



Monitoring Requirements for Biosolids Land Application

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Biosolids is a term for domestic wastewater sludge that meets standards for use as a fertilizer or soil conditioner. Biosolids standards include limitations for metals and other compounds, pathogen reduction, vector requirements and best management practices.

This publication outlines biosolids land application monitoring requirements.

Applying biosolids to land uses the available nitrogen, phosphorus and potash to fertilize growing crops. This is an environmentally sound practice sanctioned by the U.S. Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (DNR).

Reusing biosolids on crops, pastures and timberland reduces pollution of the waters of the state. It eliminates the environmental risks and costs associated with sludge disposal options, benefiting all citizens of Missouri.

Background

EPA regulations, under Title 40 Code of Federal Regulations Part 503 (40 CFR 503), establish the minimum national standards for the use and disposal of domestic sludge. These standards include limitations for the land application of biosolids.

The DNR has incorporated the EPA standards into the state requirements under the Missouri Clean Water Law and regulations. The state rules include additional requirements that are not covered in the EPA standards. Complying with state regulations

automatically meets the EPA sludge standards.

Recommended minimum monitoring frequency

Monitor the biosolids to determine the quality for regulated pollutants listed in the biosolids standards. Base the number of samples on the quantity of sludge produced by the facility.

Another sampling plan may be approved for an equal number of samples per year. For example, you sample quarterly, but apply biosolids during July only. You may collect all four samples during the land application period (*see Table 1*).

Optional sampling for lagoons

If you own a wastewater treatment lagoon or sludge lagoon that is cleaned out once a year or less, you may choose to sample only when the sludge is removed or the lagoon is closed.

Test one composite sample for each 100 dry tons of sludge or biosolids removed from the lagoon during the year or left within the lagoon at closing. Composite samples must represent various areas at one-foot depth.

Sample type

Collect composite samples for all monitoring under this section. Each composite sample must consist of at least seven to 20 grab samples. Collect

Recommended Monitoring Frequency

Monitoring frequency (See notes 1, 2)

Design sludge production (dry tons/year)	Metals, pathogens and vectors	Nitrogen		Priority pollutants and TCLP***
		TKN*	PAN**	
0 - 100	1 per year	1 per year	1 per month	1 per year
101 - 200	biannual	biannual	1 per month	1 per year
201 - 1,000	quarterly	quarterly	1 per month	1 per year
1,001 - 10,000	1 per month	1 per month	1 per week	****
10,001 +	1 per week	1 per week	1 per day	****

- (1) Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids. This data shall be used to calculate the dry tons of sludge applied per acre.
- (2) Total phosphorus and total potassium shall be tested at the same monitoring frequency as metals.
- * Test total Kjeldahl nitrogen, if biosolids application is 2 dry tons per acre per year or less.
- ** Calculate plant available nitrogen, if biosolids application is more than 2 dry tons per acre per year.
- *** Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) and toxicity characteristic leaching procedure (40 CFR 261.24) is required only for permit holder that must have a pretreatment program.
- **** One sample for each 1,000 dry tons of sludge.

Table 1. Recommended monitoring frequency.

the samples during the same week from various locations in the sludge.

Data from individual grab samples may vary by as much as 50 percent from mean values. A composite sample made up of 20 grab samples will be 90 percent to 95 percent accurate.

Dry weight basis

Report all sample results on a dry weight basis, unless otherwise specified. If the laboratory report does not specify dry weight, consider the data on a wet weight basis. The permit holder must convert the measurements to a dry weight basis. Use the following formula:

$$\text{Wet weight in ppm or mg/kg} \div \frac{\text{Percent total solids}}{100}$$

An example for 100 ppm at 2 percent total solids:

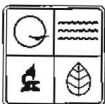
$$100 \text{ ppm} \div \frac{2}{100} = 100 \div 0.02 = 5,000 \text{ ppm dry weight}$$

Soil testing

Test soils for soil pH, cation exchange capacity and available phosphorus once every four or five years, if biosolids are applied during that period. Base available phosphorus on Bray's P-1 test.

Soil sampling must be in accordance with MU publication G 9110, *Sampling Your Soil for Testing*.

Recommended soil testing methods must be in accordance with MU publication EC 923, *Soil Testing in Missouri*, or *Recommended Chemical Soil Test Procedures for the North Central Region* (North Dakota Agricultural Experiment Bulletin 499 - Revised).



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