The Clean Air Act and Animal Feeding Operations

August 2018

Outline

- Clean Air Act

- Confined Animal Feeding Operation (CAFO) Emissions

- National Air Emissions Monitoring Study (NAEMS)
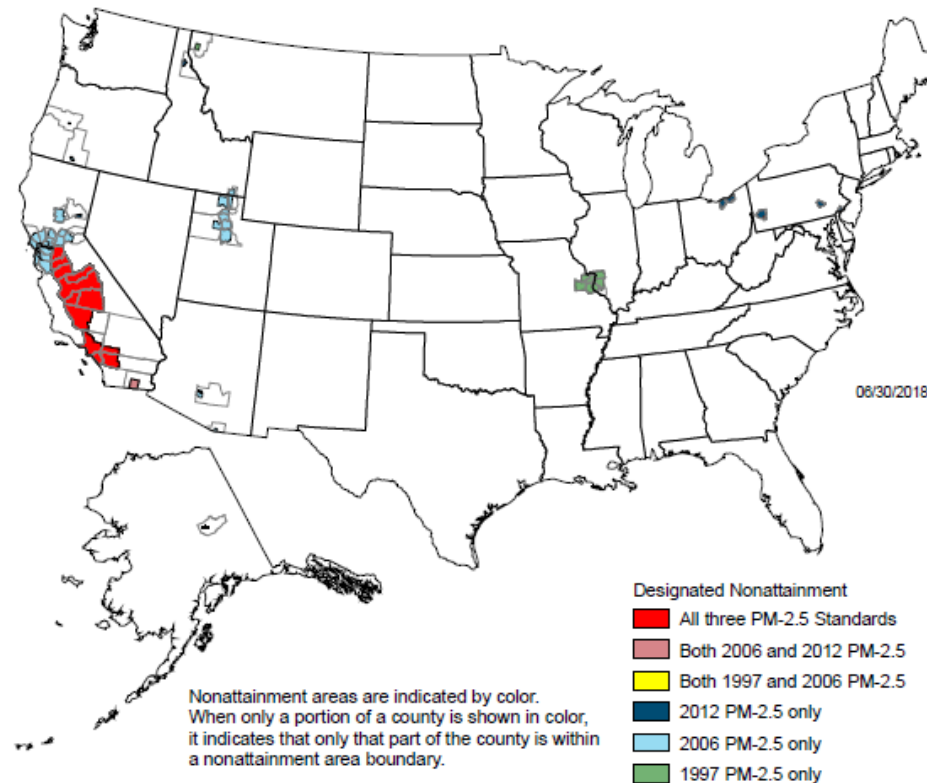
- Related Activities

Clean Air Act

- Established in 1970
  - Amended in 1977 and 1990
- Goal is to protect public health and welfare through federal air quality standards and state implementation plans
- Potential regulatory impacts on CAFOs:
  - SIPs
    - May or may not cover CAFOs (state specific)
  - Permitting
    - Required for CAFOs above certain size threshold (varies by pollutant and attainment/nonattainment status)
  - Federal Emission Standards (e.g., NESHAP)
    - Boiler MACT
    - RICE MACT

Ozone NAAQS Designations

Nonattainment Area Designations for the 2015 Ozone Standards
April 30, 2018

Nonattainment Areas
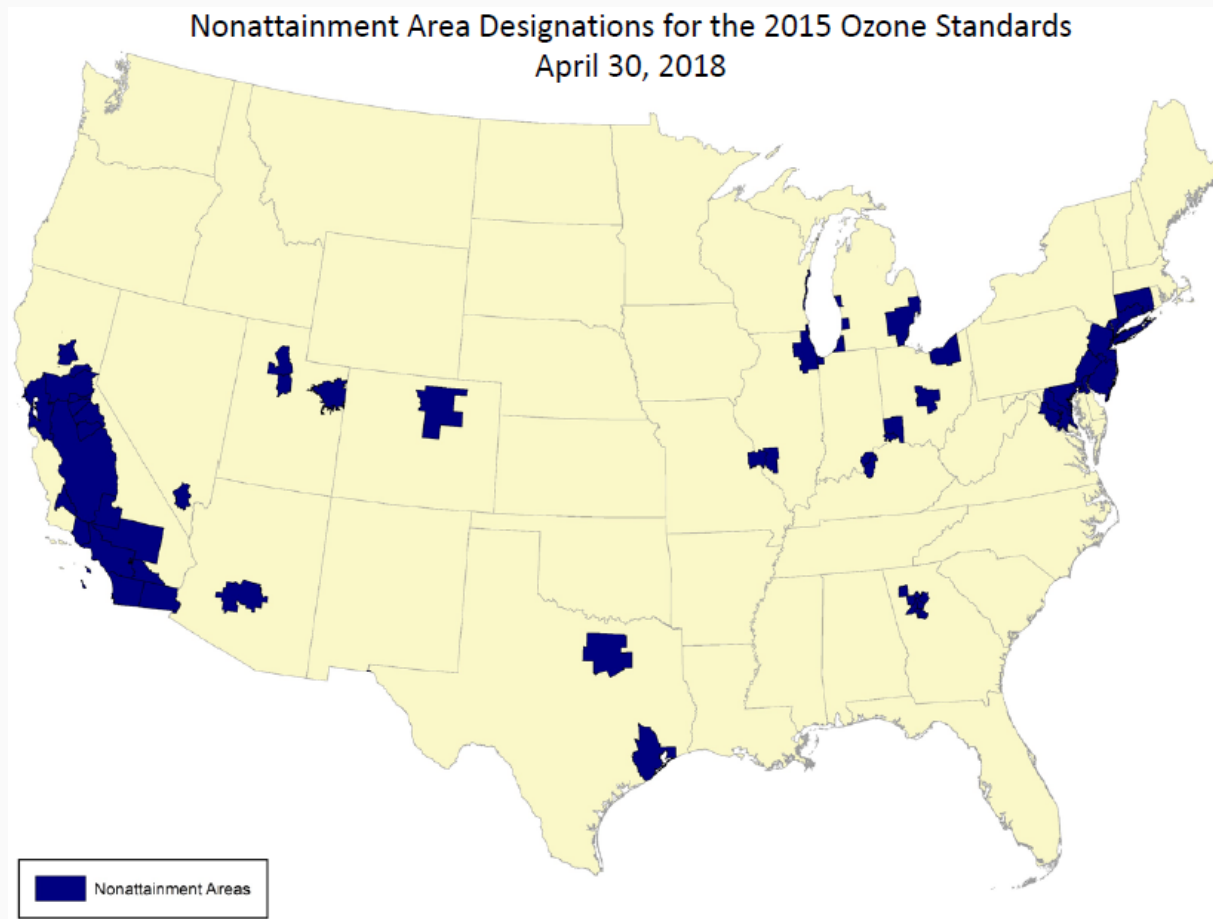
PM$_{2.5}$ NAAQS Designations

**Counties Designated Nonattainment
for PM-2.5 (1997, 2006, and/or 2012 Standards)**

08/30/2018

Nonattainment areas are indicated by color.
When only a portion of a county is shown in color,
it indicates that only that part of the county is within
a nonattainment area boundary.

Designated Nonattainment

- All three PM-2.5 Standards
- Both 2006 and 2012 PM-2.5
- Both 1997 and 2006 PM-2.5
- 2012 PM-2.5 only
- 2006 PM-2.5 only
- 1997 PM-2.5 only

CAFO Emissions: Background

- Many subcategories of animals housed in CAFOs
  - Primary focus: poultry, beef, swine, dairy
- Accurate farm-level emissions data not readily available
  - NAEMS (H_2S, NH_3, PM, VOCs)
- No current direct federal air regulations of CAFOs
  - State CAFO regulations may be incorporated into SIPs
- History of citizen suits
  - Seeking relief/regulation under CAA sections 108, 109 and 111
  - Addressing nuisance complaints under Title VI of Civil Rights Act of 1964

CAFO Emissions: Totals*

Pollutant	Total Emissions all CAFOs	Contribution by subsector

CAFO Pollutants (total including NH_3, PM, N_2O, H_2S, VOC)	~3M tpy
	  NH_3 (75%)
	  PM (13%)
	  N_2O (7%)
	  H_2S (3%)
	  VOC (2%)
		Beef (30%)
		Dairy (29%)
		Swine (25%)
		Poultry (16%)

NH_3	~2M tpy	Beef (29%) Dairy (29%) Swine (25%) Poultry (17%)

Based on EPA's 2011 NEI

CAFO Emissions

Subsector	Key Pollutants	Dominant Locations
Poultry-broilers	NH_3, VOC, PM	GA, AR, AL, MS, NC, TX, MD, DE, VA
Poultry-layers	NH_3, VOC, PM	IA, OH, IN, PA, CA
Swine (farrowing, nursery, and finishing farms)	NH_3, H_2S, VOC, PM	IA, NC, MN, IL, IN
Dairy	NH_3, VOC, PM	WI, PA, MN, NY, CA
Beef	NH_3, VOC, PM	CO, IA, KS, NE, TX

CAFO Emissions: Sources

- Housing
  - Monitored during NAEMS
- Manure Storage
 - Monitored during NAEMS
- Land Application
- Feed Storage/Preparation

NAEMS: Background

- Two-year, industry-funded study coordinated by Purdue University with EPA oversight

- Part of 2005 voluntary consent agreement between EPA and the CAFO industry

- Stated intent to use data to develop emission estimating methodologies (EEMs) for the monitored pollutants and emission sources in order to help CAFOs to determine and comply with regulatory responsibilities under the CAA, CERCLA and EPCRA

NAEMS: Emissions Monitoring

- 24 sites in 9 states were monitored from 2007-10

- Emission sources monitored include:
  - Broiler, egg layer, swine, and dairy houses
  - Swine and dairy basins and lagoons

- Pollutants monitored:
  - PM_{10}, $PM_{2.5}$, TSP, NH_3, H_2S, and VOCs

- Additional study by Tyson Foods (broiler farm in Kentucky)

Monitoring Site Locations
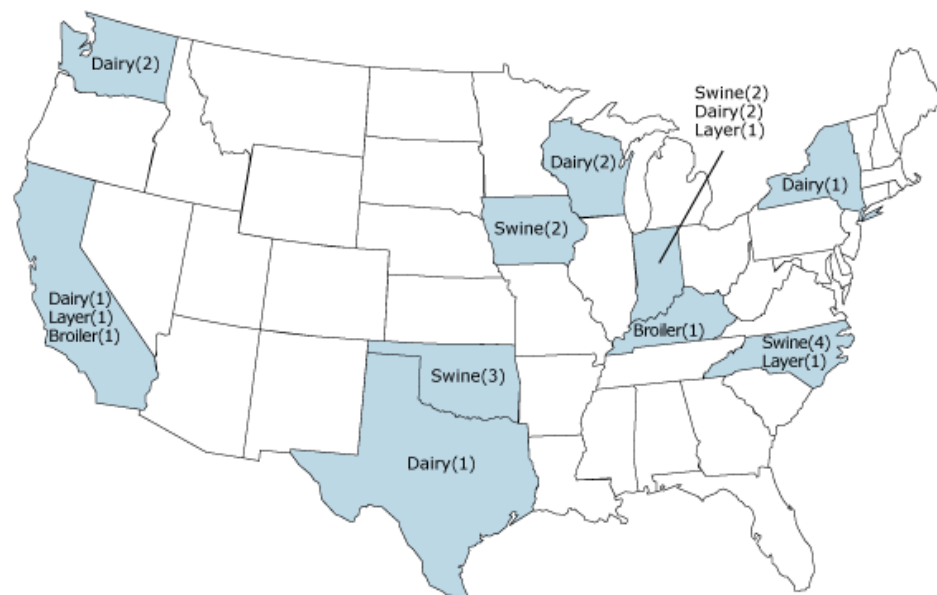
NAEMS: Challenges
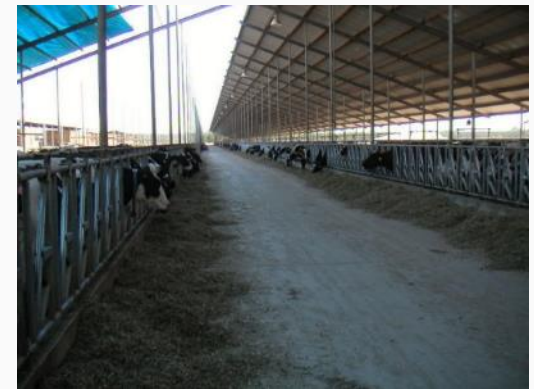
Changing Climatic Conditions

Large Open Sources

Changing Feed Rations
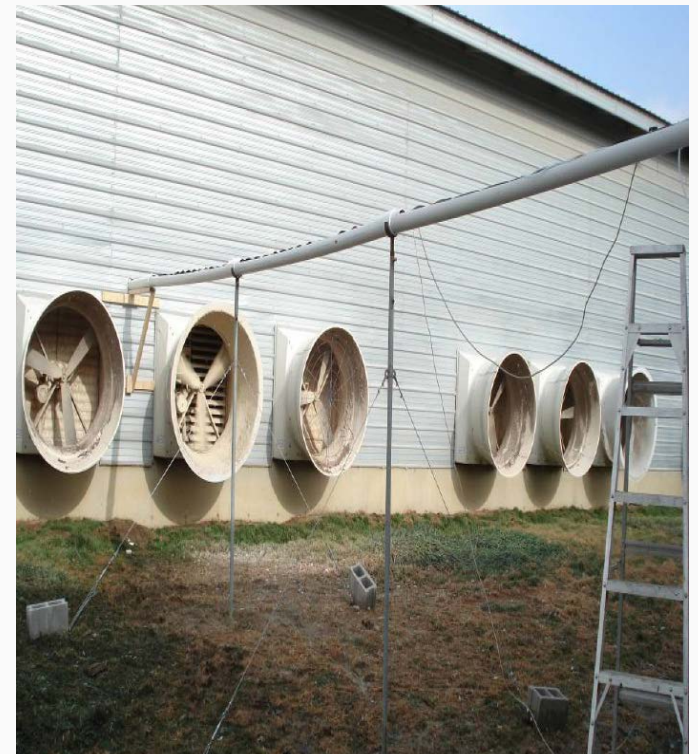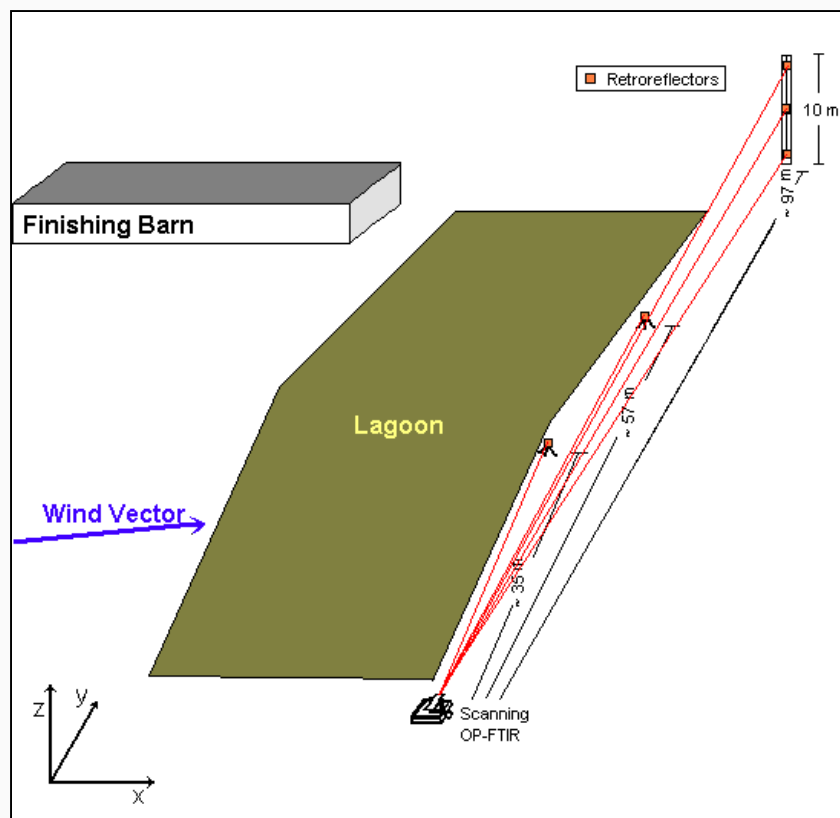
NAEMS: Challenges (cont.)

Animal Movements

Partially Enclosed and Naturally Ventilated

NAEMS: Point Sources Approach

NAEMS: Large Open Sources Approach

Open-Path FTIR Concept

NAEMS: Draft EEM Development Approach

- Development of statistical models
  - Contain one or more independent (predictor) variables (i.e., parameters that represent the varying conditions at an CAFO) and one dependent (response) variable (i.e., emissions)
  - Examples: Linear regression models, nonlinear regression models
- Verification of statistical models: resampling (e.g. cross-validation, bootstrapping)
- Evaluation of statistical models: determine agreement between observed emissions and predicted emissions using appropriate methodologies

NAEMS: 2013 Draft EEM Review

- Overarching recommendations from EPA's Science Advisory Board (SAB) review

  – Apply statistical approaches to assess emissions while developing and evaluating process-based models

  – EPA should not apply current versions of the models for estimating emissions beyond those farms covered in the data set

- SAB also made several specific recommendations related to development of the emission estimating methodologies:

  – Use "other relevant data" in addition to the NAEMS data

  – Investigate using a lower "data completeness criteria"

17

NAEMS: EEM Development Timeline

Date	Milestone
January 2019	VOC Call for Information
September 2019	Draft swine EEMs: H_2S, NH_3, PM
February 2020	Draft poultry (broiler and layer) EEMs: H_2S, NH_3, PM
July 2020	Draft dairy EEMs: H_2S, NH_3, PM
November 2020	Draft VOC EEMs
TBD	Stakeholder review period
TBD	Final EEMs

NAEMS Updates (https://www.epa.gov/afos-air)

AP-42: Compilation of Air Emissions Factors

Air Emissions Factors and Quantification

CONTACT US

SHARE (f) (t) (p) (✉)

- Air Emissions Factors and Quantification Home
- Basic Information
- **AP-42**
- Emissions Estimation Tools
- WebFIRE
- CHIEF Archives

AP-42: Compilation of Air Emissions Factors

On This Page:

- Compilation of Air Pollutant Emissions Factors (AP-42)
  - Proposed/Revised/New Emissions Factors
  - AP-42 Proposed Factors, But Not Finalized
  - AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources
- Additional AP 42 Resources
  - Historical AP-42 Information
  - AP-42 Frequent Questions
  - Older editions of AP-42, Volume 1

AP 42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources

Chapter	Title
Cover page and Table of Contents	Cover page, detailed Table of Contents, Publications in Series, Insertion Instructions, and Key Word Index (PDF) (26 pp, 128 K, About PDF). This is current through the Fifth Edition, Supplement C of AP 42. For sections and chapters added after November 1997, see the chapter web pages below.
Introduction	Introduction to AP 42, Volume I, Fifth Edition (PDF) - January 1995 (10 pp, 70 K, About PDF)
Chapter 1	External Combustion Sources
Chapter 2	Solid Waste Disposal
Chapter 3	Stationary Internal Combustion Sources
Chapter 4	Evaporation Loss Sources
Chapter 5	Petroleum Industry
Chapter 6	Organic Chemical Process Industry
Chapter 7	Liquid Storage Tanks
Chapter 8	Inorganic Chemical Industry
Chapter 9	Food and Agricultural Industries
Chapter 10	Wood Products Industry
Chapter 11	Mineral Products Industry

https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors

20

AP 42 Chapter 9.4 Placeholder

9.4 Livestock & Poultry Feed Operations

At this time, there is no "AP–42 factor" or estimation method for this category. As would be the case even if there were an AP–42 method, users must evaluate their own application to determine the most appropriate method of estimating emissions. In the case of permits, sources are expected to use "best available data", not necessarily AP–42, to determine their emissions (see OAR's Memoranda for Operating Permits & New Source Review (Title V) Policy & Guidance Web site for permitting policies). As detailed in the Introduction to AP–42, AP–42 emission factors are not provided as recommended permit limits.

National Emission Inventory – Ammonia Emissions from Animal Husbandry Operations, Draft Report, January 30, 2004. (PDF 640K)
EPA estimated ammonia emissions for the years 2002, 2010, 2015, 2020, and 2030 from U.S. animal husbandry operations for inclusion in EPA's National Emissions Inventory (NEI). This report describes the data collected and literature reviewed to develop the inventory, explains the methodology to estimate ammonia emissions, summarizes the results at the state level, and discusses the limitations associated with the data used.
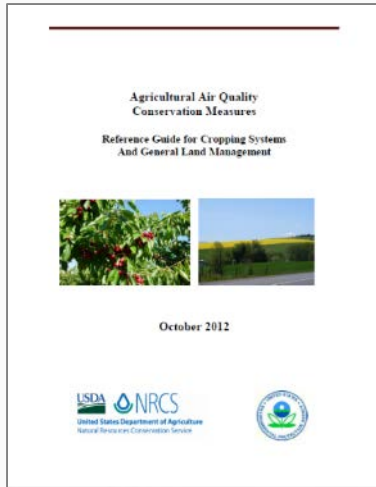FACT SHEET – National Emission Inventory – Ammonia Emissions from Animal Husbandry Operations (PDF 16K)
The data supporting the report is available in MS Access format. (ZIP 4M)
The contact is Bill Schrock at (919)541–5032, or schrock.bill@epa.gov

There are several interagency emissions factors reports available below under **Related Emissions Factor Documents** for Livestock & Poultry Feed Operations.

https://www3.epa.gov/ttnchie1/ap42/ch09/index.html

Related Activities: Best Management Practices

Agricultural Air Quality Conservation Measures
Reference Guide for Cropping Systems And General Land Management
October 2012

Agricultural Air Quality Conservation Measures
Reference Guide for Poultry and Livestock Production Systems
September 2017

- Joint EPA/USDA Agricultural Air Quality Conservation Measures documents
  - Reference Guide for Cropping Systems and General Land Management
  - Reference Guide for Poultry and Livestock Production Systems
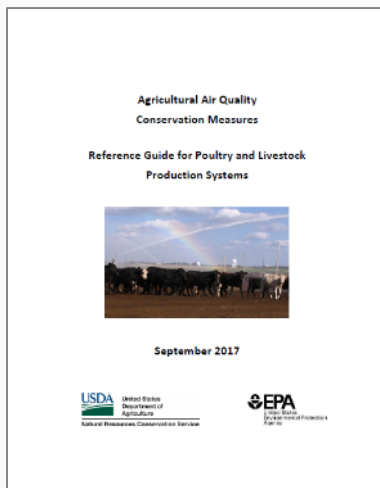
- Focus on USDA conservation measures and state BMPs
  - Four states with formal BMP rules: AZ, CA, ID, WA

Related Activities: Petitions/Lawsuits Update

- Ammonia
  - April 2011 petition to regulate NH_3 as a criteria pollutant under CAA sections 108 and 109; subsequent lawsuit voluntarily dismissed by plaintiffs in January 2017

- CAFOs
  - September 2010 petition to list CAFOs under CAA section 111(B); subsequent lawsuit voluntarily dismissed by plaintiffs after 2017 denial of petition
  - December 2014 notice of intent to sue for unreasonable delay of a non-discretionary duty to establish emission factors under CAA section 130 for VOC emissions from CAFOs; currently outstanding
  - Recent settlement of September 2014 Title VI complaint regarding alleged discrimination related to swine feeding operations in North Carolina

Questions?