

# **Field Test of Biofilter at Swine Facilities**

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# ***Biofiltration for Animal Production Facility Exhaust***

- **Biofilter = a pollution control technique using living material to capture and biologically degrade pollutants. Common uses include processing waste water, capturing harmful chemicals or silt from surface runoff, and microbiotic oxidation of contaminants in air.**
- **Biofilter = enclosed control system that contacts emissions with a solid media (such as bark) and use microbiological activity to transform pollutants to innocuous compounds such as CO<sub>2</sub>, water, and ...**

# *Biofilter Being Tested*



EBRT of 4-second, wood chip based

# *Other Design of Biofilters*





# *Industrial Uses of Biofilters*



Photo source: Roger Treloar

# *Biofilters at Oklahoma State University*



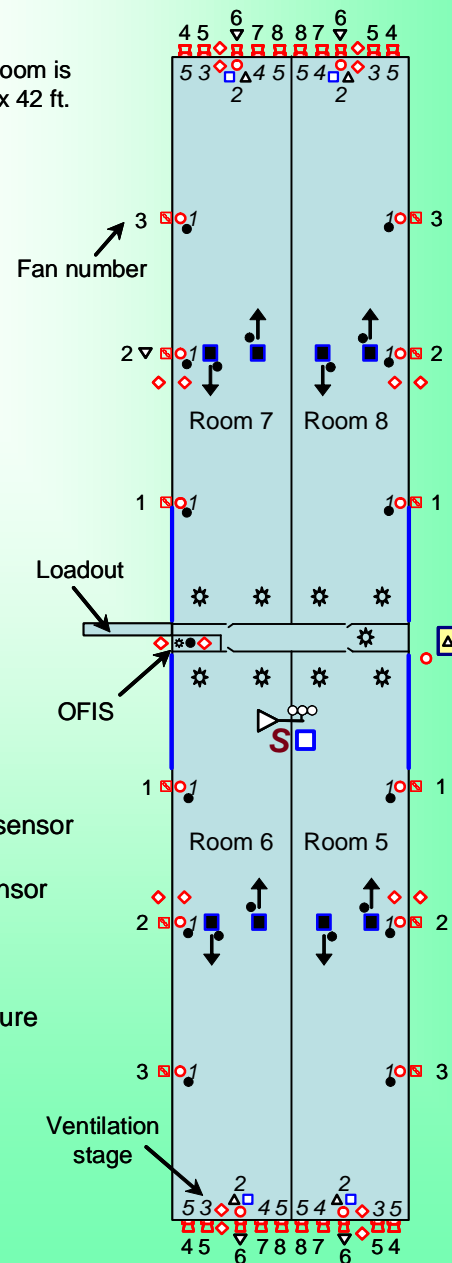


# Biofilters Tested at Finisher Site

- Add on project of effectiveness study
- NAEMS site, 4, 1000-head deep pit finishing rooms.
- Tested for 4 months continuously.

- Heater
- ⊛ Activity sensor
- ◊ Static pressure port
- RH/Temp probe
- ▲ TEOM
- Thermocouple
- Air sampling
- ∞ Wind sensor
- S Solar sensor
- Exhaust fan w/ RPM sensor
- Pit Fan w/ RPM sensor
- ▼ Anemometer
- △ BG w/ outdoor enclosure

Each room is 200 ft x 42 ft.



# *Biofiltration Effectiveness Tested*



Gen. 1 design, vertical  
EBRT of  $< 1$  second

Automated Hydration System.  
Automatic shut-off when raining





# *Gen. 2 Design, Tested*

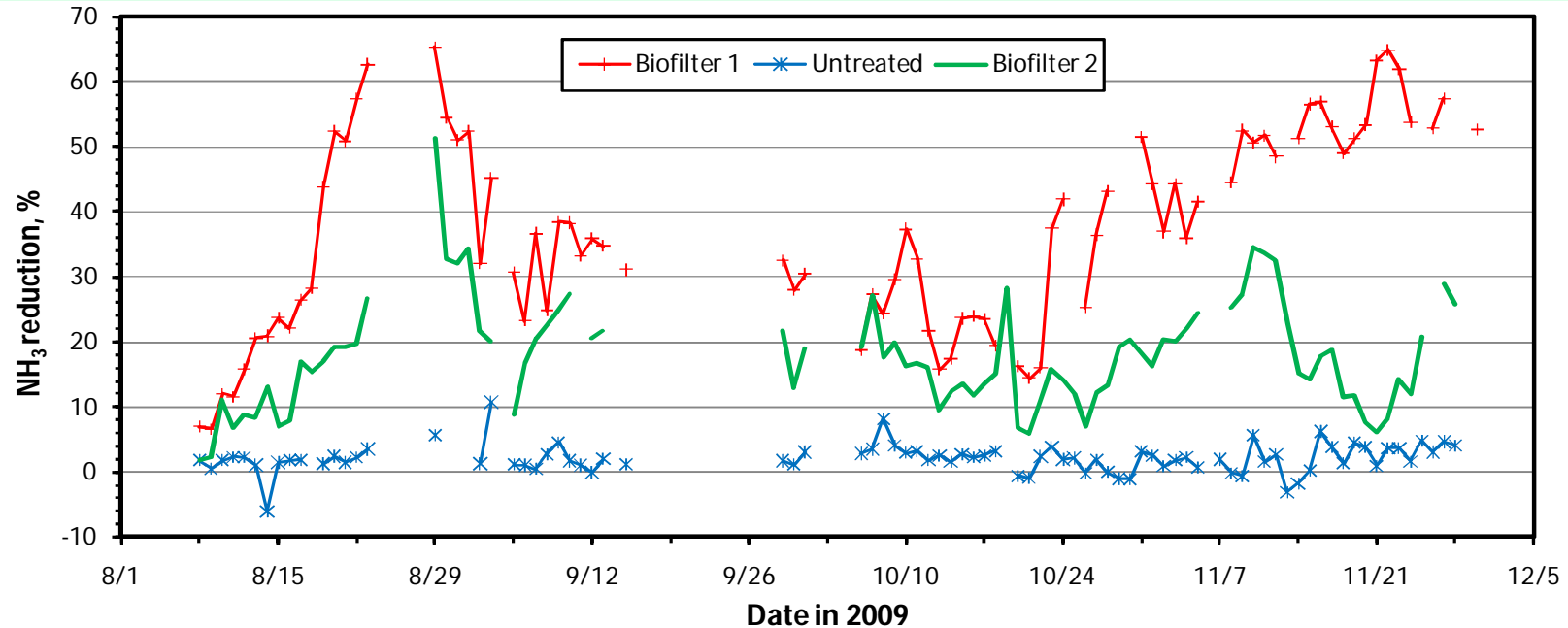


EBRT = 0.3s and 0.6s

# *Variables Monitored and Enclosure*

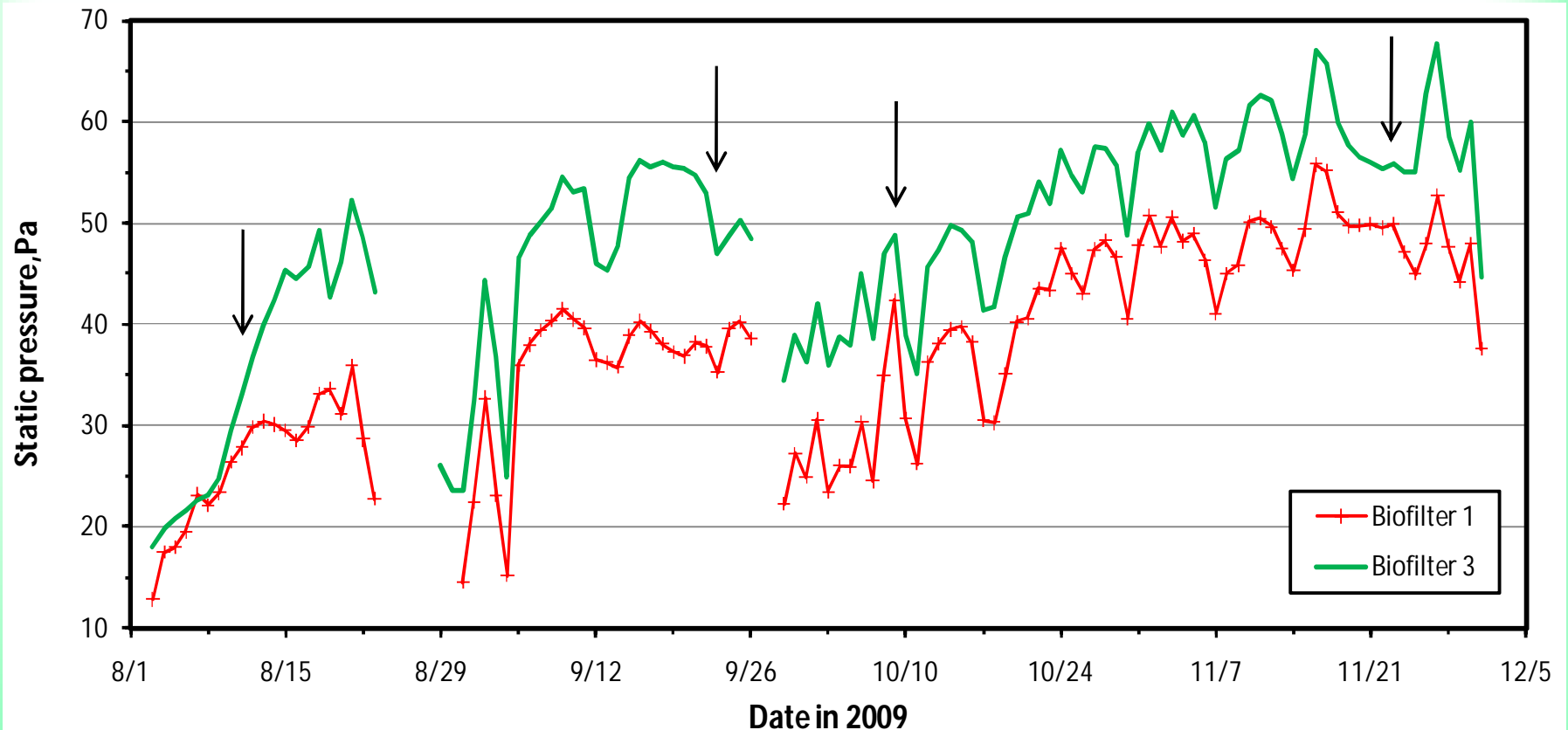


# *Improved Hydration and Results*





# *Static Pressure Over Time*

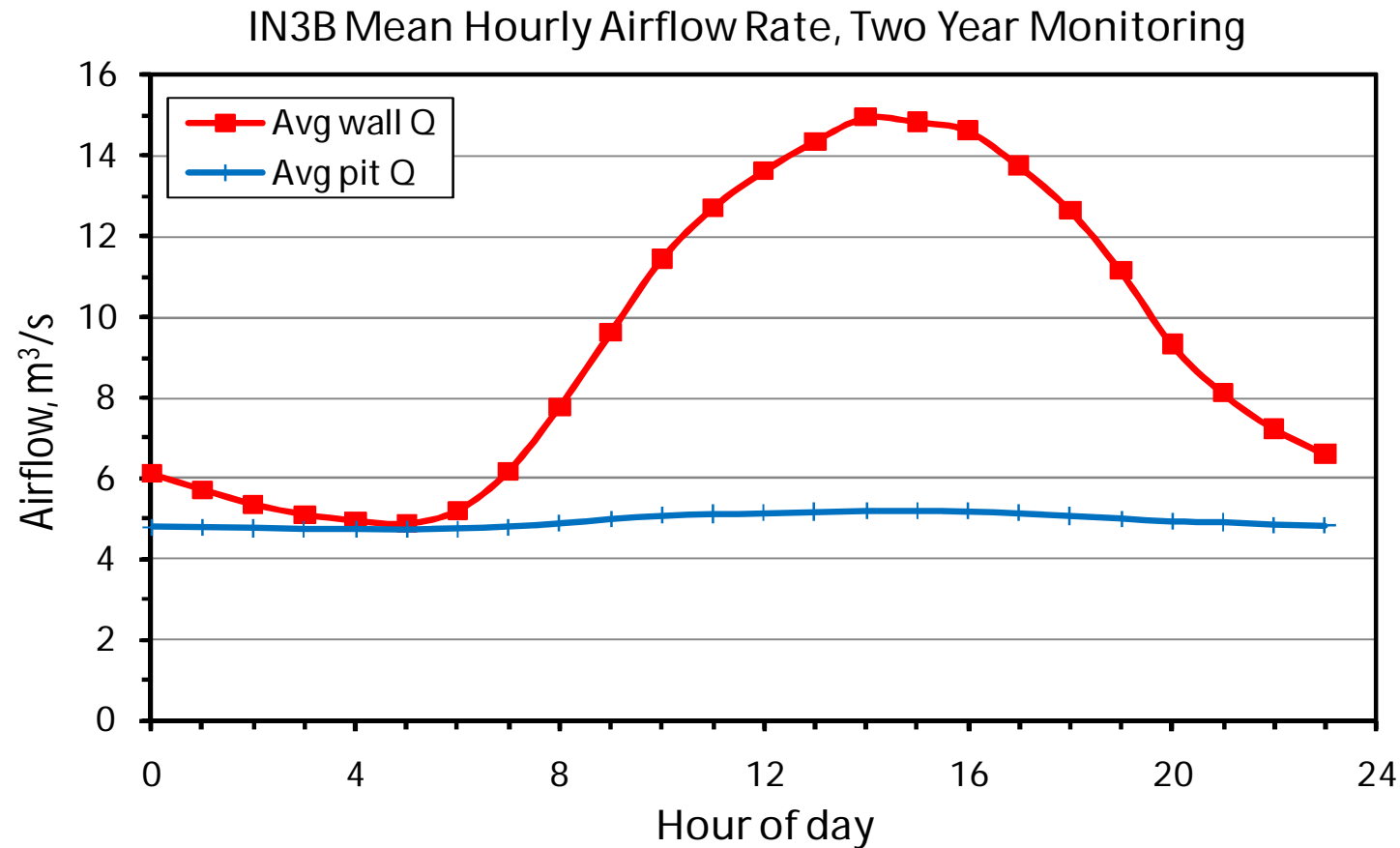


Static pressure within the biofilters. The arrows indicate the biofilter media turning and mixing events.

## *Summary of Performance/Cost*

- **5-inch biofilters reduced  $\text{NH}_3$  concentrations by 31% and 18%, and  $\text{H}_2\text{S}$  concentrations by 27% and 24%, respectively. Insignificant reductions of  $\text{CH}_4$  concentration were observed.**
- **10-inch biofilters reduced  $\text{NH}_3$  concentrations by 46% and 18%, and  $\text{H}_2\text{S}$  concentrations by 42% and 28%, respectively.**
- **The biofilters were efficient in reducing PM.**
- **Biofilters installation at a single swine finishing room with three pit fans (24-inch fans), the total cost would be \$4200/room**

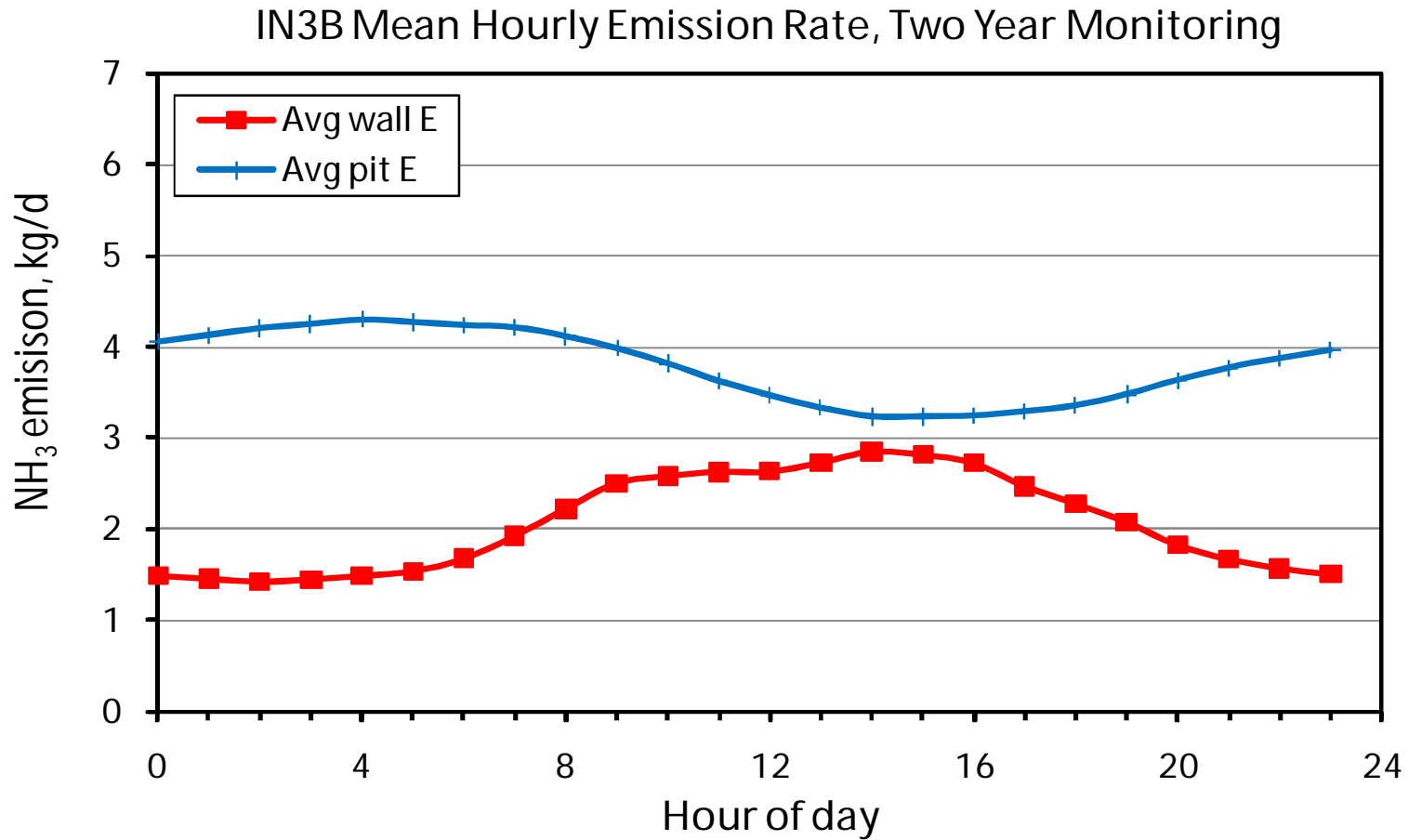
## *Mitigating Only Pit Fan Emission?*



The 4-room mean pit airflow was 5.0 m<sup>3</sup>/s, which was 34% of the total room airflow of 14.5 m<sup>3</sup>/s.



# *Mitigating Only Pit Fan Emission?*



The 4-room mean pit emission rate was 3.8 kg/d, which was 55% of the room total of 6.9 kg/d.

*Finally.....*



- **Questions, please?**