

Frequently Asked Questions

What are biosolids?

Biosolids are the nutrient-rich organic by-product of domestic wastewater treatment. They contain essential plant nutrients and organic matter, and can be recycled and applied as a fertilizer and soil amendment, when properly treated and managed.

What is the difference between biosolids and sludge?

The term “sludge” describes the untreated solids produced in the domestic wastewater treatment process. To make biosolids, sewage sludge is treated through carefully regulated processes (biological, chemical or physical) to kill pathogens and stabilize organic matter. This reduces offensive odors and its appeal to insects and rodents. The material only becomes biosolids once it meets federal and state standards so that it can be safely used for beneficial land application.

Why does the EPA and DEQ consider biosolids safe for land application?

Biosolids have been widely used on farms and other natural resource sites across North America for decades. Sixty percent of U.S. biosolids are applied to soils, enhancing soil health, recycling nutrients, sequestering carbon, and providing a productive use for a material that every community has to manage. (Wastewater treatment is a vital public service, and it creates solids that have to be managed.) Portland, Seattle, Los Angeles, Denver, Chicago, Boston, and hundreds of other communities recycle their biosolids to soils. Most major land grant universities have studied biosolids effects on soils and have found little risk when used according to regulations. Every U.S. state and Canadian province allows biosolids use on soils. The U.S. Environmental Protection Agency, U.S. Department of Agriculture and U.S. Food and Drug Administration all approve biosolids recycling. Thousands of research publications over 45 years and two major reviews by the National Academy of Sciences have found biosolids use on soils presents “negligible risk” when managed in accordance with federal regulations and that “there is no documented scientific evidence that the Part 503 rule (the federal biosolids regulations) has failed to protect public health.”

What are the benefits of land application of biosolids?

Land application is a cost-effective and sustainable option for managing biosolids. The Oregon Environmental Quality Commission encourages the land application of biosolids when managed in a manner which protects the public health and maintains or improves environmental quality. The Oregon Department of Environmental Quality implements this policy across the state.

Plants need a complex mixture of nutrients, soil, air and water to grow well. Biosolids enrich the soil with essential nutrients and organic matter. Biosolids typically contain about 50 percent organic matter, which improves soil tilth, allows the soil to drain and breathe better, and hold more water. This results in decreased water runoff and soil erosion, with increased water conservation. These attributes may help a farmer comply with agricultural conservation practices. Research plots and demonstration sites have shown that the quality of crops grown on biosolids-amended soils is equal or superior to those grown with commercial fertilizers.

How are biosolids regulated in Oregon?

The land application of biosolids, biosolids-derived products and domestic septage is regulated under the DEQ regulations found in Oregon Administrative Rules Chapter 340, Division 50. The state rules incorporate most of the federal biosolids regulations (Chapter 40 Code of Federal Regulations Part 503), including requirements that reduce pathogens, stabilize organic matter, and limit trace elements including arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.



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Biosolids

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In Oregon, monitoring is also required for several macronutrients, including potassium, nitrogen, and phosphorus. DEQ is responsible for permitting land application sites for Class B biosolids in Oregon to protect public health and the environment. For each site where biosolids are applied, DEQ issues a site authorization to the wastewater treatment facility that prescribes appropriate management practices for the site, which account for:

- Site characteristics and soil conditions
- Protection of ground and surface water and wells
- Biosolids chemical properties
- Type of biosolids (liquid, semi-solid, or solid)
- Method of biosolids application

Among other things, the site authorization establishes conditions on:

- Allowable biosolids application rate, season of application
- Public access restrictions
- Required waiting periods between biosolids application and crop harvest or grazing
- Required buffers near homes, highways, and other public areas

What risks do trace metals pose?

EPA thoroughly studied the potential risks from trace metals in biosolids and set maximum levels in biosolids to ensure protection of public health and the environment. To date, studies indicate that properly treated and managed biosolids can be land applied in an environmentally sound manner. Based on the 2017 analytical results, the concentrations of these trace metals found in biosolids produced in Oregon are well below the maximum levels identified by EPA.

Many of the regulated metals in biosolids are beneficial and necessary for healthy plant growth in correct amounts, such as copper, molybdenum, and zinc which are micronutrients for plants. The presence of these micronutrients is one reason why biosolids can be more effective than mineral fertilizers at promoting plant growth.

What about organic compounds in biosolids?

Many chemicals used in society can be found in trace amounts in wastewater. The fact is few chemicals of concern are found in biosolids. An EPA 2009 *Targeted National Sewage Sludge Survey*¹ investigated levels of several trace organic compounds in solids collected from 74 wastewater treatment plants nationally. The EPA study found some analytes were present in all samples, while others were present in none or only a few samples. EPA continues to review hazard and exposure assessments for these pollutants as data and analytical methods improve.

What about pharmaceuticals in biosolids?

Pharmaceuticals such as antibiotics, prescription drugs and personal care products, like soaps, shampoos, detergents, and perfumes contain a wide variety of chemicals. The effect of these chemicals on the environment is the focus of considerable research. Although leading scientists see little threat to the public health and the environment from these chemicals associated with biosolids, EPA is currently developing better sampling and analytical procedures for these chemicals. Once improved sampling and analytical methods are in place, EPA plans to conduct exposure and hazard assessments for these pollutants. This study will take into account toxicity data for humans and ecological receptors, solids pollutant concentrations, and the fate and transport of these chemical compounds.

The best way to reduce concentrations of pharmaceuticals in biosolids is by never flushing unwanted drugs down the toilet, and to support effective drug take back programs. Purchase soaps and cleaners that are manufactured with the environment in mind - such as those that are recognized in EPA's *Safer Choice Program*².



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¹Samples collected in 2006 & 2007 - see <https://nepis.epa.gov/Exe/ZyPDF.cgi/P1003RNO.PDF?Dockey=P1003RNO.PDF>

² See <https://www.epa.gov/saferchoice>

What about Per- and Polyfluoroalkyl substances (PFAS) in biosolids?

Perfluorooctanoic acid and perfluorooctane sulfonate have had considerable public attention in recent years, especially in New England. Concerns here in Oregon have focused on impacts near industrial facilities that used these chemicals specifically airports with foam firefighting systems. These chemicals are found in carpets, furniture, household dust and air, cooking tools, outdoor clothing, fire-fighting foams, and other products. Because these chemicals are ubiquitous in today's society and the environment there is ongoing uncertainty about their actual affects. These chemical are being phased out of use here in the U.S and Canada; as a result wastewater treatment facilities are seeing decreasing concentrations in their systems. In the 2000s perfluorooctanoic acid was found in the typical biosolids at an average concentration of 34 parts per billion (ppb) and more recent studies have found average perfluorooctanoic acid concentrations of 2.3 and 5.3 ppb in the biosolids. Research and risk assessments conducted in New England have determined that direct contact, inhalation, or ingestion of materials containing less than 500 parts per billion of perfluorooctanoic acid pose no significant risk.³ Thus, biosolids and residuals present negligible risk via these pathways.

Does the land application of biosolids pollute surface water or groundwater?

Properly managed biosolids products do not pollute surface water or groundwater. Biosolids recycling programs follow best management practices to ensure water quality is protected. In fact, documented improvements in surrounding water quality have been found in numerous biosolids application projects due to enriched soils and vigorous growth of vegetation that reduce soil erosion and stabilize contaminants that had previously contributed to stream and groundwater pollution. Biosolids are not allowed to runoff into surface water, including rivers, streams, irrigation ditches, or ponds; and, biosolids application rates and site management practices are designed to prevent the leaching of nutrients to groundwater

Are biosolids tested before land application?

Biosolids are tested by the generating facility before they are land applied. The required minimum frequency of this sampling is based on the volume of biosolids produced by the facility each year as summarized in the table below.

Dry weight – metric tons/year	Sampling Frequency
0 – < 290	Annually
≥290 - <1,500	Quarterly
≥1,500 - <15,000	Bimonthly
≥15,000	Monthly

Is the soil tested at land application sites?

Facilities test the soil at land application sites to calculate the agronomic rate for that field. Facilities are required to collect soil samples at a minimum if they land apply biosolids at the agronomic rate for more than two out of three successive years. Additional or more frequent testing may be required in their biosolids management plan or site authorization letter.

What notification or signage are required for authorized sites?

There are no federal regulations requiring notification or signage for authorized biosolids sites. Oregon state regulations requires notification prior to approval of any proposed site that maybe sensitive to residential housing, runoff or groundwater. DEQ policy requests signs to be posted at the field and land application notices sent out to adjacent property owners when a facility is asking DEQ for approval to land apply on a given field. Once DEQ has approved a field with a site authorization letter, the permittee must follow the requirements established in their biosolids



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³ See <https://www.nebiosolids.org/>

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management plan and site authorization letters which can require signs to be posted at the field at the start of land application and during land application activities. If a facility is required to post signs, most of them remove the signs after land application activities are completed so the signs do not interfere with the farming activities or get knocked down and become roadside litter.

What are biosolids agronomic rates?

The agronomic loading rate is based on a crop's ability to use nitrogen and considers the plant-available nitrogen content of the biosolids and other nitrogen sources at the site. Biosolids application at agronomic rates supplies adequate nitrogen to facilitate crop growth while protecting water quality.

For Further Information:

Oregon Department of Environmental Quality:
<https://www.oregon.gov/deq/wq/programs/Pages/Biosolids.aspx>

United States Environmental Protection Agency:
<https://www.epa.gov/biosolids>

Oregon State University:
<http://cropandsoil.oregonstate.edu/>

Washington State University:
<https://puyallup.wsu.edu/soils/biosolids/>

University of Idaho:
<https://www.uidaho.edu/extension>

University of Arizona, College of Agriculture and Life Sciences:
<http://cals.arizona.edu/pubs/consumer/az1426.pdf>

Oregon Association of Clean Water Agencies
<http://www.oracwa.org/c-biosolids.html>

Northwest Biosolids Management Association:
<http://www.nwbiosolids.org>

National Biosolids Partnership:
<http://www.biosolids.org/>

North East Biosolids and Residuals Association:
<http://www.nebiosolids.org/>

Alternative formats

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.



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