

National Ambient Air Quality Standards (NAAQS)

2011 Overview

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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 (NO₂)
 - Particulate Matter
 - Coarse Particulate Matter (PM₁₀)
 - Fine Particulate Matter (PM_{2.5})
 - Ozone (O₃)
 - Sulfur Dioxide (SO₂)

What are the NAAQS?

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m ³)	8-hour	None	
	55 ppm (40 mg/m ³)	1-hour		
Lead	115 µg/m ³	Rolling 3-Month Average	Same as Primary	
Nitrogen Dioxide	53 ppb ⁽¹⁾	Annual (Arithmetic Average)	Same as Primary	
Particulate Matter (PM ₁₀)	100 ppb	1-hour	Same as Primary	
	150 µg/m ³	24-hour	Same as Primary	
Particulate Matter (PM _{2.5})	15.0 µg/m ³	Annual (Arithmetic Average)	Same as Primary	
Ozone	75 µg/m ³	24-hour	Same as Primary	
	1.075 ppm (2008 std)	8-hour	Same as Primary	
Sulfur Dioxide	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
	1.14 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 (O₃)



Ozone

- AKA "ground-level ozone" or "smog"*
- Powerful oxidizing agent
- Formation: NO_x + VOCs + sunlight
- "Good Up High, Bad Nearby"
 - Stratospheric vs. Tropospheric
- Ground-level ozone = criteria pollutant
- NO_x sources: automobiles/non-road equipment, EGU's, and fossil fuel combustion
- VOC sources: Solvents, automobiles/non-road equipment, and industrial processes

Ozone

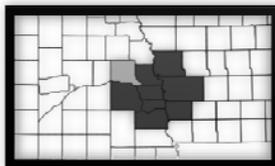
- EPA lowered standard from .08 ppm to .075 ppm in 2008
 - Clean Air Scientific Advisory Committee (CASAC) had recommended .06 ppm to .07 ppm
- EPA initiated reconsideration in 2009
 - Proposing to set standard within 2008 CASAC recommended levels
- Final revision expected...

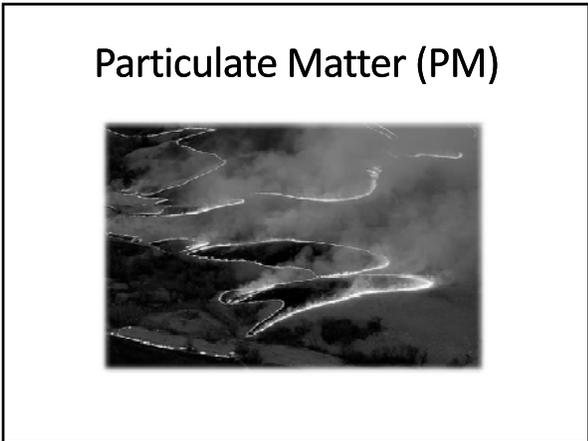
Ozone In Nebraska

- 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: ~.065 ppm
 - Ozone values trending upwards

Ozone in Nebraska

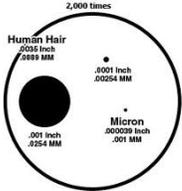
- NDEQ, IDNR, EPA Region 7 Community-based planning process
 - Covers the Omaha/Council Bluffs MSA
 - Open dialogue with local agencies/stakeholders
 - Identify opportunities for voluntary actions & public outreach





Particulate Matter

- Mixture of solid particles/liquid droplets
 - PM₁₀: 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}
 - SO₂/NO₂ from power plants, industries, and automobiles

PM_{2.5} 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_{2.5} Implementation presentation

PM₁₀ 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 (SO₂)



Sulfur Dioxide

- Primary Source: EGU's
 - Also from fossil fuel combustion and industrial processes
- Combines with 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_2/NO_2 Secondary Standard

- Rule proposed in August 1, 2011 Federal Register
- Equivalent to Primary NO_2 and SO_2 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 (NO₂)



Nitrogen Dioxide

- From automobiles/off-road equipment and EGU's
- Major component of ground-level ozone and PM_{2.5}
 - Reacts with ammonia, moisture, other compounds
- 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 SO₂ and NO_x) or
 - Ozone season NO_x
- Several states in both programs
 - Nebraska included for fine particles only

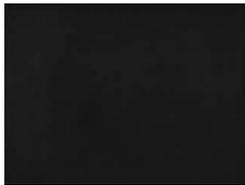
Cross-State Air Pollution Rule

- Designed to improve air quality in eastern US states
- EPA specified SO₂ and NO_x 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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