

The World of PM_{2.5} and Engine Update

David A Graiver, P.E.
Environmental Engineer
NDEQ: Air Quality



August 2011

Nebraska Department of Environmental Quality

PM_{2.5}?

HUMAN HAIR
50-70µm (microns) in diameter

FINE BEACH SAND
90 µm (microns) in diameter

PM₁₀
Dust, pollen, mold, etc.
<10µm (microns) in diameter

PM_{2.5}
Combustion particles, organic compounds, metals, etc.
<2.5µm (microns) in diameter

Image courtesy of the U.S. EPA.
Image Source: www.iowadnr.gov/Portals/1/dnr/uploads/air/environment/majorpollutants/humanhair.jpg

Nebraska Department of Environmental Quality

What's the **BIG** Deal with PM_{2.5}?

1

23

4

http://www.aqfairbanks.com/wp-content/uploads/2010/04/lungs.gif

Nebraska Department of Environmental Quality

History of PM ... Part 1

- 1971 - EPA issues NAAQS for TSP
- 1987 - EPA replaced TSP with PM₁₀
 - 24 hour PM₁₀ NAAQS of 150 µg/m³
 - Annual PM₁₀ NAAQS of 50 µg/m³
- 1997 - EPA adds PM_{2.5} standards
 - 24 hour PM_{2.5} NAAQS of 65 µg/m³
 - Annual PM_{2.5} NAAQS of 15 µg/m³
 - Seitz PM₁₀ surrogacy Policy
 - Show compliance with PM₁₀ NAAQS

Nebraska Department of Environmental Quality

History of PM ... Part 2

- 1999 - NE starts monitoring PM_{2.5}
- 2006 - EPA Revised PM Standards
 - 24 hour PM_{2.5} NAAQS of 35 µg/m³
 - Annual PM₁₀ NAAQS revoked
- 2012 - Scheduled Revision to PM NAAQS

Nebraska Department of Environmental Quality

Current NAAQS

- PM₁₀ 24 hour: 150 µg/m³
- PM_{2.5} 24 hour: 35 µg/m³
- PM_{2.5} annual: 15 µg/m³
- Background values vary by location
 - Natural Sources
 - Nearby Sources
 - Unidentified Sources

Nebraska Department of Environmental Quality

Potential Future NAAQS

- 2012 Promulgation of PM₁₀ and PM_{2.5} NAAQS
- PM₁₀ 24 hour: 150 µg/m³ → 65-85 µg/m³
 - Considering to change both level and form
- PM_{2.5} 24 hour: 35 µg/m³ → 30-35 µg/m³
- PM_{2.5} annual: 15 µg/m³ → 11-13 µg/m³
- NAAQS Review Documents
 - www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html

Nebraska Department of Environmental Quality


PM_{2.5} Rulemaking - Surrogacy

- 2/11/2010 Notice of Proposed Rulemaking
 - Repeal PSD grandfather provision
 - PM₁₀ surrogacy for sources with a complete application as of July 15, 2008.
 - End early the use of PM₁₀ Surrogate Policy (PSD)
- Final Rule Published 5/18/2011 and effective 7/18/2011
- No action taken on PM₁₀ Surrogacy Policy
 - Default end date was May 16, 2011

Nebraska Department of Environmental Quality

Condensable PM

- PM_{2.5} = Filterable + Condensable PM
- Condensable PM
 - Material that is vapor phase at stack conditions, but condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM immediately after discharge from the stack.



Nebraska Department of Environmental Quality

Condensable PM

- Condensable PM transition period
 - State NSR Programs didn't have to address CPM
 - Discrepancies in how states treated CPM
- NPRM for PM Test Methods 3/25/2009
- Test Method Rule promulgated 12/21/2010
- No action taken
 - Condensable PM transition period ended by default on 1/1/2011

Nebraska Department of Environmental Quality


Condensable PM

- PM_{2.5} Test Methods Rule
 - Published 12/21/2010, effective 1/1/2011
- Modification to test methods
 - Method 201A
 - Method 202
- EPA concluded that Updated Method 202 does not produce artifacts

Nebraska Department of Environmental Quality

PM_{2.5} Rulemaking - IPTP


- Inter-Pollutant Trading Policy
 - Allow sources in PM_{2.5} nonattainment areas to use emissions from precursors of PM_{2.5} as offsets for significant increases of PM_{2.5} emissions
 - July 21, 2011 EPA Memo
- Still considering options – Stay tuned



Nebraska Department of Environmental Quality

PM_{2.5} Modeling

- NDEQ has required PM_{2.5} modeling
 - 10 ton/yr PM_{2.5} threshold



www.breeze-software.com/uploaded/images/Breeze-Software/Software/Air/Aermod/AERMOD7-4window.jpg and www.adlink.es/imagenes/AGDWeb1266.JPG

Nebraska Department of Environmental Quality


PM_{2.5} Modeling

- 3/23/10 EPA Guidance Memo
 - Discusses options for PM₁₀ Surrogacy
 - Recommended methods for PM_{2.5} model<http://www.epa.gov/region7/air/nsr/nsrmemos/pm25memo.pdf>
- 10/20/10 Federal Register
 - PM_{2.5} Increments
 - PM_{2.5} Significant Impact Levels
 - PM_{2.5} Significant Monitoring Concentrations
- June 28, 2011 EPA Guidance Memo
 - Updates to 24 hour PM_{2.5} attainment test

Nebraska Department of Environmental Quality

Future EPA Guidance


- PM_{2.5} Implementation Rule and Guidance for 2011 NAAQS Revision
 - Expected early 2012
- EPA Support Center for Regulator Atmospheric Modeling (SCRAM)
 - <http://www.epa.gov/ttn/scram/>



Nebraska Department of Environmental Quality

PM_{2.5} Emission Calculations

- Stack Test Data
- AP-42
 - May need to look in footnotes
 - Appendix B
- South Coast Air Quality Management District
 - www.aqmd.gov/ceqa/handbook/pm2_5/finalAppA.doc
 - CA Emission Inventory Data and Reporting System
- Always looking for new sources
 - No longer using Reisman, Frisbie (2002)



Nebraska Department of Environmental Quality

PM_{2.5} in Title 129 (Not yet Final)

- Incorporation of Condensable PM
- Title 129, Chapter 17
 - 10 ton/yr PM_{2.5} threshold (State CP)
- Title 129, Chapter 19 (Significance)
 - 10 ton/yr PM_{2.5}
 - 40 ton/yr SO₂
 - 40 ton/yr NO_x
 } Significant for PM_{2.5}

Nebraska Department of Environmental Quality

Nonroad Engines

- 40 CFR 89.2 and 40 CFR 1068.30
- NSPS/NESHAP Implications
- Any internal combustion engine (abridged)
 - in or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function
 - in or on a piece of equipment that is intended to be propelled while performing its function
 - by itself or in or on a piece of equipment, is portable or transportable

Nebraska Department of Environmental Quality

Nonroad Engines

- An internal combustion engine is not a nonroad engine if:
 - the engine is used to propel a motor vehicle or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the Act
 - the engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the Act
 - Or the engine otherwise included in paragraph (1)(iii) of this definition (portable/transportable)...

Nebraska Department of Environmental Quality


Nonroad Engines

- Will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source.
 - A location is any single site at a building, structure, facility, or installation.
- Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period.
- An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source.
 - A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year.
- This paragraph does not apply to an engine after the engine is removed from the location.

Nebraska Department of Environmental Quality

Nonroad Engines

- Key Questions
 - Is the Engine attached to anything?
 - Does the Engine move?
 - Why does the Engine move?
 - What is the Engine used for?
 - Is the Engine replacing another Engine?
- Site-Specific details are needed for an accurate determination



Nebraska Department of Environmental Quality

Nonroad Engines

- NDEQ Fact Sheet
 - Should be finalized soon
 - Includes example determinations
 - Look for it on our web site



Nebraska Department of Environmental Quality

Nonroad Engines


- Example Determination
 - A diesel engine powers an air compressor
 - Cleaning metalworking areas throughout plant
 - Is the engine nonroad?
- Yes – we have a nonroad engine
 - Remains at each location < 12 months
 - Moved for operational purposes

Nebraska Department of Environmental Quality

Emergency Engines

- January 22, 2010 NO₂ NAAQS
- March 1, 2011 EPA Modeling Guidance
 - Recommended exclusion for “intermittent emissions”
 - Emergency engines operate intermittently
- Modeling not always required for emergency engines

Nebraska
Department
of Environmental
Quality



Questions?

Permit Hotline: 1-877-834-0474
David.Graiver@nebraska.gov
402-471-8400

Lisa.Alam@nebraska.gov
402-471-2925

