

# What are Biosolids?

Patty C. Averett, Environmental Manager

Amelia County Department of Environmental Management

**Biosolids** are the nutrient-rich organic materials resulting from the treatment of domestic sewage in a wastewater treatment facility (i.e., treated sewage sludge). **Biosolids** are a beneficial resource, containing essential plant nutrients and organic matter and are recycled as a fertilizer and soil amendment.

Biosolids are created through the treatment of domestic wastewater generated from sewage treatment facilities. The treatment of biosolids can actually begin before the wastewater reaches the sewage treatment plant. In many wastewater treatment systems, regulations require that industrial facilities pre-treat their wastewater to remove certain 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.

Once the wastewater reaches the plant, the sewage goes through a biological process that cleans the wastewater and removes the solids. The excess biological solids are then digested or stabilized through other processes to reduce or eliminate pathogens.

After treatment and processing, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth. Farmers and gardeners have been recycling biosolids for ages, reducing the need for chemical fertilizers. Biosolids are applied to promote the growth of agricultural crops, fertilize gardens and parks, and reclaim mining sites.

Biosolids that are to be beneficially used must meet federal and state requirements. Examples of beneficial use include application to agricultural land and reclamation sites (e.g., mining sites). When applied to land at the appropriate agronomic rate, biosolids provide a number of benefits including nutrient addition, improved soil structure, and water reuse. Land application of biosolids also can have economic and waste management benefits (e.g., conservation of landfill space; reduced demand on non-renewable resources like phosphorus; and a reduced demand for synthetic fertilizers). When applied to crops, application rates are restricted to the nutrient needs of the crop. The plant nutrients are slowly released throughout the growing season enabling the crop to absorb these nutrients as the crops grow. Biosolids have also been found to promote rapid timber growth, allowing quicker and more efficient harvest of an important natural resource.

Biosolids are one of the most studied materials that have ever been regulated by the U.S. Environmental Protection Agency (USEPA). Decades of studies have demonstrated that biosolids can be safely used for the production of 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.”

Virginia regulations dictate minimum setback distances (feet) to the land where biosolids are applied. These include 400 feet from public water supply reservoirs, 200 feet from an occupied dwelling, 100 feet from water supply wells or springs, 100 feet from surface waters (streams, ponds, rivers and lakes) without a vegetated buffer, and 100 feet from property lines. (As a reference, residential wells must be located 50 - 100 feet from septic systems). Setbacks from property lines and occupied dwellings can be extended up to 400 feet upon a physician's request due to a medical condition when submitted to the Virginia Department of Environmental Quality (DEQ) on their required form. Materials cannot be applied when groundwater tables or bedrock are within 18 inches of the surface.

Staging is the placement of biosolids on a permitted land application field, within the land application area, in preparation for commencing land application or during an ongoing application, at the field or an adjacent permitted field. Biosolids may be staged for up to seven days from the first day biosolids are offloaded onto the staging area.

Biosolids applicators must be certified by DEQ and their responsibilities require them to remain on site at all times during land application activities. They must also ensure that land application operations are in compliance with the regulations. **There are three companies currently permitted to land apply biosolids in Amelia: VPA00841 Nutri-Blend: 11,801.4 gross acres currently permitted, 159 fields on 18 sites; VPA00813 Synagro: 29,742.1 gross acres currently permitted, 290 fields on 29 sites; and VPA00811 Recyc Systems: 3,258.8 gross acres currently permitted, 158 fields on 15 sites.**

The permit holder shall take appropriate steps to prevent drag-out and track-out of dirt and debris or biosolids from land application sites onto public roads. Where material is transported onto a paved or public road surface, the road surface shall be cleaned thoroughly as soon as practicable, but no later than the end of each day.

Crops cannot be harvested until 30 days to 38 months after land application, depending on the crop. Animal and human access to the land application site is restricted for 30 days, and up to one year, after application.

Below are some frequently asked questions about biosolids:

**Can biosolids harm our streams and groundwater?**

Federal and state regulations, agricultural best management practices and nature provide multiple layers of protection for our streams and groundwater. Studies also show that biosolids can help reduce runoff into our streams and leaching into groundwater.

Virginia regulates how biosolids are applied in order to prevent runoff into streams or leaching into groundwater. Studies have demonstrated that biosolids applied according to current EPA and Virginia standards pose no risk to the Commonwealth's water. The Joint Legislative Audit and Review Commission (JLARC) researched biosolids impact on groundwater and surface water in its report prepared in 2017, finding that water contamination risk is very low when biosolids are applied with state regulations

**Who regulates the generation and land application of biosolids in Virginia and how can I be sure they protect my health and the environment?**

The EPA and DEQ enforce clearly defined regulations that are designed to protect human

health and the environment. Virginia's regulations also involve the Department of Conservation and Recreation (DCR), among others. Local governments have the authority to establish their own land application monitoring programs and Amelia County has a monitoring program under the Department of Environmental Management. Local monitors may inspect land application sites within their locality and respond to citizen concerns. However, localities **DO NOT** have the authority to enact local requirements that are more restrictive than state regulations. Amelia County passed an ordinance in 1999 that banned biosolids applications within the county. A landowner group filed suit against the ordinance and the county's ban was upheld by the Circuit Court. However, an appeal of this ruling made its way to the Virginia Supreme Court and the original verdict was overturned. In addition, Appomattox County also adopted a stringent ordinance that was restrictive of biosolids applications. This ordinance was challenged as well and was rejected by the courts. Through these court cases and other regulatory actions, landowner rights to apply the material under guidelines issued by DEQ have been affirmed.

Local authorities and adjoining landowners receive notice when permits are initiated or modified and are given a chance for input. Local authorities are also notified of upcoming applications.

The comprehensive regulatory program that exists today, which includes federal, state and local components, is based on decades of research and is designed to protect public health and the environment.

#### **How do biosolids help soils and crops?**

Biosolids enrich the soil with essential nutrients and add needed organic matter to the soil.

Biosolids contain many essential plant nutrients, including the primary macronutrients nitrogen, phosphorus, and to a lesser extent, potassium. Biosolids supply these needed elements to plants much like commercial fertilizer.

#### **Can biosolids be applied to forests?**

The application of biosolids to forestland is recognized as an effective method of fertilization and soil conditioning. Biosolids enhance tree health, promote growth and can improve wildlife habitat. When best management practices (BMP) are used, research shows that biosolids can help protect water quality.

Pine forests in the Piedmont and upper Coastal Plains areas of Virginia are well suited to land application of biosolids, since most of these forests are located in nutrient deficient soils.

#### **How do other states and countries handle biosolids?**

The recycling of biosolids is a widespread and accepted practice throughout the United States and the world.

According to the EPA, all 50 states have biosolids management programs. According to a United Nations report, the land application of biosolids is continuing to grow in Europe and the agricultural recycling of biosolids is in wide use throughout most western nations, including Canada, Australia and New Zealand.

#### **How much land is receiving biosolids in Virginia?**

According to DEQ, during 2016, approximately 130,219 dry tons of biosolids were applied to more than 35,300 acres of permitted land application sites. **During 2020, in Amelia County biosolids were applied to 5,084.72 acres.**

Biosolids recycle valuable nutrients to farms and forestlands, which help sustain family farms and conserve green space. Biosolids recycling is a cost-effective, sustainable alternative to land filling, incineration or other management options.

**What is sludge and how is it different from biosolids?**

Only biosolids that meet federal and state requirements following treatment are land applied. Sludge, a term applied to the solids separated from the liquid portion of wastewater passing through a wastewater recycling facility is NOT land applied on farms and forestland in Virginia. The term “biosolids” is applied to material that receives additional processing to make it suitable for recycling. During this treatment, bacteria and other tiny organisms break sewage down into simpler, harmless organic matter. The organic matter combined with bacterial cell masses settles out to form biosolids. This organic matter is rich in such nutrients as nitrogen and phosphorus and contains other supplementary nutrients, including potassium, sulfur, magnesium, calcium, copper and zinc. Federal and state regulations establish the processes that the wastewater plant or other facility must implement to qualify for the production of biosolids.

*Sources: Virginia Biosolids Council and  
the Virginia and Michigan Departments of Environmental Quality*