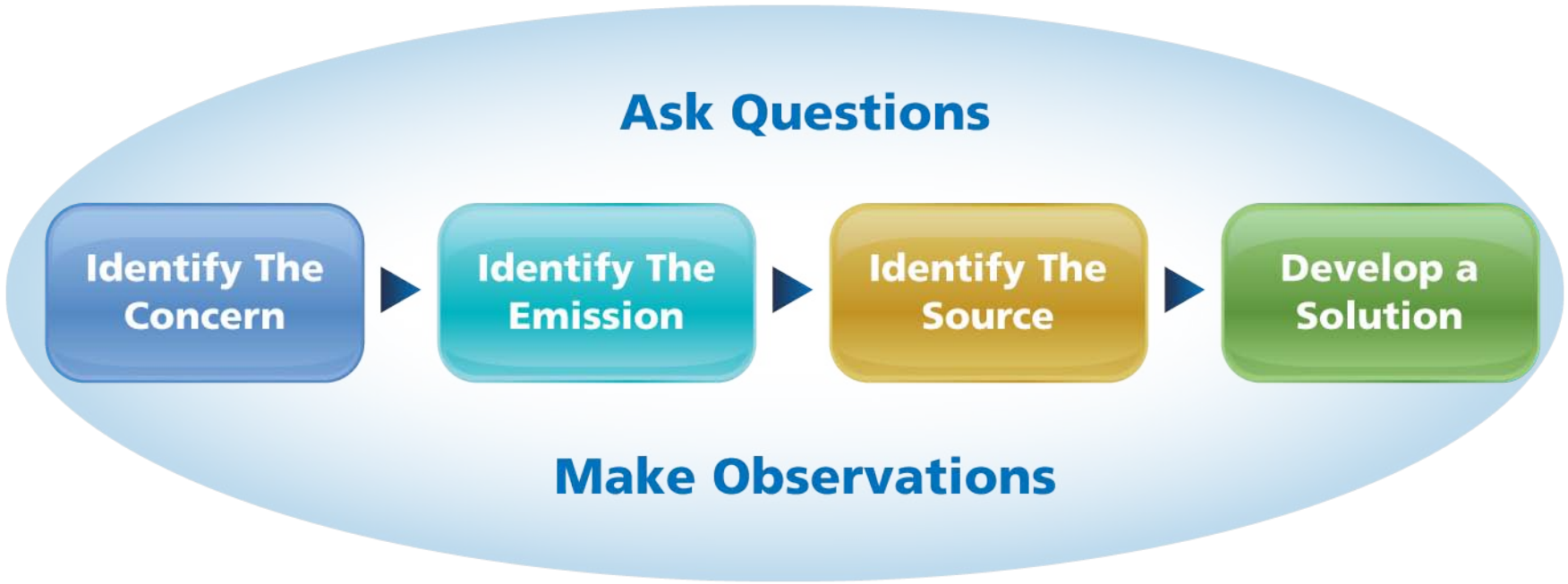
AQAC Assessment

Air Quality Assessment Steps



Planning?

- Identify the Concern
  - Identify problems and opportunities
  - Determine objectives
  - Inventory resources
  - Analyze resource data
- Identify the Emission
  - Inventory resources
  - Analyze resource data

Planning?

- Identify the Source
  - Inventory resources
  - Analyze resource data
- Develop a Solution
  - Analyze resource data
  - Formulate alternatives

Identify the Concern

- How do you know whether you need to address an air quality resource concern?
  - Producer concerns
  - Observations
  - External (off-farm) pressures
- What are the limiting factors?
  - What things does the producer have control over?
  - What things does the producer not have control over?

Producer Concerns

- Part of Step 2 (Determine Objectives) of the planning process is to have the stakeholders identify objectives
  - Producers may identify known problems
  - They may also identify potential opportunities

Observations

- Can you smell odors?
- Can you see dust blowing or deposited dust?
- Does the farm/equipment look to be maintained and managed well?

Use Your Senses

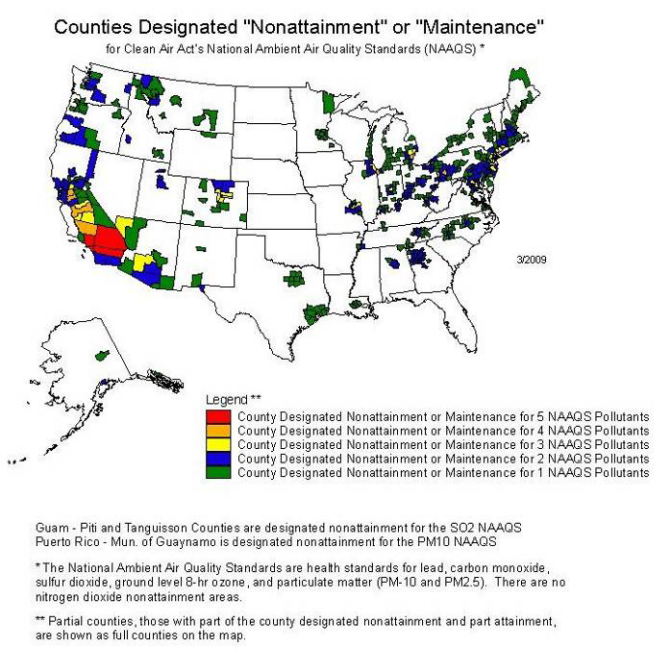
- Don’t forget to use “common sense”
- Evidence of air quality problems may not just be in the air….

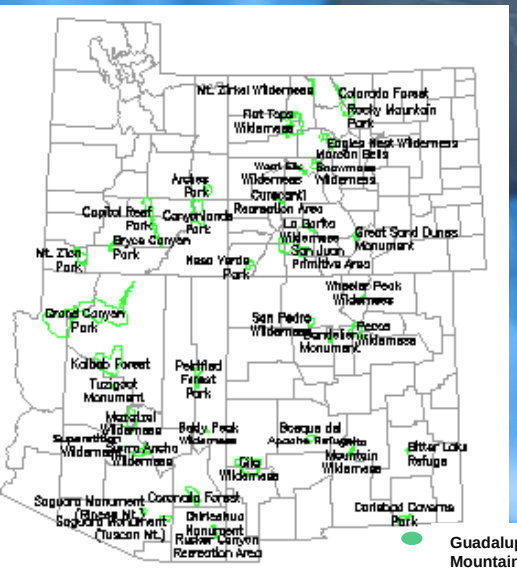
External Pressures

- General air quality status of the area around the farm
- Regulatory requirements
- Neighbor/community issues

Local AQ/Regulations

- Review whether the farm is located in or near a nonattainment or maintenance area





Guadalupe Mountains Park, TX

- Review whether the farm is located near a Class I area

Local AQ/Regulations

- Other local regulations may apply, too
  - Odors
  - Greenhouse gases
- References
  - Attainment status – U.S. EPA Green Book
    - http://www.epa.gov/oar/oaqps/greenbk/index.html
  - Local regulations
    - Contact your state, tribal, or local air quality regulatory authority

Neighbor/Community Issues

- Have there been any recent complaints?
- Has the producer received a fine or other penalty because of air emissions?

Limiting Factors

- Siting
- Meteorology
- Topography

Siting

- Where is the farm in relation to:
  - Residences
  - Schools
  - Hospitals
  - Shopping centers
  - Roads
  - Parks
  - Etc.

- What is the farm layout?

Meteorology and Topography

- Scale is important! Local-Regional-Global
- Examine meteorological (weather and climate) influences
- Examine the topographical (landscape) influences

Meteorological Influences

- Recall these basic weather factors when examining the site:
  - Temperature: averages, ranges, inversion potential
  - Wind characteristics / wind roses
  - Precipitation: amount, distribution
  - Solar radiation and cloud cover and relative humidity
  - Understand typical conditions/weather patterns associated with local AQ issues
- Some good climate references
  - Western Regional Climate Center (good climate station data)
    - www.wrcc.dri.edu/ *-OR-*
  - NRCS National Water and Climate Center (wind roses, etc.)
    - http://www.wcc.nrcs.usda.gov/climate/

Identify the Emission

- Now that we have identified the concern, we have to figure out what is contributing to the concern
- Recall which emissions contribute to the AQAC resource concerns
  - PM (direct emissions, NO_X, NH_3, VOCs)
  - Ozone (NO_X, VOCs)
  - Odors (VOCs, odorous sulfur compounds, NH_3)
  - Greenhouse gases (CO_2, CH_4, N_2O)

Identify the Source

- Now that we have identified which emissions/pollutants are the problems, how are they being:
  - Formed/generated
  - Released/emitted
  - Transported/dispersed

Formation/Generation

- Influenced by a number of physical, chemical, and biological properties
  - Amount of base nutrient available
  - Temperature
  - pH
  - Moisture
  - Oxygen availability
  - Microbial activity
  - Etc.

Formation/Generation (cont.)

- Conditions conducive to forming:
  - Direct emissions of PM
    - Low moisture
    - High winds
    - Crushing action
    - Inefficient combustion
  - Ammonia
    - Excess N
    - Higher pH
    - Higher temperatures
    - Moisture available
      - If too high, ammonia will try to remain in solution
    - Oxygen available

Formation/Generation (cont.)

- Conditions conducive to forming:
  - VOCs
    - Higher temperatures
    - Moisture available
      - If too high, some VOCs will try to remain in solution
    - Inefficient microbial decomposition or combustion of carbon-based material

Formation/Generation (cont.)

- Carbon dioxide (CO_2) is formed from the complete aerobic breakdown/decomposition of carbon-based material
- Methane (CH_4) is formed from the complete anaerobic breakdown/decomposition of carbon-based material
  - Usually in high-moisture conditions

Formation/Generation (cont.)

- Conditions conducive to forming:
  - Oxides of nitrogen (NO_x)
    - High combustion temperatures
    - Excess N
    - Combination of wet and dry areas
  - Nitrous oxide (N_2O)
    - Same as for NO_x

Formation/Generation (cont.)

- Conditions conducive to forming:
  - Odorous sulfur compounds
    - Anaerobic conditions
    - Lower pH
    - Higher temperatures

Release/Emission

- Influenced by a number of physical and chemical properties
  - Concentration of generated pollutant(s)
  - Temperature
  - pH
  - Moisture
  - Air movement
  - Etc.

Release/Emission (cont.)

- Once formed, air emissions have different release mechanisms
  - PM is different from gaseous compounds
  - Ammonia, VOCs, NO_x, CO_2, and N_2O are more diffusive
    - More concentration-based
    - Reduced exposed surface area can have an impact
  - Odorous sulfur compounds and methane rely more on “bubble” releases from liquids
    - Rely more on capture

Transport/Dispersion

- Influenced by a number of physical and chemical properties
  - Pollutant reactivity
  - Airflow, turbulence, and deposition
  - Meteorology
  - Etc.

Transport/Dispersion (cont.)

- Once released/emitted, pollutant concentrations can be influenced by:
  - Atmospheric dilution
  - Atmospheric chemical reactions
  - Filtration and deposition (i.e., windbreaks, precipitation, gravity)

Identify the Source

- There may be many sources or activities that are producing the emissions that are creating the resource concern
- A planner should:
  - Look at nearby (off-farm) sources
  - Identify on-farm sources

Nearby Sources

- Other sources near the farm may influence the area's air quality
  - These sources can also bring greater scrutiny to your farm
  - What about those of some distance that also may be of concern?

On-Farm Sources

- What/where are the places/activities/operations on-farm that can form/emit air pollutants?
  - Cropping operations
  - Animal operations
  - General farmstead activities
- Use the AQAC On-Farm Assessment Checklist to help you

Develop a Solution

- Which sources are the biggest problems?
  - If they are off-farm, the producer may not be able to do much to solve the concern
- Which on-farm sources will be the easiest to work with?
- Which process(es) can you disrupt?
  - Formation/generation
  - Release/emission
  - Transport/dispersion

Summary

- Conducting an AQAC assessment is the same as conducting an assessment for any other resource
  - Follow our planning process
- Look at the big picture (off-farm/external influences) as well as the details (on-farm)