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Projected PM2.5 Attainment Status of Each County in the U.S. and Strategies for Dealing with Nonattainment Designations

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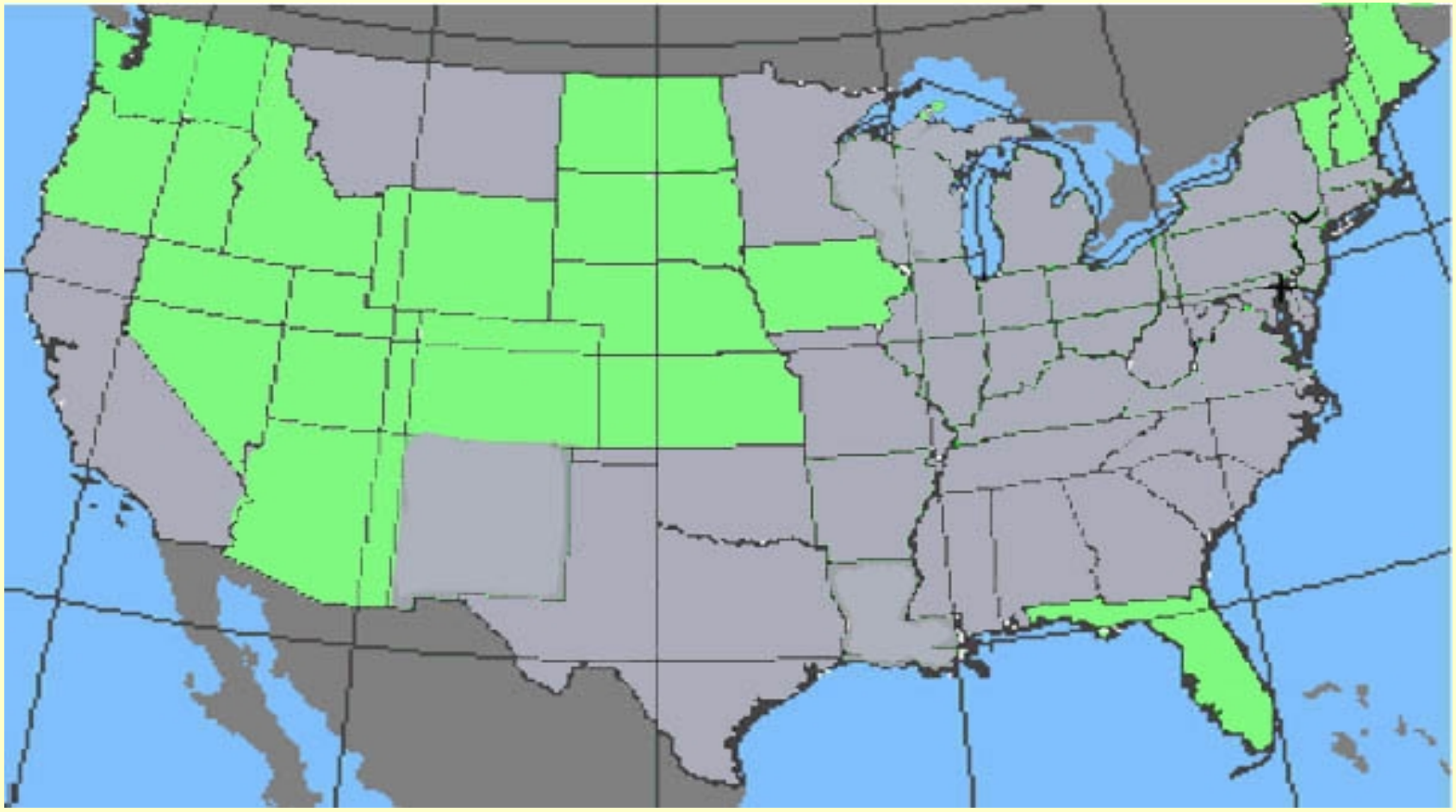
Projected PM2.5 Attainment Status of Each State



Attainment

Non-Attainment

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Purpose of This Study

1. Project the PM2.5 attainment status of each county based on 1999-2001 state monitoring results

2. Identify strategies for dealing with the expected widespread nonattainment designations

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What are the Extent and Magnitude of the Projected PM2.5 Nonattainment Designations?

Procedures

1. Access EPA's Air Quality System database

2. Review the PM2.5 annual average concentrations in each county where monitoring was conducted from 1999-2001

3. Calculate the 3-year annual average at each PM2.5 sampler

Procedures

4. In each county, select for analysis the single sampler with the highest measured 3-year annual average PM2.5 concentration

Procedures

5. Evaluate the extent of PM2.5 nonattainment in each state:

- Determine the % of counties with PM2.5 samplers projected to be 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 PM2.5 concentration and the % reduction needed to attain the NAAQS

   - Sort results from highest to lowest percent reduction required

Procedures

- For each state, determine the average % reduction in the highest 3-year annual average PM2.5 concentration by county needed to attain the NAAQS

- Sort state results from highest to lowest average % reduction required

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What is the Extent of the Projected PM2.5 Nonattainment Designations?

31 States plus the District of Columbia are projected to be designated nonattainment for the PM2.5 annual NAAQS

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

State	Percent
DC	100%
GA	90%
TN	87%
OH	79%
AL	76%
WV	71%
IN	68%
DE	67%

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

State	Percent
MS	56%
KY	55%
NC	50%
PA	50%
CA	48%
IL	45%
VA	44%
MD	43%

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

State	Percent
NJ	42%
AR	33%
RI	33%
SC	31%
CT	25%
MO	21%
MA	20%
NY	18%

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

State	Percent
MI	16%
NM	10%
MT	8%
TX	7%
LA	6%
WI	6%
MN	5%
OK	5%

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What are the Magnitudes of the Projected PM2.5 Nonattainment Designations?

Results:Maximum Percent Reduction Required in Annual PM2.5 Concentration for States with Highest Concentrations

State	Percent
CA	54%
MO	39%
GA	38%
AL	35%
PA	34%
NJ	33%
OH	31%
NY	29%

Results:Average Percent Reduction Required in Annual PM2.5 Concentration for States with Highest Concentrations

State	Percent
CA	26%
NY	19%
NJ	19%
DC	18%
CT	18%
GA	17%
OH	16%
DE	15%

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Summary of Results on Maximum % Reductions in PM2.5 Concentrations Needed to Attain the Annual NAAQS

Needed % Reduction	# States
>25%	11
10-25%	15
<10%	6

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Summary of Results on Average % Reductions in PM2.5 Concentrations Needed to Attain the Annual NAAQS

Needed % Reduction	# States
>25%	1
10-25%	15
<10%	16

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Strategies for Dealing with Nonattainment Designations

1. Evaluate the validity of the monitoring data

2. Use spatial averaging for attainment designations

3. Determine if current Federally-mandated emission control programs will result in PM2.5 NAAQS attainment

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Strategies for Dealing with Nonattainment Designations

4. Focus on a Secondary-First PM2.5 control strategy

5. Focus on a Primary-First PM2.5 control strategy

Strategy 1: Evaluate the Validity of the Monitoring Data

EPA Required Performance Evaluation Procedures:

1. Sampler Flow rate audit quarterly: **State**

2. Precision via permanently collocated sampler at 25% of sites: **State**

3. Performance Evaluation with collocated sampler at 25% of sites/year: **EPA**

4. Balance systems and performance audits: **State**

Strategy 1: Evaluate the Validity of the Monitoring Data

EPA Required Performance Evaluation Procedures:

5. Sampler performance audits: **State**

6. Systems audit: **EPA**

7. Systems audit: **State**

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Strategy 1: Evaluate the Validity of the Monitoring Data as Follows:

1. Review results of EPA's Performance Evaluation with collocated sampler at 25% of sites/year

2. Conduct independent Performance Audit of samplers with annual average concentrations exceeding 15 ug/m3

3. Conduct independent Systems Audit of samplers with annual average concentrations exceeding 15 ug/m3

Strategy 2: Use Spatial Averaging for Attainment Designations

State may propose a Community Monitoring Zone (CMZ) based on the spatial average of multiple PM2.5 samplers in making attainment designations if no sampler exceeds the spatial average by more than 20%

Strategy 3: Determine if current Federally-mandated emission control programs will result in PM2.5 NAAQS attainment

1. NOx SIP Call

2. Phase II Acid Rainb SO2 Emission Reductions

3. Heavy Duty Diesel Vehicle and Diesel Fuel Emission Reduction Rule

Strategy 3: Determine if current Federally-mandated emission control programs will result in PM2.5 NAAQS attainment

4. Federal Motor Vehicle Emission Reduction Program

5. Other NOx Emission Reduction Programs to Attain the Ozone SIP

Strategy 3: Determine if current Federally-mandated emission control programs will result in PM2.5 NAAQS attainment

7. Other Organic Carbon Emission Reduction Programs to Attain the Ozone SIP and Certain MACTs

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Strategy 4: Focus on a Secondary-First PM2.5 Control Strategy

1. Assemble the multi-state (regional) emissions inventory of PM2.5 and PM2.5 precursor emissions

2. EPA and Regional Haze Organizations conduct regional modeling of various PM2.5 control strategies

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Strategy 4: Focus on a Secondary- First PM2.5 Control Strategy

3. EPA and states develop PM2.5 and PM2.5 precursor emission reduction budgets by state in OTAG-like process

4. States develop SIPs to comply with emission reduction budgets

Strategy 5: Focus on a Primary-First PM2.5 Control Strategy

Focus on a SIP development strategy of:

1. Primary PM2.5 emission controls first

2. Secondary PM2.5 emission controls to address remaining nonattainment problems

Strategy 5: Focus on a Primary-First PM2.5 Control Strategy

How much of the annual average PM2.5 concentrations come from Primary PM2.5 emissions?

2001 Annual Average PM2.5 Concentration at Cleveland Speciation Site Assuming 50% of OC is Primary

Primary	**ug/m3**	**%**
Elemental carbon	1.05	5.3%
Organic carbon (OC)	2.40	12.2%
Metals	3.35	17.0%
Other	0.07	0.3%
Total	**6.87**	**34.9%**

2001 Annual Average PM2.5 Concentration at Cleveland Speciation Site Assuming 50% of OC is Primary

Secondary	**ug/m3**	**%**
Sulfates	5.23	26.6%
Nitrates	2.77	14.1%
Ammonium	2.39	12.2%
Organic carbon(OC)	2.40	12.2%
Total	**12.79**	**65.1%**
Combined Total	**19.66**	**100.0%**

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2001-2002 Annual Average PM2.5 Concentrations at Three Speciation Sites Near Pittsburgh

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Component	% of annual average
Primary	32-38 %
Secondary	62-68 %.

Strategy 5: What is the Feasibility of a Primary-First PM2.5 Control Strategy?

State PM2.5 monitoring data for 1999-2001 indicate that to attain the annual NAAQS:

- 15 states require less than a 10% average reduction in annual PM2.5 concentrations

- 16 states require from 10% to 25% average reduction in annual PM2.5 concentrations

Strategy 5: What is the Feasibility of a Primary-First PM2.5 Control Strategy?

A Primary-First strategy is feasible if the possible reductions in emissions from primary sources will reduce the annual PM2.5 concentrations by the needed % to attain the NAAQS

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

1. Use existing or establish additional PM2.5 speciation samplers near the highest measured annual PM2.5 concentration in each area exceeding the annual NAAQS

OR

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

1a. Conduct speciation analysis of statistically significant sample of the state's archived refrigerated PM2.5 teflon filters for samplers exceeding the annual NAAQS to estimate the speciated annual average concentration (estimate OC)

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

2. Estimate fraction of total organic carbon that is Primary versus Secondary by developing the local primary organic carbon and elemental carbon emissions inventory (Cabada, et. al.)

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

3. Conduct Receptor Modeling of each speciated sample to identify the main Primary source categories contributing to the measured PM2.5 concentration

4. Calculate the 3-year annual average of these Receptor Model source contributions separately for each source category and for each sampler

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

5. Determine the maximum economically and technically feasible reductions in Primary emissions from the major source categories contributing to the 3-year annual average concentrations exceeding the NAAQS

Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy

6. Decide which Primary emission controls to implement and determine the extent of any remaining nonattainment in the state requiring secondary PM2.5 emission reductions

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Strategy 5: How to Develop a State Primary-First PM2.5 Control Strategy: Example

Sample No.	3-Year Avg. Conc.	% Primary	% Primary Reduction Needed to Attain the NAAQS

Conclusions

1.There are projected to be widespread PM2.5 nonattainment designations in 31 states plus the District of Columbia.

2. These designations will result in potentially large costs to comply with the SIPs states must develop and implement between 5 and 7 years from now.

Conclusions

3. A Primary-First PM2.5 Control strategy offers the potential for more cost effective ways to attain the PM2.5 NAAQS in many of the states to be designated nonattainment