National Biosolids Partnership

Frequently Asked Biosolids Questions

1) What are Biosolids?

Biosolids are the nutrient-rich solid organic matter recovered from the treatment of domestic sewage in a wastewater treatment facility. Biosolids are a beneficial resource, containing essential plant nutrient and organic matter and are recycled as a fertilizer and soil amendment. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

2) What is the difference between biosolids and sewage sludge?

Sludge is generally used before applicable beneficial recycling criteria have been achieved which normally occurs at the outlet of the stabilization process. It should be used in tandem with a specific process descriptor (e.g., *primary sludge*, *waste activated sludge*, *secondary sludge*, etc.)

Biosolids is generally used after applicable beneficial recycling criteria have been achieved, i.e., at the outlet of the stabilization process. Common stabilization processes include the following: aerobic digestion, autothermal thermophilic aerobic digestion (ATAD), anaerobic digestion, composting, alkaline stabilization, thermal drying, including flash, rotary, fluid bed, paddle, hollow-flight, disc, and infrared dryers, thermophilic pozzolanic fixation, acid oxidation/disinfection, and heat treatment/acid digestion.

3) Why do we have biosolids?

We have biosolids as a result of treating sewage sludge (i.e., the solids generated during the treatment of domestic sewage in a treatment plant) to meet the land application regulatory requirements). Wastewater treatment technology has made our water safer for recreation and seafood harvesting. Thirty years ago, thousands of American cities dumped their raw sewage directly into the nation's rivers, lakes, and bays. Through regulation of this dumping, local governments now required to treat domestic sewage and to make the decision whether to recycle the solids generated as fertilizer, incinerate them or bury them in a landfill. If the solids meet the regulatory requirements for land application and are recycled, they are biosolids.

4) How are biosolids generated and processed?

Biosolids are generated when solids generated during the treatment of domestic sewage are treated further to meet regulatory requirements. The wastewater treatment can actually begin before the wastewater reaches the treatment plant. In many larger wastewater treatment systems, pre-treatment regulations require that industrial facilities pre-treat their wastewater to remove many hazardous contaminants before it is sent to a wastewater treatment plant. Wastewater treatment facilities monitor incoming wastewater streams to ensure their recyclability and compatibility with the treatment plant process.

Sewage sludge is not generated until domestic sewage is treated in a treatment works, and biosolids are not produced until the sewage sludge meets the land application Part 503 requirements. For these reasons, the treatment of biosolids cannot occur before the domestic sewage reaches the wastewater treatment plant.

Once the wastewater reaches the plant domestic sewage goes through physical, chemical and biological processes that clean the domestic sewage and remove the solids. If necessary, some of the solids are then treated with lime to raise the pH level to eliminate objectionable odors. Pathogen reduction (disease-causing organisms, such as bacteria, viruses and parasites) and other organisms capable of transporting disease for the solids usually occurs in a different process (e.g., a digester).

5) How are biosolids used?

After treatment and processing, biosolids can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth. The controlled land application of biosolids completes a natural cycle in the environment. By treating sewage sludge, it becomes biosolids that can be used as valuable fertilizer, instead of taking up space in a landfill or other disposal facility.

6) Where are biosolids used?

Farmers and gardeners have been recycling biosolids for ages. Biosolids recycling is the process of beneficially using treated residuals from wastewater treatment to promote the growth of agricultural crops, fertilize gardens and parks and reclaim mining sites. Land application of biosolids takes place in all 50 states.

7) Why are biosolids used on farms?

The application of biosolids reduces the need for chemical fertilizers. As more wastewater plants become capable of producing high quality biosolids, there is an even greater opportunity to make use of this valuable resource.

8) What percentage of biosolids is recycled and how many farms use biosolids?

EPA estimates that the 16,000 publicly owned treatment works generate approximately 7 million tons of sewage sludge. About 60% of all sewage sludge is biosolids that is beneficially used as a fertilizer on farm land following treatment; 17% ends up buried in a landfill; 20% is incinerated; and about 3% is landfill or mine reclamation cover. Only a small percentage (much less than 1 percent) of the total food supply has been fertilized with biosolids. Biosolids provide farmers with $60 to $160 per acre worth of fertilizer, including many essential nutrients that the farmer may not normally replenish in the soil. Biosolids also contain valuable organic matter that improves the health, quality and structure of the soil.

9) Are biosolids safe?

Decades of studies have demonstrated that biosolids can be safely used on food crops. The National Academy of Sciences has reviewed current practices, public health concerns and regulator standards, and has concluded that "the use of these materials in the production of crops for human consumption when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production and to the environment." In addition, an epidemiological study of the health of farm families using biosolids showed that the use of biosolids was safe.

10) Do biosolids smell?

Biosolids may have their own distinctive odor depending on the type of treatment it has been through. Some biosolids may have only a slight musty, ammonia odor. Others have a stronger odor that may be offensive to some people. Compounds that contain sulfur and ammonia, which are both plant nutrients, cause most odors.

11) Are there regulations for the land application of biosolids?

The federal biosolids rule is contained in 40 CFR Part 503. Biosolids that are to be land applied must meet these strict regulations and quality standards. The Part 503 rule governing the use and disposal of biosolids contains general requirements, numerical limits , for metals in biosolids, pathogen and vector attraction reduction standards, management practices and frequency of monitoring, record keeping and reporting requirements for land applied biosolids as well as similar requirements for sewage sludge that is surface disposed or incinerated. Most recently, Part 503 requirements have been proposed to limit the concentration of dioxin and dioxin like compounds in biosolids to ensure safe land application. Biosolids are one of the most studied materials that have ever been regulated by EPA.

12) Where can I find out more about the regulations?

The biosolids rule is described in the EPA publication, A Plan English Guide to the EPA Part 503 Biosolids Rule. This guide states and interprets the Part 503 rule for the general reader. This guide is also available in hard copy. In addition to the Plain English Guide, EPA has prepare A Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule which shows the many steps followed to develop the scientifically defensible, safe set of rules (also available from EPA in hard copy.)

The cited references provide valuable information about the Part 503 land application requirements. However, if the information in the references is different form the requirements in the Part 503 rule, the Part 503 rule requirements apply. A number of relevant biosolids publications are located on the National Biosolids Partnership's web page at: http://www.biosolids.org.

13) How are biosolids used for agriculture?

Biosolids are used to fertilize fields on which crops are grown. Agricultural uses of biosolids that meet strict quality criteria and application rates have been shown to produce significant improvements in crop growth and yield. Nutrients found in biosolids, such as nitrogen, phosphorus and potassium and trace elements such as calcium, copper, iron, magnesium, manganese, sulfur and zinc, are necessary for crop production and growth. The use of biosolids reduces the farmer's production costs and replenishes the organic matter that has been depleted over time. The organic matter improves soil structure by increasing the soil's ability to absorb and store moisture.

Crops use the organic nitrogen and phosphorous found in biosolids very efficiently because these plant nutrients are released slowly throughout the growing season. This enables the crop to absorb these nutrients as the crop grows. This efficiency lessens the likelihood of groundwater pollution of nitrogen and phosphorous.

14) Can biosolids be used for mine reclamation?

Severely disturbed soils can be reclaimed through the addition of biosolids to replace lost topsoil. Biosolids have been used successfully to reclaim surface strip mines, large construction sites, parks, wetlands and landfills. Biosolids improve soil fertility and stability, aiding revegetation and decreasing erosion. Biosolids have been used successfully at mine sites to establish sustainable vegetation. Not only does the organic matter, inorganic matrix and nutrients present in the biosolids reduce the bioavailability of toxic substances often found in highly disturbed mine soils, but also regenerate the soil layer. This regeneration is very important for reclaiming abandoned mine sites with little or no topsoil. The biosolids application rate for mine reclamation is generally higher than the agronomic rate, which cannot be exceeded for use of agricultural soils. The Part 503 land application requirements have to be met when biosolids are used to reclaim disturbed areas.

15) How are biosolids used for forestry?

Biosolids improve forest productivity, increase growth of hybrid poplars and enhance the aesthetic value of Christmas trees. Where biosolids have been used, the trees grow faster than those living in unfertilized soils. Wildlife populations often increase in these areas because the under story vegetation is more abundant. Biosolids have been found to promote rapid timber growth, allowing quicker and more efficient harvest of an important natural resource. The Part 503 land application requirements have to be met when biosolids are applied to forests.

16) Can biosolids be used for composting?

Yes, biosolids may be composted and sold or distributed for use on lawns and home gardens. Biosolids composted with sawdust, wood chips, yard clippings, or crop residues make excellent mulches and topsoils for horticultural and landscaping purposes. Even after composting, the sewage sludge has to meet the appropriate Part 503 requirements for it to become biosolids that can be applied to lawns and home gardens. Many professional landscapers use composted biosolids for landscaping new homes and businesses. Home gardeners also find composted biosolids to be an excellent addition to planting beds and gardens. Most biosolids compost, are highly desirable products that are easy to store, transport and use.

17) Are there rules about where biosolids can be applied?

To determine whether biosolids can be applied to a particular farm site, a good management practice includes an evaluation of the site's suitability and is generally performed by the land applier. The evaluation examines water supplies, soil characteristics, slopes, vegetation, crop needs and the distances to surface and groundwater.

There are different rules for different classes of biosolids. Class A biosolids contain no detectible levels of pathogens and must meet strict vector attraction reduction requirements and low levels metals contents. The biosolids preparer usually applies for a permit and only have to apply for permits to ensure that these very tough standards have been met. However, the Part 503 requirements have to be met even if there is no permit. Class B biosolids are treated but still contain detectible levels of pathogens. There are buffer requirements, public access, and crop harvesting restrictions for Class B biosolids. (The land application site restrictions have to be met in all cases where Class B biosolids are land-applied.)

Nutrient management planning ensures that the appropriate quantity of biosolids is land applied. The biosolids application is specifically calculated to match the nutrient uptake requirements of the particular crop. Nutrient management technicians work with the farm community to assure proper land application and nutrient control.

18) Are there buffer requirements or restrictions on public access to sites with biosolids?

Exceptional quality biosolids used in small quantities by general public have no buffer requirements, crop type, crop harvesting or site access restrictions. Exceptional Quality biosolids is the name given to treated residuals that contain low levels of metals and pathogens, and do not attract vectors. When used in bulk, Class A biosolids are not subject to buffer requirements. There are buffer requirements, public access, and crop harvesting restrictions for all Class B biosolids (treated but still containing detectible levels of pathogens).

"Exceptional quality" biosolids are produced when the Class A pathogen requirements, ceiling and pollutant concentration limits, and one of the first eight vector attraction reduction options are met. The advantage of having an "exceptional quality" biosolids is that the Part 503 land application general requirements and management practices (the buffer requirement is a management practice) do not have to be met when the biosolids are land-applied. This is true for both bagged and bulk biosolids. The permitting authority can require that the Part 503 land application general requirements and management practice be met when bulk "exceptional quality" biosolids are land-applied if they think it is necessary to protect public health and the environment. The best way to understand the "exceptional quality" concept is to understand that a Part 503 standard contains seven elements (i.e., general requirements, pollutant limits, management practices, operational standards for pathogens and vector attraction reduction, and frequency of monitoring, record keeping, and reporting requirements). Only five of those elements (i.e., pollutant limits and operational standards for pathogens and vector attraction reduction, and frequency of monitoring, record keeping, and reporting requirements) have to be met, unless otherwise specified by the permitting authority for bulk biosolids, if the biosolids are "exceptional quality."

19) Can anyone apply biosolids to land?

Anyone who wants to use biosolids for land application must comply with all relevant federal and state regulations. In some cases a permit may be required.

20) Did the federal government ban ocean dumping of sludge because of a threat to marine ecology?

There was little threat to the marine environment from the disposal of sewage sludge (based on the answer to Question # 1, sewage sludge that is disposed is not biosolids) at the 106 Mile Ocean Dumping Site from pollutants in sewage sludge. Years after this activity has ceased, monitoring surveys at that site have never demonstrated adverse effects on marine life there. The reason why Congress banned ocean dumping was not that sewage sludge were toxic to marine life. Congress recognized that the nutrients in sewage sludge could cause increased algae production, eventually leading to oxygen depletion at the site. Congress properly decided that it made much more sense and

better policy to get sewage sludge out of the ocean and use the nutrients in that material more productively to provide crop nutrients and to improve soil quality.

21) Is EPA pushing the use of biosolids as a fertilizer? Is the federal policy for biosolids driven by economics of disposal?

As a result of its decade-long assessment of biosolids, EPA concluded that recycling biosolids to land was an environmentally responsible solution, when used in accordance with the Part 503 rule. The Federal policies supporting and promoting the beneficial recycling of biosolids are based upon sound science that has demonstrated the benefits of such recycling. These policies are not driven by economics, and the choice of to recycle biosolids remains a local decision.

22) How do the risks associated with biosolids compare with other soil amendments used in agriculture?

A Water Environment Research Foundation (WERF) study completed in 2002 finds that the risks associated with biosolids are no greater than risks associated with other soil amendments used in agriculture. The project, "Evaluate Risks and Benefits of Soil Amendments Used in Agriculture" (project no. 99-PUM-1), examined the risks and benefits, advantages and potential disadvantages associated with the use of a variety of soil amendments in comparison to chemical fertilizers. Project results indicate that the relative risk to the environment from amendments and fertilizers varies by parameter and shows that known risks from each of the materials studied can be managed. Moreover, these manageable risks must be carefully weighed against the considerable benefits provided by the land application of amendments and fertilizers.

23) Is recycling much cheaper than disposal?

In areas where disposal costs have increased due to shrinking landfill space and increased costs to maintain and monitor landfills, some cities and towns find that recycling biosolids is less expensive than land filling. However, in most cases, land filling is competitive or less expensive than land application. In such cases, many U.S. communities have made a positive environmental decision to commit to recycling biosolids despite the additional cost. This is especially true where communities have committed to the additional costs of composting or heat drying and pathogen reduction processes for biosolids prior to utilization.

24) Are biosolids that are land applied comprised of everything you flush down the toilet and everything industry puts down the drain?

This question implies that the biosolids that are being recycled to land are raw, untreated, and full of toxics. This is not the case. Biosolids that are land applied are carefully treated and used in accordance with Part 503 rule and have their quality further assured by required industrial pretreatment. Many analytical studies by

municipalities show that the quality of biosolids has continued to increase because of industrial pretreatment.

25) Are Biosolids good for the environment?

Recycling biosolids is good for the environment. Organic matter has been recycled for centuries to improve soil fertility and productivity. When properly applied and managed, biosolids can: provide essential plant nutrients; improve soil structure and tilth; add organic matter; enhance moisture retention; and reduce soil erosion.

Biosolids recycling is regulated and encouraged by the United States Environmental Protection Agency and state and local authorities. Research and years of recycling experience have demonstrated that properly managed land application of biosolids is environmentally safe.

26) What is the consensus in the scientific community about the safety of using biosolids for food crop production?

Decades of research and actual application of biosolids have resulted in an overwhelming scientific agreement among qualified researchers that the use of biosolids in accordance with existing Federal guidelines and regulations, presents negligible risk to the consumer, to crop production, and to the environment. In fact, the science-based approach used in developing the biosolids standards could serve as a model for policy and regulation in other areas of agricultural production and food safety

27) What will it mean for a wastewater treatment plant, biosolids manager or land applier to agree to follow an Environmental Management System (EMS) for Biosolids?

The National Biosolids Partnership (NBP) is now developing a voluntary EMS for biosolids. The NBP consists of members from the Association of Metropolitan Sewerage Agency, the Water Environment Federation, the U.S. Environmental Protection Agency (EPA) and other stakeholders including the general public. Those facilities that pledge to follow the EMS are agreeing to follow community-friendly practices in addition to being in compliance with applicable state and Federal regulations. Community friendly practices refer to the control of odor, traffic, noise, and dust as well as the management of nutrients. Those who pledge to follow the EMS will be subjected to audit by impartial independent third parties.