BIOSOLIDS: QUESTIONS & ANSWERS

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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 have wondered whether disease-causing organisms left over from the wastewater treatment process could be spread through the air to humans or animals. There have even been unsubstantiated claims of illness after land application.

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 federal and state regulations make it even more unlikely that diseases can be transmitted from biosolids.

All biosolids land-applied in Virginia 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 Virginia Department of Environmental Quality (DEQ). 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. Their 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, including one in Virginia, 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)

Wastewater treatment workers who are exposed to higher amounts of airborne releases of organisms than are found in biosolids land application have not been found to be at higher risk than the general population. A study of the health effects of occupational exposure to wastewater carried out in the United States followed over 100 wastewater treatment plant workers at three activated sludge sewage treatment plants. The study, which included stool examinations, cultures, and antibody surveys, concluded that there was no increased incidence of infection in workers. (4)

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.(5) This response could be aggravated if people have been told that biosolids will make them sick. EPA and DEQ 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.

In cases where a nearby neighbor to a proposed land application site is already ill, the DEQ and the land applier will usually increase the width of the buffer out of consideration for the comfort of the neighbor. Such accommodations, however, should not be interpreted as confirmation that aerosols from biosolids cause or aggravate disease.

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

Note: The above section on the health of biosolids workers and farmers was adapted from a paper by Erik Apedaile, Bsc (Agr) Pag, and printed in the *Canadian Journal of Infectious Diseases and Medical Microbiology*, July/August 2001, Vol. 12, No. 4