

## REGULATIONS GOVERNING THE USE OF MUNICIPAL SLUDGE ON AGRICULTURAL LAND

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Cropland application of sludge can be a mutually beneficial experience for a community and farmers provided the economics of transport and potential health problems are resolved in advance. Applying sludge to cropland is usually a beneficial practice because the organic matter in sludge has some value as a soil conditioner, and the sludge can be a source of plant nutrient elements which can be substituted for commercial fertilizer. At the same time, farmers need to recognize that sludge will probably contain pathogenic organisms, and there is a possibility that the sludge may contain heavy metals or chemicals which could be toxic to crops, and which could increase the heavy metal concentrations in edible crops enough to be detrimental to animals and humans. It is probable that sludges from treatment plants in urban areas or that from plants treating industrial wastes will contain concentrations of heavy metals. Sludge from treatment plants serving residential communities will more likely be free of heavy metals or toxic chemicals. All sludges need to be analyzed and should be used only after consideration of all potential crop and soil problems are dealt with based upon advice from public health officials and Extension personnel.

In order to deal with this combined community problem and farmer opportunity, the Massachusetts Department of Environmental Quality Engineering (DEQE) is developing a draft of regulations for the land application of sludge. The term 'sludge' as used in the regulations refers to both stabilized waste water treatment plant sludge and stabilized septage from septic tanks. The proposed regulations set forth procedures and standards with which land application projects must comply to safeguard the environment and public health.

At present, the regulations identify land and water constraints for using sludge; and specify requirements for monitoring, transportation, storage, stabilization and proper land application of the sludge. Although the regulations are complex, they make it reasonably simple for farmers to utilize sludge, putting the responsibility for monitoring of the sludge and the soil upon the generator of the sludge. The entire process has to be proposed through an approval process with DEQE.

Land constraints identified in the regulations deal with maximum land slope in relation to the crop being grown, the depth of soil, the type of soil and drainage characteristics found on a farm, the pH of the soil, and allows the utilization of common erosion control and runoff prevention methods normally used in conservation practice in agriculture to influence the use of sludge on the land. Water constraints relate to the minimum depth to groundwater on potential application sites and limits are specified for sludge application in proximity to surface waters, and to public and private water supply wells.

To determine the safety of the sludge, a complete analysis is required outlining limits for selected metals and chemicals. If sludge is to be land applied, the regulations specify periodic reviews to be certain the sludge falls within allowable limits on a continuing basis. The regulations also call for monitoring soils on the application site prior to sludge application so there can be a comparison of the soil before and after the addition of the sludge.

Rather complete specifications are provided for transport vehicles to eliminate the possibility of leakage on a public way which might cause problems with the public health or cause a nuisance. In a similar fashion, requirements are presently specified for storage of sludge. There are specifications for locating the storage in relation to wells, groundwater and surface water as well as locations with respect to residences. At the present time, a registered engineer must be engaged to design a storage facility. Presumably, such structures would be located at treatment plants.

Sludge stabilization requirements are specified to be certain that transfer of disease by application of sludge will be minimized. The stabilization requirements identify different processes that can be utilized by a treatment plant in order to make the sludge safe for land application.

In relation to application of sludge, there are specifications in the regulation dealing with the rate of application in relation to what is termed "the agronomic rate of vegetation grown", presumably relating to nitrogen requirements for the crop. The regulation specifies that sludge shall be incorporated by a variety of methods within a two-day period following application.

The regulation requires that records be kept by the generator of the sludge so that complete record of all use of sludge on farmland is maintained by the generator.

It should be noted that the present status of the regulations is that they are in draft form. This means that they are subject to review and change prior to final release. Several interesting questions are posed by the developers of the regulation. For example, DEQE is interested in determining whether the regulation should include numerical limits for annual and lifetime accumulation of concentrations of heavy metals in organic chemicals in either the sludge or for land applications rates. At the present time, no specific numerical limits for heavy metals and organic compounds are specified. There is an attempt to allow the limits to vary in accord with limits set by the USEPA and the USDA for land application of sludge and septage in relation to best agricultural management practices recommended by the Massachusetts Cooperative Extension Service. A guideline manual to accompany the regulations will contain specific numerical limits in relation to current practice. Alternatively, specific numerical limits could be somewhat simpler but would require periodic revision to be in accord with current practices.

Further, the regulation does not now propose to monitor groundwater at application sites since careful control is to be maintained over the sludge at the point of generation and during application. It is evident that major engineering renovation of a farm field would be extremely difficult and expensive to conduct, and as a consequence, it has been decided at this point that the control of the sludge is absolutely necessary and that groundwater monitoring will not be required. Certain storage constraints are included in the regulation to eliminate the possibility of groundwater contamination from storage sites.

In summary, after long years of study, there is progress in the formulation of regulations for the use of sludge and septage in agricultural land. There are a great many people interested in this activity in these environmentally conscious times so, it is unlikely that the resulting regulations will please all users of the regulations, including farmers. Any regulation will be a set of compromises, particularly those which deal with public health problems. The regulations do appear to cover most critical issues, perhaps at the expense of convenience for treatment plant operators and farmers. It is progress to think that this potential resource may be available for appropriate use on Massachusetts farms. If you are interested in the development of these regulations, you can contact Ms. Fifi Nessen, Division of Hazardous Waste, Department of Environmental Quality Engineering, One Winter Street, Boston, Massachusetts, 02110, for further information.

## SEWAGE SLUDGE AS A FERTILIZER FOR SILAGE CORN

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Corn (Wisconsin 335A) has been grown on a fine sandy loam at the University of Massachusetts Research Farm at South Deerfield and fertilized with municipal sewage sludge, with conventional chemical fertilization, or with combinations of sludge and chemical fertilizers. Digested liquid and raw, vacuum-filtered sludges have been used. Sludges and chemical fertilizers appear to support about equal yields of silage production, averaging about 17 to 18 tons per acre each year for the past four years. Sludges which have been used are from Amherst and Sunderland and are considered to be domestic sludges. They are low in toxic metals, and accumulation of toxic metals does not appear to occur in the silage. No feeding trials with livestock have been made with this silage.