

An hourglass-shaped graphic with a globe in the top bulb and another globe in the bottom bulb. The hourglass is light blue and has a dark blue cap at the top. The globe in the top bulb is dark blue, while the globe in the bottom bulb is light blue. The hourglass is centered on the page.

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Report RL32273

Air Quality: EPA's Proposed Interstate Air Quality Rule

Larry Parker and John Blodgett, Resources, Science, and Industry Division

Updated March 13, 2004

Abstract. On December 17, 2003, EPA issued proposed rules to address the effects of interstate transport of air pollutants on non-attainment of the National Ambient Air Quality Standards (NAAQS) for fine particulates and ozone. With the proposed Interstate Air Quality rule, EPA proposes a region-wide emissions cap for NO_x and SO₂ to be implemented in two phases.

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Air Quality: EPA's Proposed Interstate Air Quality Rule

Summary

On December 17, 2003, the Environmental Protection Agency (EPA) issued a proposed rule to address the effect of interstate transport of air pollutants on non-attainment of the National Ambient Air Quality Standards (NAAQS) for fine particulates (PM_{2.5}) and ozone (specifically, the 8-hour standard). The proposed Interstate Air Quality (IAQ) rule appeared in the *Federal Register* January 30, 2004. For PM_{2.5}, the proposed rule finds that the interstate transport of sulfur dioxide (SO₂) and nitrogen oxides (NOx) from 28 states and the District of Columbia contributes significantly to downwind non-attainment; for ozone, the proposed rule finds that interstate transport of NOx from 25 states and D.C. contributes significantly to downwind non-attainment of the 8-hour standard.

With the IAQ rule, EPA proposes a region-wide emissions cap for NOx and SO₂ to be implemented in two phases — 2010 and 2015. Based on the methodology employed in the proposed rule, EPA estimates reductions of about 70% from baseline emissions in 2015. EPA's methodology determined the caps by applying "highly cost effective" pollution controls on electric generating units.

EPA has presented the proposed IAQ rule and the accompanying proposed Mercury (Hg) rule as a "suite of integrated air actions" to reduce emissions of three pollutants — SO₂, NOx, and Hg. The two proposed rules are integrated in such a way that the technologies reducing SO₂ and NOx emissions under the IAQ rule also reduce enough Hg emissions to meet the modest 2010 reduction requirements of the proposed Hg rule. This combination of requirements and technology allows utilities to meet the requirements of both rules without installing three different control technologies — one for each pollutant. As EPA does not provide a cost-benefit analysis of Hg reductions, it is not possible to quantitatively determine whether this decision is economically efficient in terms of potential Hg benefits foregone by not imposing a more stringent reduction requirement.

However, from the broader perspective of the interaction of the proposed rules with the underlying Clean Air Act (CAA), there is a resulting lack of integration. It is likely to be argued that the proposed rule simply represents another layer on an already multi-layered cake called the Clean Air Act. Adding a regionwide annual cap and trade program onto a regulatory structure whose foundation is health-based national standards that focus on the local concentration of pollutants in the ambient air presents numerous difficulties. As a result, there are multiple inconsistencies between the proposed rule and other provisions of the CAA. These conflicts are not surprising — there is little EPA can do to resolve them out by regulation. If the Administration's goal is to restructure CAA compliance strategies toward market-oriented cap and trade programs without creating more layers and conflicts, it is possible a statutory solution will be necessary.

This report will be updated if events warrant.

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Air Quality: EPA's Proposed Interstate Air Quality Rule

Overview

On December 17, 2003, the Environmental Protection Agency (EPA) issued proposed rules to address the effects of interstate transport of air pollutants on non-attainment of the National Ambient Air Quality Standards (NAAQS) for fine particulates (PM_{2.5}) and ozone (specifically, the 8-hour standard).¹ The proposed Interstate Air Quality (IAQ) rule appeared in the *Federal Register* January 30, 2004. For PM_{2.5}, the proposed rule finds that the interstate transport of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) from 28 states and the District of Columbia contributes significantly to downwind non-attainment; for ozone, the proposed rule finds that interstate transport of NO_x from 25 states and the District of Columbia contributes significantly to downwind non-attainment of the 8-hour standard.

To remedy the situation, the proposed rule generally follows the methodology EPA employed in an earlier regulation that addressed interstate transport of ozone pollution, the NO_x SIP Call.² In the NO_x SIP Call, EPA found 21 states and the District of Columbia significantly contributed to non-attainment of the 1-hour ozone NAAQS.³ To remedy the situation, EPA set statewide emissions budgets for NO_x emissions, and recommended that states achieve those budgets through “highly cost-effective” controls on electric generators and large industrial facilities under a regional cap and trade program. States are to implement controls by May 31, 2004.

With the IAQ rule, EPA proposes a region-wide emissions cap for NO_x and SO₂ to be implemented in two phases — 2010 and 2015. Based on the methodology employed in the proposed rule, EPA's estimates of emissions under the caps are provided in Table 1, along with percent reductions from the basecase. EPA's methodology determines the caps by applying “highly cost effective” pollution controls on electric generating units.

¹Environmental Protection Agency, *Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule); Proposed Rule* (69 *Federal Register* 4566-4650). Hereafter referred to as the Proposed Interstate Air Quality Rule.

²For background and discussion of the NO_x SIP Call, see CRS Report 98-236 ENR, *Air Quality: EPA's Ozone Transport Rule, OTAG, and Section 126 Petitions — A Hazy Situation?* by Larry Parker and John Blodgett.

³Originally, the rule included 22 states; however, Wisconsin was removed from the rule's reduction requirements by the court during litigation in 2000. See: *Michigan v. EPA*, 213 F.3d 663 (D.C. Cir. 2000) *cert. denied* 532 U.S. 904 (2001)

**Table 1. EPA Estimates of Regional NO_x and SO₂ Caps and Percentage Reduction
(million tons)**

Year	NO _x Emissions (no cap)	NO _x Emissions (cap)	SO ₂ Emissions (no cap)	SO ₂ Emissions (cap)
2010	3.1	1.6 (48%)	9.0	3.9 (57%)
2015	3.2	1.3 (59%)	8.3	2.7 (67%)

Source: Proposed Interstate Air Quality Rule (69 *Federal Register* 4566-4650)

Based on the cost-effectiveness methodology, each of the affected states is assigned a statewide “emissions budget.” Each covered state would be required to submit a revised State Implementation Plan (SIP) identifying measures it intended to implement to achieve its emissions budget. States would be free to choose whatever means they deemed appropriate, subject to EPA approval. However, EPA strongly believes that the regional emissions cap can be most cost-effectively achieved through a regional cap-and-trade program focused on electric generators and intends on issuing a proposed cap-and-trade model program rule to encourage that option.

Background

Why Did EPA Do It?

In 1997, EPA finalized new NAAQS for both PM_{2.5} and ozone.⁴ The new NAAQS for ozone revised the previous ozone NAAQS by tightening the standard from 0.12 parts per million (ppm) to 0.08 ppm, increasing the averaging time from 1 hour to 8 hours, and measuring compliance by averaging concentrations rather than by counting individual peak concentrations exceeding the standard. The new PM_{2.5} NAAQS was set at an annual maximum concentration of 15 micrograms per cubic meter (ug/m³) based on the 3-year average of annual arithmetic mean PM_{2.5} concentrations from one or more community-oriented monitors; and a 24-hour concentration of 65 ug/m³, based on the 3-year average of the 98th percentile of 24-hour PM_{2.5} concentrations at each population-oriented monitor within an area.

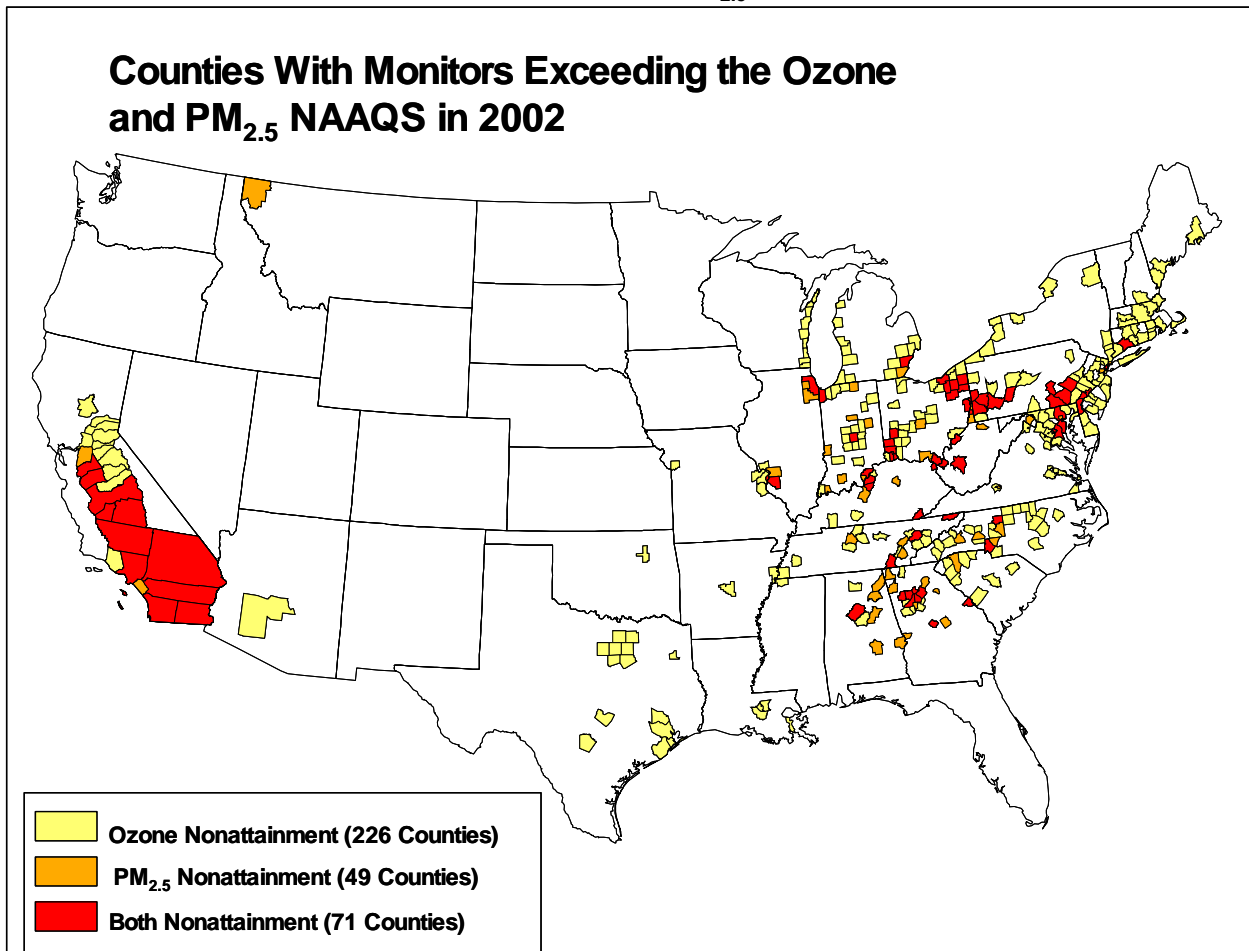
EPA has taken a cautious approach to implementing the two NAAQS. Attempts to coordinate the new 8-hour standard with the previous 1-hour standard proved difficult and subject to considerable litigation. In the case of the PM_{2.5} standard, comprehensive monitoring data were unavailable in 1997 to determine compliance and make designations. In 1998, the Congress set a statutory schedule for the two NAAQS, based on EPA’s previously announced Interim Implementation Policy.⁵ Judicial review and other factors combined to delay the designations.

⁴Published in the *Federal Register* on July 18 (62 FR 38652-38896), the standards became effective September 16, 1997.

⁵*Transportation Equity Act for the 21st Century*, P.L. 105-178, Title VI.

Figure 1 (based on 2000-2002 data) shows that for PM_{2.5}, EPA analysis indicates violations of the NAAQS over the eastern part of the United States and parts of California and Montana. Specifically, data show at least one monitor measuring concentrations in exceedence of the NAAQS in 120 counties. All 120 counties violate the annual standard; a few violate both the annual and the 24-hour standard; none violate only the 24-hour standard. The population of the affected counties is 65 million.⁶ Figure 1 also shows that for the 8-hour Ozone NAAQS, EPA analysis indicates widespread violations of the NAAQS over the eastern and midwestern United States, California and Texas, along with scattered areas in Louisiana, New Mexico and the lower Midwest. Specifically, data show 297 counties currently violate the 8-hour ozone standard. The population of the affected counties is 115 million.⁷

Figure 1. EPA Estimates of Counties in Non-Attainment of the 8-hour Ozone and PM_{2.5} NAAQS



Source: Environmental Protection Agency.

⁶ Proposed Interstate Air Quality Rule, 69 *Federal Register* 4572

⁷ Proposed Interstate Air Quality Rule, 69 *Federal Register* 4572

The 1997 8-hour ozone and PM_{2.5} NAAQS set in motion the Clean Air Act's SIP process under section 110. The promulgation of the revised ozone NAAQS and the new PM_{2.5} NAAQS meant that the SIPs of many states were no longer adequate to bring those states into compliance by the statutory deadline. Under Section 110(k)(5), if EPA finds a SIP inadequate, it must require the affected state to submit a revised SIP that includes sufficient measures to bring that state into compliance. This is known as a "SIP Call."

In the case of the 8-hour and PM_{2.5} NAAQS, the process of developing effective compliance strategies is complicated by the problem of transported air pollutants. Under section 110(a)(2)(D), SIPs must include adequate provisions to prevent sources within that state from contributing significantly to non-attainment in one or more downwind states. Finding that interstate transport of SO₂ and NO_x contributes significantly to ozone and PM_{2.5} non-attainment, the EPA issued the proposed Interstate Air Quality rule (IAQ) in December, 2003.

Combining the requirements of the CAA with EPA intentions as stated in the proposed rule, the major milestones are set out in Table 2.

Table 2. Estimated Schedule for 8-hour Ozone and PM_{2.5} NAAQS

Milestones	8-Hour Ozone NAAQS	PM_{2.5} NAAQS
EPA proposes implementation rule	June 2003	<i>Expected Spring 2004</i>
Governors submit designations of non-attainment areas	July 2003	Designations to be submitted after 3 years of data has been received. <i>Expected February 2004</i>
EPA Proposes Interstate Air Quality rule	January 2004	
EPA promulgates final implementation rule	<i>Expected early 2004</i>	<i>Expected late 2004, early 2005</i>
EPA promulgates final designations	<i>Expected April 15, 2004, effective May 2004</i>	1 year after submissions. <i>Expected by December 31, 2004</i>
EPA promulgates final Interstate Air Quality rule	<i>Expected December 2004 to June 2005</i>	
States submit IAQ Rule SIPs	<i>Expected 18 months after IAQ rule is promulgated (July-December 2006)</i>	
States submit revised SIPs to achieve PM _{2.5} and Ozone NAAQS	3 years after designations <i>(April-May 2007)</i>	3 years after designations <i>(December 2007- January 2008)</i>

Milestones	8-Hour Ozone NAAQS	PM _{2.5} NAAQS
NAAQS compliance deadline	Varies according to the severity of the problem (2007-2021)	5 to 10 years after designations (2009-2014)
Interstate Air Quality rule compliance deadlines	Two phases: 2010 and 2015	

As indicated by the table above, EPA would require States to submit their IAQ rule SIP before the NAAQS non-attainment SIPs are required. EPA justifies the submission of transported air pollutant SIPs by upwind states before the submission of non-attainment SIPs by downwind states on the basis of Section 110(a)(1)-(2) and Section 172(b) of the Clean Air Act and on policy considerations.⁸ EPA argues that the upwind reductions will facilitate planning by downwind states and that downwind states will benefit from the relatively early reductions because they themselves contribute to non-attainment elsewhere.

How Did EPA Come Up with All Its Determinations?

The proposed IAQ rule is based on a series of determinations by EPA with respect to pollution transport, cost-effective pollution control, and compliance feasibility. These determinations are made within the SIP process of Sections 110(k)(5) and 110(a)(2)(D).⁹

Significant Contribution. The pivotal finding by EPA in the proposed IAQ rule is that affected states significantly contribute to non-attainment in downwind states. This determination defines the geographic scope of the proposed rule. For states in the eastern United States, EPA conducted a series of modeling runs to determine the contribution various upwind states are projected to make to areas in the eastern U.S. projected by EPA to be in non-attainment in 2010 and 2015. For ozone non-attainment, a “significant contribution” was defined by EPA as the product of three factors: (1) actual amount of transported pollution from upwind states that contribute to non-attainment in downwind states; (2) how often contributions over specific thresholds occur; and (3) the comparative amount of the upwind transported

⁸ Section 110 requires submission of SIPs to attain NAAQS, including transport provisions, within 3 years after promulgation of a NAAQS. Section 172(b) requires submission of SIPs in response to a non-attainment designation within 3 years of the designation. EPA argues this sequence indicates the priority given to the transport SIPs over the non-attainment SIPs. Proposed Interstate Air Quality rule, p. 4624.

⁹Section 110(k)(5) provides for EPA to issue a SIP Call if existing SIPs are determined to be substantially inadequate to attain or maintain a NAAQS or mitigate interstate pollutant transport as described in sections 176A (involving Interstate Transport Commissions) or 184 (involving control of interstate ozone air pollution). Section 110(a)(2)(D) requires states to submit SIPs to the EPA that contain adequate provisions prohibiting emissions of any air pollutant that contributes significantly to NAAQS or Prevention of Significant Deterioration (PSD) non-attainment in any other state.

contribution to the total non-attainment situation in the downwind area.¹⁰ For the 8-hour ozone NAAQS, EPA modeled the emissions impact of the 31 states east of or bordering the Mississippi River on 47 eastern downwind counties. States whose maximum contribution was estimated at less than 2 parts per billion (ppb) and/or contribute less than 1 percent to total non-attainment were screened out. After evaluating the remaining eastern states on the three criteria above on 47 eastern downwind counties, 25 states were found to make a significant contribution to non-attainment.¹¹ Those states are shown in Figure 2.

For PM_{2.5} NAAQS, EPA modeled the emissions impacts of 41 states on 57 eastern downwind counties.¹² Because the controlling PM_{2.5} NAAQS is the annual standard, EPA only considered two of the three factors listed for ozone in determining significant contribution: actual amount and comparative amount.¹³ In the proposed rule, EPA is suggesting that the threshold for determining significant contribution be 0.15ug/m³ — one percent of the annual standard of 15 ug/m³. Based on that threshold, EPA found 28 states and the District of Columbia were projected to contribute significantly to 2010 PM_{2.5} non-attainment. These states are shown in Figure 2. As an alternative, EPA modeled emission contributions if the threshold was a more stringent 0.10 ug/m³. This threshold added two states to the list of contributors — North Dakota and Oklahoma.

EPA does not specify the process by which it determined that interstate transport of pollution is not a significant contributor to non-attainment in states such as California, Arizona, or Montana. The proposed rule simply states:

In analyzing significant contribution to nonattainment, we determined it was reasonable to exclude the Western U.S., including the States of Washington, Idaho, Oregon, California, Nevada, Utah and Arizona from further analysis due to geography, meteorology, and topography. Based on these factors, we concluded that the PM_{2.5} and 8-hour ozone nonattainment problems are not likely to be affected significantly by pollution transported across these States' boundaries. Therefore, for the purpose of assessing States' contributions to nonattainment in other States, we have only analyzed the nonattainment counties located in the rest of the U.S.¹⁴

The rule provides no other specific basis for EPA's determination that western non-attainment areas should not be subject to the rigorous modeling eastern non-attainment areas were. None of the extensive modeling conducted for non-attainment areas in the eastern United States was conducted on non-attainment areas in the western United States.

¹⁰ Proposed Interstate Air Quality rule, pp. 4600-4601.

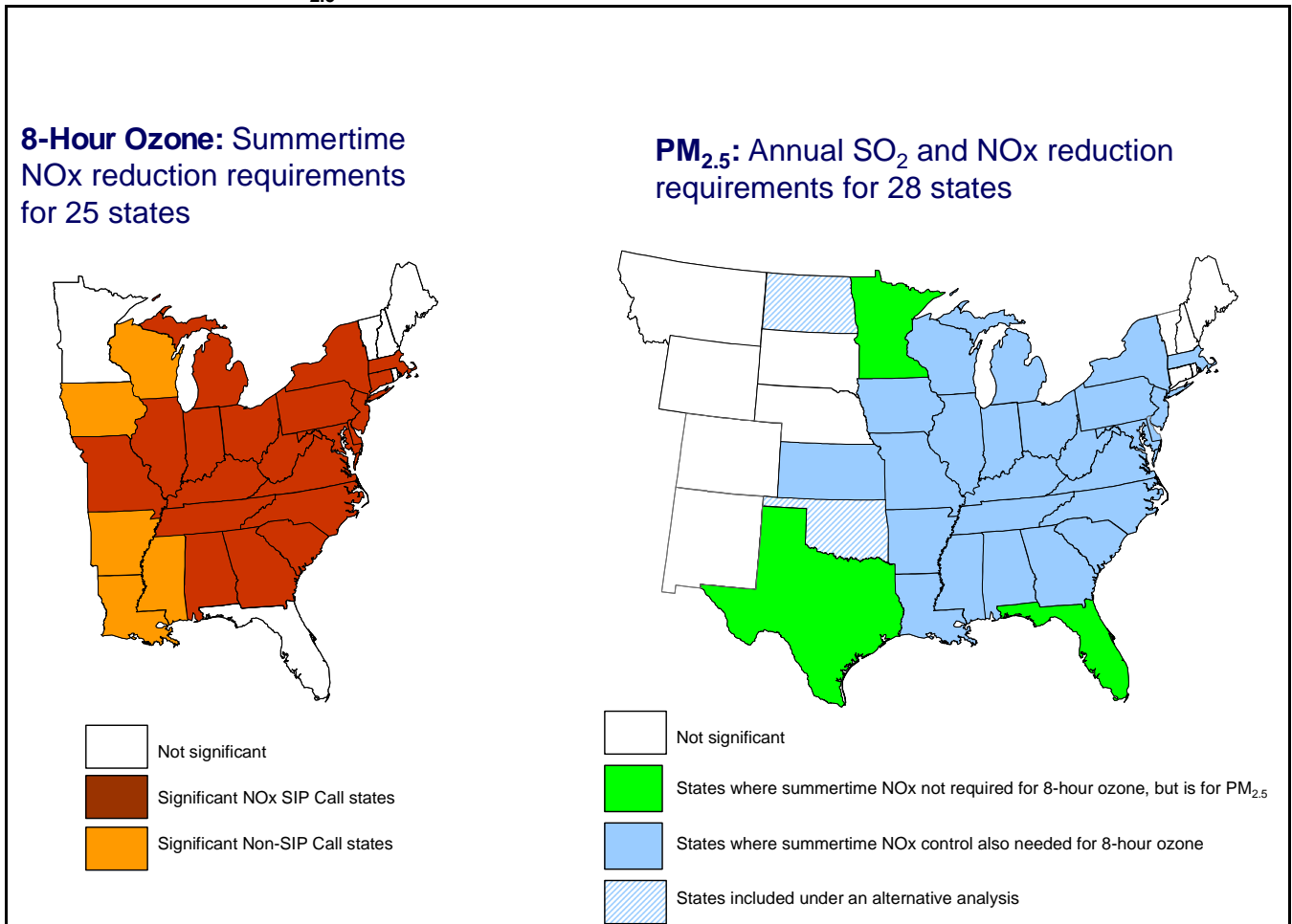
¹¹ For modeling purposes, the District of Columbia's emissions were combined with those of Maryland. Proposed Interstate Air Quality rule, p. 4601.

¹² The seven states in the contiguous 48 states not included were Washington, Oregon, California, Arizona, Nevada, Utah, and Idaho.

¹³ Proposed Interstate Air Quality rule, p. 4608.

¹⁴ Proposed Interstate Air Quality rule, p. 4581.

Figure 2. States Determined to Significantly Contribute to Ozone and PM_{2.5} Non-Attainment in Downwind Eastern Counties



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Source: Environmental Protection Agency.

Regional Cap / State Budget. With a determination of significant contribution, the proposed IAQ rule moves toward developing a cost-effective remedy. Maintaining the need to base its remedy on “highly cost-effective reductions,” EPA examined the potential balance of local control to interstate controls along with the availability and timing of cost-effective pollution control measures in upwind states. Projecting non-attainment areas in 2010, EPA concluded that for many PM_{2.5} non-attainment areas:

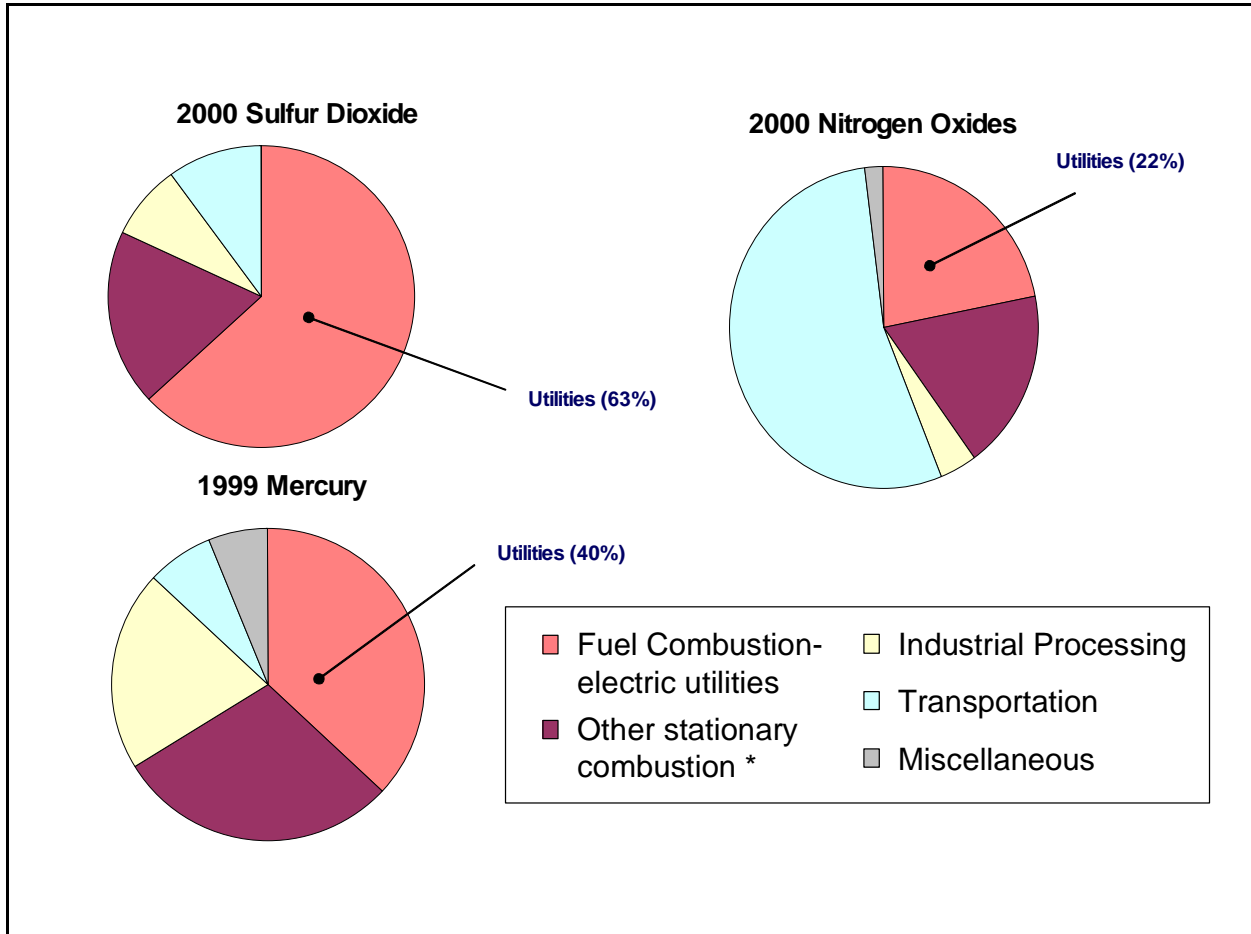
...it would be difficult, if not impossible, to reach attainment unless transport is reduced to a much greater degree and over a much broader regional area than by the simultaneous adoption of local controls within specific nonattainment areas. In addition, we found that much of the air quality improvement that did occur in downwind areas with this strategy was due to reductions in transported sulfate attributable to upwind SO₂ emissions.¹⁵

¹⁵ Proposed Interstate Air Quality rule, p. 4582.

EPA conclusions with respect to 8-hour ozone non-attainment areas were less dramatic, but still significant enough for EPA to conclude that further regional reductions were warranted.¹⁶

Calling for a combination of local and interstate transport control, EPA developed criteria for determining “highly cost-effective” transport control levels. SO₂ and NO_x are emitted by a variety of sources. As indicated in Figure 3, below, sulfur dioxide is primarily emitted by stationary sources, particularly coal-fired electric generators. In the case of nitrogen oxides, mobile sources are the primary source, although stationary sources, particularly electric generators and industrial boilers, make substantial contributions to the overall totals. Generally arguing that electric generators provided the most cost-effective emission reduction source and that data were lacking on other stationary sources, EPA focused on reductions from electric generators to determine emission budgets. In contrast, for the NO_x SIP Call, large industrial combustion sources were included in EPA’s cost-effectiveness calculations.

Figure 3. U.S. Emissions of SO₂, NO_x, and Hg by Source



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¹⁶ Specifically, EPA modeling indicated that from 22% to 96% of projected 2010 non-attainment is due to transport, depending on the specific area. Proposed Interstate Air Quality rule, p. 4584.

Focusing on electric generators 25 MW or greater, EPA developed a threshold for controlling transported pollutants by comparing the average and marginal costs of other SO₂ and NO_x regulatory actions, along with other factors. Specifically, EPA compared the average and marginal costs of installing flue-gas desulfurization (FGD) and selective catalytic reduction (SCR) technologies on electric generators with the average and marginal costs of other regulatory actions, including Best Available Control Technology (BACT) determinations, individual state actions, New Source Performance Standards (NSPS), and various mobile source decisions. Comparing the costs presented in Table 3 with previous regulatory actions, EPA found these costs to be “highly cost-effective.” Applying these “highly cost-effective” control technologies on electric generators, EPA determined the final regionwide cap presented in Table 1.

**Table 3: Projected Control Costs for Electric Generators
(1999\$/ton removed)**

	2010 Average Cost	2010 Marginal Cost	2015 Average Cost	2015 Marginal Cost
SO ₂ Control Costs	\$700	\$700	\$800	\$1,000
SO ₂ Control Cost (high cost case*)		\$900		\$1,100
NO _x Control Costs	\$800	\$1,300	\$700	\$1,500
NO _x Control Costs (high cost case*)		\$1,300		\$1,600

* Assumes high electricity demand and high natural gas prices.
Source: Proposed Interstate Air Quality Rule, p. 4613-4615

Based on the assumption that States would solely target electric generators for control, EPA proceeded to determine the appropriate statewide emission budgets. For SO₂, EPA attempted to meld the proposed rule’s allocation scheme with the existing Title IV acid rain program. With both programs based on electric generators, EPA proposes to essentially have states require a two-for-one redemption of CAA Title IV allowances during phase 1, and a three-for-two redemption of Title IV allowances during phase 2. Such redemption ratios would represent a 50% reduction during phase 1 and 67% during phase 2. For NO_x, EPA would calculate emission budgets for affected units by multiplying a NO_x emission rate specified in the proposed rule by the unit’s historical annual heat input. Similar to the allocation formula for Title IV, the proposed rule would set the NO_x emission rate at 0.15 lb./mmBtu during phase 1, increasing the stringency to 0.125 lb./mmBtu during phase 2. The baseline for the annual heat input for each unit would be the highest annual input for any year 1999 through 2002.

Implementation Schedule. As noted up front, EPA's proposed rule would divide the mandated reductions into two phases beginning in 2010 and 2015. The deadline for phase 1 was determined by EPA based primarily on an analysis of available boilermaker labor.¹⁷ Based on the assumption that all reductions would come from electric generators and from the installation of FGD and SCR, EPA argues that 49 gigawatts (Gw) of additional scrubbers and 25 Gw of additional SCR units would be necessary to meet the 2010 phase 1 requirement.¹⁸ EPA believes this to be the maximum feasible FGD and SCR construction that can be completed by the year 2010.

EPA does not provide a detailed analysis of its justification for choosing 2015 for the deadline for phase 2. Indeed, it doesn't provide the amount of additional control technology installation necessary to achieve the incremental reduction. Instead, EPA states the following to justify 2015 for phase 2:

The EPA recognizes that the power sector will need to devote large amounts of capital to meet the control requirements of the first phase. Controls installed in 2010 will generally be the largest and easiest to install. Subsequent controls will need to be installed at more plants and under more challenging circumstances. We believe that deferring the second phase to 2015 will provide enough time for companies to overcome these technical challenges and raise additional, reasonably-priced capital needed to install controls.¹⁹

Cap and Trade. EPA's preferred implementation strategy is a regionwide cap and trade program focused solely on electric generators. Under the proposed rule, if states choose to cap emissions from their electric generators, they do not have to require reductions on any other type of emission source, stationary, mobile, or area. If a state chooses to control electric generators, it "must impose a cap because this category may feasibly implement a cap."²⁰ States are encouraged to submit SIPs that follow the guidelines EPA would provide in a model cap and trade program to be promulgated later. It is EPA's hope that States will join together to make the system regionwide, such as the case with the NO_x SIP Call. However, states could not be forced to join a regionwide program, just as with the NO_x SIP Call, nor to restrict affected sources to electric generators.

Under the proposed rule, there would be two cap and trade systems — one each for SO₂ and NO_x. Each would cover the same 28 state area defined by the PM_{2.5} significant contribution finding and operate on an annual basis, as both pollutants contribute to the PM_{2.5} problem. No specific treatment of NO_x emissions reductions is provided for in the proposed rule to deal with the seasonal nature of the ozone problem.

¹⁷ Propose Interstate Air Quality Rule, p. 4617

¹⁸ These installations are in addition to the 14GW of FGD and 15Gw of SCR contained in the basecase scenario for 2010.

¹⁹ Proposed Interstate Air Quality Rule, p. 4617

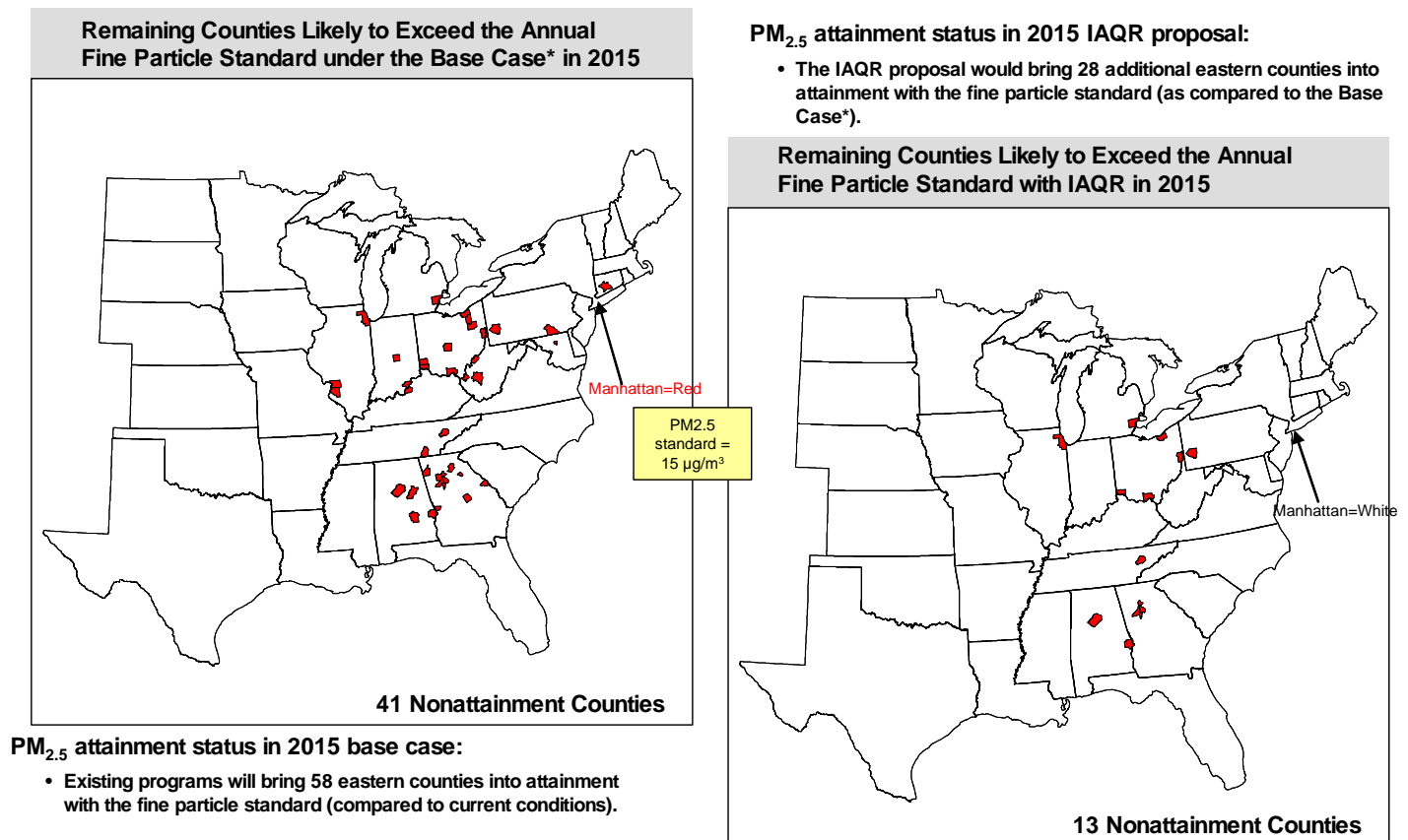
²⁰ Proposed Interstate Air Quality rule, p. 4626.

Issues

Is It Adequate?

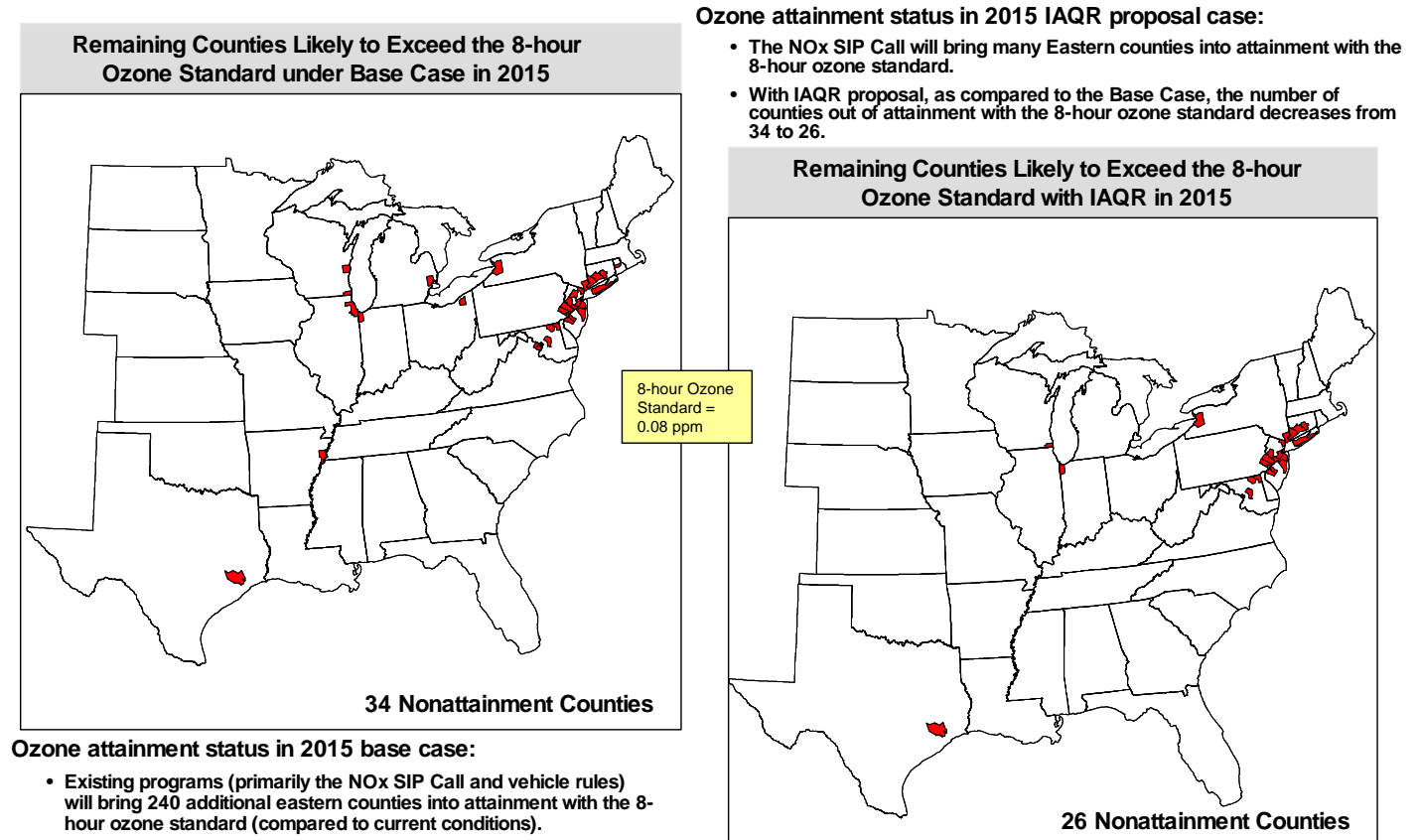
The purpose of the proposed rule is to address interstate transport of pollutants that are hindering downwind states from attaining the 8-hour ozone and PM_{2.5} NAAQS. As indicated by Figures 4 and 5, the proposed rule is predicted by EPA to have a greater impact on PM_{2.5} attainment in the eastern U.S. than on eastern 8-hour ozone attainment. According to EPA, 120 counties were out of compliance with the PM_{2.5} NAAQS in 2002. The projected basecase is predicted by EPA to bring 58 of those counties into compliance by 2015. EPA further predicted that the proposed IAQ rule will bring an additional 28 counties into compliance. EPA states this would leave 13 counties in the eastern U.S. in non-compliance in 2015. EPA does not provide any data on the 2015 non-compliance situation in the West where the proposed IAQ rule would have no effect. In contrast, EPA states that 297 countries were out of compliance with the 8-hour ozone standard in 2001. The projected basecase is predicted by EPA to bring 240 counties into compliance. EPA further predicts that the proposed rule will bring an additional 8 eastern counties into compliance. EPA states this would leave 26 counties in the eastern U.S. in non-compliance in 2015. Like the PM_{2.5} analysis, EPA doesn't provide data on the 2015 non-compliance situation in the West where the rule would have no direct effect.

Figure 4. EPA's Projections of PM_{2.5} NAAQS in 2015



Source: Environmental Protection Agency.

Figure 5. EPA’s Projections of 8-Hour Ozone NAAQS Compliance in 2015



Source: Environmental Protection Agency.

This environmental result raises several questions with respect to the proposed rule’s adequacy. The first is the magnitude of the reductions required. As EPA notes in the proposed rule, a court review of the NO_x SIP Call suggested that EPA could be very aggressive in defining significant contribution. Quoting the court in *Michigan v. EPA*, EPA focused on the following:

EPA has determined that ozone has *some* adverse health effects — however slight — at every level [citing National Ambient Air Quality Standards for Ozone 62 FR 38856 (1997)]. Without consideration of cost it is hard to see why *any* ozone-creating emissions should not be regarded as fatally “significant” under section 110(a)(2)(D)(i)(I).²¹ [emphasis in original]

A more stringent threshold for significant contribution could result in more states being involved in the reduction scheme.

Likewise the stringency of the “highly cost-effective” criteria for determining actual budgets could be questioned. EPA has based its reduction program on “highly-cost effective” SO₂ and NO_x emission reductions from electric generators. It has defined “highly cost-effective” in terms of reduction costs compared with

²¹ *Michigan v. EPA*, 213 F.3d 663 (D.C. Cir. 2000) cert. denied 532 U.S. 904 (2001). Quoted in Proposed Interstate Air Quality Rule, p. 4584.

previous regulatory actions, similar to its criteria in the NO_x SIP Call. However, EPA's own cost-benefit analysis suggests that control costs could rise dramatically without jeopardizing the very favorable cost-benefit results. As stated by EPA:

The benefit-cost analysis concludes that substantial net economic benefits to society are likely to be achieved as a result of the reduction in emissions occurring as a result of this rulemaking. The results detailed below show that this rule would be highly beneficial to society, with annual net benefits in 2010 of approximately \$55 billion (\$58 billion benefits compared to social cost of approximately \$3 billion) and net benefits in 2015 of \$80 billion (\$84 [billion] benefits compared to social costs of \$4 billion). All amounts are reflected in 1999\$.²²

Thus, it could be argued that “highly cost-effective” could be interpreted in a way to justify greater reductions based on the cost-benefit analysis, rather than relying on the proposed rule's rationale that is based on the proposed rule's comparative cost with other regulatory actions.

EPA's choice of focusing only on electric generators may also raise questions, given the cost-benefit analysis, the recommendations of the Ozone Transport Assessment Group (OTAG), and EPA's NO_x SIP Call.²³ OTAG's recommendations to EPA with respect to the NO_x SIP Call called for NO_x controls on large and medium non-utility stationary sources in addition to controlling utility sources. In the final NO_x SIP Call, EPA calculated state emission budgets based on five sectors: electric utility, nonutility sources, area sources, nonroad engines, and highway vehicles. Budgets were based on cost effective reductions, with substantial reductions required from electric generators and from nonutility sources. Indeed EPA used a 70% reduction requirement for large industrial facilities and RACT control (generally 25-50%) for smaller sources.²⁴ In the proposed IAQ rule, EPA generally released the other stationary source components from the proposed rule because of lack of data. However, EPA does not explain why it felt it had sufficient data in 1997 to propose a NO_x SIP Call that included these sources, but doesn't have sufficient data to include these sources in the proposed IAQ rule.

²² Proposed Interstate Air Quality Rule, p. 4644.

²³ OTAG was created by EPA and the 37 easternmost states under the 1990 Clean Air Act Amendments to recommend ways of reducing ozone transport in the northeastern part of the country. Final recommendations were made in 1997.

²⁴ Specifically, for utility sources, EPA used a NO_x emission rate of 0.15 lb. NO_x /mmBtu to determine budget allocations. For area sources, EPA assumed no new controls. For nonutility sources, EPA used a 70% reduction requirement for large sources, and RACT controls (generally 25%-50%) for smaller sources. EPA calculated the highway vehicle budget by assuming implementation of existing SIPs, along with the following federal measures: national low emission vehicle standards, 2004 heavy-duty engine standards, and revisions to emissions test procedures. Finally, EPA calculated the budget for nonroad engines assuming implementation of existing SIPs, along with the following federal measures: federal small engine standards (Phase II), and 1997 proposed nonroad diesel engine standards. See proposed Ozone Transport Rule and Appendix B (OTAG Recommendations), 62 *Federal Register* 60318-60420, November 7, 1997.

A third aspect of the scope of the rule that may raise questions is the decision to exempt the West from consideration. As indicated in figure 1, the West has significant areas out of compliance with the PM_{2.5} standard, the 8-hour ozone standard, or both. As noted earlier, EPA does not present any detailed analysis justifying its choice to exclude the West. With the court decision looking favorably on an aggressive interpretation of “significant contribution,” the highly favorable cost-benefit analysis, and the significant problems of 8-hour ozone and PM_{2.5} non-attainment in parts of the West (particularly in California), some will maintain a more comprehensive analysis is in order.

A final parameter of the proposed rule that may raise questions is the timing of the reductions. For states facing attainment deadlines and the prospect of imposing costly local controls, cost-effective emissions reductions from the proposed IAQ rule are viewed as critical. As stated by Pennsylvania:

Pennsylvania endorses the comments submitted by the Ozone Transport Commission. These comments list a number of concerns that the states in the Ozone Transport Region have with the IAQR. The most important concern with the IAQR is that the reductions do not come soon enough. Compliance with the proposed emissions caps is not required until after the 8-hour ozone and the PM_{2.5} attainment dates and therefore cannot be relied upon for control measures to meet these ambient standards.²⁵

EPA argues that 2010 is the earliest that reductions can feasibly be mandated, taking into account regulatory, economic, and engineering considerations. However, questions may be asked about the magnitude of reductions that are feasible by 2010. In the proposed rule, EPA focuses on the availability of skilled boilermakers as an important constraint on installing control technology — specifically FGD and SCR.²⁶ Arguing that demand for pollution control equipment and skilled boilermakers would come during a narrow window (18 months) at the end of the compliance period, EPA concludes:

In developing the first phase control levels, we intended to maximize the total control installations possible (and thus total reductions) considering the constraint on boilermaker labor, while getting similar reductions for both pollutants. This results in predicted reductions of between 40 and 50 percent for both pollutants in the first phase.²⁷

Obviously, if a more phased-in installation schedule was assumed by EPA, the labor constraint could be lessened, allowing additional control technology installations to occur.

²⁵ Nicholas DiPasquale, Deputy Secretary, Pennsylvania Department of Environmental Protection. Testimony Before the U.S. Environmental Protection Agency On the proposed Utility Mercury Reductions and Interstate Air Quality Rules, Philadelphia, Pennsylvania, February 25, 2004, p. 6.

²⁶ Proposed Interstate Air Quality Rule, p. 4617.

²⁷ Proposed Interstate Air Quality Rule, p. 4617. EPA does not make clear whether or not its discussion includes installations embedded in the baseline along with the additional installations required by the proposed rule.

Interestingly, if EPA's logic used to justify its phase 1 schedule is applied to its smaller phase 2 schedule, the resulting phase 2 deadline could arguably follow phase 1 by only 18 months — July 1, 2011. This would be based on a seamless rotation of design, construction, and test personnel from phase 1 to phase 2.²⁸ If the lesser reduction required for phase 2 meant fewer labor constraints, the deadline could be moved up. This scenario would provide continuous employment for the industry, maintaining a quality labor pool, rather than the start-stop-start scenario provided by EPA's 2015 deadline. However, EPA modified its logic for justifying its 2015 phase 2 deadline from an analysis focused on labor to a qualitative argument focused on potential site-specific technical problems with further installations and potential utility financing problems. As quoted earlier, EPA provides no details connected with its proposed 2015 deadline.

What About the NOx SIP Call?

In the proposed rule, EPA stresses the similarity of the proposed rule's methodologies to those of its previous NOx SIP Call. Although the methodologies used by EPA to develop the proposed rule may rest substantially on the NOx SIP Call, there are differences between the two rules that may raise questions. First, because the NOx SIP Call focuses on ozone attainment, it is a seasonal control program (May-September). In contrast, the proposed rule's NOx trading program would be run on an annual basis. This presents questions because the proposed rule's scope is different from that of the NOx SIP Call. For example, Massachusetts, Rhode Island, and New Hampshire are under either the NOx SIP Call's or the Ozone Transport Commission's trading scheme for seasonal control of NOx, but are not covered under the proposed rule. The NOx SIP Call includes large industrial boilers along with electric generators in its trading program; the proposed rule focuses on electric generators alone.

The details of the proposed IAQ rule's trade and cap program are not addressed in the proposed rule. EPA intends to address transitional and compatibility issues, along with providing affected states with a model cap and trade program, in a Supplemental Notice of Proposed Rulemaking (SNPR). For electric generators during phase 1, the transition may not be difficult as the mandated emissions rate for phase 1 is the same as it is for the NOx SIP Call (.15 lb./mmBtu), although the proposed program's baseline year and annual basis are different. However, for states and industrial sources that could be left in a much smaller seasonal trading program, the economic impact could be substantial, as most sources move to the larger annual trading program set up under the proposed rule.

²⁸ EPA argues that an 18 month period 21 months before the deadline is the crunch time for boilermaker labor. Assuming the boilermakers begin shifting to phase 2 projects 3 months before the phase 1 deadline (i.e., while the phase 1 installations are being tested) and assuming a 3 month testing period after phase 2 installations, the phase 2 deadline would be 18 months after the phase 1 deadline — July 1, 2011.

What About Consistency with Title IV?

Working to develop a regional cap and trade SO₂ program raises issues with respect to the statutory nationwide SO₂ cap and trade program created under Title IV of the 1990 Clean Air Act Amendments. Title IV of the 1990 CAA Amendments required the reduction of SO₂ emissions from electric generators from about 15 million tons in 1988 to 8.95 million tons by January 1, 2000. In addition, it mandates that the 8.95 million ton cap be maintained into the future, requiring new SO₂ emitting utility plants to offset their emissions with further reductions from existing facilities. To implement the program, Title IV created a comprehensive permit and emissions allowance system. An allowance is a limited authorization to emit a ton of SO₂ during or after a specific year. Issued by EPA, the allowances are allocated to existing power plants according to formulas provided in Title IV. The utility receives the allowances for a given plant regardless of the actual operation of the plant. For example, a utility may choose to shut down an existing power plant and use those allowances to offset emissions from two or more newer, cleaner facilities. Generally, a power plant that commenced operation after enactment receives no allowances, requiring it to obtain allowances from the existing pool of allowances in order to operate. A utility may trade allowances nationally as well as bank allowances for future use or sale.

EPA's attempt to add a more stringent regional system to a nationwide program raises several questions. The most obvious is the creation of a large quantity of surplus Title IV allowances developing as sources in the regional control area reduce emissions. These allowances could potentially be used by states not participating in the proposed rule (a phenomenon commonly called "leakage"). EPA believes this will not be a big problem, arguing:

The potential for leakage is dependent upon the size of the region. The large eastern trading region proposed in today's rule — which is based upon addressing PM_{2.5} — is not likely to result in significant leakage because the region is large enough to take advantage of the physical limitations in the electricity grid that prevent large power movements from the East to the West (or vice versa) through the Western Interconnect.²⁹

EPA proposes to require states to modify Title IV allowances for affected powerplants, requiring two-for-one and three-for-two transactions as discussed previously (p. 10). Modifying Title IV allowances could be a source of contention; however, allowances are not cast in concrete by the 1990 CAAA. As noted, an allowance is a limited authorization to emit SO₂. Title IV states explicitly that an allowance is not a property right, and that: "Nothing in this title or in any other provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization." (Section 403(f)). The Senate report on Title IV (from which this language originated) elaborates on this provision with the following:

²⁹ Proposed Interstate Air Quality Rule, p. 4631.

The purpose in characterizing the legal or property status of allowances in new section [403](f) of the Act is to make clear that regulatory actions taken subsequent to the issuance of allowances are not subject to the “takings clause” of the U.S. Constitution. Allowances are, in large part, simply iterations of each unit’s permit under this title. Since the permits will be, in effect, legally binding statements of each unit’s emissions limitation obligations under the pollution control program established herein, the subsection makes clear that should the Congress or the Administrator limit, revoke or otherwise modify the allowances or the underlying regulatory program established by new title IV of the Act or the regulations promulgated pursuant thereto, the U.S. government will not be obliged to compensate allowance-holders for loss of the allowances or any loss in their value. Allowances are but the means of implementing an emissions limitation program, which can be altered in response to changes in the environment or for other reasons of public policy.³⁰

Thus, EPA may have significant flexibility in modifying Title IV allowances “in response to changes in the environment or for other reasons of public policy.” However, the proposed IAQ rule’s attempt to modify and restrict Title IV allowances may nonetheless be subject to litigation.

What About Other CAA Titles?

Besides the programs discussed above, the proposed rule would have effects on other provisions of the Clean Air Act, particularly the regional haze program,³¹ and potential Section 126 petitions.

The reductions required under the proposed rule would have the effect of reducing regional haze in the eastern U.S.. EPA requests comment on the extent to which the requirements of the proposed rule could satisfy the requirements of its regional haze program. Presumably, this would include the requirement under Section 167A of the CAA that certain existing sources install Best Available Retrofit Technology (BART) to protect visibility in national parks and wilderness areas. In addition EPA requests comment on whether the emissions cap under the proposed rulemaking could be expanded to states outside the IAQ control region to assist them in meeting their regional haze obligations.³²

EPA does not discuss the potential problems SO₂ emission leakage could have on the regional haze program in the West.

A second CAA provision potentially affected by the proposed rule concerns petitions filed under Section 126. Under Section 126(b), any state or political subdivision may petition EPA for a finding that any major source or group of stationary sources located in another state is emitting pollutants that “significantly

³⁰ Senate Report 101-228, December 20, 1989 p. 321

³¹ Regional haze program 64 *Federal Register* 35714, July 1, 1999.

³² Proposed Interstate Air Quality Rule, p. 4587

contribute” to the non-attainment of a NAAQS by the downwind state.³³ Under the NOx SIP Call, EPA, along with several states that had filed Section 126 petitions to force upwind states to reduce NOx emission affecting their ability to meet the 1-hour ozone NAAQS, agreed to use the threat of action under Section 126 as a backup to the NOx SIP Call if that rule was derailed by the courts. In the proposed rule, EPA proposes to use any Section 126 petitions with respect to PM_{2.5} or 8-hour ozone in the same manner.³⁴ However, it is not clear that petitioning states will agree with EPA that a program with a 10 year compliance schedule meets the spirit and letter of Section 126.

A third interaction between the proposed rule and the CAA is controls on mercury (Hg) emissions from coal-fired electric generators. In announcing the proposed IAQ rule in December, 2003, the Administration also announced a companion proposed Hg rule for electric generators.³⁵ The Hg proposal attempts to integrate its reduction requirement with the NOx and SO₂ requirements of the IAQ rule by mandating Hg reductions that can be achieved by the technologies that would be used to achieve the IAQ rule. The result is a modest reduction in Hg compared with the levels of reductions achieved under EPA’s previous regulations on Municipal Waste Combustors and on Medical Waste Incinerators, or achieved by utility Hg control technology that has been field-tested and is being actively marketed commercially.³⁶ EPA’s integrated approach allows electric generators to meet its proposed Hg limits without having to install specific Hg control technology, such as has been installed on incinerators and other facilities. However, if the IAQ rule is stalled, then the economic advantage of the integration for Hg control will be lost. In contrast, if the Hg rule is stalled, the IAQ will achieve the modest reductions entailed in the Hg rule without the rule. In any case, the Hg rule most likely will be the source of extensive litigation.

³³ EPA is to respond to the petition within 60 days. If the petition is granted, the offending sources must cease operations within 3 months unless the sources comply with emission controls and compliance schedules as determined by EPA to bring them in compliance with the section.

³⁴ Proposed Interstate Air Quality Rule, p. 4580

³⁵ For more on the proposed Hg rule, see: James E. McCarthy, *Mercury Emissions to the Air: Regulatory and Legislative Proposals*, CRS Report RL31881.

³⁶ EPA estimates its proposed utility Hg rule will achieve about a 29% reduction in 1999 levels by 2010. Under previous EPA Hg rules for Municipal Waste Combustors and Medical Waste Incinerators, reductions of over 90% from 1990 levels were achieved. The firm ADA.ES claims its Activated Carbon Injection (ACI) technology is available now and proven to achieve Hg reduction of over 90% in utility applications. See [<http://www.adaes.com/>]. For information on other Hg control technologies, see the Institute of Clean Air Companies website for recent technical papers and presentations [<http://www.icac.com/>]

What About Clear Skies?

The proposed rule is not the Bush Administration's preferred means of addressing the transported air pollution problem.³⁷ Its preferred means is the Clear Skies Act (H.R. 999/S. 485) introduced in the 108th Congress. Clear Skies would amend the Clean Air Act to place emissions caps on electric utility emissions of SO₂, NO_x, and Hg. Implemented through a tradeable allowance program, the emissions caps would be imposed in two phases: 2010 (2008 in the case of NO_x) and 2018.³⁸ However, noting the uncertainty of the legislative process, EPA believes the proposed rule is the prudent course.

The Administration's preference for Clear Skies is not hard to understand for a variety of reasons. The larger market and additional time provided by the national scope and extended deadlines of Clear Skies promise a less expensive remedy compared with the proposed IAQ/Hg rules in terms of cost per ton of pollutant reduced. The national scope also eliminates issues of leakage and lack of western coverage that may create controversy for the proposed IAQ rule. The statutory nature of Clear Skies means changes in the Title IV allowance program and the NO_x SIP Call would be definitive.

Perhaps more importantly, Clear Skies deals directly with many of the CAA interface issues raised above. Clear Skies' modifications to CAA provisions to resolve problems that otherwise could arise include:

- New statutory standards for SO₂, NO_x, particulate matter, and Hg for new sources that would replace NSPS; modified sources could opt in and be exempted from BACT determinations, LAER determinations, BART requirements, New Source Review (NSR), and Maximum Achievable Control Technology (MACT) requirements (the latter with respect to Hg). Existing sources can also receive these exemptions if they agree to meet a particulate matter standard specified in the bill along with good combustion practices to minimize carbon monoxide emissions within 3 years of enactment.
- Exemption for steam electric generating facilities from Hg regulation under Section 112 of the CAAA.
- Relief from enforcement of any Section 126 petition before 2012

However, these changes raise questions of their own that could enlarge the debate on the Clean Air Act beyond the increased use of market mechanisms. In addition, there is yet to be a vote on Clear Skies, or any other multi-pollutant control bill in this Congress. Whether the proposed rule will encourage or discourage such a vote this year is unclear.

³⁷ Proposed Interstate Air Quality Rule, p. 4580

³⁸ For more on Clear Skies and other proposed multi-pollutant legislation, see: Larry Parker and John Blodgett, *Air Quality: Multi-Pollutant Legislation in the 108th Congress*, CRS Report RL31779.

What Is Next?

The 60 day public comment period for the proposed rule ends on March 30th. With much of the public focus on the accompanying proposed mercury rule, the Interstate Air Quality rule has not received much attention. However, if promulgated, the proposed rule would have far-reaching effects in terms of economics, environmental impact, and policy.

In terms of economics, there are different perspectives at work. The economic perspective embodied in the proposed rule may best be described as a cost-effectiveness approach. Cost curves are constructed and compared with an eye toward finding the most cost-effective reduction level — the “knee” in the cost curve. At this point, the proposed rule is maximizing the reductions achieved per dollar spent. Accordingly, the proposed rule sets its reduction targets in this vicinity. To increase the likelihood that reductions will be economically efficient, the proposed rule includes several market mechanisms, such as trading and banking, to encourage affected parties to seek the most efficient solution to their compliance problem. Likewise, deadlines are set with cost considerations in mind. Implementing environmental goals through market mechanisms, thereby allowing polluters to choose their lowest cost abatement actions, represents a general elevation of economic “efficiency” as the guiding principle of decision-making. This focus is more evident when one considers the interaction between the proposed Interstate Air Quality rule with the proposed Mercury rule.

A second economic perspective on setting reduction targets under the proposed rule would be to base it on cost-benefit analysis. The difference between the costs and benefits of the proposed rule is an order of magnitude in favor of the benefits. This number is based primarily on one benefit — reduced premature fatalities among adults resulting from reduced PM_{2.5}.³⁹ Other potential categories of benefits are not assessed.⁴⁰ If one were to adopt the classic economic perspective of setting the marginal cost of control at the marginal benefit received, it is highly likely that the reductions mandated by the proposed rule would be higher. Likewise, deadlines might be advanced to achieve the benefits quicker. This approach of defining “highly cost-effective” reductions is not discussed in the proposed rule. Economics appears to be defined in the proposed rule as costs to the electric utility industry. Alternative perspectives are not addressed.

Environmental impacts addressed by the proposed bill derive primarily from sulfur dioxide control. The phase 1 NO_x requirements for electric generators are similar to those of the NO_x SIP Call. Ozone is not a focus, even to the point of ignoring the seasonal nature of the problem in favor of an annual reduction program. As a result, the primary benefits of the proposed rule are from PM_{2.5} compliance and avoidance of related SO₂-caused impacts such as regional haze. The focus on SO₂ is in line with EPA’s cost-benefit analysis that quantifies benefits mostly from SO₂ control.

³⁹ Proposed Interstate Air Quality Rule, p. 4645.

⁴⁰ Proposed Interstate Air Quality Rule, p. 4647.

However, from the perspective of the proposed rule's environmental goal of addressing non-attainment of the PM_{2.5} and ozone NAAQS in downwind states, a complementary focus on the characteristics of the ozone problem might seem appropriate. In this case, refinement of the proposed rule with respect to ozone would be necessary. The NO_x SIP Call is a seasonal program because ozone is a seasonal problem. If EPA wishes to keep the annual NO_x program proposed in the rule because of its PM_{2.5} and regional haze advantages, a seasonal weighting factor might be considered to ensure greater NO_x reductions during the ozone season while allowing greater emissions at other times of the year. Whether this would have a positive or negative effect on the overall cost-benefit of the rule can not be determined quantitatively as EPA did not estimate many benefits of ozone reduction. Thus, while more focus on NO_x and consequently on ozone could make the proposed rule more effective, it is unclear if it would be more economically efficient.

From a policy standpoint, EPA has presented the proposed Interstate Air Quality rule and the accompanying proposed Mercury rule as a "suite of integrated air actions" to reduce emissions of three pollutants — SO₂, NO_x, and Hg.⁴¹ The two proposed rules are integrated in such a way that the technologies reducing SO₂ and NO_x emissions under the Interstate Air Quality rule also reduce enough Hg emissions to meet the 2010 reduction requirements of the proposed Mercury rule. This combination of requirements and technology allows utilities to meet the requirements of both rules without installing three different control technologies — one for each pollutant. If the Hg reduction were more stringent, utilities could be forced to install activated carbon injection (ACI) in addition to the FGD and SCR technologies assumed to be chosen under the proposed Interstate Air Quality rule. As EPA does not provide a cost-benefit analysis of Hg reductions, it is not possible to quantitatively determine whether this decision is economically efficient in terms of potential Hg benefits foregone by the lower reduction requirement.

However, from the broader perspective of the interaction of the proposed rules with the underlying Clean Air Act, there is a resulting lack of integration. It is likely to be argued that the proposed rule simply adds another layer on an already multi-layered cake called the Clean Air Act. Adding a regionwide annual cap and trade program on top a regulatory structure whose foundation is health-based national standards that focus on the local concentration of pollutants in the ambient air presents numerous difficulties. As a result, there are multiple inconsistencies between the proposed rule and other provisions of the Clean Air Act. These conflicts are not surprising — there is little EPA can do to resolve them through regulation. If the Administration's goal is to restructure CAA compliance strategies toward market-oriented cap and trade programs without creating more layers and conflicts, it is possible a statutory solution will be necessary.

⁴¹ Environmental Protection Agency. "Clean Air Proposals Promise Sharp Power Plant Pollution Reductions." Press Release, December 15, 2003.