects both human health and the environment, Congress directed EPA to develop a comprehensive national Sewage Sludge Program aimed at reducing risks and maximizing the beneficial uses of sludge. In February of 1993, EPA issued its sewage sludge use or disposal regulation, 40 CFR Part 503, commonly referred to as the "503s." The 503s set minimum quality standards and dictate proper management practices for all sewage sludge that is used or disposed of through land application, surface disposal, and incineration. Many states have more stringent rules.

The Northeast States, NEIWPCC, and the EPA believe that, when managed and applied properly, biosolids can be valuable resources. With the phaseout of unlined landfills, the federal ban on ocean dumping, and growing public awareness of environmental issues, communities have begun to recognize that biosolids can be a resource and not a waste. Many communities have discovered viable, safe, and environmentally sound options for the beneficial use of their biosolids. Some communities have implemented a single beneficial use method, some employ a combination of different sludge use and/or disposal methods, others have entered into regional solutions or contracted with privately-owned facilities. In choosing an option, communities must consider cost, odor control, and siting issues.