

Wayne P. Robarge (Site PI; wayne_robarge@ncsu.edu; 919.515.1454), Jihoon Kang (Site Engineer; jkang@ncsu.edu; 919.513.3841)

Introduction to NAEMS

- Increased public concerns over air pollutants from animal feeding operations (AFOs)
- Lack of scientifically credible data for regulating air emissions from AFOs under federal regulations
 - Clean Air Act ^{1 Comprehensive Environmental Response, Compensation, and Liability Act}
 - CERCLA¹/EPCRA² ^{2 Emergency Planning and Community Right-to-know Act}
- NAEMS established by a non-profit organization called the Agricultural Air Research Council
 - Under a voluntary Air Compliance Agreement between the EPA and the animal industries
 - Overseen by the EPA Office of Air Quality Planning and Standards
 - Led by Purdue University (Dr. Albert Heber) and in collaboration with seven different universities
- Monitoring 24 different sites (14 barns and 10 open sources) across nine states according to the EPA-approved quality assurance project plan
- Department of Soil Science in NCSU monitoring two swine sites (Sow farm and finishing farm)

Project objective

- To determine emission rates of NH₃, H₂S, PM (Particulate Matter), and VOC (Volatile Organic Carbon) from representative AFOs in the dairy, poultry, and swine industries
- To gather baseline information that can be used to evaluate differences in emissions due to geographical region, season, time of day, building design, growth cycle of the animals, and building management



Figure 1. Locations of NAEMS sites¹

Site description

- Typical sow farm operation in the southeastern US
- Slatted floors and pull-plug recharge system
- Both barn and lagoon component at the same farm
- Mechanical ventilation that exhaust all air through endwalls

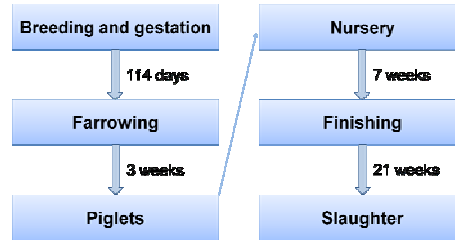


Figure 2. Pig production cycle

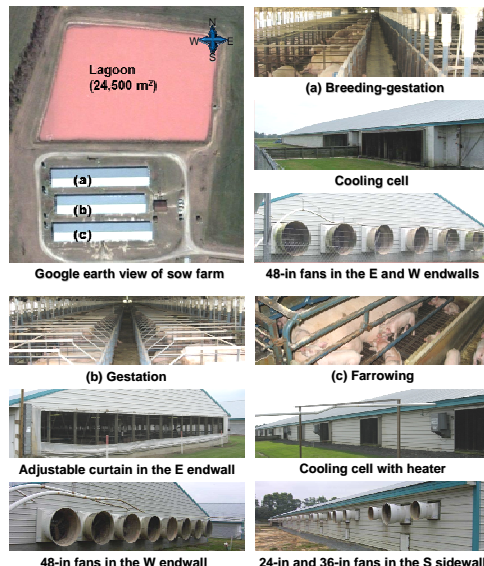


Figure 3. Sow farm layout and barn operations

Instrumentation

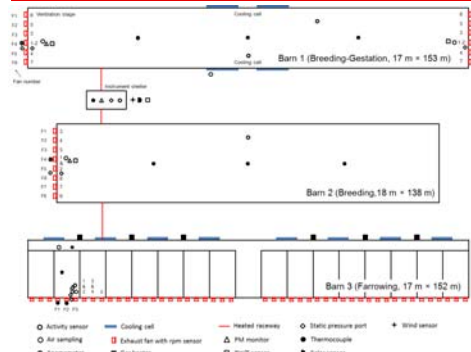


Figure 4. Sampling and measurement locations¹

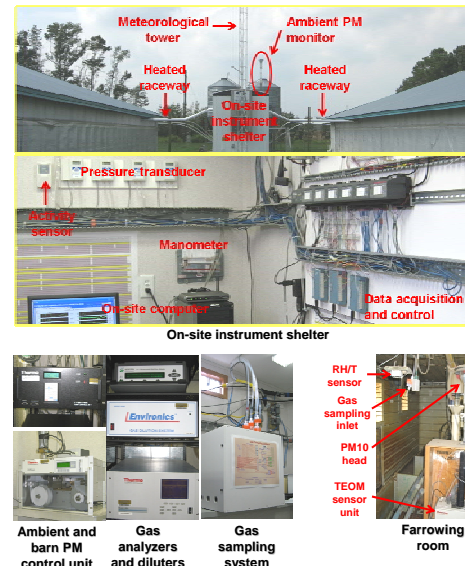


Figure 5. Sow farm instrumentation²

Data generation and processing

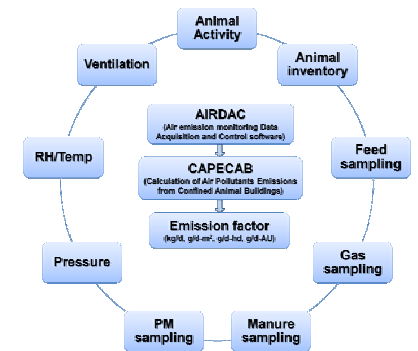
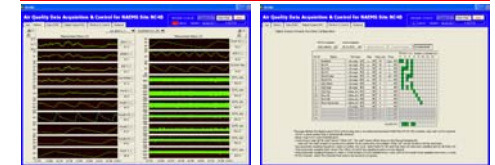


Figure 6. Data generation and processing for NAEMS

Progress

- Data collection since December 15, 2007
- Weekly, monthly, and annual site maintenance
- Zero-span check and calibration curve for gas analyzers
- Quality assurance/control
- Calibration of ventilation fans using Fans Assessment Numeration System (FANS)
- Manure/feed sampling
- Daily data analysis
- Emission factor calculation

Acknowledgement

¹Adapted from Quality Assurance Project Plan for the NAEMS Project and Site Monitoring Plan for NC4B.
²We gratefully acknowledge the Purdue Agricultural Air Quality Lab members for site setup, technical support, and data analysis.