

Projected PM_{2.5} Attainment Status of Each County in the U.S. and Strategies for Dealing with Nonattainment Designations and the Proposed Interstate Air Quality Rule

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Projected PM2.5 Attainment Status of Each State



 Attainment

 Non-Attainment

Introduction

- On July 18, 1997, EPA issued new National Ambient Air Quality Standards (NAAQS) for PM_{2.5}:
 - **15 ug/m³** annual average based on a 3-year average
 - **65 ug/m³** based on 3-year average of the 98th percentile of the daily 24-hour concentrations

Introduction

- Over 1,100 PM_{2.5} samplers began operation in 1999 and over 1,200 samplers are now operating
- All monitoring had to commence by no later than 12/31/99

Schedule

1. EPA announced proposed Interstate Air Quality Rule: 12/17/03
2. States/Tribes recommend proposed attainment and nonattainment designations: 2/04
3. EPA responds with intended modifications to the proposed designations: 7/04

Schedule

4. EPA finalizes attainment and nonattainment designations: 12/04

5. EPA finalizes Interstate Air Quality Rule: 1/05

Schedule

6. State/Tribal State Implementation Plans due: 12/07

7. Attainment dates: 2009-2014

Purpose of This Study

Project the PM_{2.5} attainment status of each county in the U.S. based on 2000-2002 monitoring results and identify strategies for dealing with the expected widespread nonattainment designations and proposed Interstate Air Quality Rule

What is the Extent and Magnitude of the Projected PM_{2.5} Nonattainment Designations?

Procedures

1. Access EPA's Air Quality System (formerly AIRS) database
2. Obtain the PM_{2.5} annual average concentrations in each county where monitoring was conducted from 2000-2002
3. Calculate the 3-year annual average at each PM_{2.5} sampler

Procedures

4. Select for analysis the single sampler in each county with the highest measured 3-year annual average PM_{2.5} concentration

Procedures

5. Evaluate the extent of PM_{2.5} nonattainment in each state:

- Determine the percent of counties with PM_{2.5} samplers in each state projected to be designated nonattainment

- Sort states by this percentage

Procedures

6. Evaluate the magnitude of the nonattainment problem in each state:
 - Determine the maximum 3-year annual average PM_{2.5} concentration in each state and the percent reduction needed to attain the NAAQS
 - Sort results by highest to lowest percent reduction required

Procedures

- Following reported results are for all PM_{2.5} Monitoring Data some of which did not satisfy all requirements for making attainment determination
- However, we believe much of this data is still indicative of future monitoring results and future attainment determinations

Procedures

7. Evaluate the magnitude of the nonattainment problem in each state:
 - Determine the average percent reduction in 3-year annual average PM_{2.5} concentration needed to attain the NAAQS averaging over the maximum percent reduction needed in each county
 - Sort results by highest to lowest average percent reduction required

Results: Percent of Counties with PM2.5 Samplers Projected to be Nonattainment

State	Percent
DC	100%
OH	80%
GA	75%
WV	69%
IN	63%
TN	53%
KY	53%
PA	52%

Results: Percent of Counties with PM2.5 Samplers Projected to be Nonattainment

State	Percent
AL	44%
MD	43%
CA	36%
DE	33%
RI	33%
IL	26%
NC	26%
NJ	25%

Results: Percent of Counties with PM2.5 Samplers Projected to be Nonattainment

State	Percent
NY	22%
CT	20%
MA	20%
VA	18%
MO	12%
SC	11%
MI	10%
MT	8%
AR	6%

Results: Maximum Percent Reduction Required in Annual PM_{2.5} Concentration for States with Highest Concentrations

State	Percent
PA	56%
CA	54%
TN	37%
OH	34%
AL	30%
NY	30%
IL	25%
MI	24%

Results: Average Percent Reduction Required in Annual PM_{2.5} Concentration for States with Highest Concentrations

State	Percent
CA	27%
PA	23%
CT	17%
MO	14%
DC	14%
OH	13%
IL	13%
MI	13%

Summary of Results on Maximum % Reductions in PM_{2.5} Concentrations Needed to Attain the Annual NAAQS

Needed % Reduction	# States
>25%	6
10-25%	15
<10%	4

Summary of Results on Average % Reductions in PM_{2.5} Concentrations Needed to Attain the Annual NAAQS

Needed % Reduction	# States
>25%	1
10-25%	14
<10%	10

Comparison Between 1999-2001 and 2000-2002 Data

	1999-2001 Data	2000-2002 Data
Number of States with One or More Counties Projected to be Non- Attainment	32	24

Comparison Between 1999-2001 and 2000-2002 Data

Maximum Percent Reduction in PM_{2.5} Concentrations Needed to Attain the NAAQS

	1999-2001 Data	2000-2002 Data
>25%	9	6
10-25%	17	15
<10%	6	4

Comparison Between 1999-2001 and 2000-2002 Data

Average Percent Reduction in PM_{2.5} Concentration Needed to Attain the NAAQS

	1999-2001 Data	2000-2002 Data
>25%	1	1
10-25%	15	14
<10%	16	10

Proposed Interstate Air Quality Rule (IAQR)

- Applies to Title IV Affected Units in 29 states mainly in eastern half of U.S.
- Requires SO₂ emission reductions of 65% of the 2001 SO₂ Allowances
- Requires NO_x emission reductions to level equivalent to 0.125 lbs/MMBTU

Proposed Interstate Air Quality Rule

- Cap and trade program to achieve emission reductions
- Emission reductions made in two stages: 2010 and 2015
- SO₂ annual cap in 2015: **2.7 million tons/year**
- NO_x annual cap in 2015: **1.3 million tons/year**

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- A combination of Primary and Secondary emission reductions for PM_{2.5} are needed to attain the PM_{2.5} annual standard
- The most cost effective combination will vary from county to county

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- Use the projected speciated 3-year annual average concentrations in 2010 to divide PM_{2.5} into its Secondary and Primary fractions for the monitor recording the highest measurements in the county

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- Determine the % reduction in total concentration and in Primary concentration needed to attain the NAAQS
- Decide what % reduction in Primary emissions and concentrations is technically and economically feasible

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- Calculate the remaining Secondary concentration reduction needed to attain the NAAQS.

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- Assemble the same input data to the REMSAD Model as used by EPA except for the Affected Units SO₂ and NO_x emissions

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed IAQR

- Run the REMSAD Model for various reductions in SO₂ and NO_x emissions from Affected Units (e.g 25% reduction from current SO₂ Allowances) in the nonattainment counties to determine the reduction in Secondary PM_{2.5} concentrations at the monitors of highest concentration

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed Interstate Air Quality Rule

- Combine the reductions in Secondary and Primary concentrations determined for the county to determine the level of Secondary emission control needed to attain the NAAQS

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed Interstate Air Quality Rule

- Summarize statistics on the needed Secondary emission reductions combined with feasible Primary remissions control for all nonattainment counties

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed Interstate Air Quality Rule

Example:” With a 40% SO₂ and NO_x Secondary emission reduction, 90% of the nonattainment counties will become attainment using feasible Primary emission controls”

Strategies for Dealing With the PM_{2.5} Nonattainment and the Proposed Interstate Air Quality Rule

- Decide on the most cost effective combination of Primary and Secondary emission reductions to adopt for attaining the NAAQS

What is the Potential for This PM_{2.5} Control Strategy Working?

How much reduction in PM_{2.5} concentrations is needed to attain the annual NAAQS?

Summary of Results on Maximum % Reductions in PM_{2.5} Concentrations Needed to Attain the Annual NAAQS

Needed % Reduction	# States
>25%	6
10-25%	15
<10%	4

What is the Potential for This PM_{2.5} Control Strategy Working?

How much of the annual average PM_{2.5} concentrations come from Primary PM_{2.5} emissions?

25% to 50%+ depending on area

What is the Potential for This PM2.5 Control Strategy Working?

- 15 states require a 10% to 25% maximum reduction in PM2.5 concentrations
- 4 states require less than a 10% reduction in PM2.5 concentrations

What is the Potential for This PM_{2.5} Control Strategy Working?

This control strategy approach is feasible in many of the 24 states with nonattainment counties

Conclusions

1. There are projected to be widespread PM_{2.5} nonattainment designations in 24 states plus the District of Columbia.
2. These designations will result in potentially large costs to the electric power industry to comply with the SIPs states must develop and implement between 5 and 7 years from now.

Conclusions

3. A PM_{2.5} control strategy that combines county specific analyses of feasible Primary emission reductions with a certain level of uniform Secondary emission reductions from the power industry offers the potential for more cost effective ways to attain the PM_{2.5} NAAQS than the proposed Interstate Air Quality Rule.