

Permit Guidelines for Application of Municipal Sludge on Agricultural Lands

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Municipal sludge is frequently applied to agricultural land to make use of the nutrients it contains and prevent pollution. Before you can apply sludge to cropland, however, you must obtain a permit from the North Carolina Department of Environment, Health and Natural Resources through the Division of Environmental Management, Post Office Box 29535, Raleigh, NC 27626-0535.

Interest in using sludge to fertilize agricultural crops has increased recently for several reasons. Commercial fertilizer costs have

increased, whereas sludge is available in large quantities at give-away prices. Also, recent legislation prevents the disposal of sludge along with domestic solid waste in landfills, and the costs of alternative sludge disposal methods are high. Both North Carolina and the U.S. Environmental Protection Agency (USEPA) recognize sludges as a beneficial product if handled properly and both encourage its reuse in agricultural systems.

Before application, sludge must be tested for toxic or hazardous contaminants. If any contaminants exceed the standards as prescribed by the USEPA, the sludge cannot be used on agricultural land. A number of state-enforced regulations and guidelines regarding the use of sludge ensure that public health and environmental quality are protected.

Permit Requirements

The permit application fee is \$400. A written notarized contract setting forth the responsibilities of the sludge producer, handler, and landowner is also required. The following information must accompany the permit application:

- A site map with topographic contour intervals not exceeding 10 feet or 25 percent of the total variation in elevation on the site, whichever is less. It must show all buildings within the property boundary in addition to the location of all wells, pits and quarries, springs, lakes, ponds, and other surface drainage features within 500 feet of the disposal site.
- Information on the location, construction details, and primary usage (such as for drinking water, process water, or monitoring) of all wells within 500 feet of the disposal site;
- For sites not previously permitted:
 1. A USDA-Natural Resources Conservation Service (NRCS) soils map of the application site and an evaluation of the site by a soil scientist to verify the accuracy of the NRCS soils map in depicting the occurrence, if any, of a seasonally high water table or the presence, if any, of bedrock within 3 vertical feet of the deepest point of sludge application and specifying the cation exchange capacity.
 2. If an NRCS soils map of the application site is not available, a soil scientist's evaluation and mapping of the site to a depth of 7 feet or the "C" horizon, whichever is less, for field evaluation of soil texture, color, depth, thickness, and type of restrictive horizons. The evaluation must indicate the occurrence of a seasonally high water table or the presence of bedrock within 3 vertical feet of the deepest point of sludge application; and the soil cation exchange capacity.
- A complete chemical analysis of the typical sludge to be applied, including but not limited to measurements of total solids, pH, ammonia nitrogen ($\text{NH}_3\text{-N}$), nitrate nitrogen ($\text{NO}_3\text{-N}$), total kjeldahl nitrogen (TKN), plant-available nitrogen (PAN), total phosphorus, and potassium; toxicity characteristic leaching procedure (TCLP) for 40 parameters including organic chemicals and pesticides; nine additional metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc; and sodium adsorption ration by calculation.
- Recommendations by a soil scientist for application rates of liquids, solids, minerals, and other waste constituents.
- A plan approved by an agronomist, including recommendations for cropping systems and cover crops, to ensure environmental quality based on the proposed application rates of liquids, solids, minerals and other waste constituents.
- A project description for the land-application system, including treatment, volume of sludge generated, storage, application method, equipment, site-management plan, and transportation routes to the site, noting especially load limited bridges or roads.



USEPA Recommendations

Table 1. Current USEPA requirements for the lifetime maximum amount of heavy metals that can be applied to agricultural land.	
Metal	Pounds per Acre
Lead (Pb)	267
Zinc (Zn)	2,498
Copper (Cu)	1,338
Nickel (Ni)	374
Cadmium (Cd)	34
Arsenic (As)	36
Chromium (Cr)	2,677
Mercury (Hg)	15
Selenium (Se)	89

Farmers should not accept sludge or apply it to cropland without a recent and complete waste analysis because nutrient and heavy-metal contents vary greatly in sludges from different treatment plants. The heavy-metals content in particular may adversely affect crop production or the food chain if too much is applied to the soil. [Table 1](#) gives the current USEPA lifetime limits for application of heavy metals to a given land area. After these limits have been reached, sludge application must cease, but the land may still be used for normal agricultural production. The soil pH on sludge application sites should be maintained above 6.0 for optimum crop uptake of nutrients and to lower the plant uptake and leaching potential of heavy metals. Soil samples should be tested annually to monitor pH and heavy metal concentrations. Sludges that have been treated with lime may offer liming benefits to soils as well as nutrient and organic matter value.

For some situations, it may be recommended to apply sludge onto cropland by directly injecting it into the soil or incorporating it into the soil within 6 hours. These processes will reduce the potential for odor and for loss of nutrients in runoff after a rainfall. It also reduces the potential for attraction of disease carrying organisms such as rats and flies.

For surface application, only sludge that has been properly digested and stabilized at the treatment plant or by a contractor is allowed. (These recommendations do not cover the disposal of raw septage from residential septic tanks.) Do not allow livestock to graze pastures or forages while any residual sludge remains on the vegetation surface. North Carolina regulations stipulate that livestock must be withdrawn for at least 30 days from pastures where sludge has been applied. Do not allow lactating dairy cattle to graze in pastures that receive sludge until one year after the last sludge application. This prevents contamination of the udder with eggs of intestinal parasites. There are also restrictions for crops for direct human consumption that range from 14 to 38 months, depending on the crop type.

Good public relations can mean the success or failure in the use of sludge on agricultural land. Properly treated municipal sludge has an earthy odor that may be objectionable to some people; however, this odor is not hazardous. Common sense should govern the time and place at which the sludge is spread. Most of the harmful bacteria and viruses in raw sewage are destroyed in the digestion process at the treatment plant, and remaining organisms die off very quickly when exposed to heat, sunlight, and soil organisms. With proper precautions, sludge application poses very little threat to human or animal health.

For more information on permit requirements contact the Division of Environmental Management in the North Carolina Department of Environment, Health, and Natural Resources. The Administrative Code Section dealing with "Waste Not Discharged to Surface Waters" is 15 A NCAC 2H.200.

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