1-hour SO₂ Nonattainment: Scope of Work for Muscatine, IA

Muscatine County Conservation Board
Environmental Learning Center

October 3, 2013
Overview

- Welcome and Introductions
- \( \text{SO}_2 \) National Ambient Air Quality Standards
- \( \text{SO}_2 \) Nonattainment
- Role of Affected Stakeholders
- Questions/Comments
National Ambient Air Quality Standards (NAAQS)

- The NAAQS are federal standards that establish maximum concentrations of air pollutants that are acceptable in the general air we breathe. These standards are set to protect public health and welfare with adequate margin of safety.
  - Primary standards
    - Protect public health
  - Secondary standards
    - Protect welfare & the environment (materials damage, soils, vegetation, ecosystem health, visibility)

- NAAQS are established for Criteria Pollutants
  - Sulfur dioxide (SO₂)
  - Nitrogen dioxide (NO₂)
  - Particulate matter (PM)
    - PM broken into two size fractions, PM_{2.5} & PM_{10}
  - Carbon monoxide (CO)
  - Lead (Pb)
  - Ground-level ozone (O₃)
1-hour SO$_2$ NAAQS

- NAAQS undergo periodic review, required by CAA
  - Every 5 years
  - Review latest public health information and scientific data
- New 1-hour SO$_2$ NAAQS finalized on June 3, 2010
  - SO$_2$ NAAQS established in 1971
  - Reviewed in 1996: No changes
- Level: 75 parts per billion (ppb)
- Form: 3 year average of the 99$^{th}$ percentile of daily maximum 1-hour average concentrations at each monitor
SO\textsubscript{2} and Human Health

• Short-term exposures linked to adverse respiratory effects
  – Bronchoconstriction
  – Increased asthma symptoms

• Studies show connection between short-term exposures and increased visits to emergency departments and hospital admissions for respiratory illnesses

• At-risk populations include children, the elderly, and asthmatics

• Children at higher risk
  – More likely to be active
  – Breathe more air per pound
  – Bodies still developing
Characteristics of Sulfur Dioxide (SO₂)

- Burning of fuels containing sulfur for power, heat, manufacturing, and transportation
  - When a sulfur-containing fuel such as coal or fuel oil is burned, the sulfur is oxidized and released to atmosphere
- Contributes to secondary PM₂.₅ (sulfates)
- Sulfates contribute to visibility loss or haze
- Leading contributor to acid precipitation
SO2 Air Monitoring Sites

• New Monitors Operational in 2012:
  – Greenwood Cemetery:
    • 1/1/12
  – Muscatine High School East Campus (Garfield):
    • 8/1/12
How Do I Check SO2 Readings in Muscatine?

Go to Current Air Quality at:
http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
How Do I Check SO2 Readings in Muscatine (cont.)?

OUTDOOR AIR QUALITY

About the SHL

Environmental

> Outdoor Air Quality
  > Air Quality Data
  > Historical Air Quality Data
  > Iowa Air Monitoring Network

> Limnology
> Private Well Water
> Analytical Services

Air Quality Data

Current Air Quality Index Map

Real-time Continuous Data

Today's Predicted Air Quality Index

Hourly Air Quality Index Maps
How Do I Check SO2 Readings in Muscatine (cont.)?

1. Select a site: Davenport, Jefferson School

2. Select a date: 2013-09-23

3. Submit Your Query:

All data points are reported in local time.

EPA (AQI) Health Thresholds
76 ppb over a 1 hour period
NAAQS Exceedances/Violations vs. Emergency Episodes

**NAAQS Exceedances or Violations prompt planning actions:**

- Public notification
- Forecasting persistence of high emissions
- Ongoing violations may prompt requirements for emissions control plans that may:
  1. take 1-3 years to develop, and
  2. take another 3-5 years to implement.

**Emergency Episode Levels prompt immediate reductions:**

- Public notification
- Forecasting persistence of high emissions
- Determination of level of episode
- Immediate implementation of appropriate abatement & curtailment strategies
### AQI Comparison to Emergency Episodes

<table>
<thead>
<tr>
<th>AQI</th>
<th>SO2 Value (ppb)*</th>
<th>Level of Health Concern</th>
<th>SO2 Value (ppb)*</th>
<th>Emergency Episode Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>0-35</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-100</td>
<td>36-75</td>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>101-150</td>
<td>76-185</td>
<td>Unhealthy for sensitive groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>151-200</td>
<td>186-304</td>
<td>Unhealthy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>201-300</td>
<td>305-604</td>
<td>Very unhealthy</td>
<td>300-599</td>
<td>Alert</td>
</tr>
<tr>
<td>301-500</td>
<td>605-1004</td>
<td>Hazardous</td>
<td>600-799</td>
<td>Warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>800+</td>
<td>Emergency</td>
</tr>
</tbody>
</table>

*SO2 values up to 304 ppb are 1-hr averages; remainder are 24-hr averages.  

*24-hr averages; must be expected to persist for 12 or more hrs.
Exceedance Days* for Muscatine SO2 Monitors 2011-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Musser Park</th>
<th>Muscatine HS East Campus</th>
<th>Greenwood Cemetery</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>37</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2012</td>
<td>25</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2013**</td>
<td>21</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

*An Exceedance Day is a day where the daily maximum 1-hour SO$_2$ value is at least 75.5 ppb

** Preliminary data reported through August 26, 2013.
NAAQS Nonattainment Ramifications

• Ongoing violations of the NAAQS = Poor air quality
  – Increased respiratory or other health problems,
  – Increased emergency room visits and healthcare costs,
  – Lost school and work time.

• Nonattainment = Lost economic growth opportunities
  – Limitations on economic growth if the project will increase air pollution,
  – Stigma impacting new prospects.

• Attainment Plan = Plan for getting back in attainment
  – State implementation plan (SIP) including federally enforceable emissions reductions,
  – More restrictive nonattainment permitting,
  – Timelines for achieving attainment, and possible penalties.

• Failure to submit SIP may trigger loss of federal highway funds.
Nonattainment Area (green line), Monitors (yellow), & Major Sources (orange) of SO$_2$ (2012 emissions in tons per year)
Progress Towards Achieving Attainment

Nonattainment Effective
October 4, 2013

Establish Baseline Emissions and Operations
2013

Develop Control Measures, Contingency Plans
2014

Finalize Control Strategy and Issue Permits
Early 2015

Public Comment Period
March 2015

Attainment Plan Due By
April 6, 2015

Attainment No Later Than
October 4, 2018
Nonattainment SIP Elements

• State must submit plan to EPA detailing how attainment will be achieved, could include
  – Case-by-case emissions reductions strategies
  – New rules, such as stricter emissions standards

• Show that emissions reductions strategies will achieve attainment (Attainment Demonstration)

• If attainment deadline not meet, predefined control measures must go into effect without additional regulatory actions (Contingency Measures)

• Transportation Conformity does not apply to SO$_2$ nonattainment areas
Nonattainment NSR

• More stringent major source preconstruction permitting requirements (replaces Prevention of Significant Deterioration (PSD))

• Install most stringent emissions controls achievable

• Increases in emissions must be offset with emissions reductions elsewhere in the nonattainment area

• Source must certify compliance of all their in-state facilities

• Source must complete alternative siting analysis
Redesignation Process

• To redesignate from nonattainment to attainment:
  – Supporting (clean) data & EPA Administrator approval
    • Air quality meets the SO₂ NAAQS
  – Full approval of the nonattainment SIP
  – Air quality improvement due to permanent and enforceable emissions reductions
  – State has meet certain CAA 110 implementation requirements
  – A fully approved maintenance plan
    • 10 year time horizon (with later revisions - additional 10 years)
Role of Affected Sources

- Review, update SO$_2$ emissions and source characteristics
  - Perform source testing as needed
- Participate in modeling analyses
  - Provide comment on modeling protocol
  - Baseline modeling
  - Contribution evaluation
- Control strategy development
- Assist in contingency plan development
- Prepare, submit permit applications
- Participate in project update meetings as necessary
Comments, Questions, Discussion

- Nonattainment website

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