

# National Ambient Air Quality Standards (NAAQS)

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## 2011 Overview

Presented by

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# The History of Air Pollution



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# What are NAAQS?

- National Ambient Air Quality Standards (NAAQS): mandated by Clean Air Act
  - “Ambient Air”: Air the general public can access, not private property
- EPA sets standards for pollutants
  - NDEQ monitors and ensures compliance
  - Permits issued to ensure standards protected

# What are NAAQS?

- Mandated by the Clean Air Act (CAA)
- Two types of standards:
  - **Primary:** Protect public health, especially "sensitive" populations
  - **Secondary:** Protect public welfare
  - Designed to protect with an "adequate margin of safety"

# What are Criteria Pollutants?

- NAAQS for six principal pollutants called "criteria" pollutants
- Criteria Pollutants:
  - Carbon Monoxide (CO)
  - Lead (Pb)
  - Nitrogen Dioxide (NO<sub>2</sub>)
  - Particulate Matter
    - Coarse Particulate Matter (PM<sub>10</sub>)
    - Fine Particulate Matter (PM<sub>2.5</sub>)
  - Ozone (O<sub>3</sub>)
  - Sulfur Dioxide (SO<sub>2</sub>)

# What are the NAAQS?

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m <sup>3</sup> )	8-hour	None	
	35 ppm (40 mg/m <sup>3</sup> )	1-hour		
Lead	0.15 µg/m <sup>3</sup>	Rolling 3-Month Average	Same as Primary	
Nitrogen Dioxide	53 ppb <sup>(3)</sup>	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour	Same as Primary	
Particulate Matter (PM <sub>10</sub> )	150 µg/m <sup>3</sup>	24-hour	Same as Primary	
Particulate Matter (PM <sub>2.5</sub> )	15.0 µg/m <sup>3</sup>	Annual (Arithmetic Average)	Same as Primary	
	35 µg/m <sup>3</sup>	24-hour	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour	Same as Primary	
	0.08 ppm (1997 std)	8-hour	Same as Primary	
	0.12 ppm	1-hour	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour
	0.14 ppm	24-hour		
	75 ppb	1-hour	Same as Primary	

# State Designations

- EPA required to review NAAQS every 5 years
- When NAAQS amended, new “designations” assigned by EPA
  - States recommend designation and justification
  - States provide monitoring/modeling data
- “State Implementation Plans” (SIPs) developed
  - SIPs provide implementation, maintenance, & enforcement of NAAQS
- Nebraska currently classified as attainment or unclassifiable for all NAAQS

# State Designations

- Designation options:
  - **Attainment:** Full compliance with standard
    - PSD Permit – BACT
  - **Attainment/Unclassifiable:** Unable to determine compliance but assume full compliance
    - PSD Permit – BACT
  - **Nonattainment:** Noncompliance with part or all of standard
    - Nonattainment NSR Permit – LAER



# Nonattainment

- Area designated nonattainment if NAAQS exceeded
- Designations based upon single violating monitor
- Area designations depend upon pollutant & sources
- Nonattainment SIP must include enforceable emission limits, control measures, & time-tables for compliance (3-20 years)
- Require Nonattainment NSR permits
  - LAER
  - Offsets
  - Transportation project limitations

# How Do NAAQS Affect Me?

- Compliance with NAAQS standards administered by NDEQ
- **However...**
  - Title 129 standards set to maintain compliance with NAAQS
  - Permit modeling ensures emissions don't cause exceedences
  - Construction/Operating Permit limits set to ensure compliance
  - Nonattainment = More controls, requirements, \$...

# Ozone ( $O_3$ )



# Ozone

- AKA “ground-level ozone” or “smog”\*
- Powerful oxidizing agent
- Formation:  $\text{NO}_x$  + VOCs + sunlight
- “Good Up High, Bad Nearby”
  - Stratospheric vs. Tropospheric
- Ground-level ozone = criteria pollutant
- $\text{NO}_x$  sources: automobiles/non-road equipment, EGU’s, and fossil fuel combustion
- VOC sources: Solvents, automobiles/non-road equipment, and industrial processes

# Ozone

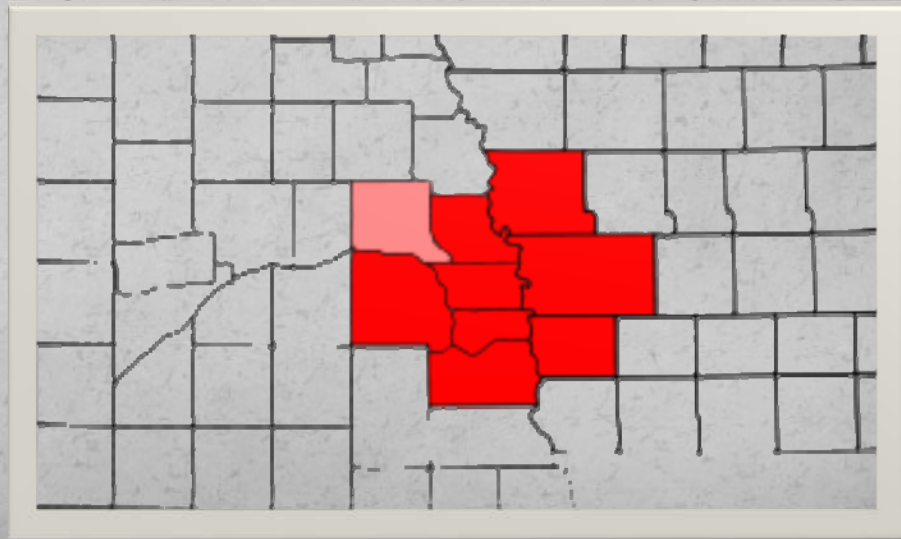
- EPA lowered standard from .08 ppm to .075 ppm in 2008
  - Clean Air Scientific Advisory Committee (CASAC) had recommended .06 ppm to .07 ppm
- EPA initiated reconsideration in 2009
- Proposing to set standard within 2008 CASAC recommended levels
- Final revision expected...

# Ozone In Nebraska

- Nebraska monitors in Omaha and Davey
  - Monitor from April-October (“ozone season”)
  - May utilize nearby out-of-state monitors for designations
- In attainment/unclassifiable for 1997 8-hour standard
- Primary concern in Omaha/Council Bluffs MSA if standard lowered
  - Pisgah, IA:  $\sim .065$  ppm
  - Ozone values trending upwards

# Ozone In Nebraska

- NDEQ, IDNR, EPA Region 7 Community-based planning process
  - Covers the Omaha/Council Bluffs MSA
  - Open dialogue with local agencies/stakeholders
  - Identify opportunities for voluntary actions & public outreach



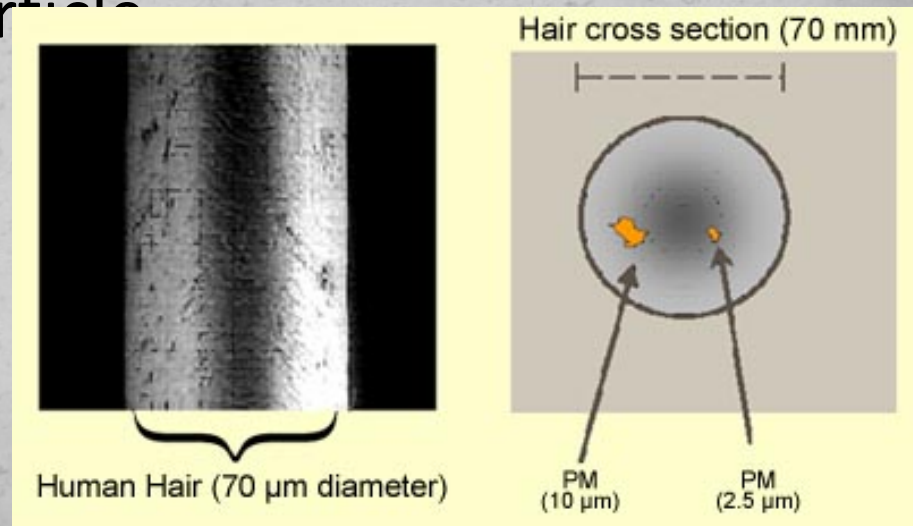
# Particulate Matter (PM)





# Particulate Matter

- Mixture of solid particles/liquid droplets
  - $PM_{10}$ : Diameter <10 micrometers (coarse\*)
  - $PM_{2.5}$ : Diameter <2.5 micrometers (fine\*)
  - Average human hair = 70 micrometers diameter – 30x > largest fine particle



# Particulate Matter

2 types of PM:

- Primary particles: Emitted directly
  - Construction sites, unpaved roads, fields, smokestacks, fires, etc.
- Secondary particles: From chemical reactions in the atmosphere
  - Most common  $PM_{2.5}$
  - $SO_2/NO_2$  from power plants, industries, and automobiles

# PM<sub>2.5</sub> In Nebraska

- Monitors in Omaha, Bellevue, Blair, Lincoln, Grand Island, Scottsbluff
- Recommending attainment/unclassifiable designation for 2006 standard
- Next NAAQS revision: late 2011
  - Recommendation to lower annual and 24-hour standard up to 25%
  - Potential to affect Omaha MSA
  - See PM<sub>2.5</sub> Implementation presentation

# PM<sub>10</sub> In Nebraska

- Monitors in Omaha, Weeping Water, Cozad, and Gothenburg
- Historically high levels in Weeping Water
  - Multiple limestone quarries
  - Implemented community-based planning
  - NDEQ evaluating recent exceedences
- Next NAAQS revision: late 2011
  - Recommendation of lowering standard 50% or more
  - Could affect other parts of state

# Sulfur Dioxide ( $\text{SO}_2$ )



# Sulfur Dioxide

- Primary Source: EGU's
  - Also from fossil fuel combustion and industrial processes
- Combines with  $\text{NO}_2$  to form  $\text{PM}_{2.5}$ 
  - Combines with water vapor to form acid rain
- EPA created 1-hour primary standard in 2010
  - Maintained annual and 24-hour standards
  - Monitor citing now based on population and emission inventories
  - BONUS QUESTION: Vog?

# Sulfur Dioxide in Nebraska

- 2 source-oriented monitors in Omaha
  - Placed near large power plants
- New designation process for 2010 standard
  - Based on monitor and modeling data
  - Developing methods for determining background concentrations for modeling
  - Contact NDEQ modeling staff for further information

# SO<sub>2</sub>/NO<sub>2</sub> Secondary Standard

- Rule proposed in August 1, 2011 Federal Register
- Equivalent to Primary NO<sub>2</sub> and SO<sub>2</sub> Standards
- Original intent to protect against acidification of sensitive aquatic ecosystems
- Based on “aquatic acidification index”
- EPA will continue to develop aquatic acidification standards for future implementation



# Carbon Monoxide



# Carbon Monoxide (CO)

- Source: Combustion
  - Pollution primarily from automobiles
- Final Rule signed August 12, 2011
  - Maintain current 8-hour and 1-hour standards
  - No secondary standards
  - Revised monitoring requirements
- Monitors dependent upon urban population
- Nebraska: 2 CO monitors, Omaha and Lincoln
- Expecting no additional required monitors

# Lead (Pb)



# Lead

- Traditional sources: motor vehicles and industry
  - Now ore/metal processing and aviation gasoline
- Emissions decreased 94% between 1980 and 1999
  - ?
- Omaha designated nonattainment from 1992-2001
  - ASARCO: Lead Smelter
  - Gould: Lead Battery Recycler
- 2008 rule change required 2 source-oriented monitors in Fremont and Auburn
- Future monitors: Omaha and potentially Norfolk

# Nitrogen Dioxide (NO<sub>2</sub>)



# Nitrogen Dioxide

- From automobiles/off-road equipment and EGU's
- Reacts with ammonia, moisture, other compounds
- Major component of ground-level ozone and PM<sub>2.5</sub>
- Concentrations in vehicles/near roadways higher
- Average concentrations decreased >40% since 1980
- New "Near Road Monitoring" in large urban areas (>500,000 people)
  - By January 1, 2013: 1 monitor in Omaha
  - No previous monitoring in Nebraska

# Exceptional Events Rule



# Exceptional Events Rule

- Exceptional events:
  - Not controllable or preventable
  - Caused by human activity or natural events
- Excludes meteorological events or pollution from source noncompliance
- States can exclude data from exceedences
  - Avoid nonattainment
- Seeking clarification for out-of-state events transported into other states



# Exceptional Events Rule

- Nebraska affected by Flint Hills in eastern Kansas
- Prescribed burning to improve rangeland in Spring
  - State of Kansas created voluntary smoke management plan
  - Smoke effects monitored levels of PM and ozone in eastern Nebraska



# Cross-State Air Pollution Rule (CSAPR)



# Cross-State Air Pollution Rule

- Only applies to large power plants
- Finalized July 6, 2011
- Formerly known as Clean Air Interstate Rule (CAIR) and Transport Rule
- Requires 27 states in eastern half of US to reduce:
  - Fine particles (annual  $\text{SO}_2$  and  $\text{NO}_x$ ) or
  - Ozone season  $\text{NO}_x$
- Several states in both programs
  - Nebraska included for fine particles only

# Cross-State Air Pollution Rule

- Designed to improve air quality in eastern US states
- EPA specified SO<sub>2</sub> and NO<sub>x</sub> allocations for 2012 and 2014
- Limited emissions trading
  - Only trade within same program
  - Strict emissions limit in each state
  - NDEQ will develop implementation of rule

# Questions?



# Modern Pollution Controls



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