

Biosolids Facts

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Q. Can disease-causing organisms be spread through the air during biosolids land application?

A. The latest scientific studies say no.

Because you can usually smell biosolids being applied on a farm, some people wonder whether disease-causing organisms left over from the wastewater treatment process could be spread through the air to humans or animals.

While there have not been any scientifically-documented cases of illnesses caused by biosolids, there have been a number of scientific studies that demonstrate the difficulty of transmitting biosolids-related diseases through the air. Current U.S. and State regulations make it even more unlikely that diseases can be transmitted from biosolids.

All land-applied biosolids must meet rigorous standards for pathogens (disease-causing organisms) set by the U. S. Environmental Protection Agency (EPA) and must be applied according to regulations set by the EPA and state regulatory agencies. In addition to EPA-approved wastewater treatment processes, biosolids must undergo additional treatment through digestion and/or lime stabilization to reduce pathogens to a safe level.

Pathogens not detectible

Studies were recently reported by researchers in the Department of Microbiology and Immunology, University of Arizona, and supported by the National Science Foundation Water Quality Center, to determine whether liquid biosolids could spread disease through the air. The conclusion: "...aerosolized microorganisms were not detectable during land application of liquid class B biosolids..."⁽¹⁾

An even more extensive university study of class B liquid and solid biosolids, which used 10 different land application test sites evaluated the overall incidence of aerosolized microorganisms from the land application of biosolids and "determined that microbial risks of infection were low for residents close to biosolids application sites. The researchers concluded: "Overall bioaerosol exposure from biosolids operations poses little community risk based on this study."⁽²⁾

Both studies relied on actual direct measurements taken near the source of the application, rather than theoretical models constructed from measurements taken from great distances.

What about the health of biosolids workers and farmers?

Epidemiological studies of biosolids land application have been conducted to determine whether pathogens can be transmitted to humans through the air. Research in Ohio documented the health of humans and animals on 47 farms that received biosolids and 46 control farms. Researchers concluded that the risks of respiratory or digestive illness, as well

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as general symptoms, were not statistically different between the biosolids farms and control farms. The study included monthly questionnaires, annual tuberculin testing, and quarterly blood and fecal sampling for microbiological testing. ⁽³⁾

A related study tested over 300 samples of biosolids from four different Ohio wastewater treatment plants for the presence of viruses. Serology methods were then used to objectively measure infection as well as subclinical infection in people on farms where biosolids were used and on control farms that did not use biosolids. Stool specimens were tested for enteric bacterial pathogens. No significant difference between biosolids farms and control farms was found over the five years of the study. ⁽⁴⁾

A study published in the November 2008 *Journal of Environmental Quality* concluded that the risks to land application workers from aerosolized microorganisms from biosolids is extremely small, even less than those of workers in wastewater treatment plants, whose health has been shown to be comparable to the general population. The findings are significant, since land application workers are typically exposed to biosolids on a daily basis, compared to rural populations, which typically are exposed to aerosolized constituents, if at all, for only a few hours every few years.

The study concluded that the potential for transport of aerosolized microorganisms is slight: “It has been well-documented that microorganisms subjected to any substantial transport through air... undergo rapid inactivation due to environmental factors such as ultraviolet light and desiccation” ⁽⁵⁾

A response to odor

Studies by Dr. Susan Schiffman, psychiatrist at Duke University Medical School, and other researchers suggest that mild, short-term responses can be stimulated by odors themselves in the absence of actual disease-causing organisms, especially in people who already associate those odors with illness and disease. ⁽⁶⁾ Studies have demonstrated that this response could be aggravated if people have been told that biosolids will make them sick.

EPA and DEP rules provide for buffers between an area to be land-applied and near-by residences. These buffers are offered to reduce nuisance odors to neighbors and to provide additional assurance to people who may be concerned about the possible airborne transmission of pathogens.

(1) *Environmental Science & Technology*, 2005, Vol. 39, No. 6.

(2) *Journal of Applied Microbiology*, doi:10.1111/j.1365-2672.2005.02604.

(3) *Demonstration of Acceptable Systems for Land Disposal of Sewage Sludge Ohio*. United States Department of Commerce, National Technical Information Services, 1985.

(4) *Wastewater Aerosols and Disease* – Proceedings of a Symposium. Ohio: Ohio Office of Research and Development, United States Environmental Protection Agency, 1979.

(5) “Estimated Occupational Risk from Bioaerosols Generated During Land Application of Class B Biosolids,” *Journal of Environmental Quality*, 37:2311-2321, October 23, 2008.

(6) *Journal of Agromedicine*, Vol. 7 (1), 2000