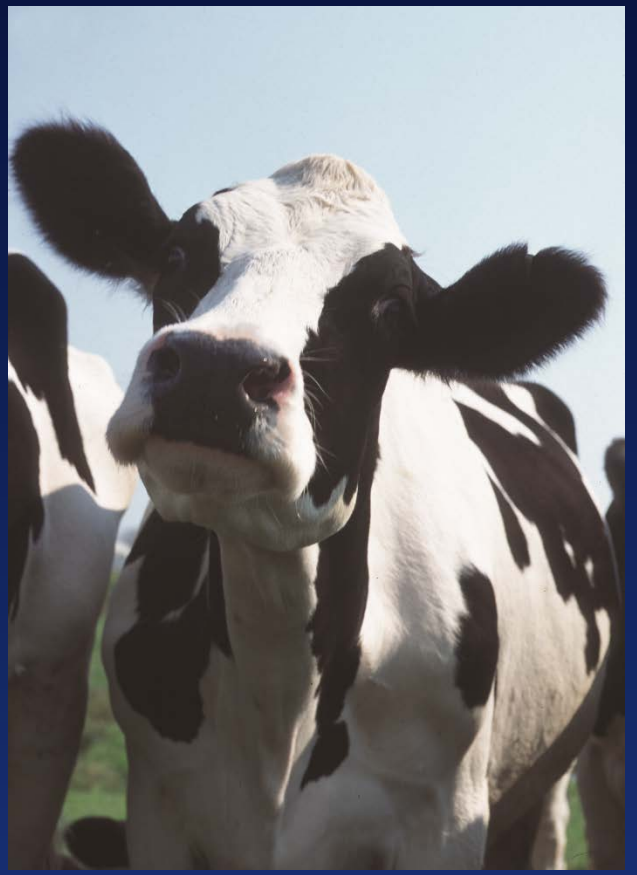
United States Department of Agriculture
Natural Resources Conservation Service

Reviewing Air Quality and the NRCS



August 23, 2017

Topics

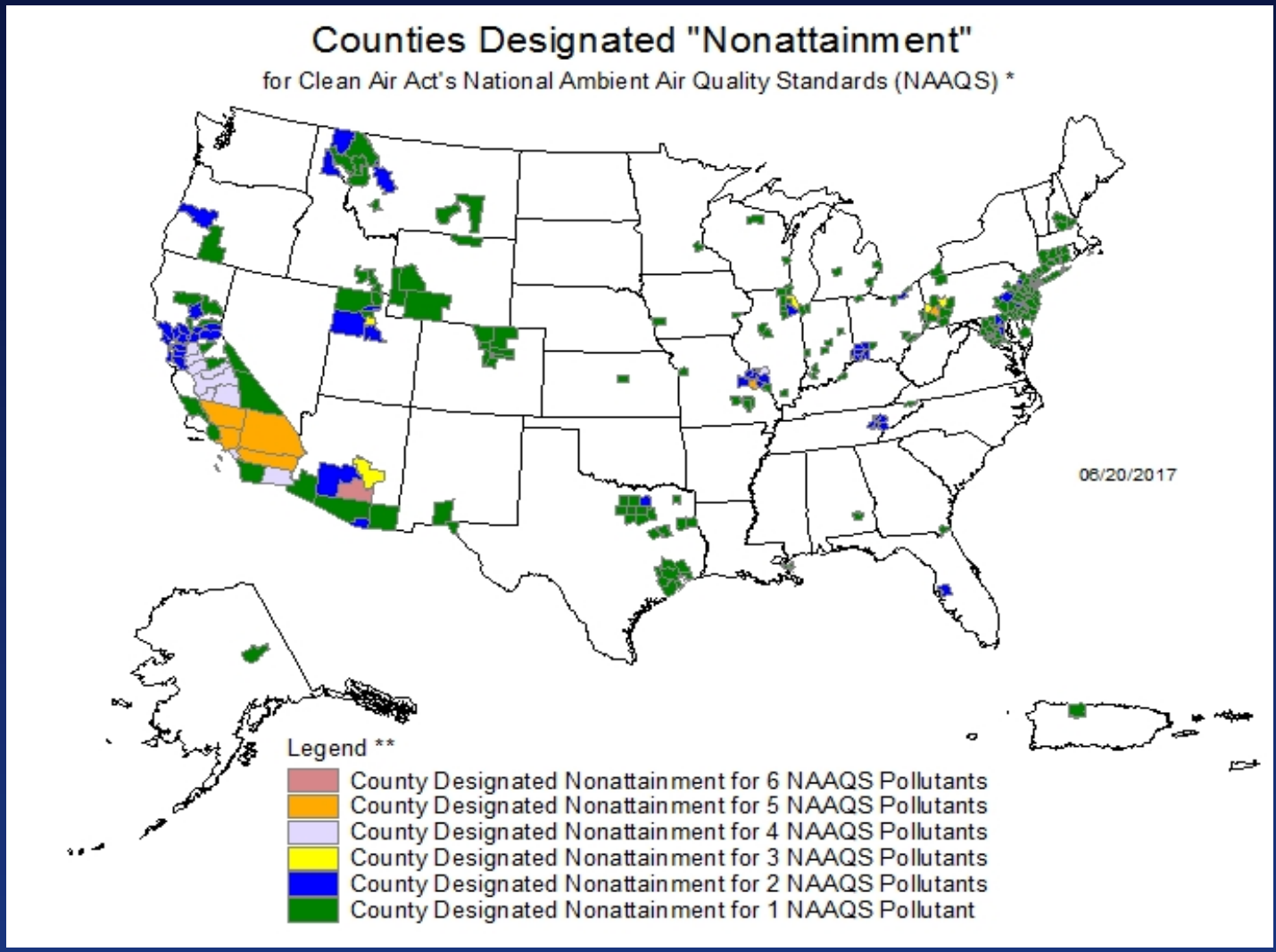
- Agricultural Air Quality Overview
- Regulatory Applicability
- AQAC Resource Concerns
- Air Quality in Conservation Practices
- NAQI
- Air Quality in Other NRCS Programs
- Some Examples and Successes

Agricultural Air Quality Overview

- NRCS addresses natural resources, and Air is a primary resource (SW**A**PA+H,E)
- Greatest focus is on air emissions from agricultural activity, but some on other sources (range and forest management)
- Air is an important issue in many areas, not just where directly regulated
- The Clean Air Act (1970, 1990) is the primary, overarching environmental law influencing federal, state and local air regulations and planning
- Agriculture has historically gotten a “pass” on regulations, but not so in those areas most polluted, with large agricultural presence, or near sensitive population areas. Confined livestock operations are a particular focus

Regulatory Applicability

- Primary air responsibility is with the EPA, who works with state and local entities to achieve objectives
- States analyze air quality, emissions (amount, locations, sources, etc.) and develop Implementation Plans for meeting objectives (SIPs)
- National Ambient Air Quality Standards (NAAQS) apply to 6 pollutants. Of these, our chief concern is with particulate matter (both PM10 and PM2.5) and ozone (precursors are NO_x and VOCs)
- EPA establishes “nonattainment” areas for NAAQS pollutants that exceed standards. States and locals have to develop plans to meet “attainment” goals
- Other pollutants are regulated under different rules (such as hazardous air pollutants, or HAPs), and by entities other than EPA (such as local odor ordinances)


Counties Designated "Nonattainment"
for Clean Air Act's National Ambient Air Quality Standards (NAAQS) *
06/20/2017
Legend **
County Designated Nonattainment for 6 NAAQS Pollutants
County Designated Nonattainment for 5 NAAQS Pollutants
County Designated Nonattainment for 4 NAAQS Pollutants
County Designated Nonattainment for 3 NAAQS Pollutants
County Designated Nonattainment for 2 NAAQS Pollutants
County Designated Nonattainment for 1 NAAQS Pollutant

AQAC Resource Concerns

- Emissions of Particulate Matter and PM Precursors
- Emissions of Ozone Precursors
- Emissions of Greenhouse Gases
- Objectionable Odors



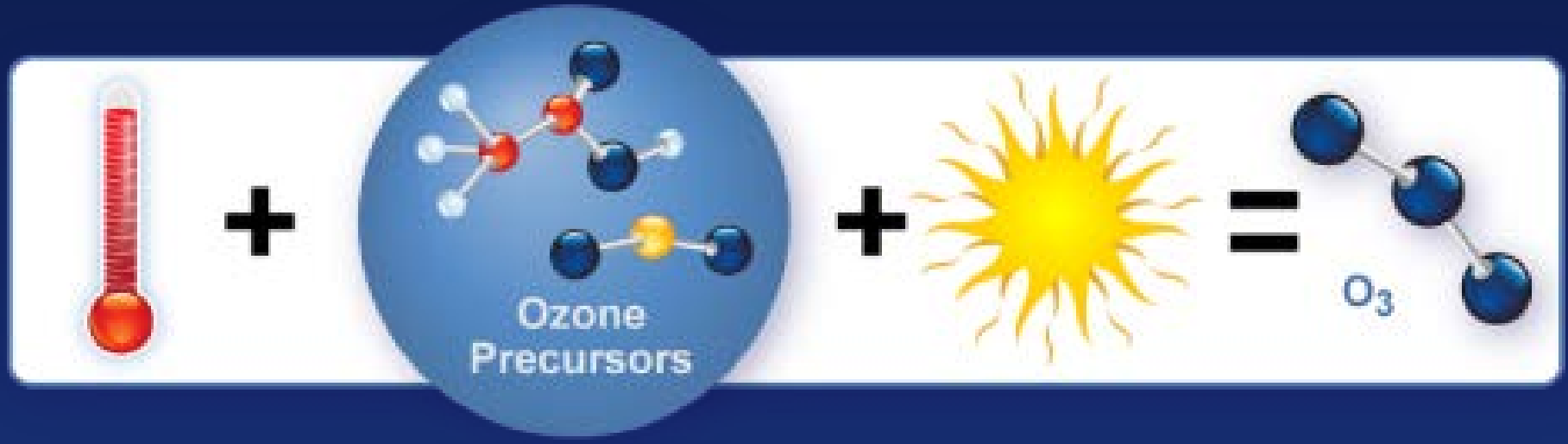
Emissions of Particulate Matter and PM Precursors

- Includes both PM_{10} and $PM_{2.5}$
- Directly emitted PM
  - Dust (equipment movement, wind, tillage, harvesting, animal activity, etc.)
  - Combustion (internal combustion engines, other)
  - Smoke from fires
  - Chemical drift
- PM Precursors
  - Form PM via chemical reactions, aggregation, etc.
  - Include ammonia, nitrates, sulfates

Emissions of Ozone Precursors

- Ozone precursors include oxides of nitrogen (NO_x) and volatile organic compounds (VOCs)
- NO_x and VOCs combine in the presence of sunlight to form ozone (O_3)
- In most places where ozone is an issue the emission of focus is NO_x
  - Usually an abundance of VOCs, so NO_x is limiting
- NO_x sources include engine combustion (primarily), fires, reactions in and above soils (including fertilization)

Ozone Formation



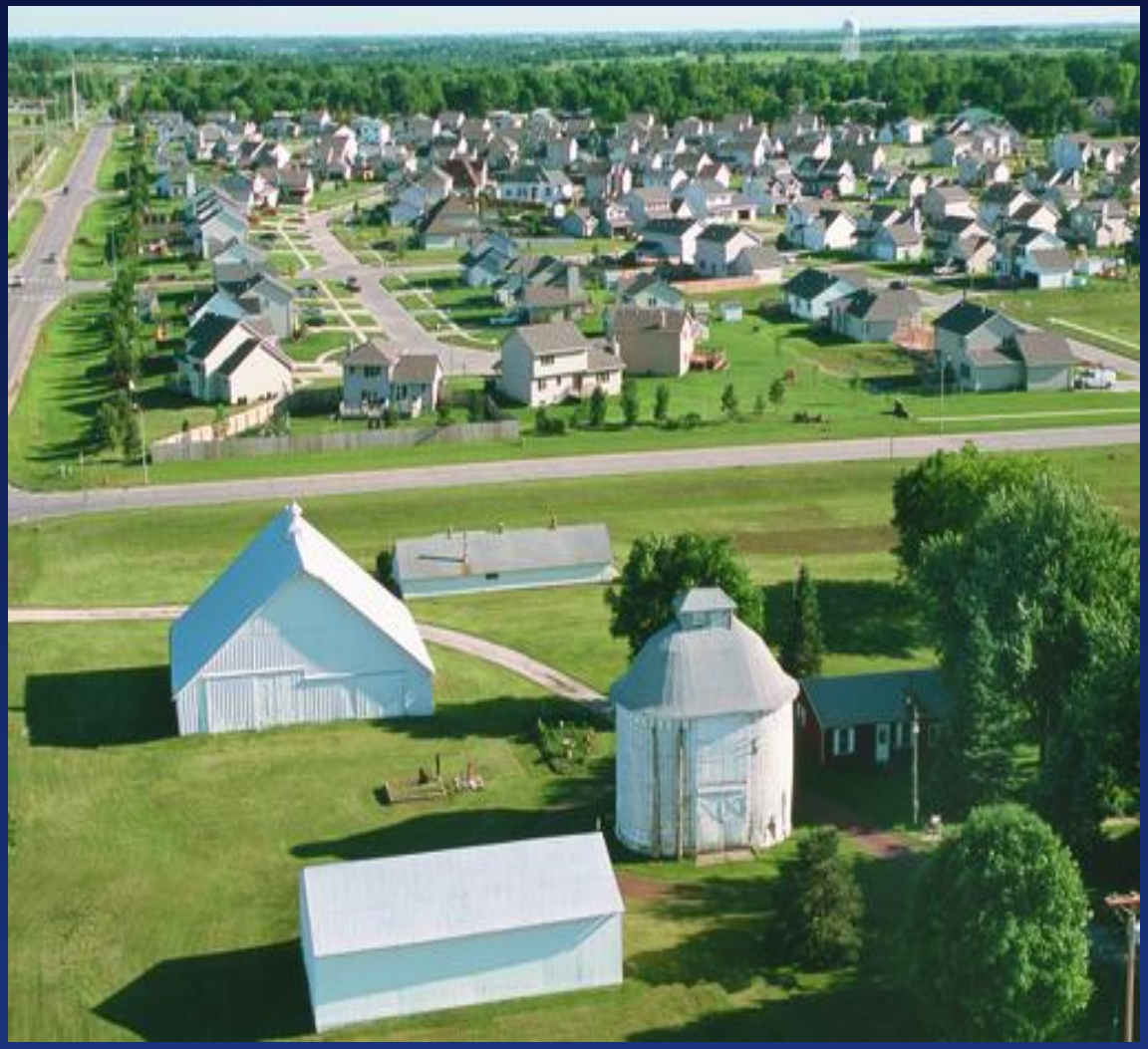
Though ozone can form in cool temperatures

Emissions of Greenhouse Gases

- GHGs of focus to NRCS are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)
- N_2O very different from NO_x (NO and NO_2)
- Global warming potential (gwp) established for GHGs. The standard is CO_2, defined to be = 1.0
- GWP of CH_4 is ~25, and gwp of N_2O is ~300
- With regard to CO_2 should consider carbon sequestration (CO_2 removed from atmosphere and held in liquid or solid form)
- 9% of US GHG emissions are from ag; 35% of US methane emissions from ag

Objectionable Odors

- Primary objectionable odors from agriculture include hydrogen sulfide (H_2S—rotten egg smell), ammonia (NH_3), and some VOCs
- No official odor regulations from EPA. Mostly addressed on a local level. In some cases odor regulations intersect right-to-farm laws
- Often complaint driven, and addressed via good neighbor objectives



Air Quality in Conservation Practices

- Five primary air quality practices:
  - 371, Air Filtration and Scrubbing
  - 372, Combustion System Improvement
  - 373, Dust Control on Unpaved Roads and Surfaces
  - 375, Dust Control from Animal Activity on Open Lot Surfaces
  - 376, Field Operations Emissions Reduction
- *Now under review and being modified!*

Air Filtration and Scrubbing (371)

- A device or system for reducing emissions of air contaminants from a structure via interception and/or collection
- Emissions targeted can include PM, VOCs, ammonia, odorous sulfur compounds (including H_2S), and methane
- Includes filtration, scrubbing, adsorption, inertial collection
- Not utilized to date; need some pilot projects

Combustion System Improvement (372)

- Replacing, repowering or retrofitting agricultural combustion systems and/or related components or devices
- Focus on emissions of PM and NO_x
- Sources targeted include stationary, portable, and self-propelled mobile equipment
- Has been used heavily by CA (and a few other states) to replace older, high-emitting tractors and other mobile equipment
- Also used for some other engines, as well as other combustion devices, such as orchard smudge pot removals

Dust Control on Unpaved Roads and Surfaces (373)

- The treatment of unpaved roads and surfaces to reduce dust (airborne particulate matter) produced by vehicular and machinery traffic, or wind action
- This is all about PM (mostly PM_{10} but some $PM_{2.5}$)
- Dust suppressants are utilized. Mostly road oil, polymers, and lignosulfonate
- Used most in the West and the High Plains

Dust Control from Animal Activity on Open Lot Surfaces (375)

- Reducing or preventing the emissions of PM arising from animal activity on open lot surfaces at animal feeding operations
- Focus is on PM (both PM_{10} and $PM_{2.5}$)
- Main application is to feedlots, with potential application to other open lot AFOs
- Two components: manure harvesting and water application (sprinklers)

Field Operations Emissions Reduction (376)

- Adjusting field operations and technologies to reduce PM emissions
- Focused on PM_{10} (primarily) and $PM_{2.5}$ emissions from various field operations
- Includes tillage, harvesting, precision guidance, timing of operations
- Used especially where farm PM emissions are a prime objective and/or where the area is in nonattainment status for PM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National Air Quality Initiative (NAQI)

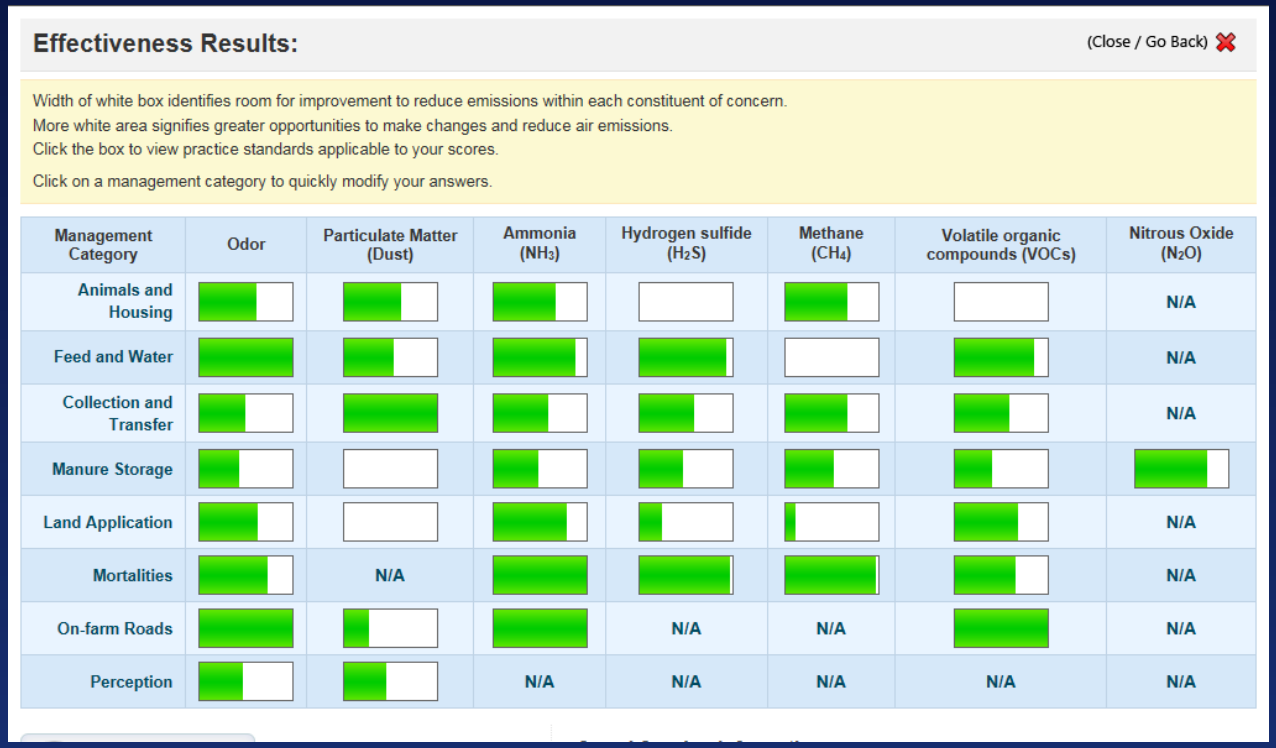
- The NAQI is a farm bill-directed initiative under NRCS EQIP (2014 Farm Bill authorized $25 mil/year)
- Provides financial assistance to implement conservation practices that address air resource issues
- Now open to all areas of the US (not just nonattainment areas)
- States apply for NAQI funds, targeting key AQ issues
- 11 states (AZ, CA, CO, DE, MD, OH, OK, OR, PA, TX, WA) utilized NAQI in FY16. In some cases, additional air quality EQIP funds were added to NAQI funds
- National and state rankings established to address highest priority air quality issues in a state/region

Air Quality in other NRCS Programs

- Many Conservation Innovation Grants (CIGs), especially in the past, have focused on air quality
  - Air curtain incinerator (box burner) for low emitting combustion of orchard prunings, forest slash, etc. (OR)
  - Gasifier for poultry manure utilization and emissions reduction (WV)
  - Dust-reducing almond harvester modifications (CA)
  - Windbreak wall for poultry housing emissions reduction (NC)
  - Development and implementation of the National Air Quality Site Assessment Tool (NAQSAT) for livestock operations (currently the official NRCS tool for general assessment of air emissions management from various livestock operation sectors)


BurnBoss

Using NAQSAT Results in Planning



Effectiveness Results: (Close / Go Back)

Width of white box identifies room for improvement to reduce emissions within each constituent of concern.
More white area signifies greater opportunities to make changes and reduce air emissions.
Click the box to view practice standards applicable to your scores.

Click on a management category to quickly modify your answers.

Management Category	Odor	Particulate Matter (Dust)	Ammonia (NH_3)	Hydrogen sulfide (H_2S)	Methane (CH_4)	Volatile organic compounds (VOCs)	Nitrous Oxide (N_2O)
Animals and Housing							N/A
Feed and Water							N/A
Collection and Transfer							N/A
Manure Storage							
Land Application							N/A
Mortalities		N/A					N/A
On-farm Roads				N/A	N/A		N/A
Perception			N/A	N/A	N/A	N/A	N/A

- Identify opportunities and problems; Develop appropriate alternatives;
- Understand solutions; Support decisions
- Archived NAQSAT webinar available

Tool -- http://naqsat.tamu.edu

Air Quality in other NRCS Programs

- Conservation Stewardship Program (CStP) has a few enhancements that are directly air quality-related, including
  - No till to reduce tillage induced particulate matter (329128Z)
  - Modify field operations to reduce particulate matter (376128Z)
  - Improving nutrient uptake efficiency and reducing risks to air quality – emissions of greenhouse gases (590130Z)
  - Reduce ozone precursor emissions related to pesticides by utilizing IPM PAMS techniques (595129Z)
- Resource Conservation Partnership Program (RCPP). Some RCPP projects are targeting air emission reductions, including the Salton Sea (CA)

Some Examples and Successes

- CA NO_x reductions via combustion system improvement (nearly 4,000 high emitting tractors replaced). Official credit for emission reductions recognized by EPA
- Smudge pot removals and replacement with much cleaner burning technologies (OR)
- NRCS-led effort in CO (primarily) to reduce nitrogen inputs to Rocky Mountain National Park
- Delaware and Maryland air emissions management for poultry operations

Smudge pots: Old, high-emitting radiant heat technology for frost protection now being replaced

Air Quality Webinar Series

- Air Quality in NRCS Across the Nation (Fall 2017)
- Evaluating Air Quality Resource Concerns (2018)
- Fire, Smoke and Air Quality (2018)
- Addressing Agricultural Particulate Matter (2018)
- Addressing Agricultural Ammonia Emissions (2018)
- Air Quality Practice Standard Revisions and Use
- Odor Mitigation

Questions?

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