

## ENVIRONMENT

**Title:** Effectiveness of Biofilters in Reducing Aerial Pollutant Emissions – NPB #08-089

**Investigator:** Teng Teeh Lim<sup>1</sup>, Yaomin Jin<sup>2</sup>, and Albert Heber<sup>2</sup>

**Institution:** <sup>1</sup> Agricultural Systems Management, University of Missouri;  
<sup>2</sup> Agricultural & Biological Engineering, Purdue University

**Date Submitted:** August 25, 2010

### Scientific Abstract

Two elevated-bed, wood chip biofilters were installed at a commercial swine finishing farm in Indiana. Effectiveness of the biofilters to mitigate aerial pollutants (ammonia, hydrogen sulfide, and methane) and particulate matter (PM<sub>2.5</sub>, PM<sub>10</sub>, and TSP) was evaluated. Wooden enclosures were installed to collect and redirect the biofilter-treated exhaust streams, and one untreated stream was a control for quality-check purposes. The two 5-inch biofilters (biofilters with 5-inch media thickness) reduced NH<sub>3</sub> concentrations by 31.2% (P<0.01) and 18.1% (P>0.01), and H<sub>2</sub>S concentrations by 26.6% (P<0.01) and 23.6% (P<0.01), respectively, insignificant reductions of CH<sub>4</sub> concentration were observed. The 10-inch media biofilters (biofilters with 10-inch media thickness) reduced NH<sub>3</sub> concentrations by 45.8% (P<0.01) and 18.0% (P<0.01), and H<sub>2</sub>S concentrations by 42.2% (P<0.01) and 27.9% (P<0.01), respectively. Reductions of PM<sub>10</sub>, and TSP were 62.0% and 89.7% for the 5-inch biofilters, and were 62.9% and 96.3%, for the 10-inch biofilters, respectively. Very low PM<sub>2.5</sub> concentrations were measured in the treated and untreated airstreams. Pressure drops of the biofilters averaged 29.6 and 39.7 Pa for the 5-inch biofilters 1 and 2, and were 47.2 and 57 Pa for the 10-inch biofilters 1 and 2, respectively. The empty bed residence times were 0.3s and 0.6s for the 5-inch and 10-inch biofilters, respectively, when the additional pressure drop was considered. Maintaining proper and uniform biofiltration media moisture content is very important for maintaining mitigation effectiveness, and minimizing backpressure on the fans. Frequent maintenance checks of the biofilter and spray system to minimize compaction, ensure uniform moisture content, and minimize pressure drops are required to ensure maximum effectiveness.

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These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • [pork.org](http://pork.org)

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