

Questions and Answers about Biosolids Recycling





Sunflowers are frequently grown in Colorado using biosolids as a soil amendment.



This brochure was produced by the Rocky Mountain Water Environment Association (RMWEA), which represents 1,200 water quality professionals in Colorado, New Mexico, and Wyoming. RMWEA is the premiere training and professional development organization for water quality professionals in the Rocky Mountain West. Its members are scientists, engineers, wastewater treatment plant operators and maintenance personnel, laboratory technicians, biosolids operators, pretreatment workers, sewer system operators, and administrators who work every day to improve water quality.



Wheat yields can often be improved by using biosolids to amend the soil.

Where Do Biosolids Come From?

Households generate wastewater. When you run clothes washers, take showers, and flush toilets, you turn clean water into wastewater. Businesses and industries also generate wastewater. Most wastewater, a combination of soap suds, toilet paper, and other matter, travels through an extensive sewer system until it reaches the domestic wastewater treatment plant. At wastewater treatment plants, the water is cleaned and discharged into a river or other receiving body for use downstream.

The solid, organic fraction of wastewater that remains after the water has been returned to the environment is called sewage sludge. Sewage sludge that has been treated according to federal and state biosolids regulations, can then be called “biosolids.”

What Are Biosolids?

Merriam-Webster's Collegiate Dictionary (10th edition) defines biosolids as *"solid organic matter recovered from a sewage treatment process and used as fertilizer."* This organic matter is treated according to federal and Colorado regulations to meet biosolids criteria for beneficial use.

The chemical makeup and biological components of biosolids depend upon the wastewater's composition. Household chemicals, oil and grease, microorganisms, pesticides, and solvents are a few of the pollutants that could be found in wastewater. As a result, the quality and the ability to beneficially use biosolids can be affected. The best way to ensure that pollutants remain at safe levels is to prevent their discharge into the sewer system—something Colorado wastewater treatment facilities do regularly.

Biosolids, a natural fertilizer and soil conditioner, have been beneficially used since the 1920s by farmers, horticulturists, land use specialists, and the public in Colorado and throughout the United States and the world. The Colorado Department of Public Health and Environment and the U.S. Environmental Protection Agency have regulated and encouraged biosolids recycling since 1985 because their valuable nutrients and organic matter can improve plant growth and soil structure.

What Are the Most Common Uses of Biosolids?

In the United States, biosolids can be managed in only three ways.

1. Biosolids can be landfilled
2. Biosolids can be incinerated
3. Biosolids can be beneficially recycled



Machines similar to manure spreaders are used to land apply biosolids.

Depending on the level of treatment, biosolids can be used for:

- land application where crops such as corn, soybeans, grains, hay, and pasture are grown
- land application to non-agricultural land areas such as forests,

parks, cemeteries, golf courses, lawns, and gardens

- land reclamation in the mining and forestry industries, and following forest fires

Eighty-five percent of the biosolids generated in Colorado are recycled. This compares with a U.S.-wide biosolids recycling rate of about **50** percent. In addition, 92 percent of Colorado's wastewater treatment plants recycle their biosolids.



When the wheat harvest comes in, farmers can see the benefits of biosolids.

Why Is It Important To Recycle Biosolids?

Biosolids are a valuable resource rich in nutrients and organic matter. This makes the material useful as a fertilizer and a soil conditioner. Benefits associated with recycling biosolids include:

- diverting a recyclable material from landfills and incinerators
- improving soil structure
- improving the water-holding capacity of soil to prevent erosion
- increasing crop yields
- an inexpensive alternative to chemical fertilizers

What Are the Major Methods Of Applying Biosolids?

In Colorado, biosolids come in three different forms: liquid, semi-solid (dewatered), and compost.

- Liquid biosolids are typically injected into soils a few inches under the surface or sprayed onto fields, pasture or forests
- Dewatered biosolids are applied with equipment similar to that used for spreading animal manures on farm land. Dewatered biosolids



Liquid biosolids are injected into a field near Steamboat Springs, Colo. Injection reduces odors and makes biosolids more neighbor friendly.

can be left on the surface or incorporated into the soil by plowing or disking

- Compost can be used on lawns and gardens the same as other composts purchased at greenhouses or home-stores

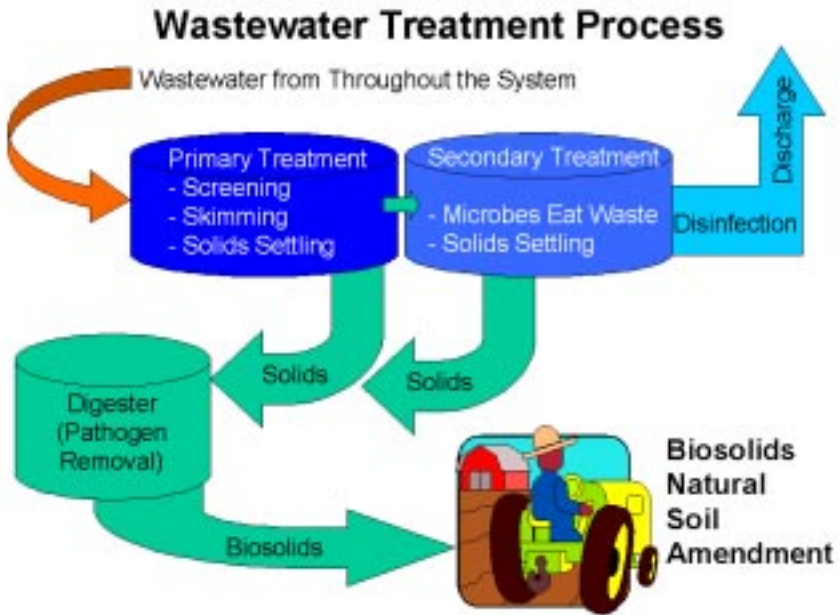
Do Biosolids Have An Odor?

Biosolids smell something like mulch—an earthy odor. The odors are not harmful, but they are present for a short time. The treatment process stabilizes biosolids and minimizes odors. The type of treatment

process used makes a difference in the odor levels. Incorporating biosolids by plowing or disking into the soil further reduces odors.

How Are Biosolids Treated?

Wastewater treatment plants treat biosolids to reduce or eliminate harmful microorganisms called pathogens. As required by both EPA and the Colorado Department of Public Health and Environment, wastewater treatment plants must treat biosolids to reduce pathogens and to stabilize the biosolids by reducing the odors and that attract insects and animals (called “vectors”) before the material can be reused.



In Colorado, aerobic (with air) digestion and anaerobic (without air) digestion are the most common methods for treating biosolids. Digestion creates an environment that kills pathogens through heat and by reducing the microbial food source. In addition, some facilities compost their biosolids. The heat and microbial action of the composting process kill pathogens and stabilize the biosolids even more.

How Can the Public Be Sure Biosolids Are Used Safely?

The Colorado Department of Public Health and Environment regulates biosolids to ensure correct and safe use. Regulatory compliance

includes monitoring, record keeping, reporting, permitting, and laboratory analyses by all wastewater treatment plants involved with producing and applying biosolids.

The Colorado Department of Public Health and Environment has the authority to investigate any biosolids project and to penalize violators of the state standards. Any citizen can ask questions or request information related to biosolids safety by contacting EPA at 303-312-6129 or the Colorado Department of Public Health and Environment at 303-692-3100.

Has Scientific Research Shown that Biosolids Are Safe?

Decades of scientific research have shown that we can use biosolids



Biosolids can be used to reclaim damaged land such as this sand dune in southeastern Colorado.

safely. Scientists at reputable institutions such as Colorado State University, University of Colorado at Boulder and Denver, and other state and national institutions have conducted research on biosolids.

Extensive data collected since the 1920s show that the use of biosolids, when in compliance with state and federal regulations, poses no known risks to human health or the environment. There has never been a substantiated case of illness or environmental harm caused by the proper use of biosolids.

Are There Heavy Metals In Colorado's Biosolids?

Colorado biosolids—and most biosolids—contain trace amounts of metals. Biosolids may be recycled only when metal concentration levels are suitable for application to farm lands, reclamation sites, or home and garden use. Many of these metals—copper and zinc are two examples—are micronutrients required for plant and animal growth and health. Domestic wastewater treatment plants cannot recycle biosolids that exceed the metals limits. The table below shows those limits and the average metals content for Colorado.

Colorado Department of Public Health & Environment Maximum Metals Concentration (mg/kg, dry weight basis)

Metal	Average Concentration* in Biosolids	Limit for Beneficial Use
Arsenic	7	75
Cadmium	7	85
Copper	636	4,300
Lead	106	840
Mercury	18	57
Nickel	42	420
Selenium	10	100
Zinc	750	7500

*For the state of Colorado

How Do You Know How Much Biosolids To Use?

In agriculture, the amount of biosolids used is based on soil test results and the estimated nutrients needed for the crop to be grown. The controlling factor in Colorado is usually the nitrogen that is taken up and used for plant growth. Using only the amount of nitrogen needed for crop growth ensures optimum uptake of nitrogen and prevents its



Millet is a good biosolids crop.

migration into ground waters.

Biosolids produced for lawns and gardens in Colorado have been composted. This additional processing reduces the nitrogen content to low levels. This product is used primarily for its organic matter as a soil amendment and for the micronutrients such as copper and zinc. Recommendations for loading rates are on the bags or can be obtained from the producer when the compost is purchased in bulk.

What Role Does the Colorado Department of Public Health and Environment Play in Ensuring the Quality and Safety of Biosolids?

The Colorado Department of Public Health and Environment regulates the quality and use of biosolids through its Biosolids Management Program. It also administers and enforces the National Pretreatment Program that the Clean Water Act mandates. Pretreatment, or source control, programs establish strict rules for industries that discharge pollutants such as copper, zinc, or other metals or toxins to a publicly owned wastewater treatment plant. Compliance by industry and strict enforcement of the pretreatment program by state and local authorities ensures that the wastewater treatment processes are working effectively, thus improving the quality and safety of biosolids.

How Do I Find Out More About Biosolids?

As Colorado's population grows, so will the amount of biosolids produced. Finding alternatives for biosolids use depends greatly on the acceptance of this valuable product by Colorado citizens. The Colorado Department of Public Health and Environment, the U.S. Environmental Protection Agency, and others working with biosolids recycling invite you to take an active role in learning more about the wastewater treatment process and the generation and recycling of biosolids in your community.

For further information about biosolids please contact: Bob Brobst, USEPA VIII, 999 18th St., Suite 500, Denver, CO 80202, (303) 312-6129, or Wes Carr, Colorado Department of Public Health and Environment-Water Quality Control Department, 4300 Cherry Creek Drive South, Denver, CO 80222-1530, (303) 692-3613.

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Flowers and vegetables can be planted in soil amended with Class A Exceptional Quality biosolids compost with no danger to people or pets. Turf grass can be topped with Class A EQ biosolids compost, and the soil under turf grass can also be mixed with the product to improve both its fertility and water holding ability.

