



# UNIVERSITY OF MARYLAND

SCHOOL OF PUBLIC HEALTH

*Maryland Institute for Applied Environmental Health*

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July 15, 2009

Peach Bottom Township  
School Board

Re: Parking of school buses adjacent to a proposed swine facility

Dear Sir/Madam:

I am writing to provide my opinion regarding the parking of school buses adjacent to a proposed 2,450-head swine facility in the Peach Bottom Township.

I am an Assistant Professor at the University of Maryland College Park, School of Public Health. My primary appointment is in the Maryland Institute for Applied Environmental Health and my secondary appointment is in the Department of Epidemiology and Biostatistics. My research interests lie in the area of environmental epidemiology and exposure assessment, and for the past 10 years I have been conducting studies concerning human health impacts associated with large-scale agricultural facilities. I am the former Acting Director of the Office of Environmental Health at the Maryland Department of Health and Mental Hygiene, as well as the former Research Director of the Industrial Animal Production program at the Center for a Livable Future, Johns Hopkins University.

I was asked to provide this letter by members of the Peach Bottom Concerned Citizens Group. However, the views that I will express are my own and are based on my own experiences and scientific investigations.

In the immediate area of large-scale swine facilities, the anaerobic decomposition of swine manure results in the production and dispersion of air-borne emissions that can lead to adverse environmental and public health effects. Over 160 compounds have been identified in airborne emissions from swine facilities such as the proposed 2,450-head facility in the Peach Bottom Township. These compounds can be grouped into 3 categories: gases and vapors; bioaerosols; and nonbiologic aerosols.

The predominant gases of concern to public health include ammonia, hydrogen sulfide, carbon monoxide and methane. The primary source of these gases is the slurry of manure and urine that is held in storage pits beneath the swine barns, and the second major source is the land application of swine manure. At high concentrations, such as those that have been measured at similar swine facilities, ammonia and hydrogen sulfide adversely affect the respiratory system, and cause eye and skin irritation. Other chemicals utilized in swine production, including quarternary ammonium disinfectants, aldehydes and chloramines also have been associated with

adverse respiratory effects such as asthma. The nonbiologic aerosols that are emitted from swine CAFOs include dust particles generated from dried manure, feed, dried dander or skin cells, and hair. Chronic exposures to these particles can result in an increased risk of bronchitis and asthma.

The predominant swine-related bioaerosols of concern to public health include bacteria, antibiotic-resistant bacteria, endotoxins and viruses. My area of expertise relates to the detection of antibiotic-resistant bacteria emitted from large-scale agricultural facilities. Therefore, I will focus the remainder of this letter on this topic.

Several recent studies by our research group and others have shown that the air within and around large-scale swine facilities is characterized by high levels of antibiotic-resistant bacteria, including antibiotic-resistant *Staphylococcus aureus*, Coagulase-negative *Staphylococcus*, *Enterococcus*, Group A streptococci, and fecal coliforms. In particular, in a recent study published in *Environmental Health Perspectives* by Shawn E. Gibbs et al., *S. aureus* was the most common organism detected in indoor air samples collected from a swine facility. This organism also could be detected in outdoor air samples up to (at least) 450 ft. downwind of the swine facility (Note: No additional samples were collected beyond 450 ft.). In this study, the *S. aureus* isolates were not tested for resistance to methicillin; therefore, it is unclear whether any of the detected *S. aureus* were methicillin-resistant *S. aureus* (MRSA), which have received increasing attention in the news media as of late.

However, another recent study published in *PLoS ONE* by Tara C. Smith et al., showed that 49% of swine and 45% of swine workers in the Midwestern U.S. were carriers of MRSA, emphasizing that this organism could be very common on large-scale swine facilities and these facilities could serve as an important environmental reservoir of MRSA. The particular strain identified in this study was ST398, a strain that is typically resistant to other antimicrobials besides methicillin and has been shown to cause MRSA infections in human populations. MRSA is an important human bacterial pathogen that is increasingly associated with virulent and often fatal community-acquired infections in the U.S. Therefore, the finding of this organism in both U.S. swine and U.S. swine workers is significant from a public health perspective.

While the Smith et al. study did not evaluate air samples in and around the swine facilities for the presence of ST398 MRSA, it is possible (based on previous work) that this organism could be present in air samples downwind of large-scale swine facilities. In addition to MRSA, downwind air may contain elevated levels of gases, endotoxins and non-biological aerosols as discussed above.

For these reasons, it is my professional opinion, based on available scientific evidence, that parking school buses 1200-1800 ft. downwind of a proposed swine facility is unadvisable. This policy could result in unintentional exposures to antibiotic-resistant bacteria, susceptible bacteria and other aerosols among children who use these buses to travel to and from school. Children, in general, are considered a susceptible sub-population; therefore, as a general public health policy, additional measures should be taken to protect them from potential environmental exposures, even when there is insufficient data to determine the specific magnitude of a particular environmental exposure. In the field of public health, we refer to this as the “precautionary

principle.” I strongly recommend that the school board utilize this precautionary principle and secure another location to park the school buses that will transport the children to and from school.

Thank you for your consideration. If you have any additional questions, please feel free to contact me at 301-405-1772 or [ars@umd.edu](mailto:ars@umd.edu).

Sincerely,

A handwritten signature in black ink, appearing to read "A. Sapkota". The signature is written in a cursive style with a large initial "A".

Amy R. Sapkota, PhD, MPH  
Assistant Professor